The creation of large volumes of complex healthcare data means that artificial intelligence (AI) will increasingly be applied within every aspect of the field. AI algorithms are already being utilized by a number of healthcare organizations for diagnosis and treatment recommendations, patient engagement and adherence, and administrative activities. Our vision at the Ottawa DOM-NFP is to build AI healthcare applications to accelerate the prevention, diagnosis and treatment of diseases, and provide universal access to medical expertise and care. To achieve this vision, we have assembled a multidisciplinary team of experts from diverse fields and we are building strategic partnerships with world-leading AI organizations.

Microsoft and Ottawa DOM-NFP are working together towards a common goal for healthcare

"Power comes not from knowledge kept but from knowledge shared" – Bill Gates

As part of our effort to build world class partnerships with leading organizations in the field of AI, we reached out to Microsoft to explore opportunities to work together. Microsoft has shown great interest in our work and have agreed to build long-term
collaboration to support our Digital Health and AI Program. Additionally, Microsoft offered the Ottawa DOM-NFP an Azure grant. We are in discussion with other world leading organizations and will continue building such strategic collaborations in the future.

Our goal is to provide medical researchers with a springboard to accelerate knowledge implementation by helping them translate their research into AI powered healthcare applications. We are creating in-house resources for technology development, market research, knowledge translation and business strategy, and building strategic partnerships with external organizations, healthcare investors and public sector funders. We envision that the digital health applications developed through such multi-functional collaborations will empower physicians, patients and other care professionals to make informed decisions quicker and more accurately than ever before.

Presently, we are working on three high-impact projects with members of the Divisions of the Department of Medicine. We are on the lookout for more research projects that we can help build into impactful solutions, and we welcome you to reach out to us with your ideas.

**Current Projects**

1. **COVID19 Triage Application** - Based on the Clinical Triage Protocol for Major Surge in COVID Pandemic issued by Ontario Health

The COVID pandemic has had a major effect on healthcare around the world. The surge of patients resulting from this novel infection has exposed shortages of critical care beds in healthcare facilities around the world, including developed areas in Europe and the United States.
Opportunity Identified

- Fundamental Ethical Principles
- A Digital Decision Tool
- Data-driven Improvements
- Subsequent Analysis and Research

The goal of this project is to build a digital decision tool along with a lasting infrastructure for future pandemics and other healthcare challenges in which a surge in demand requires effective, proportional and fair triaging.

Benefits:

- Clinicians will save time when taking care of critically ill patients by having the triage algorithm readily available for use
- Reduced risk of error in applying the criteria, especially with changes based on the current level of triage in the province
- The app will keep track of patients triaged by clinicians. This will allow for future adjustment of the criteria based on outcomes

2. Deep Venous Thrombosis (DVT) / COVID-19 Direct-Referral Web App

Deep Vein Thrombosis (DVT) is a common illness that affects 2-5% of people and can lead to thromboembolism, which is estimated to cause the death of approximately 300,000 people per year in North America alone. Late or inaccurate diagnosis of DVT in patients can lead to thrombus extension, pulmonary embolism, and unnecessary exposure to anticoagulants which can cause severe complications such as bleeding and can be costly for the health care system. Additionally, patients with COVID-19 are at the risk of developing DVT. Therefore, fast and accurate diagnosis of DVT is important to mitigate complications and decrease health care cost.
Opportunity Identified -

- Joint Assessment of DVT and COVID-19 Risk to Speed up Patient Assessment
- Web App for Auto-filing Referral
- Machine Learning Models to Improve Assessment
- Spark Collaboration between AI Team and Biomedical Researchers

The goal of this project is to implement a new web app through which the patients can be directly referred to the Thrombosis Assessment and Treatment Unit by their family doctor, bypassing the ED visit and allowing the assessment of DVT risk as well as COVID-19 status at the same time.

Benefits

- The direct referral web application reduces ED congestion, and it facilitates and speeds up referral for patients suspected to have DVT/COVID-19.
- We can leverage this framework to host variety of rule-based and machine learning models that can ultimately improve patient diagnosis across wide range of diseases.
- Integration with EMR systems will enhance automation and workflow efficiencies that will incentivize healthcare providers to use this and future Ottawa DOM-NFP developed applications, to grow the user base and unique data.

3. Digital Tool to Predict Urgent Dialysis in Patients with CKD

Approximately 40% of patients followed in multi-care kidney clinics in Ontario require urgent unplanned dialysis initiated in the hospital. Urgent dialysis start is associated with higher mortality and morbidity, greater healthcare costs, and elevated patient distress, stemming from the fact that these patients are not optimally prepared for
dialysis. The total annual burden to the Canadian healthcare system from unplanned dialysis in 2005 was estimated at $33 million in direct hospital costs alone.

Opportunity Identified

- A Prediction Model
- Usage in Multiple Clinics or Other Jurisdictions
- An Artificial Intelligence (AI) Prediction Model

The goal of this project is to build a tool for accurate and reliable prediction about CKD patients at risk for urgent dialysis and allow for proper planning and timely interventions. Formulating such a predictive model will have a significant impact on patient care, morbidity, mortality, and result in optimization of health care dollars.

Benefits

- This will allow more personalized prediction for urgent dialysis in individual patients, and will let clinicians educate patients, prepare them for dialysis or kidney transplantation, and intervene on modifiable factors.
- This will improve patients' quality of life, morbidity, and mortality. We aim to develop this prediction model into a tool that can be incorporated in multi care kidney clinics.
- Saving for the Canadian Healthcare: Based on our analysis, if the tool can help reduce unplanned dialysis by half, it can lead to one-half yielded savings ranging from $17.3 million to $21 million in healthcare costs to Canada, while also improving patient outcomes.
The Team

The Ottawa DOM-NFP’s Digital Health and AI Program is led by a diverse and multicultural team of experts from the fields of medicine, engineering, data science, bioinformatics, business strategy, business development and project management. The team also comprises volunteers and Software Engineering students from the University of Ottawa who assist in the development and testing of innovative digital technologies under the guidance of the AI Program Implementation Manager. The Ottawa DOM-NFP’s Digital Health and AI team is focused on accelerating healthcare innovation through the integration of human intelligence with Artificial Intelligence and thus improving lives of patients and their families.

1. Dr. Philip Wells - Chief/Chair, Department of Medicine, University of Ottawa

Dr. Phil Wells holds an MD and FRCPC (Internal Medicine) from the University of Ottawa, and FRCPC (Hematology) and MSc (Clinical Epidemiology) from McMaster University. Dr. Wells has been in a practicing position for 35 years and has held many leadership positions including training program director, director of clinical research, head of the division of hematology, and the Chair/Chief of the Department of Medicine. Dr. Wells’ core expertise is in the fields of Internal Medicine, Hematology and Thrombosis Medicine, as well as Clinical Epidemiology. Dr. Wells has been awarded the OHRI Researcher of the Year award, the OHRI Career Research Achievement award, and a University of Ottawa Lifetime Achievement award. Dr. Wells was one of the first Canada Research Chairs recipients at the University of Ottawa, and more recently received a Faculty of Medicine Distinguished Clinical Research Chair and a University of Ottawa Research Chair award. Dr. Wells is renowned for authoring the ‘Wells Rules
for the diagnosis of pulmonary embolism and deep vein thrombosis which are taught in Medical schools across the world and used in National Healthcare guidelines globally.

Dr. Wells’ vision for the Ottawa DOM-NFP is to pursue opportunities by utilizing the collective wisdom, knowledge and innovations of members of the Department of Medicine, which will enable activities, investments and partnerships that will eventually result in the provision of better patient care.

2. **Dr. Ran Klein - PhD, AI Program Implementation Manager**

Dr. Klein leads the Digital Health & AI Support Team that comprises Medical AI Officer(s), Data Scientists, Business Development Strategists, Software Developers, AI experts, and volunteers. Dr. Klein works on translating the requirements and needs of the healthcare experts to the technical experts and vice versa. He has a passion for facilitating culture change due to the advent of AI in Healthcare by organizing training, journal club, and talent acquisition activities.

3. **Dr. Babak Rashidi - MD, Medical AI Officer**

Dr. Rashidi has vast experience in digital health, AI, and Machine Learning. Along with his knowledge in data & analytics, EMR evolution, and patient care, Dr. Rashidi brings his medical expertise to the Digital Health & AI Team. He works on identifying innovative ideas and developing and improving the accuracy of prediction tools and algorithms.
4. **Abhilash Menon - MBA, Business Strategist**

Abhilash is an electronic engineer and holds an MBA from the University of Ottawa. He comes with diverse professional experience in multichannel digital marketing, business development, business strategy, software development, and entrepreneurship. With his varied skill set, entrepreneurial attitude, and project management skills, Abhilash helps the team in achieving the organization's vision by identifying innovative healthcare projects, building strategic collaborations, and spearheading impactful programs.

5. **Darshdeep Dhillon - MBA, Business Strategist**

Darshdeep brings with her years of healthcare management experience in building businesses across sectors, including medical devices, pharmaceutical, diagnostics and over-the-counter consumer goods. She is a Biomedical Engineer and an MBA from the University of Ottawa. She has held various positions of responsibility across marketing, strategy, business development and sales leadership across international markets.

6. **Soroush Shahryari Fard**

Soroush is a graduate student at University of Ottawa's Faculty of Medicine studying Biochemistry with specialization in Bioinformatics. His research focuses on developing diagnostic machine learning models for prostate cancer, and further improving mass spectrometry-based proteomics using machine learning. Soroush brings his knowledge in machine learning
and software development to the team, and his perspective as a young researcher can further motivate new opportunities and initiatives that nurture the next generation of scientists and physicians in AI and medicine.