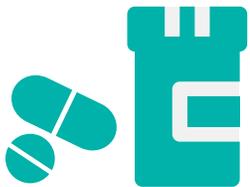


# Research with Impact

A selection of recent projects that illustrate the combination of clinical insight and scientific rigour that drives ICES research.



Helping to inform  
Canada's opioid response



Supporting Patients First  
by mapping access to  
primary care



Contributing to policy  
changes for the prevention  
of concussions



Driving the development  
of new cardiovascular  
risk prediction models  
with big data



Advancing Ontario's  
mental health strategy  
with system-wide  
benchmarking and  
analysis

## Helping to inform Canada's opioid response

The inappropriate use of prescription opioids has emerged as a significant public health and safety issue in Ontario and across Canada. Work conducted at ICES contributed to the speed with which Ontario has modelled for other provinces the collection of timely and robust data and analysis for an evidence-informed response to the opioid crisis.

ICES scientist **Tara Gomes** is principal investigator of the Ontario Drug Policy Research Network (ODPRN), in which ICES is a partner. A 2016 *CMAJ paper* co-authored by Gomes demonstrated that national vital statistics can be used to analyze prescription opioid-related mortality with considerable accuracy in the absence of more sophisticated surveillance systems, to accelerate national surveillance and monitoring strategies. Gomes's methodology used ICES linked data for validation and is now being replicated in other provinces. The paper was awarded the 2017 Article of the Year by the CIHR's Institute of Health Services and Policy Research.

At the local level, ongoing data collection and analysis contributed by ICES and ODPRN about patterns of opioid use for each of the province's public health units and Local Health Integration Networks has been helping to inform rapid regional responses to the opioid crisis.

ICES research also helped to inform the Canadian Medical Association's 2015 policy statement on harms associated with opioids and other psychoactive prescription drugs, which recommended the launch of a comprehensive national strategy. ICES senior scientist **David Juurlink** presented at the House of Commons Standing Committee on Health during the strategy formulation in October 2016, and delivered a keynote address at Canada's national Opioid Conference the following month.

Also informed by ICES/ODPRN research, Ontario's Strategy to Prevent Opioid Addiction and Overdose is now being implemented. In January 2017, based on an ODPRN analysis, Ontario delisted high-strength formulations of long-acting opioids from the Ontario Drug Benefit Formulary to help prevent addiction and support appropriate prescribing. ICES and ODPRN have been conducting ongoing rapid analysis of opioid utilization patterns, including an analysis of palliative care patients to determine the policy's potential impact on this patient population.

Tara Gomes



David Juurlink



The work of ICES and ODPRN has helped to drive **rapid, targeted regional responses** to the opioid crisis.



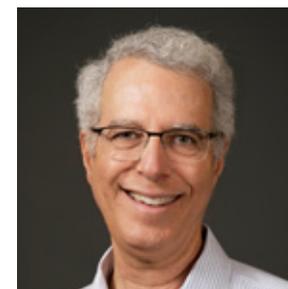
ICES research helped to inform **Ontario's Strategy to Prevent Opioid Addiction and Overdose**, now being implemented, including the delisting of high-strength formulations of long-acting opioids from the Ontario Drug Benefit Formulary.



ICES research helped to inform the **CMA's 2015 policy statement** on harms associated with opioids and other psychoactive prescription drugs, which recommended the launch of a **comprehensive national strategy**.

## Supporting Patients First by mapping access to primary care

Rick Glazier



With the passage of Ontario's *Patients First Act* in 2016, the province's 14 Local Health Integration Networks assumed responsibility for planning and performance improvement for the primary health care system. The Act requires that this planning take place at smaller regional levels to better address the unique health care needs of the province's diverse urban, rural and remote communities.

Some of the groundwork for this more localized planning has been undertaken by the Ontario Community Health Profiles Partnership (OCHPP), using data held at ICES. Guiding the project is **Rick Glazier**, a senior scientist at ICES and lead of its primary care and population health research program. Dr. Glazier is also a scientist at the Centre for Urban Health Solutions at St. Michael's Hospital.

Glazier and his team were approached by the Toronto Central LHIN to create neighbourhood-level maps for prioritizing resource allocation. By linking primary care records with geographic and demographic data, the team identified areas where residents were less likely to be attached to a primary care physician and where continuity of care was low.

"Low attachment and low continuity mean disordered care," explains Glazier. "Where people don't have regular access to a family doctor, we see chaotic patterns of health system use, with more use of emergency services and less use of preventative measures like cancer screening and diabetes care. That's where you'll see higher health costs."

The neighbourhood mapping process is gradually being applied across Ontario, with planners at other LHINs requesting similar data.

To support local capacity building, the OCHPP maintains an open-access **web data portal**. The tool enables health policy planners and local agencies to interact with the data for planning purposes. For example, the Toronto Central LHIN, a partner in the OCHPP, has been using the tool to plan local access to interprofessional care, including Family Health Teams and Community Health Centres.

"By bringing together the issues of primary care and population health, we can see how they overlap and influence each other," says Glazier. "Looking at these interactions in the context of equity and geography, we can map, neighbourhood by neighbourhood and region by region, where health investment is most needed in Ontario."



Working in partnership with the **Toronto Central LHIN**, ICES researchers have used administrative and other data held at ICES to create **neighbourhood-level maps** that pinpoint areas where patients have low access to primary care.



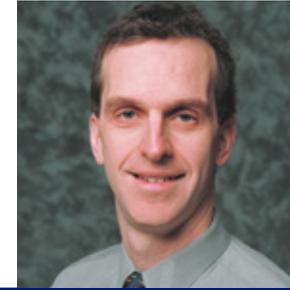
The neighbourhood mapping process is gradually being applied across **Ontario**, with planners at other LHINs requesting similar data.



The **Ontario Community Health Profiles Partnership** uses linked data from ICES to maintain a **web portal** that allows health policy planners and local agencies such as Community Health Centres to interact with the data for planning purposes.

## Contributing to policy changes for the prevention of concussions

Donald Redelmeier



Alison Macpherson



Inspired by his work caring for patients diagnosed with acute concussion in the Sunnybrook emergency department, ICES senior scientist **Donald Redelmeier** set out to investigate media anecdotes on the link between concussions and suicide. This curiosity-driven investigation revealed that a patient's history of concussion could triple the subsequent risk of suicide. Redelmeier's 2016 **paper** received coverage from major news outlets in Canada, the United States and Europe and contributed to evolving discussions about the prevention and treatment of head injuries in professional athletes, including those in the NFL, CFL and NHL. The work has also led to increased attention to preventing concussions among adults engaged in everyday activities.

Also concerned about rising concussion rates in children and youth, ICES senior adjunct scientist **Alison Macpherson**, a professor at York University, and ICES chief science officer **Astrid Guttman**, a physician at the Hospital for Sick Children, examined the treatment of pediatric concussion cases in emergency departments and primary care centres across Ontario. Their **study** determined that rates of pediatric concussion had risen sharply in 10 years, nearly doubling for boys and more than doubling for girls. Hockey and ice skating were the leading causes. These findings have informed Ontario legislation

to address child and youth concussion. The Rowan's Law Advisory Committee, named in honour of a young woman who died following a rugby injury, was established by an act of the Ontario legislature in 2016 with a mandate to create new guidelines around concussion in children and youth in sport. The Manitoba government subsequently announced plans for similar legislation. Former NHL player Eric Lindros cited ICES in his championing of Rowan's Law, adding that the Ontario legislation "should be the gold standard across Canada that we all support."



**International news coverage** of Donald Redelmeier's work on concussion and suicide has informed ongoing discussions of **risk in professional sports**, including the NFL, CFL and NHL.



Work by Macpherson and Guttman on **child and youth concussions** has informed legislation that will lead to province-wide practice guidelines for youth sport.

## Driving the development of new cardiovascular risk prediction models with big data

Jack Tu



The Cardiovascular Health in Ambulatory Care Research Team (CANHEART) big data project was launched in 2012. Under the direction of **Jack Tu**, a senior scientist at ICES and lead of its cardiovascular research program, the multi-year project uses encoded personal identifiers to link multiple population-based databases held at ICES, enabling the project team to analyze population-wide cardiovascular clinical measures and outcomes while taking into account patient sociodemographic characteristics, behavioural and traditional cardiac risk factors, comorbidities, and health services and prescription drug use.

The scale of the data is large, encompassing the entire Ontario adult population of 10 million people dating back to 2008. A 2015 editorial in the journal *Circulation* on CANHEART's work described the size and integration of the data as "impressive."

From this big data, the CANHEART team has developed a Canadian definition of ideal cardiovascular health for adults and youth. Created in 2014 in partnership with the Heart and Stroke Foundation, the CANHEART Health Index measures and monitors the heart health of Canadians against an ideal based on six health behaviours or factors associated with better cardiovascular health.

In the clinical setting, family doctors can use the index when counselling patients about their heart risk. In policy environments, the index provides a baseline

for goal setting. For example, the Heart and Stroke Foundation used the index to inform its ambitious 2020 Mission Impact Goals, with an aim of reducing the risk factors for heart disease and stroke by 10% and the death rate from heart disease and stroke by 25% by 2020.

The CANHEART team is working to develop cardiovascular risk prediction models that consider the impact of ethnicity on cardiovascular health, using the robustness of an enhanced CANHEART big data cohort with contributions from the Electronic Medical Record Administrative Data Linked Database (EMRALD) and the Ontario Laboratories Information System (OLIS).

According to Tu, the CANHEART project demonstrates some of the many ways big data will be used in the future to improve cardiovascular risk prediction models that will more accurately identify all patients at risk.

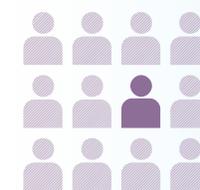
"Our work so far has shown that despite progress in cardiovascular health and health care, there are significant disparities in our understanding of heart health among ethnic populations," explains Tu. "Through our big data multifactorial analyses, we're showing that cardiovascular risk is not a one-size-fits-all proposition. Our team is working to create better ethnic-specific rules to unravel the root causes of the disparities in heart health among Canada's ethnic groups."



Launched in 2012, the **CANHEART big data** initiative conducts multifactorial analyses of cardiovascular risk, outcomes and health system use for Ontario's adult population of **10 million people** dating back to 2008.



The **CANHEART Health Index** was used by the Heart and Stroke Foundation to inform its **2020 Mission Impact Goals**, and is being used by family doctors when counselling patients about their heart risk.



The CANHEART team is now working to develop new **risk prediction models** based on the influence of an individual's **ethnicity** on his or her cardiovascular health.

# Advancing Ontario's mental health strategy with system-wide benchmarking and analysis

Astrid Guttmann



Paul Kurdyak



Canada's new Health Accord allocated an additional \$1.9 billion for Ontario in support of mental health initiatives. These funds come with a requirement that each province must develop performance indicators and mechanisms for annual reporting. This work is already well underway in Ontario due in part to the Mental Health and Addictions Scorecard and Evaluation Framework (MHASEF). An ICES initiative that released its **first scorecard** in 2015, the multi-year project releases scorecards every two years. The scorecards are broken into adult and child and youth sections, with the next child and youth scorecard to be published in June 2017. An adult scorecard is planned for 2018.

"The existence of MHASEF has helped to position Ontario as a national leader in mental health performance measurement," says **Paul Kurdyak**, who is lead scientist of the ICES mental health and addictions program and director of health systems research at the Centre for Addiction and Mental Health (CAMH). Kurdyak was recently named co-chair of the steering committee for Ontario's Mental Health and Addictions Data Strategy Project, which will oversee the creation of a data and performance measurements strategy for the province.

The MHASEF child and youth scorecards are also being used by the provincial government to track progress on its comprehensive strategy for child and youth mental health, an area highlighted for improvement in recent recommendations from Ontario's auditor general. Since the first scorecard was released in 2015, the team has been expanding its data holdings to reflect system-wide determinants of child and youth mental health with new acquisitions of interministerial data through partnerships with the ministries of Children and Youth Services, Education, and Community and Social Services.

"Our team brings a sophisticated knowledge of performance measurement and data, with deep experience around data linkage and validation," comments **Astrid Guttmann**, ICES' chief science officer and a clinician and researcher at Toronto's Hospital for Sick Children. "Not only do we play a leading role in housing and analyzing large data sets, but our team possesses the clinical expertise to ask and investigate highly relevant research questions that result in robust peer-reviewed evidence."



The **MHASEF scorecards** measure province-wide indicators for system performance and patient outcomes for children, youth and adults through geographic and equity lenses.



The child and youth scorecard is being used by the province to track progress on its **comprehensive strategy for child and youth mental health**, an area highlighted for improvement in recent recommendations from **Ontario's auditor general**.



Since its launch in 2015, the MHASEF project has expanded data holdings to include **interministerial data** through **partnerships** with the ministries of Children and Youth Services, Education, and Community and Social Services.