Artificial Intelligence & Refugee Health:
REIMAGINE HUMAN CONNECTION

2022 EVENT BOOKLET
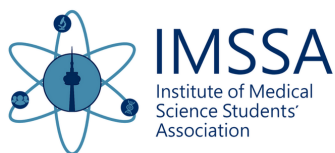
The Healthcare
INNOVATION
CHALLENGE

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A MESSAGE FROM OUR FOUNDERS

Dear Guests,

  Thank you for participating in The Healthcare Innovation Challenge! We are honoured to welcome you in our inaugural year and hope you have a fulfilling experience. After a competitive Round 1 that began in mid-May, the top 5 teams have been selected. They have spent the last two weeks carefully preparing their presentation pitches. Today, they are sharing the product of their hard work and ingenuity.

  This year's theme, *Artificial Intelligence & Refugee Health: Reimagine Human Connection,* fuses together two seemingly unrelated yet emergent topics in healthcare discourse. The refugee crisis has been an ongoing global issue that has become exasperated in the last two decades. Political turmoil, armed conflict, and precarious economic situations across West and Southeast Asia, North and Sub-Saharan Africa, Central and South America, and more recently, Eastern Europe, have forced millions to surrender their livelihoods in search of safety abroad. The hardship experienced by refugees around the world cannot be understated. The need for innovative solutions to the countless health challenges faced by this unique patient population is more pressing now than ever before.

  On behalf of our organizing team, we would like to extend our heartfelt thanks for your participation. We hope you leave today's event having learned something new.

Keep innovating,

Kayvan Aflaki & Serena Peck

Ministerial Message from the Honourable Jean-Yves Duclos Minister of Health on the Healthcare Innovation Challenge – June 24, 2022

The COVID-19 pandemic has made us all change the way we work and has inspired us to be creative as we adapted to new realities. While the pandemic has caused significant disruption to the delivery of in-person health care services, it has also been a game-changer for innovation. We've learned healthcare solutions must be adaptable, resilient, and creative. That is why initiatives like the Healthcare Innovation Challenge at the University of Toronto should be celebrated.

I would like to congratulate all of the participants in today's challenge recognizing the importance of innovative and sustainable solutions in response to issues faced in providing healthcare in this country. That said, this year's theme—Artificial Intelligence (AI) x Refugee Health—reflects the fact that AI systems can play an important role in the delivery of quality healthcare, respecting human right principles—no matter where you were born.

One of the most visible changes throughout this pandemic has been how people access publicly funded health care services. Virtual care and digital health have helped people in Canada safely access the care they need. In the future, digital innovations and new virtual modalities of care will be increasingly essential to ensure people in Canada receive the care they need, when and where they need it.

One of the key ways Canada can strengthen public health care and deliver better health outcomes is by enabling responsive, person-centred care that leverages the tools available to help individuals understand and better manage their health. A person-centered health system depends on the collection, access, sharing and use of health data—which can improve integrated care delivery, foster virtual care, inform public health advice, enable data-driven research and innovation, and support health system planning and transformation.

I hope contestants today understand the impact of their contributions. Competitiveness and ambition can create real-world changes in healthcare, and for that, I thank you.

The Honourable Jean-Yves Duclos, P.C., M.P.

Canada

Message ministériel de l'honorable Jean-Yves Duclos, ministre de la Santé, concernant le Healthcare Innovation Challenge – 24 juin 2022

La pandémie de COVID-19 nous a tous fait changer notre façon de travailler et nous a inspirés à faire preuve de créativité pour nous adapter à de nouvelles réalités. Si la pandémie a considérablement perturbé la prestation des services de soins de santé en personne, elle a également changé la donne en ce qui concerne l'innovation. Nous avons appris que les solutions en matière de soins de santé doivent être évolutives, résilientes et créatives. C'est pourquoi des initiatives comme le Healthcare Innovation Challenge (défi d'innovation en matière de soins de santé) de l'Université de Toronto doivent être célébrées.

Je tiens à féliciter tous les participants au défi d'aujourd'hui, qui reconnaît l'importance de solutions novatrices et durables pour répondre aux problèmes que pose la prestation de soins de santé au pays. Cela dit, le thème de cette année – intelligence artificielle et santé des réfugiés – reflète le fait que les systèmes d'intelligence artificielle peuvent jouer un rôle important en ce qui concerne la prestation de soins de santé de qualité dans le respect des principes des droits de la personne, quel que soit le lieu de naissance.

L'un des changements les plus visibles tout au long de la pandémie a été la façon dont les gens accèdent aux services de soins de santé financés par l'État. Les soins virtuels et la santé numérique ont aidé les personnes au Canada à accéder en toute sécurité aux soins dont elles avaient besoin. À l'avenir, les innovations numériques et les nouvelles modalités virtuelles de soins seront de plus en plus essentielles pour que les personnes au Canada reçoivent les soins dont elles ont besoin, au moment et à l'endroit où elles en ont besoin.

L'un des principaux moyens par lesquels le Canada peut renforcer les soins de santé publics et produire de meilleurs résultats en matière de santé consiste à offrir des soins adaptés et axés sur la personne qui tirent parti des outils existants pour aider les personnes à comprendre leur santé et à mieux la gérer. Un système de santé axé sur la personne dépend de la collecte, du partage et de l'utilisation des données sur la santé, ainsi que de l'accès à celles-ci, ce qui peut aider à améliorer la prestation de soins intégrés, à favoriser les soins virtuels, à éclairer les conseils en matière de santé publique, à permettre la recherche et l'innovation axées sur les données et à appuyer la planification et la transformation du système de santé.

J'espère que les participants comprennent l'impact de leurs contributions. La compétitivité et l'ambition peuvent entraîner des changements réels dans les soins de santé, et pour cela, je vous remercie.

L'honorable Jean-Yves Duclos, C.P., député

Canada

UNHCR
United Nations High Commissioner for Refugees
Haut Commissariat des Nations Unies pour les réfugiés

UNHCR Representation in CANADA
Représentation du HCR au CANADA

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Our/Notre Code: CANOT/037/22

6 June 2022

Dear Delegates,

I would like to welcome you to the Health Innovation Challenge and express my appreciation for your commitment to the health and wellbeing of refugees and displaced people around the world.

Health is a fundamental human right for all, including refugees. Making it possible for refugees and other forcibly displaced people to access healthcare is a top priority for UNHCR.

Last month, the world marked a grim milestone with an estimated 100 million people forced to flee their homes because of conflict, persecution and violence. The vast majority of the world's refugees and internally displaced people are hosted by developing countries already struggling to meet the health needs of their own populations.

The COVID-19 pandemic has particularly been an eye opener in this respect, highlighting the capacity gaps in national health systems and the difficulty for displaced people themselves to realize their wellbeing and development.

In addition, as we've seen in conflicts such as Syria, Yemen and Ukraine, hospitals and clinics are often deliberately targeted during hostilities, further degrading already strained healthcare systems.
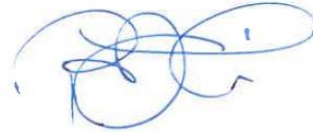
As one of the top ten donors to UNHCR, Canada has been an important partner for the UN Refugee Agency in helping it meet the needs of forcibly displaced people around the globe. However, amid drastically growing needs around the world, UNHCR increasingly relies on the generosity, know-how and ingenuity of ordinary Canadians in finding solutions to the global displacement crisis.

Kayvan Aflaki and Serena Peck
Co-Founders of The Healthcare Innovation Challenge
Institute of Medical Science University of Toronto
1 King's College Circle, Medical Sciences Building, Room 2374
Toronto, ON
M5S 1A8

I commend your commitment to finding solutions to the pressing health needs of millions of people who have been forced to flee their homes by using artificial intelligence and other innovative tools.

I am thrilled to support this conference and look forward to the results of the challenge.

Sincerely,

Rema Jamous Imseis
UNHCR Representative in Canada

COMPETITION JUDGES

Dr. Muhammad Mamdani

Dr. Mamdani is Vice President of Data Science & Advanced Analytics at Unity Health Toronto and Director of U of T's Temerty Faculty of Medicine Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM). Dr. Mamdani's team bridges advanced analytics including machine learning with clinical and management decision making to improve patient outcomes and hospital efficiency. He is also a Professor in the Department of Medicine of the Temerty Faculty of Medicine, the Leslie Dan Faculty of Pharmacy, and the Institute of Health Policy, Management and Evaluation of the Dalla Lana Faculty of Public Health. He is also adjunct Senior Scientist at the Institute for Clinical Evaluative Sciences (ICES) and a Faculty Affiliate of the Vector Institute. In 2010, Dr. Mamdani was named among Canada's Top 40 under 40. He has published over 500 studies in peer-reviewed medical journals. Dr. Mamdani obtained a Doctor of Pharmacy degree (PharmD) from the University of Michigan (Ann Arbor) and completed a fellowship in pharmacoeconomics and outcomes research at the Detroit Medical Center. During his fellowship, Dr. Mamdani obtained a Master of Arts degree in Economics from Wayne State University in Detroit, Michigan with a concentration in econometric theory. He then completed a Master of Public Health degree from Harvard University in 1998 with a concentration in quantitative methods.

Jenn McIntyre

Jenn McIntyre is the Policy and Advocacy Coordinator at the Centre for Refugee Children. She has worked in the field of refugee settlement support and advocacy for nearly a decade, with a particular emphasis on unaccompanied and separated children, border issues and immigration detention. Jenn is a passionate community organizer and collaborator. She is involved in a number of networks, including the Canadian Council for Refugees, the Canadian Sanctuary Network, the Ontario Coalition of Service Providers for Refugee Claimants and the Canada-US Border Network.

Dr. Pascal Tyrrell

Pascal Tyrrell PhD is a data scientist — a combination of research methodologist, computer/database solutions architect and innovator. He received his PhD in medical sciences from the University of Toronto working in the area of pediatric rheumatology at SickKids. Currently, he is the Director of Data Science and Associate Professor with the Department of Medical Imaging, Temerty Faculty of Medicine, University of Toronto where he is also the founding director of the MiDATA Data Science program. Pascal is cross appointed to the Institute of Medical Science and the Department of Statistical Sciences where his research aims to introduce statistically-sound and innovative Artificial Intelligence and Machine Learning approaches to the study of medical images in health-related outcomes research. Pascal has previous work experience in the computer, financial, and medical device industries, and is the CEO and co-founder of the software startup company SofTx Innovations Inc.

Vanessa Wright

Vanessa Wright works as a Nurse Practitioner at Women's College Hospital's Crossroads Clinic, where for the past eleven years, she has provided comprehensive medical services to newly arrived refugees. She has also worked across a variety of community health centres in Toronto and provided primary health care and emergency nursing care in medically under-serviced First Nation communities in Northern Ontario. Her other professional experiences include working as a Field Nurse for Doctors Without Borders in South Africa, South Sudan, Zambia, and India. She sits on the health advisory council for the Canadian Centre for Victims of Torture, acts as a subject matter expert for CAMH's Immigrant and Refugee Mental Health Course, and is an association member with Doctors Without Borders.

Atsuhiro Hibi

Atsuhiro Hibi is a first year PhD student at the Institute of Medical Science, Temerty Faculty of Medicine, University of Toronto. He is a member of the Temerty Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM). After receiving his master's degree in computer science at Kyoto University, Japan, he worked as an AI corporate researcher in manufacturing industry for eight years and led multidisciplinary projects specializing in machine learning for image recognition tasks. His PhD research, under the supervision of Dr. Pascal Tyrrell and Dr. Michael Cusimano, focuses on AI-assisted CT assessment methods applicable to traumatic brain injury. He has a research interest in dramatically decreasing annotation workload with the aim of increasing speed of technology translation from bench to bedside.

MEET THE FINALISTS

Team 3: Daniel Diatlov, Farheen Khan, Kavin Selvan, Jenny Yune & Reeti Sharma

Refugees coming to Canada face various barriers, including racism, lack of language proficiency, and differences in cultural norms when accessing healthcare services. In addition, refugees from different nations come with a wide range of specific health issues that may be unfamiliar to Canadian clinicians. To address these barriers, we propose an artificial intelligence algorithm via our app, CanHELPR, that will assist health care practitioners with the precise collection of health information from refugees. The algorithm will recommend to clinicians what conditions to focus on during refugees' health assessments based on three key criteria: prevalent diseases in the refugees' regions of origin, natural history, and presenting symptoms. Overall, CanHELPR will ease refugees' transition into the Canadian healthcare system through targeted identification of their health history based on worldwide health data monitoring, increase health care accessibility for refugees through language translation, and promote their engagement through collaborative co-design and implementation.

Team 6: Saisujani Rasiah & Lisa Eunyoung Lee

The prevalence of post-traumatic stress disorder (PTSD), which is associated with adverse brain development, poor academic performance, and behavioural problems, is up to 76% in refugee children. Yet, there is a lack of validated, culturally appropriate, and child-specific trauma measurement tools for refugee children, which leads to PTSD symptoms going unnoticed and unsupported. Therefore, we introduce PATRICK ("Predict And Treat Refugees in Canada – Kids") – an innovative tool that can predict the risk for PTSD and treat using a psychological chatbot. Machine learning algorithm will learn from data acquired from non-invasive and feasible tests in a mobile clinic, identify patterns, and make accurate predictions about future outcomes. Then, a psychological chatbot will electronically deliver a child-centered play therapy and trauma-based cognitive behavioural therapy for those at high risk for PTSD. PATRICK will identify PTSD early, provide opportunities for symptom management and early intervention, and ultimately, improve health outcomes of refugee children.

Team 7: Nayaab Punjani, Sarah Sadat, Vjura Senthilnathan, Anchana Kuganesan & Sydney Brockie

Pregnancy outcomes in refugees are influenced by socioeconomic factors, cultural customs, and language barriers. Because of this, refugee mothers are up to five times more likely to develop postpartum depression (PPD) compared to Canadian-born mothers. To address the overrepresentation of refugee women with PPD, we propose LogiSPEAK, an AI tool that predicts PPD development in refugee women. Using a passive collection of auditory data from personal mobile devices, along with a psychologist-assessed diagnosis of PPD from 2000 participants sampled across four language categories (Indo-Iranian, Niger-Congo, Romance, and Sino-Tibetan), our tool will be trained to assess changes in speech patterns to determine universal markers for PPD. Following development of LogiSPEAK, the goal is to use early speech input from new refugee mothers along with the trained weighting of universal speech markers to infer diagnosis of PPD, leading to early intervention to improve mothers' wellbeing and subsequently that of their children.

Team 9: Alex Boshart, Marlene Rong, Adriano Nella & Nairy Khodabakhshian

Refugee children experience stressors before, during, and after displacements such as family disruption, discrimination, and physical trauma that predispose them to a multitude of mental health issues. Pediatric healthcare screening upon arrival often neglects mental health evaluations. Creating artwork has been identified as an outlet for not only supporting mental health but also for allowing individuals to express their emotions, particularly trauma from wartime experiences. We propose an app (RefugeeART) that utilizes a Convolutional Neural Network (CNN) platform to screen for mental health concerns by analyzing artwork made by refugee children. Based on detected features associated with various mental health concerns, the app will provide personalized mental health risk stratifications and relevant resources. Our solution will streamline the process of connecting refugee children with culturally and contextually appropriate resources alongside necessary referrals to specialists, while also supporting the management of increasing patient volumes.

Team 12: Muzaffar Bhatti, Shaghayegh Foroozan, Addison Pacheco, Sami Ul Haq & Archita Srinath

Between 2013 and 2015, LGBTQ2S+ individuals accounted for 13% of asylum-seekers accepted to Canada on grounds of discrimination. Unfortunately, the health of these individuals is negatively impacted by systemic barriers in Canada, including a lack of education and discrimination from healthcare providers. Although longitudinal data is insufficient, current evidence suggests these disparities contribute to a long-term decline in health. To address this, we propose the use of a chatbot-style app that receives user inquiries and applies deep learning to a) provide personalized guidance/advice to prospective users of the LGBTQ2S+ community and b) matches them with qualified, non-discriminatory clinicians. Python, AWS, and Appy Pie will be used to develop the app and we aim to launch this after a 2-year developmental stage. The app will act as a safe outlet for the LGBTQ2S+ community to discuss healthcare concerns. Upon successful implementation, our framework can be extended to other marginalized groups.

After battling rough seas and high winds from Turkey, migrants arrive by rubber raft at the Greek island of Lesbos. Fearing capsize, some panicked and jumped into the cold water in desperation to reach land. This young boy made it, unlike hundreds of others. Photo by Tyler Hicks, The New York Times.

ROUND 1 HONOURABLE MENTIONS

Team 1: Sara Corvinelli, Daniya Abdouh & Tuana Tia Kant

A texting crisis helpline application for refugee mental healthcare: SafeSpace

Team 5: Samira Choudhury, Rowaida Hussein & Crizza Ching

BetterCare+: A portal to accessible and patient-focused care for refugees

Team 8: Alexander Koven, Megh Rathod, Jonathan Wu & Anat Usatinsky

Spotting cardiovascular disease in refugees using a novel, AI-powered, wearable device

Team 10: Michael Tsui, Robyn Loves & Arundhati Nair

Predictive modeling of ICU admissions in newly migrated populations to facilitate an enhanced surveillance program in the first 5 years following migration

Team 13: Chelsia Watson, Rachel Peiris & Fatima Syed

Pocket of Care: A Virtual Healthcare Assistant for Refugees

Connect with us!

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Maryam and Nore Kasmeih wait for Syrian refugees at Pearson International Airport in Toronto, Canada in December 2015. Photo by Steve Russell, Toronto Star.