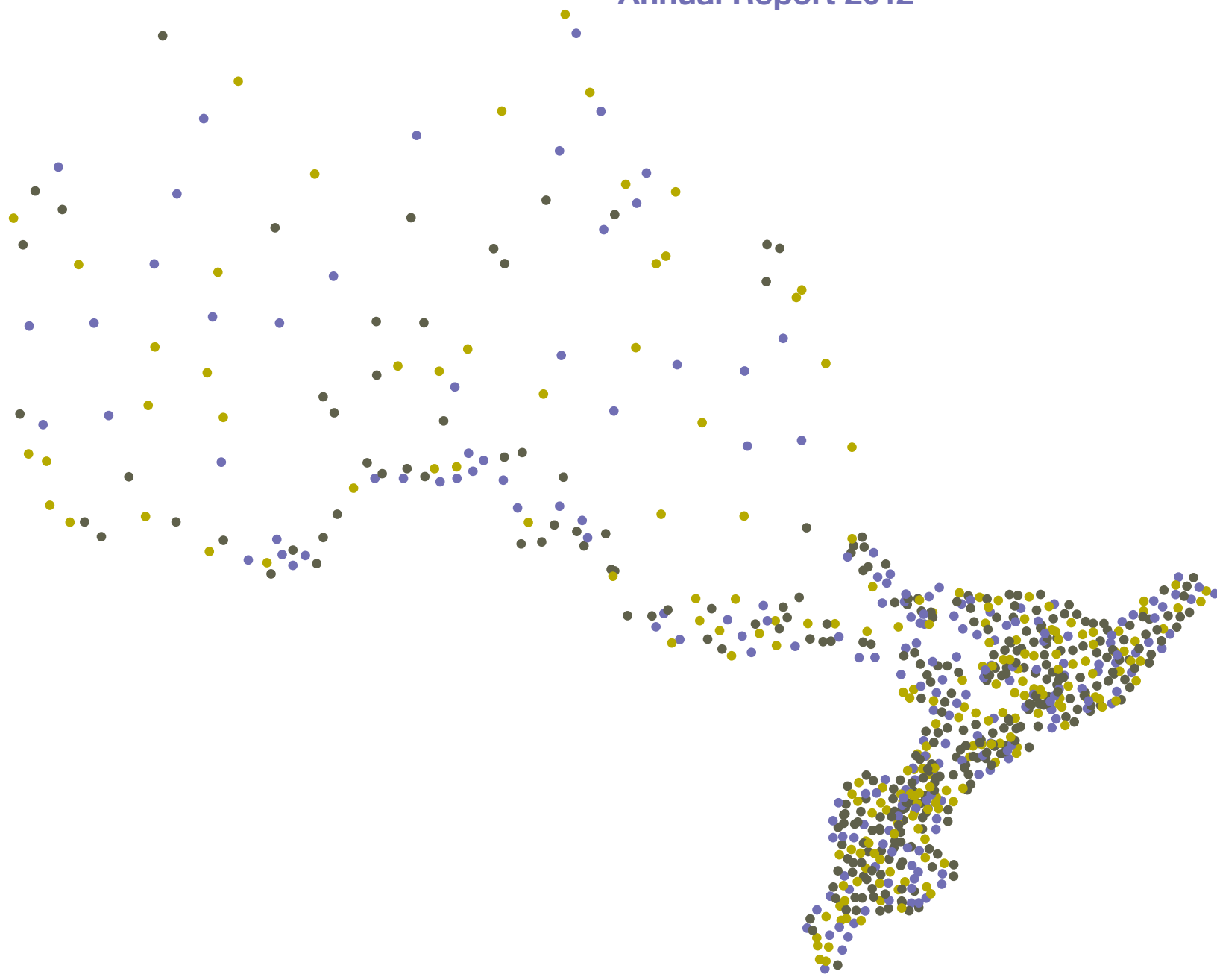
Research with Impact

Annual Report 2012



ICES Institute for Clinical Evaluative Sciences

ICES research stimulates improvements in health system performance and promotes better health for Ontarians

Population-based health research that makes a difference

Since 1992, ICES has been applying leading-edge scientific research and expertise to study and evaluate health care delivery and outcomes in Ontario. ICES researchers link data from many sources, including population-based health surveys, anonymous patient records, and clinical and administrative databases. ICES is the only research organization in Ontario that is privileged to hold and use such data. ICES goes to great lengths to protect the privacy interests of the people of Ontario and is recognized as an international leader in maintaining the security of health information.

Scientists and clinicians lead world-class research teams

ICES scientists are internationally recognized leaders; many are practicing clinicians who understand the everyday challenges of health care delivery. They lead multidisciplinary teams consisting of statisticians and epidemiologists, as well as specialists in knowledge translation, information security, privacy and technology. The diverse expertise presented within these specialized teams is the foundation of the innovative approach to research at ICES.

Evidence-based research informs decisions

To obtain a comprehensive picture of health care issues, ICES researchers take a unique approach to studying the continuum of care. Their unbiased, evidence-based knowledge and recommendations, profiled in atlases, investigative reports and peer-reviewed journals, are used to guide decision making and inform changes in health care delivery. Highly regarded in Canada and abroad, ICES research can be applied by clinicians, health care planners and policy makers.

Independence from various funding sources

ICES receives core funding from the Ontario Ministry of Health and Long-Term Care. ICES faculty and staff also compete for peer-reviewed grants from federal agencies, such as the Canadian Institutes of Health Research. Some receive project-specific grants from provincial and national organizations. However, ICES maintains an independent stance from these funding sources and takes pride in its international reputation as an objective and credible source of health and health services evaluation.

Growing partnerships with Canada's leading institutions

ICES is located on the campus of Sunnybrook Health Sciences Centre in Toronto, at Queen's University in Kingston (ICES@Queen's), at the Ottawa Hospital Research Institute (ICES@uOttawa) and at the University of Toronto (ICES@UofT). A new satellite site at the Lawson Health Research Institute in London, Ontario (ICES@Western) will open in late 2012. Additional sites across Ontario are being planned.

MESSAGE FROM THE PRESIDENT & CEO

ICES in 2011/12

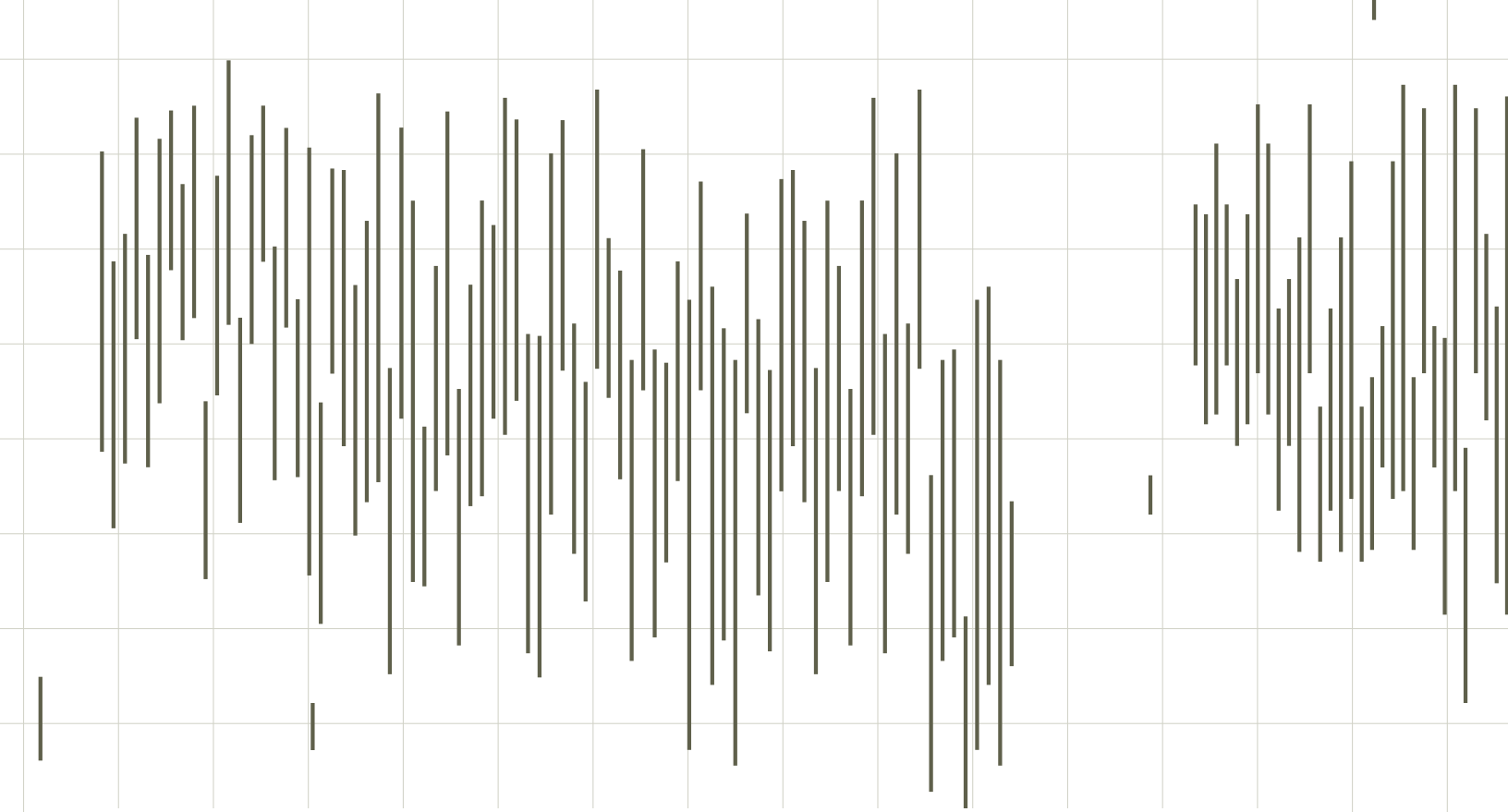
This past year of ICES work was one of substantial growth, achievement, productivity and impact.

- We increased our research capacity with the addition of 23 scientists across an expanded research portfolio, including developments in Mental Health and Addictions, and Kidney, Dialysis and Transplantation.
- We established a Scientific Advisory Committee of external consultants with a mandate to advise the Board of Directors on the quality, direction, scope, salience and focus of our work.
- We implemented a new model for responding to rapid requests for research support: AHRQ (Applied Health Research Questions).
- Our organization was mentioned favourably in the recommendations of the Commission on the Reform of Ontario's Public Services (the Drummond Report).
- We collaborated with the Métis Nation of Ontario to produce a number of reports on chronic disease and have established an ongoing partnership with MNO researchers.
- Research teams at our satellite offices at Queen's University and the University of Ottawa held symposia to share their respective research efforts and accomplishments.
- Our work has been highly relevant to decision making in a number of sectors, for instance, current negotiations between the Government of Ontario and the Ontario Medical Association.
- We expanded our data partnerships both within and beyond the realm of health research to include the provincial ministries of Education, Children and Youth Services, and Community Safety and Correctional Services.
- We completed the building of the ICES satellite at the University of Toronto, and our satellite office at Western University will open in late 2012.

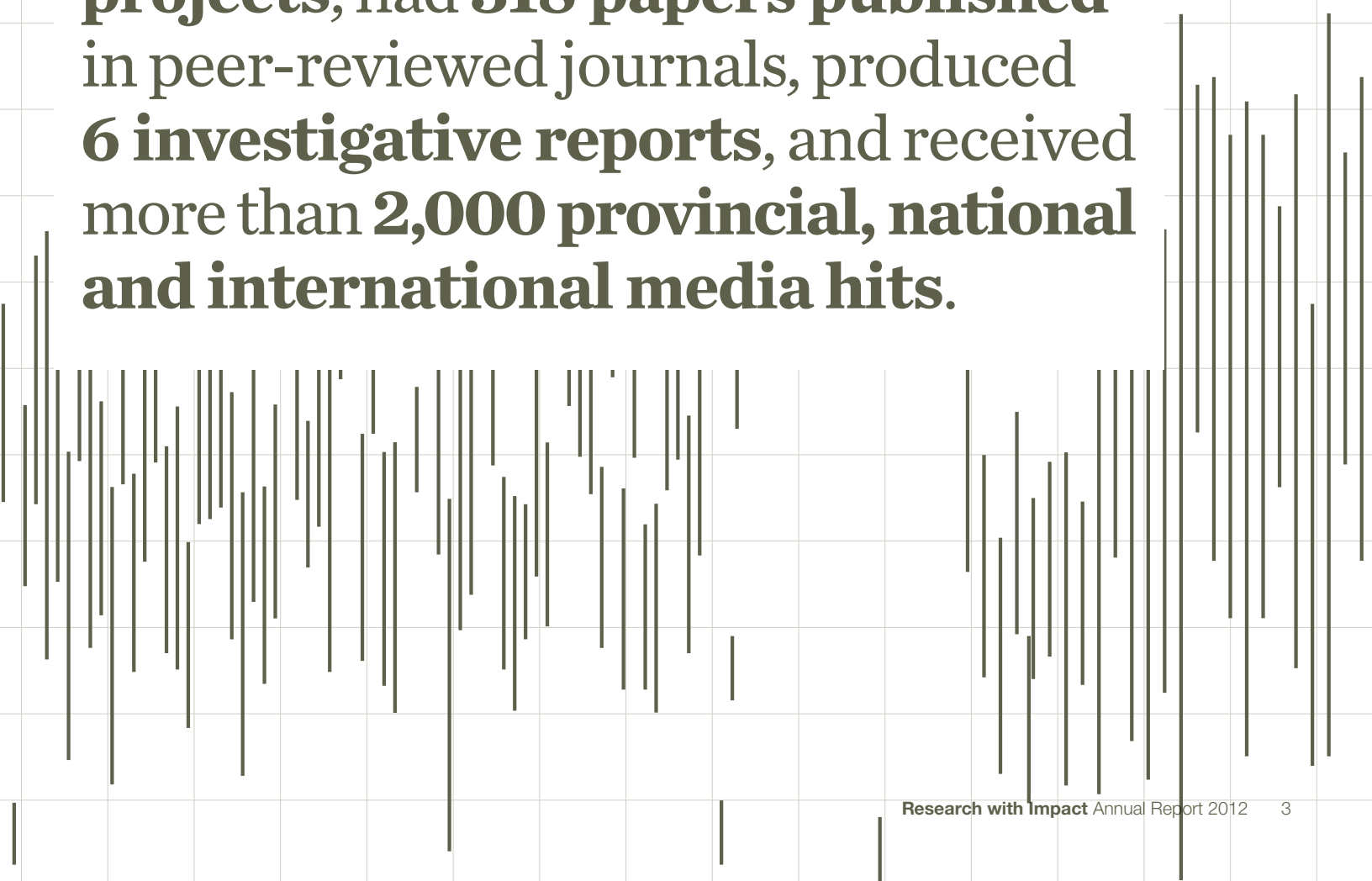
In this report, we present highlights of some of the research ICES has published over the past year. This is by no means an exhaustive list.

As we head into our 20th year of operation in 2012/13, we look forward to engaging with new partners and expanding our capacity for research that will stimulate improvements in health system performance and promote better health for Ontarians.

Dr. David Henry, President and CEO



We initiated **231 new research projects**, had **318 papers published** in peer-reviewed journals, produced **6 investigative reports**, and received more than **2,000 provincial, national and international media hits**.



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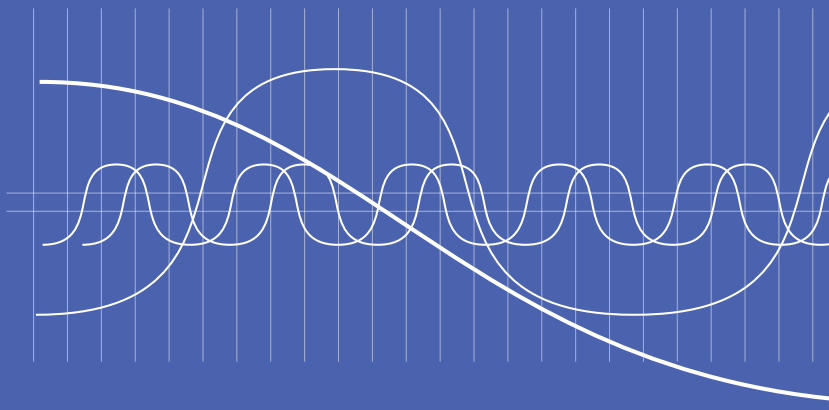


April 2011

May 2011

June/July 2011

August 2011

September 2011

October 2011

November 2011

December 2011

January 2012

February 2012

March 2012

APRIL 2011

Prescribing trends of certain cholesterol-lowering drugs in the U.S. and Canada vary markedly

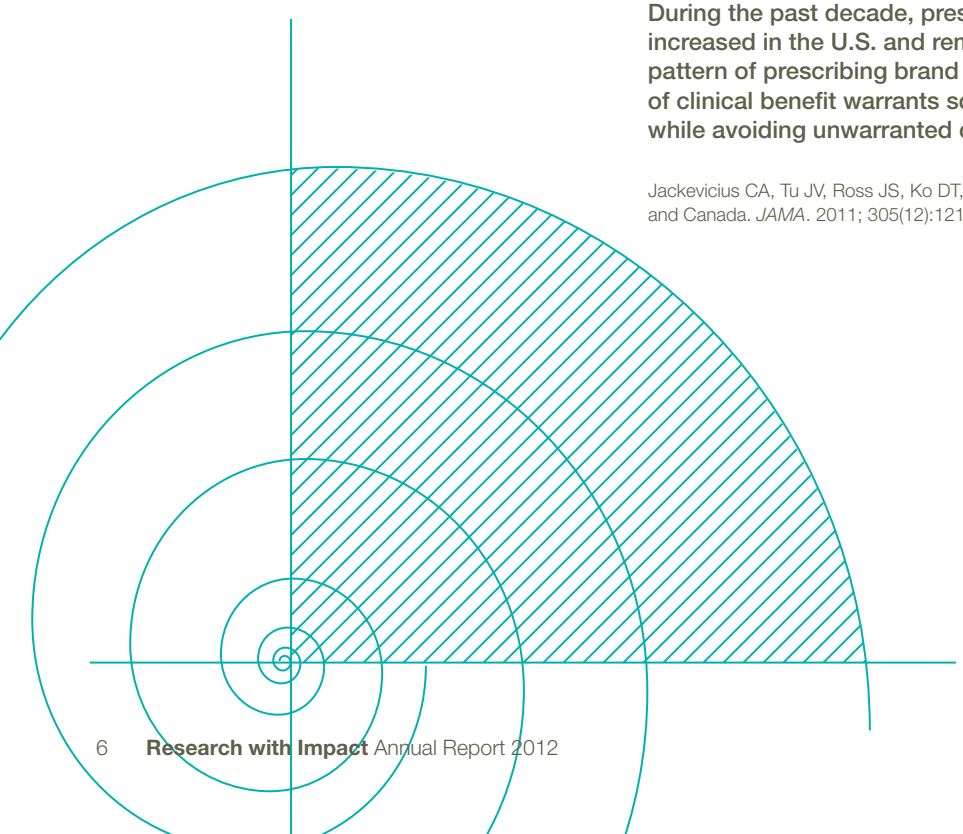
Analyzed the number and cost of generic versus brand name formulations of fibrate products prescribed in the U.S. and Canada between January 2002 and December 2009.

Fibrates are a class of drugs used to lower cholesterol levels. While generic formulations of fenofibrate, a newer type of fibrate with uncertain benefit, have long been available in Canada, their use has lagged behind in the U.S. What is the availability and use of fibrates and fenofibrate in the U.S. and Canada?

- During the study period, prescriptions of fibrates per 100,000 population rose from 336 to 730 in the U.S. (up 117%) and from 402 to 474 in Canada (up 18%).
- Prescriptions of fenofibrate per 100,000 population rose from 150 to 440 in the U.S. and from 321 to 429 in Canada.
- The annual ratio of generic to brand name fenofibrate use in the U.S. ranged from 0:1 to 0.09:1 between 2002 and 2008; the ratio in Canada increased from 0.51:1 to 1.89:1 between 2005 and 2008.
- Fenofibrate expenditures per 100,000 population per month increased from $11,535 in 2002 to $44,975 in 2009 in the U.S. and declined from $17,695 to $16,112 over the same period in Canada.

During the past decade, prescriptions for fibrates (particularly fenofibrate) increased in the U.S. and remained stable in Canada. The ever-increasing pattern of prescribing brand name over generic drugs without evidence of clinical benefit warrants scrutiny to ensure that medication use is optimized while avoiding unwarranted costs.

Jackevicius CA, Tu JV, Ross JS, Ko DT, Carreon D, Krumholz HM. Use of fibrates in the United States and Canada. *JAMA*. 2011; 305(12):1217–24.



Adults with developmental disabilities and psychiatric issues are more frequent ED visitors

Compared ED visit rates, triage levels, and time and frequency of visits in Ontario from April 2007 to March 2009 for two IDD groups (those with and without a psychiatric disorder) and two groups with no IDD (those with a psychiatric disorder and a random sample of the general population).

Are Ontario adults with intellectual and developmental disabilities (IDDs) more likely to visit emergency departments (EDs) than those without IDDs?

- Both IDD groups had higher rates of ED visits than the non-IDD groups.
- Triage levels were similar across groups.
- The ratio of after-hour to regular-hour ED visits was largest for those with IDD and psychiatric disorders.
- The proportion of high ED users (five or more visits) was 15.6% for those with both IDDs and psychiatric disorders and 5.2% for those with a psychiatric disorder only.

The comparatively frequent use by individuals with an IDD of a health care resource that is expensive and difficult for them to negotiate suggests that non-emergency alternatives are insufficient. There is a need to examine the intersection between health and social services provided to this population, as gaps in social services may be another precipitant of crisis leading to ED visits.

Lunsky Y, Lin E, Balogh R, Klein-Geltink J, Bennie J, Wilton AS, Kurdyak P. Are adults with developmental disabilities more likely to visit EDs? *Am J Emerg Med*. 2011; 29(4):463-5.

Health promotion programs are effective in reducing heart disease hospitalizations in Ontario

Of 39 randomly selected Ontario communities, 20 received the CHAP initiative and 19 received no intervention. In the CHAP communities, residents aged 65 or older were invited to attend cardiovascular risk assessment and education sessions in community pharmacies over a 10-week period during the autumn of 2006. Automated blood pressure readings and self-reported risk factor data were collected and shared with participants and their family physicians and pharmacists.

The Cardiovascular Health Awareness Program (CHAP) is a community-based initiative that brings together health care providers, volunteers, and health and social services organizations to actively participate in the prevention and management of heart disease and stroke in Ontario. Has CHAP had an effect on morbidity from cardiovascular disease?

- All 20 intervention communities successfully implemented CHAP.
- A total of 1,265 three-hour sessions were held in 129 of 145 pharmacies (89%) during the 10-week program; 15,889 participants had 27,358 cardiovascular assessments with the assistance of 577 volunteers.
- CHAP was associated with three fewer annual hospital admissions for cardiovascular disease per 1,000 people aged 65 or older.

A collaborative, multi-pronged and community-based health promotion and prevention program targeted at older adults can reduce cardiovascular morbidity at the population level.

Kaczorowski J, Chambers LW, Dolovich L, Paterson JM, Karwalajtys T, Gierman T, Farrell B, McDonough B, Thabane L, Tu K, Zagorski B, Goeree R, Levitt CA, Hogg W, Laryea S, Carter MA, Cross D, Sebaldt RJ. Improving cardiovascular health at population level: 39 community cluster randomized trial of Cardiovascular Health Awareness Program (CHAP). *BMJ*. 2011; 342:d442.

Excessive doses of opioids prescribed for non-malignant pain are linked to increased risk of death

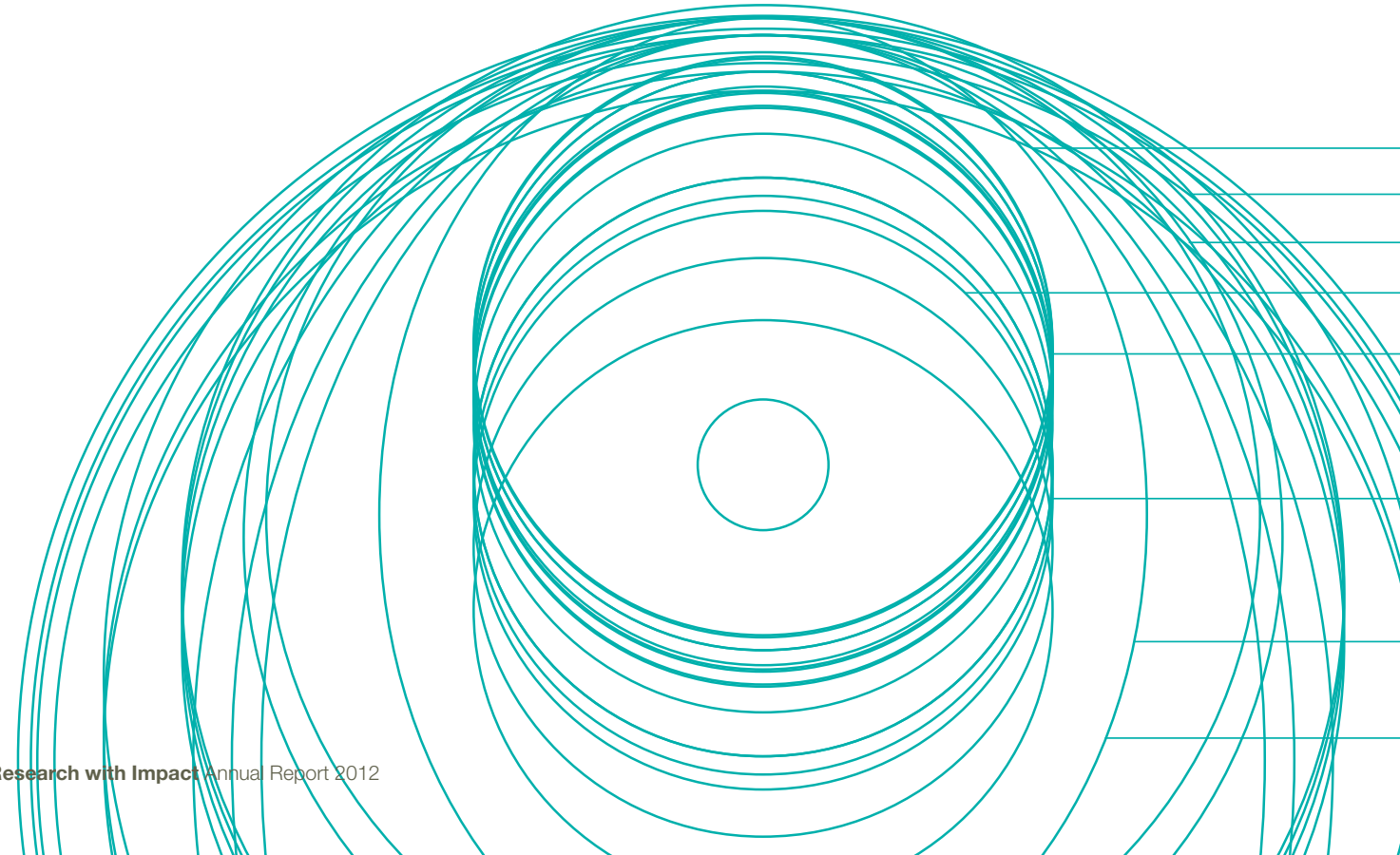
Examined data from more than 607,000 patients aged 15 to 64 who were eligible for publicly funded provincial drug coverage and received an opioid prescription for non-malignant pain between August 1997 and December 2006 in Ontario. Of these, 498 patients whose deaths were opioid-related were compared to a control group of 1,714 patients who were taking opioids but did not die. The risk of death was compared for various daily doses of opioids.

Opioids, such as oxycodone, codeine and morphine, are widely prescribed to treat chronic pain not related to cancer, often in doses exceeding recommended clinical guidelines. What is the relationship between opioid dose and opioid-related mortality for this population in Ontario?

- In total, 1,463 patients died of opioid-related causes, the equivalent of 13 deaths per month in this population.
- Opioid doses exceeding recommended guideline maximums (200 mg of morphine per day or equivalent) were associated with an almost three-fold higher risk of mortality compared with those prescribed low doses.
- Moderate doses of opioids (equivalent to 50 to 199 mg per day) were associated with a doubled risk of opioid-related mortality.
- Patients who died of opioid-related causes were more likely to have a history of alcoholism, to have been treated with benzodiazepines and other sedating medications and to have obtained opioids from multiple physicians and pharmacies.

Physicians should carefully assess the appropriateness of long-term use of opioids to treat chronic, non-malignant pain, particularly at high doses.

Gomes T, Mamdani MM, Dhalla IA, Paterson JM, Juurlink DN. Opioid dose and drug-related mortality in patients with non-malignant pain. *Arch Intern Med*. 2011; 171(7):686–91.



Incidence of upper GI cancers is rising dramatically in Ontario

Analyzed data on age, sex, neighbourhood income level, health region and comorbidity at the date of diagnosis for Ontarians over age 18 with a new diagnosis of EA/GCA from 1972 to 2005.

Surgical services for esophageal adenocarcinoma and gastric cardia adenocarcinoma (two relatively rare cancers that are difficult to distinguish in a clinical setting) are being centralized to 11 designated treatment centres in Ontario. What is the incidence of and regional variation in EA/GCA in Ontario?

- Overall, 8,245 patients were diagnosed with EA/GCA.
- EA/GCA incidence per 100,000 population rose from 1.0 in 1972 to 3.9 in 2005.
- The highest proportion of cases occurred in the Hamilton Niagara Haldimand Brant health region (15%) and the lowest in the North West health region (2%).
- The distribution of treatment centres did not align well with the number of EA/GCA cases per health region.

The rising incidence of EA/GCA is an important emerging health problem. Further investigation of regional variation is warranted, particularly in the allocation of cancer health resources.

Tinmouth J, Green J, Ko YJ, Liu Y, Paszat L, Sutradhar R, Rabeneck L, Urbach D. A population-based analysis of esophageal and gastric cardia adenocarcinomas in Ontario, Canada: incidence, risk factors, and regional variation. *J Gastrointest Surg*. 2011; 15(5):782–90.

Researchers

From left to right:
Cynthia Jackevicius: *Prescribing trends of certain cholesterol-lowering drugs in the U.S. and Canada vary markedly*
Yona Lunsky: *Adults with developmental disabilities and psychiatric issues are more frequent ED visitors*
Larry Chambers: *Health promotion programs are effective in reducing heart disease hospitalizations in Ontario*
Tara Gomes: *Excessive doses of opioids prescribed for non-malignant pain are linked to increased risk of death*
Jill Tinmouth: *Incidence of upper GI cancers is rising dramatically in Ontario*

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MAY 2011

One in 25 patients have complications after implantable cardioverter-defibrillator replacement

Examined 45-day major and minor complication rates and all-cause mortality rates in 1,081 patients who underwent ICD replacement in Ontario between February 2007 and August 2009.

Implantable cardioverter-defibrillators (ICDs) help to maintain normal heart rhythm. Complications after ICD replacement are often clinically devastating. What factors contribute to these complications?

- Forty-seven patients (4.3%) experienced a complication within 45 days.
- There were 47 major complications in 28 patients, most commonly infection, lead revision, electrical storm and pulmonary edema.
- The complication rate increased with the increasing number of device leads (found in more complex devices).
- Minor complications, most commonly surgical site infection and pocket hematoma, occurred in 2.3% of patients.
- Variables associated with a major or any complication included angina class, multiple previous ICD procedures, low implanter volume and the use of anti-arrhythmic therapy, such as beta blockers and calcium channel blockers.
- Mechanical complications directly related to the ICD procedure were associated with a 4.4%, 8.7% and 8.7% rate of mortality at 45, 90 and 180 days, respectively.

Identifying factors contributing to complications after ICD replacement may permit identification of high-risk individuals who warrant incremental monitoring and therapy to attenuate risk.

Krahn AD, Lee DS, Simpson CS, Khaykin Y, Cameron D, Janmohamed J, Yee R. Austin PC, Chen Z, Hardy J, Tu JV. Predictors of short-term complications after implantable cardioverter-defibrillator replacement: results from the Ontario ICD Database. *Circ. Arrhythm Electrophysiol*. 2011; 4(2):136–42.

Statin use before major elective surgery may prevent kidney injury in older patients

Analyzed 213,347 Ontario Drug Benefit Plan recipients aged 66 or older who underwent major elective surgery in Ontario between January 1995 and November 2008. Patients were deemed to be statin users if there was evidence of at least one statin prescription in the 90 days before surgery. Outcomes examined were acute kidney injury, acute dialysis and 30-day mortality.

Many patients who undergo major elective surgery develop serious kidney complications soon after. Do patients taking statins prior to surgery have improved renal outcomes?

- In the two weeks after surgery, 1.9% of patients developed acute kidney injury and 0.5% required acute dialysis. The 30-day mortality rate was 2.8%.
- Prior to surgery, 32% of patients were taking a statin.
- Statin use was associated with 16% lower odds of acute kidney injury, 17% lower odds of acute dialysis and 21% lower odds of death.
- Statins were beneficial whether they were started more than 90 days or less than 30 days before surgery.

These findings are the results of an observational study with a reliance on data (diagnostic codes) lacking in sensitivity and specificity. Further investigation with more rigorous studies is warranted.

Molnar AO, Coca SG, Devereaux PJ, Jain AK, Kitchlu A, Luo J, Parikh CR, Paterson JM, Siddiqui N, Wald R, Walsh M, Garg AX. Statin use associates with a lower incidence of acute kidney injury after major elective surgery. *J Am Soc Nephrol*. 2011; 22(5):939–46.

Patients with incidental abdominal aneurysms are not receiving appropriate follow-up

Identified 191 patients at The Ottawa Hospital whose AAA was found incidentally between January 1996 and September 2008 and followed them to elective repair or rupture of the aneurysm, death for any reason or March 31, 2009. The radiographic monitoring frequency of each incidental AAA was calculated.

An abdominal aortic aneurysm (AAA) that is identified when the abdomen is imaged for some other reason is known as an incidental AAA. Are patients with incidental AAAs receiving appropriate follow-up?

- Almost one-third of the patients (29.3%) received no further radiographic monitoring of the incidental AAA.
- Factors associated with lack of adequate follow-up included older age, large size of aneurysm at detection, and detection while the patient was in hospital or the emergency department.
- Comorbidities were not associated with monitoring.

Health system innovations are recommended to ensure timely, reliable and proactive follow-up. Interventions, such as automated patient and physician notification procedures, should be implemented to improve the monitoring of incidental AAAs.

van Walraven C, Wong J, Morant K, Jennings A. Austin PC, Jetty P, Forster AJ. Radiographic monitoring of incidental abdominal aortic aneurysms: a retrospective population-based cohort study. *Open Med*. 2011; 5(2):e67–76.

Ontario women with depression are less likely to seek screening for breast or cervical cancer

Identified Ontario female respondents to the 2002 Canadian Community Health Survey, Mental Health and Well Being component , with either major depressive disorder or clinically significant depressive symptoms. Determined if they had a screening mammogram within two years or a screening Pap test within three years of the survey administration date. Their screening rates were compared with those of non-depressed women participating in the survey.

Previous studies examining the association between depression and screening for breast and cervical cancer present conflicting results. Is depression a risk factor for reduced preventive care screening for breast and cervical cancer in Ontario?

- Women with major depression and women with depressive symptoms made significantly more primary care visits than non-depressed women.
- Both groups of women were less likely to receive breast cancer screening than their non-depressed counterparts (46.1% vs. 61.5% for major depression, and 49.9% vs. 61.9% for depressive symptoms).
- Neither major depression nor depressive symptoms was found to be associated with cervical cancer screening in the full population, but women over age 40 with depressive symptoms were less likely to receive cervical cancer screening than their non-depressed counterparts.

Attention to the uptake of preventive services in women is warranted at both the psychiatric specialist and primary care levels.

Vigod SN, Kurdyak PA, Stewart DE, Gnam WH, Goering PN. Depressive symptoms as a determinant of breast and cervical cancer screening in women: a population-based study in Ontario, Canada. *Arch Womens Ment Health*. 2011; 14(2):159–68.

Assessment tools track symptoms and performance status for end-of-life cancer care

From a cohort of 45,118 adults with cancer in Ontario between January 2007 and March 2009, identified patients who had at least one ESAS or PPS assessment in the six months before death. The decedents' average ESAS and PPS scores each week before death were analyzed.

To improve end-of-life care, providers need systematic and standardized ways to manage symptoms. Ontario's cancer system is unique because it has implemented two such assessment tools: the Edmonton Symptom Assessment System (ESAS), a patient-reported tool that measures the severity of nine symptoms (scale 0 to 10; 10 indicating the worst), and the Palliative Performance Scale (PPS), a provider-reported tool that measures patient performance status (scale 0 to 100; 0 indicating death). What is the trajectory of ESAS and PPS scores in the six months before death?

- The study included 10,752 decedents with ESAS assessments and 7,882 decedents with PPS assessments.
- For ESAS symptoms, average pain, nausea, anxiety and depression scores remained relatively stable over the six months.
- Conversely, shortness of breath, drowsiness, well-being, lack of appetite and tiredness increased in severity over time, particularly in the month before death.
- More than one-third of the cohort reported moderate to severe scores (4 to 10) for most symptoms in the last month of life.
- Trajectories of mean ESAS scores followed two patterns: increasing vs. generally flat.
- The average PPS score declined slowly over the six months before death, starting at approximately 70 and ending at 40, and declining more rapidly in the last month.

Further research is needed to determine how to use the prevalence of and changes in symptom scores to predict time to death in an outpatient cancer population. The high proportion of moderate to severe symptom scores in the final weeks of life represents opportunities for improved patient care at end of life.

Seow H, Barbera L, Sutradhar R, Howell D, Dudgeon D, Atzema C, Liu Y, Husain A, Sussman J, Earle C. Trajectory of performance status and symptom scores for patients with cancer during the last six months of life. *J Clin Oncol*. 2011; 29(9):1151–8.

Researchers

From left to right:
Douglas Lee: *One in 25 patients have complications after implantable cardioverter-defibrillator replacement*
Carl van Walraven: *Patients with incidental abdominal aneurysms are not receiving appropriate follow-up*
Simone Vigod: *Ontario women with depression less likely to seek screening for breast or cervical cancer*
Hsien Seow: *Assessment tools track symptoms and performance status for end-of-life cancer care*

JUNE/JULY 2011

Lower risk of death in COPD patients taking long-acting beta-agonists

Compared all-cause mortality in 46,403 patients with COPD, aged 66 or older, who were newly prescribed either a beta-agonist or an anticholinergic in Ontario between July 2003 and March 2007.

Medications are a mainstay of managing chronic obstructive pulmonary disease (COPD), a largely preventable respiratory condition which affects 12–20% of adults and is the fifth leading cause of death worldwide. Long-acting inhaled beta-agonists and anticholinergics are both used to treat COPD. Which medication is better for initial therapy?

- Overall mortality was 38.2%.
- Compared to patients prescribed beta-agonists, those taking anticholinergics were 14% more likely to die, 13% more likely to be hospitalized for COPD and 9% more likely to visit the emergency department (ED) for COPD.
- They were also more likely to be hospitalized or visit the ED for conditions exacerbated by COPD, such as pneumonia or influenza.

Further research is needed to confirm these findings in younger patients and in randomized controlled trials and to examine the relative safety profiles of these medications.

Gershon A, Croxford R, To T, Stanbrook MB, Upshur R, Sanchez-Romeu P, Stukel T. Comparison of inhaled long-acting ß-agonist and anticholinergic effectiveness in older patients with chronic obstructive pulmonary disease. *Ann Intern Med*. 2011; 154(9):583–92.

End-of-life care for lung cancer patients in Ontario differs from the United States

Used U.S. Surveillance, Epidemiology and End Results (SEER)–Medicare data and the Ontario Cancer Registry to compare end-of-life care for patients aged 65 or older with non-small cell lung cancer who died between 1999 and 2003 in the U.S. (n=13,533) and Ontario (n=8,100). Compared data on chemotherapy, emergency department use, hospitalizations and supportive care for short-term (less than 6 months) and longer-term (6 months or more) survivors.

Both Canada and the U.S. offer government-financed health insurance for the elderly. It is not clear how end-of-life care differs for cancer patients in the two systems.

- Patients in both systems used health care services extensively, especially in the last month of life.
- Rates of chemotherapy were higher in the U.S. than in Ontario for every month before death.
- Among short-term survivors at five months before death, 33.2 U.S. vs. 9.5 Ontario patients per 100 person-months received chemotherapy.
- Among longer-term survivors at five months before death, 24.4 U.S. vs.14.5 Ontario patients per 100 person-months received chemotherapy.
- During the last 30 days of life, more patients were hospitalized in Ontario compared to the U.S.: 78.6 vs. 49.9 patients per 100 person-months for short-term survivors and 67.1 vs. 44.1 patients per 100 person-months for longer-term survivors.

The lack of a formal hospice program in Ontario may account for differences in hospital and emergency department use between the two systems; however, treatment differences may reflect differing attitudes between the U.S. and Ontario regarding end-of-life care.

Warren JL, Barbera L, Bremner KE, Yabroff KR, Hoch JS, Barrett MJ, Luo J, Krahn MD. End-of-life care for lung cancer patients in the United States and Ontario. *J Natl Cancer Inst*. 2011; 103(11):853–62.

Less than half of patients with multiple sclerosis continually adhere to drug therapies

Identified 682 Ontario Drug Plan beneficiaries aged 15 or older who were newly treated with one of four DMDs between April 2006 and March 2008: intramuscular interferon beta-1a, subcutaneous interferon beta-1a, subcutaneous interferon beta-1b or glatiramer acetate.

Disease-modifying drugs (DMDs) for the treatment of multiple sclerosis have been shown to slow disease progression if taken chronically. Large-scale studies on adherence to these drugs have not been conducted in Ontario.

- Cumulative persistence rates for all four drugs were similar over time, ranging from 73.6–79.1% at six months, 59.1–63.1% at one year and 41.5–47.4% at two years.
- After two years, the proportion of patients who had discontinued treatment, switched to another DMD or died was similar among the four drugs.

Low adherence to self-injected multiple sclerosis DMDs is consistent with other international reports and with reported low adherence rates for other chronic diseases. Future studies may shed light on adherence rates for oral DMDs.

Wong J, Gomes T, Mamdani M, Manno M, O'Connor PW. Adherence to multiple sclerosis disease-modifying therapies in Ontario is low. *Can J Neurol Sci*. 2011; 8(3):429–33.

Myocardial perfusion imaging predicts cardiovascular outcomes

Examined 9,605 patients aged 18 or older who underwent exercise-stress MPI between January 2003 and March 2007 at one Ontario hospital. Determined the impact of summed stress score (SSS) and percent left ventricular (LV) ischemia on a) death or myocardial infarction (MI), and b) a composite measure of death, MI or late coronary revascularization (occurring more than 90 days following MPI).

Exercise stress testing is used to detect coronary artery disease. Adding myocardial perfusion imaging (MPI) makes the test lengthier and more costly. Does MPI enhance the prognostic value of stress testing?

- During 35,007 person-years of follow-up, there were 290 deaths, 175 MIs and 525 coronary revascularization procedures.
- Of those who attained an exercise workload of ≥10 metabolic equivalents, major stress perfusion defects (SSS ≥7) were present in 4.2% overall and in 3.7% without ST-segment shifts, whereas large ischemic defects (≥10% LV ischemia) were present in 1% overall and in 0.7% without ST-segment shifts.
- For those with 1–4%, 5–9% and ≥10% LV ischemia, the risk of death, MI or revascularization was 1.5, 2.4 and 4.9 times higher, respectively, than in those with no ischemia.
- Summed stress scores ≥7 were associated with a 57% increased risk of death or MI, compared to those with no stress perfusion defects.

MPI provides additional prognostic information beyond traditional exercise stress testing in some patients. Since it entails radiation exposure, MPI should be performed after considering the absolute benefit of study findings and the role of the additional information provided in changing patient management.

Lee DS, Verocai F, Husain M, Al Khdair D, Wang X, Freeman M, Iwanochko RM. Cardiovascular outcomes are predicted by exercise-stress myocardial perfusion imaging: impact on death, myocardial infarction, and coronary revascularization procedures. *Am Heart J*. 2011; 161(5):900–7.

One in four new HIV infections in Ontario are among women: POWER Study

Used several data sources to examine HIV incidence, prevalence, risk behaviours, community services, clinical care and health outcomes in Ontario between 2006 and 2008. These indicators were stratified by gender, socio-economic status, ethnicity, country/region of birth and HIV exposure category.

HIV prevention and care is complex and directly influenced by stigma, marginalization and the social determinants of health. What are the patterns of illness and outcomes of care for HIV-infected women in Ontario?

- Women accounted for 25% of new HIV infections between 2006 and 2008 and 18% (4,700) of the estimated HIV infections in the province.
- Most women (93%) acquired HIV through sexual contact.
- Women who emigrated from a country where HIV was endemic accounted for more than half of all new infections among women in 2008.
- Women reported lower rates of condom use than men, and those who injected drugs reported riskier injection behaviours than men.
- Women comprised one-third of users of community-based HIV services.
- Over 90% of HIV-positive pregnant women who knew their HIV status received antiretrovirals during pregnancy, which could prevent transmission to the newborn.

Strategies to promote HIV prevention, testing and access to care need to continue, and targeted efforts directed at hard-to-reach groups, including older women and aboriginal women, would improve the health of Ontarians living with HIV and those at risk for HIV infection. The high rates of prenatal HIV screening indicate that measureable improvements can be achieved with organized and targeted programs.

Bayoumi AM, Degani N, Remis RS, Walmsley SL, Millson P, Loutfy M, et al. HIV infection. In: Bierman AS, editor. *Project for an Ontario Women's Health Evidence-Based Report, Volume 2*. Toronto: St. Michael's Hospital and the Institute for Clinical Evaluative Sciences; 2011.

Implementing best practices is improving Ontario stroke system efficiency

Reviewed stroke and transient ischemic attack across the care continuum, including stroke prevention, emergency department care, acute inpatient care, inpatient rehabilitation and home care services, in Ontario from 2003/04 to 2009/10. Presented 20 key indicators of stroke care across the province's 14 Local Health Integration Networks (LHINs) in the form of report cards.

Best practices are well established for stroke prevention and care, both in Canada and internationally. What progress has been made in implementing best practices to optimize outcomes for Ontario stroke patients?

- In 2008/09, almost 90% of patients received neuroimaging within 24 hours of arrival at hospital.
- Only one in three stroke victims arrived at hospital in time to be considered for therapy, such as stroke thrombolysis, that would dramatically improve outcomes.
- There was wide variation across LHINs in access to inpatient rehabilitation, and patients requiring community-based rehabilitation received inadequate service levels.
- Among the 14 LHINs, 11 had one to four indicators exhibiting exemplary performance.
- Despite Ontario's aging population, there was a decrease in the rates of emergency department visits and hospital stays for stroke or transient ischemic attack between 2003/04 and 2009/10.
- Specialized stroke centres were much more likely to provide stroke care best practices, including access to stroke thrombolysis, admission to stroke units and discharge to inpatient rehabilitation.
- Despite a two-day reduction in wait time for inpatient rehabilitation in 2009/10 compared to 2003/04, access to inpatient rehabilitation decreased for severely disabled stroke patients.

The Ontario Stroke System has continued to make significant gains in the implementation of many stroke best practices. However, there has been minimal change in the public's responsiveness to the onset of the signs and symptoms of stroke, clinical management of atrial fibrillation and availability of community-based services.

Hall R, Khan F, O'Callaghan C, Meyer S, Fang J, Hodwitz K, Bayley M. *Ontario Stroke Evaluation Report 2011: Improving System Efficiency by Implementing Stroke Best Practices*. Toronto: Institute for Clinical Evaluative Sciences: 2011.

Researchers

From left to right:
Andrea Gershon: *Lower risk of death in COPD patients taking long-acting beta-agonists*
Lisa Barbera: *End-of-life care for lung cancer patients in Ontario differs from the United States*
Arlene Bierman: *One in four new HIV infections in Ontario are among women: POWER Study*
Ruth Hall: *Implementing best practices is improving Ontario stroke system efficiency*

AUGUST 2011

Study raises doubts about the value of heart ultrasound before elective surgery

Identified 264,823 Ontario residents aged 40 or older who had elective intermediate- to high-risk non-cardiac surgery between April 1999 and March 2008. Of these, 35,498 patients who had an outpatient echocardiogram within 180 days before surgery were matched to a control group of 70,996 untested patients. Mortality at 30 days and one year and length of hospital stay were compared in the two groups.

Echocardiography, which uses sound waves to create an image of the heart, is the most commonly ordered preoperative cardiac test. Is it associated with improved survival or shorter hospital stay after major non-cardiac surgery?

- Overall, 40,084 patients (15.1%) had an echocardiogram before surgery.
- Increases in postoperative mortality in tested vs. untested patients were seen at 30 days (2.0% vs. 1.7%) and one year (7.4% vs. 6.9%).
- Testing was also associated with an increase in average hospital stay of 0.31 days.

The relatively common use of echocardiography represents an unnecessary health care cost and may also needlessly delay scheduled surgeries. The findings highlight the need for further research to guide better use of this test.

Wijeysundera DN, Beattie WS, Karkouti K, Neuman MD, Austin PC, Laupacis A. Association of echocardiography before major elective non-cardiac surgery with postoperative survival and length of hospital stay: population-based cohort study. *BMJ*. 2011; 342:d3695.

Ontario's recent immigrants are safer drivers than long-term residents

Matched 965,829 recent immigrants with 3,272,393 long-term residents aged 16 to 65 and living in Ontario between April 1995 and March 2006 and followed them for at least three years.

Many presume that new Canadians are accident-prone drivers, dealing with unfamiliar roads and customs and extreme weather conditions. Does the evidence support this characterization?

- Overall, 10,975 individuals were admitted to hospital as drivers involved in a motor vehicle crash; immigrant drivers were 40–50% less likely to be involved in a serious crash than long-term residents.
- Immigrant drivers' comparative risk of a serious crash was lowest in the years immediately following arrival in Ontario, but differences persisted beyond the fifth and sixth year after immigration.
- The findings extended to crashes with the highest levels of severity and to adults with the highest levels of income.

If long-term residents had the same risk profile as recent immigrants, the difference would have saved approximately 49 lives, 1,000 critical care unit admissions, 2,000 surgeries and 30,000 days in hospital over the study period.

Redelmeier DA, Katz D, Lu H, Saposnik G. Roadway crash risks in recent immigrants. *Accid Anal Prev*. 2011; 43(6):2128–33.

Canada's non-white ethnic groups are at higher risk for type 2 diabetes than their white counterparts

From population health surveys conducted between 1996 and 2005, identified a multi-ethnic cohort of 59,824 non-diabetic Ontarians aged 30 or older. Respondents were followed from their survey interview date to the diabetes diagnosis date, death date or March 31, 2009, whichever occurred first.

A body mass index (BMI) of 30 or more is considered to be a key risk factor for diabetes in white populations. Is this BMI an appropriate standard for defining diabetes risk in non-white populations?

- After adjusting for age, sex, sociodemographic characteristics and BMI, the risk of diabetes was 3.4 times higher among South Asians, 2.0 times higher for blacks and 1.9 times higher for Chinese persons than for white persons.
- The median age at diagnosis was lowest among South Asians (49 years), followed by Chinese (55 years), black (57 years), and white (58 years) persons.
- For the equivalent incidence rate of diabetes at a BMI of 30 in white persons, the BMI cutoff value for South Asian, Chinese and black persons was 24, 25 and 26, respectively.

As the proportion of Canada's population that is comprised of visible minority groups increases over time, there is an urgent need for ethnically appropriate diabetes education and screening programs, and for lowering current targets for ideal body weight for non-white populations.

Chiu M, Austin PC, Manuel DG, Shah BR, Tu JV. Deriving ethnic-specific BMI cutoff points for assessing diabetes risk. *Diabetes Care*. 2011; 34(8):1741–8.

ED wait times are associated with higher rates of mortality and hospital admission in Ontario

Analyzed outcomes of all patients who attended high-volume EDs (those treating more than 13,324 patients annually) in Ontario from April 2003 to March 2008 but were not admitted; this included patients who were seen and discharged and those who left without being seen. Average length of stay was calculated separately for each ED and ED shift. Adverse events were defined as death or a hospital admission within seven days after leaving the ED.

Approximately 85% of patients who present at an emergency department (ED) go home after their visit. What is the effect of ED wait times on outcomes for these patients?

- Overall, 13,934,542 patients were seen and discharged, and 617,011 patients left without being seen.
- Patients who were seen during ED shifts in which wait times were longer were more likely to suffer an adverse event.
- For high-acuity patients with an ED wait time of six or more hours, the risk of death was 79% higher and of hospitalization 95% higher when compared to a wait time of one hour.
- Even for low-acuity, less sick patients, the relative risk of death was 71% higher and of hospitalization 66% higher for ED shifts that had wait times of six hours or more.
- Patients who left the ED without being seen did not have a higher risk of death or need for hospital admission than patients who were seen by an ED physician and discharged home.

Reducing adverse events attributable to long wait times among patients who go home is probably best achieved by reducing the overall length of stay in EDs for all patients, rather than targeting for review or follow-up those patients who leave without being seen. Further research on patient safety should evaluate whether quality improvement and performance measurement initiatives prioritizing ED wait times result in reductions of adverse events.

Guttmann A, Schull MJ, Vermeulen MJ, Stukel TA. Association between waiting times and short term mortality and hospital admission after departure from emergency department: population based cohort study from Ontario, Canada. *BMJ*. 2011; 342:d2983.

Bronchodilators are linked to bladder dysfunction in patients with COPD

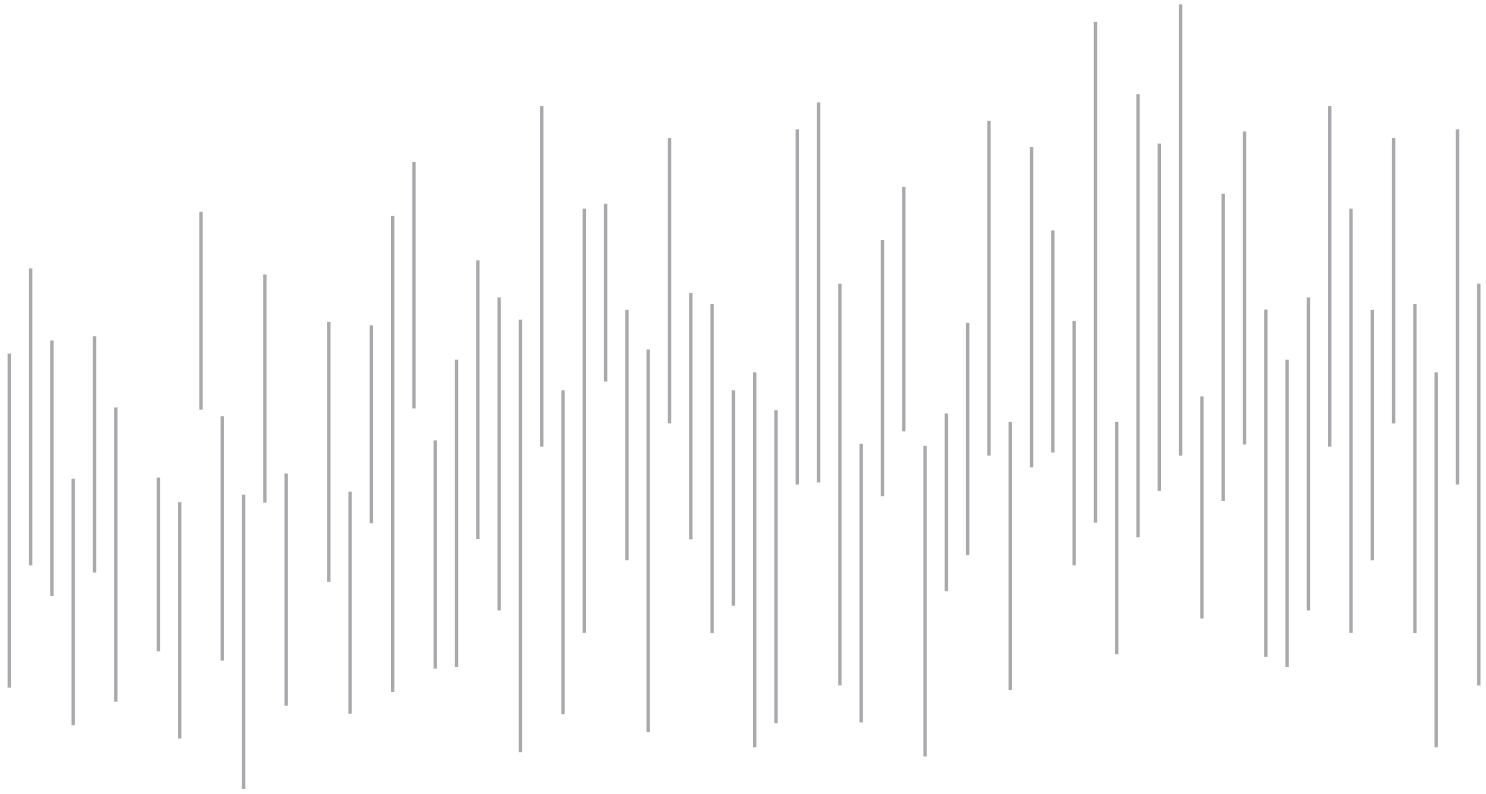
Followed all individuals aged 66 or older who were added to the Ontario COPD database between April 2003 and March 2009, and matched those who had an emergency department visit, a same-day surgery visit or a hospitalization for AUR with up to five controls.

Inhaled anticholinergic medications (IACs) are widely used in the treatment of chronic obstructive pulmonary disease (COPD). Acute urinary retention (AUR) is common in older men with prostatic enlargement and is associated with increased morbidity and mortality. AUR can be precipitated by the use of IACs. What is the risk of AUR in seniors with COPD using IACs?

- Of 565,073 individuals with COPD, 9,432 men and 1,806 women developed AUR.
- Approximately 1 in 263 current users of IACs developed AUR over 180 days.
- Compared with non-users of IACs, users had a significantly increased risk (42%) of hospitalization, ED visits or same-day surgery for AUR.
- Individuals at highest risk were men prescribed both short- and long-acting IACs concomitantly (169% higher) and men with benign prostatic hyperplasia (81% higher).

Physicians should highlight for patients the possible connection between urinary symptoms and inhaled respiratory medication use to ensure that changes in urinary flow are reported. Reliable and comprehensive safety data are needed to determine whether the increasing morbidity and mortality in COPD are due to the underlying disease or are treatment-induced.

Stephenson A, Seitz D, Bell CM, Gruneir A, Gershon AS, Austin PC, Fu L, Anderson GM, Rochon PA, Gill SS. Inhaled anticholinergic drug therapy and the risk of acute urinary retention in chronic obstructive pulmonary disease: a population-based study. *Arch Intern Med*. 2011; 171(10):914–20.



The Canadian lifestyle is hazardous to immigrant heart health

Among the four ethnic groups, compared cardiovascular risk factor profiles of 7,515 recent immigrants to Ontario (those in Canada for less than 15 years) with 156,282 long-term residents (native-born Canadians and immigrants in Canada for 15 or more years). Cardiovascular risk factors included smoking, obesity, diabetes and hypertension. The proportion of risk that could be attributed to long-term Canadian residency was calculated.

There is growing evidence that cardiovascular risk profiles differ markedly across Canada's four main ethnic groups: white, South Asian, Chinese and black. What is the impact of long-term Canadian residency on cardiovascular risk within and across these groups?

- For all ethnic groups, the percentage of respondents with two or more major cardiovascular risk factors was higher for those who resided longer in Canada.
- The greatest proportional change in recent immigrants vs. long-term residents was observed in the Chinese group (2.2% vs. 5.2%), followed by the white (6.5% vs. 10.3%), black (9.2% vs. 12.1%) and South Asian (7.7% vs. 8.2%) groups.
- Diabetes was 1.8 times more prevalent among long-term residents of Chinese or white descent than among their recent immigrant counterparts.
- South Asian and black females who were born in Canada or lived in Canada for at least 15 years were 3 to 4 times more likely to smoke than their recent immigrant counterparts.

Given that immigrants will be responsible for the net growth of the Canadian population by 2031, there is a need to better understand how to preserve the healthy behaviours of recent immigrants and reduce the negative influences of Western culture.

Chiu M, Austin PC, Manuel DG, Tu JV. Cardiovascular risk factor profiles of recent immigrants vs. long-term residents of Ontario: a multi-ethnic study. *Can J Cardiol*. 2012; 28(1):20–6.

Researchers

From left to right:
Duminda Wijeysundera: *Study raises doubts about value of heart ultrasound before elective surgery*
Donald Redelmeier: *Ontario's recent immigrants are safer drivers than long-term residents*
Astrid Guttmann: *ED wait times are associated with higher rates of mortality and hospital admission in Ontario*
Peter Austin: *Bronchodilators are linked to bladder dysfunction in patients with COPD*
Maria Chiu: *The Canadian lifestyle is hazardous to immigrant heart health*

SEPTEMBER 2011

Emergency department triage of heart attack patients has improved in Ontario

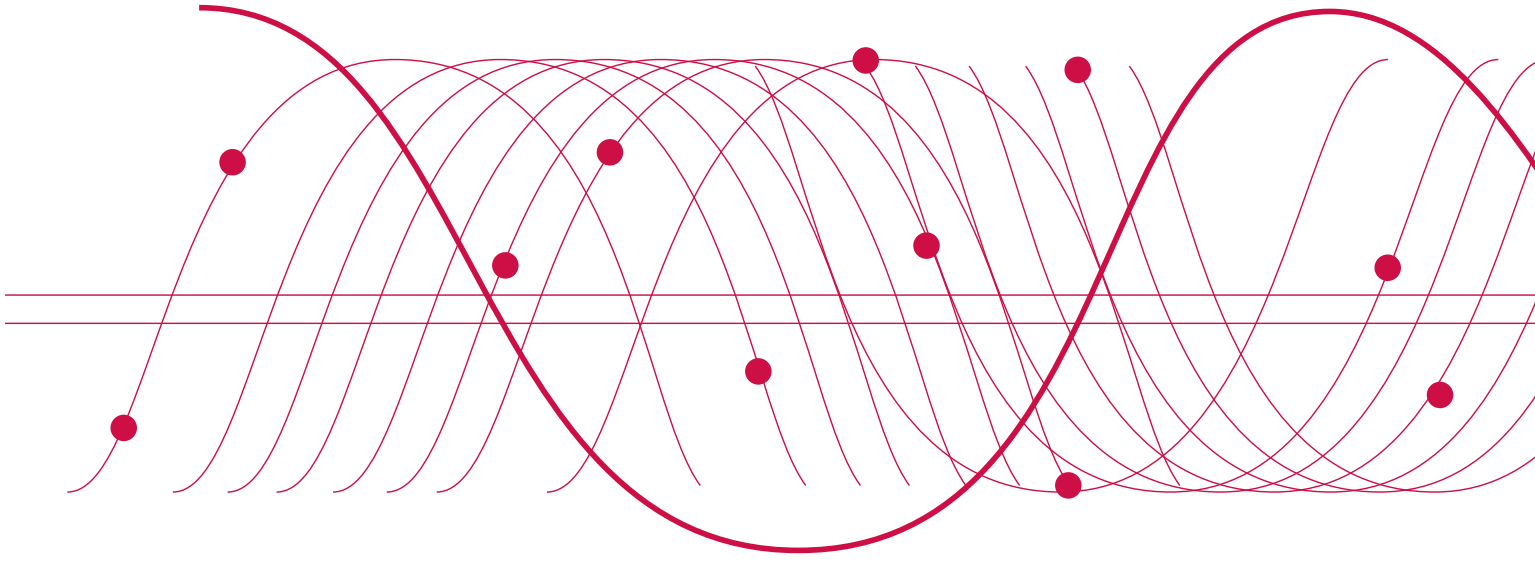
Identified 6,605 patients with AMI admitted to 96 Ontario hospitals in 2004/05 and compared them to similar cohorts at those sites in 2000/01 according to the rate of low-priority ED triage (a score of 3, 4 or 5), and its effect on the time to diagnosis and therapy, length of hospital stay and mortality.

In 2000/01, approximately half of patients with acute myocardial infarction (AMI) presenting at an emergency department (ED) in Ontario were given a low-priority triage score. Was this appropriate and how does it compare to more recent findings?

- Among patients with AMI, low-priority triage in 2004/05 was less frequent than in the earlier cohort (33.3% vs. 50.3%).
- In patients with ST-segment elevation myocardial infarction, it was 25.9%, vs. 43.8% previously.
- Being assigned a low-priority triage score was linked to an increase in median door-to-electrocardiogram and door-to-needle times of 12.2 and 20.7 minutes, respectively, longer than in the earlier cohort (4.4 and 15.1 minutes); and was associated with a longer hospital stay and higher 90-day and one-year mortality.

Given that triage is performed on all ED patients, is associated with patient outcomes and is amenable to improvement, hospital systems should consider adopting a standardized triage system, monitoring ED triage and supporting ongoing systems-level initiatives that could improve it.

Atzema CL, Schull MJ, Austin PC, Tu JV. Temporal changes in emergency department triage of patients with acute myocardial infarction and the effect on outcomes. *Am Heart J*. 2011; 162(3):451–9.



One in four Ontario adults will be diagnosed with COPD by age 80

Identified all Ontario residents aged 35 to 80 who were free of COPD in April 1996 and monitored them until March 2010 for three possible outcomes: diagnosis of COPD by a physician, reached 80 years of age or death. The cumulative incidence of physician-diagnosed COPD over a lifetime was calculated.

Chronic obstructive pulmonary disease (COPD) is a progressive respiratory disease linked to smoking and exposure to air-borne pollutants. Although it is one of the most prevalent and costly chronic diseases, there has never been a comprehensive estimate of the risk of developing COPD in the general population.

- A total of 579,466 adults were diagnosed with COPD by a physician over the study period.
- The lifetime risk of physician-diagnosed COPD for adults aged 35 or older was 27.6% at age 80.
- The risk was higher in men than in women (29.7% vs. 25.6%), in those living in a rural setting compared with urban areas (32.4% vs. 26.7%), and in those in the lowest versus the highest socioeconomic groups (32.1% vs. 23.0%).

These findings draw attention to the huge burden of COPD on society and can be used to educate the public about the need for resources to combat the disease. They can also be used to support the need for smoking cessation programs and the development of other strategies to optimize COPD care.

Gershon AS, Warner L, Cascagnette P, Victor JC, To T. Lifetime risk of developing chronic obstructive pulmonary disease: a longitudinal population study. *Lancet*. 2011; 378(9795):991–6.

Few Ontario women with gestational diabetes receive follow-up testing for type 2 diabetes

Identified 47,691 women aged 17 to 49 with GDM who had live births at an Ontario hospital between April 1994 and March 2008 and matched them to similar women without GDM. The type of diabetes test administered up to six months postpartum and the specialty of the ordering physician were determined.

Canadian clinical practice guidelines recommend testing women with gestational diabetes mellitus (GDM) between six weeks and six months after delivery to detect the presence of type 2 diabetes. To what extent are these guidelines being followed in Ontario?

- Overall, 2.8% of pregnancies were complicated by GDM.
- Postpartum administration rates of the oral glucose tolerance test (OGTT) increased by approximately 0.8% per year for women with GDM, an increase of 11% from 1994 to 2008.
- Nonetheless, by the end of the study period, fewer than 1 in 6 women with GDM received an OGTT.
- As expected, a postpartum OGTT for women without GDM was uncommon and did not change over time.
- Virtually all women with GDM had postpartum visits with a family physician or obstetrician; 4.5% of women had an OGTT ordered by one of these physicians.

Interventions to change test ordering that target family physicians and obstetricians are most likely to increase the proportion of women with GDM who receive postpartum diabetes testing.

Shah BR, Lipscombe LL, Feig DS, Lowe JM. Missed opportunities for type 2 diabetes testing following gestational diabetes: a population-based cohort study. *BJOG*. 2011; 118(12):1484–90.

Many seniors fail to renew prescriptions after discharge from hospital

Analyzed hospitalization and prescription records of all Ontario residents between 1997 and 2009 and identified 396,380 patients aged 66 or older with long-term use of at least one of five medication groups (statins, antiplatelet/anticoagulant agents, levothyroxine, respiratory inhalers and gastric acid suppressants). Patients were stratified into three groups: those admitted to the ICU (n=16,474), those hospitalized without ICU admission (171,438), and a non-hospitalized control group (208,468). Their rates of medication discontinuation at 90 days after hospital discharge were compared.

At hospital discharge, patients may be susceptible to prescription errors of omission as responsibility shifts from one physician to another. For patients taking medications for chronic diseases, what is the risk of unintentionally discontinuing these drugs after discharge?

- Hospitalized patients had a higher rate of discontinuation across all medication groups compared to the controls.
- The antiplatelet/anticoagulant group had the highest discontinuation rate (19.4%) of all medication groups.
- Within that group, 22.8% had an ICU admission and discontinued their medication after hospital discharge, compared to only 11.8% in the control group.
- ICU admission was associated with an additional risk of discontinuation in four of the five medication groups versus hospitalizations without ICU admission.

Better interdisciplinary communication that includes primary care physicians and large-scale organizational innovations based on electronic health records are advocated as solutions to improve medication continuity and patient safety.

Bell CM, Brener SS, Gunraj N, Huo C, Bierman AS, Scales DC, Bajcar J, Zwarenstein M, Urbach DR. Association of ICU or hospital admission with unintentional discontinuation of medications for chronic diseases. *JAMA*. 2011; 306(8):840–7.

Cholinesterase inhibitors are not linked to postsurgery complications in seniors with dementia

Analyzed all individuals with dementia aged 66 or older who underwent hip fracture surgery between April 2003 and December 2007 in Ontario. Patients were stratified by type of anesthesia used (general or regional; regional does not involve the use of muscle relaxants), residence type (community dwelling or long-term care) and use or non-use of ChEIs. Mortality and morbidity rates were calculated.

Cholinesterase inhibitors (ChEIs), which may provide short-term cognitive improvements in older adults with mild dementia, have been reported to interact with muscle relaxants given during general anesthesia, increasing the risk of postoperative complications. What effect do ChEIs have on outcomes of older adults who have undergone hip fracture surgery?

- Of the 11,787 patients with hip fracture and dementia, 45% received general anesthesia for surgery and 49% resided in long-term care.
- ChEIs were used by 26% of patients before surgery.
- High rates of postoperative mortality and complications were observed in both users and non-users of ChEIs in the matched samples.
- There was no evidence of an increased risk of adverse postoperative outcomes associated with ChEIs for patients receiving general anesthesia.

Poor postoperative outcomes overall reinforce the need to prevent fractures and improve outcomes in older adults with dementia.

Seitz DP, Gill SS, Gruneir A, Austin PC, Anderson G, Reimer CL, Rochon PA. Effects of cholinesterase inhibitors on postoperative outcomes of older adults with dementia undergoing hip fracture surgery. *Am J Geriatr Psychiatry*. 2011; 19(9):803–13.

Popular anti-inflammatory drugs raise the risk of heart attack in patients with pre-existing cardiovascular risk

Undertook a systematic review of 51 large-scale observational studies on NSAIDs and cardiovascular risk from Europe, the U.S., Canada and Australia. Used the pooled data to study the effects of high and low doses of different NSAIDs on patients with high or low risk of vascular disease.

The pain-relieving, fever-reducing and inflammation-reducing properties of the class of drugs called non-steroidal anti-inflammatory drugs (NSAIDs) make them popular for the treatment of many common conditions. However, NSAIDs have well-documented side effects. The risk of cardiovascular complications during treatment with NSAIDs is one of the most studied adverse drug reactions, but these reviews provide limited information on dose effects and patient characteristics and do not directly compare the cardiovascular risk for each drug.

- Among drugs that are popular in Canada and the U.S., diclofenac (brand names include Voltaren), indomethacin (Indocid) and etodolac (Lodine) presented the highest cardiovascular risk, and naproxen (Aleve, Naprosyn) presented the lowest risk.
- Among drugs used outside North America, etoricoxib (Arcoxia) had the highest risk.
- Among the most widely used NSAIDs, naproxen and low-dose ibuprofen (Motrin, Advil, Nuprin) were least likely to increase cardiovascular risk.
- The risk with ibuprofen rose when the dose was higher than 1,200 mg per day.
- In contrast, naproxen remained free of risk at higher doses and was safer overall.
- Celecoxib (Celebrex) had a similar risk profile to ibuprofen with an increased risk at doses higher than 200 mg per day.
- Diclofenac was found to elevate risk in low doses—doses that are available without prescription in several countries.
- Indomethacin is an old, rather toxic drug and is still quite popular for treating gout, but the new evidence on cardiovascular risk casts doubt on its continued clinical use.

These results should inform clinical and regulatory decisions. Physicians should prescribe selectively after assessing a patient's risk of a heart attack or stroke and estimating the additional risk posed by the NSAID under consideration.

McGettigan P, Henry D. Cardiovascular risk with non-steroidal anti-inflammatory drugs: systematic review of population-based controlled observational studies. *PLoS Med*. 2011; 8(9):e1001098.

Researchers

From left to right:
Clare Atzema: *Emergency department triage of heart attack patients has improved in Ontario*
Teresa To: *One in four Ontario adults will be diagnosed with COPD by age 80*
Baiju Shah: *Few Ontario women with gestational diabetes receive follow-up testing for type 2 diabetes*
Chaim Bell: *Many seniors fail to renew prescriptions after discharge from hospital*
Paula Rochon: *Cholinesterase inhibitors are not linked to postsurgery complications in seniors with dementia*

OCTOBER 2011

Tamoxifen use is linked to increased diabetes risk in breast cancer survivors

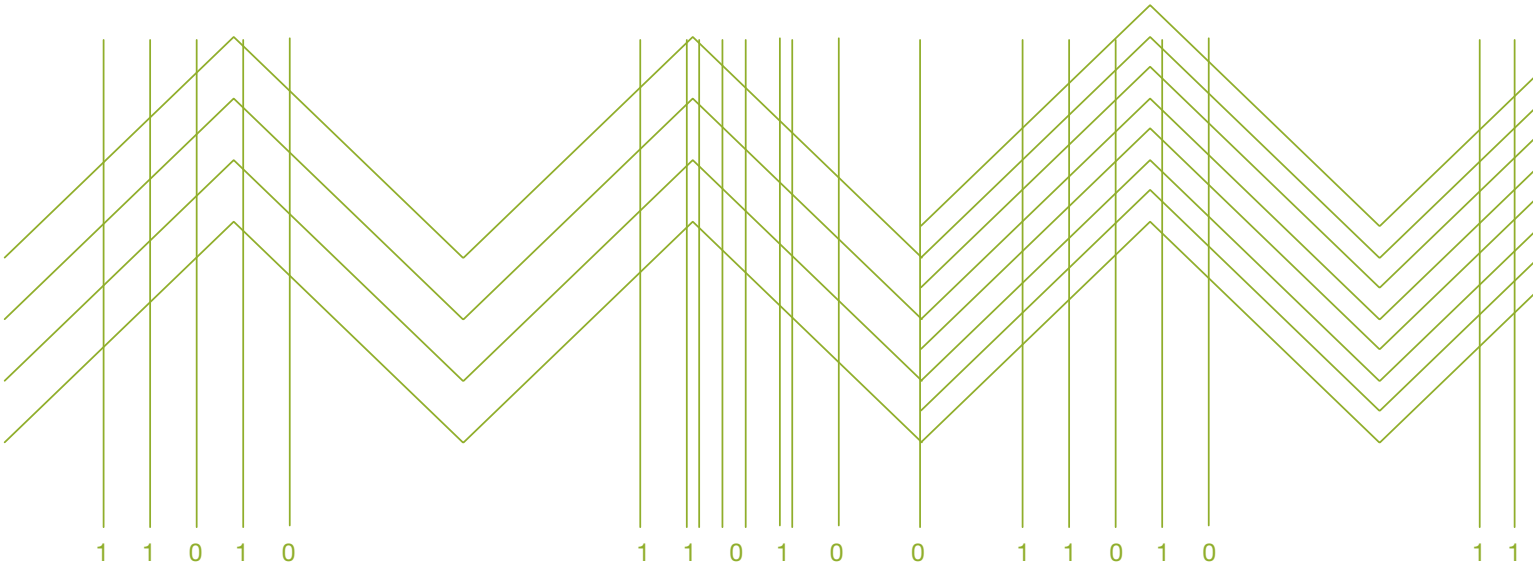
Identified women aged 66 or older who were newly diagnosed with early-stage breast cancer between April 1996 and March 2006 in Ontario. Patients were observed until the first occurrence of diabetes, a breast cancer recurrence, a new malignancy, death or March 31, 2008. Cohort members diagnosed with diabetes during follow-up were matched with up to five controls from the cohort who did not develop diabetes. The likelihood of diabetes was compared for current tamoxifen users and non-users.

Tamoxifen is the most commonly prescribed hormonal treatment in women with breast cancer. Is tamoxifen use in older breast cancer survivors associated with an increased risk of diabetes?

- Of 14,360 breast cancer survivors identified (average age at diagnosis 74.9 years), 1,445 (10%) developed diabetes over an average follow-up of 5.2 years.
- The odds of developing diabetes were 24% higher in women treated with tamoxifen compared to those not receiving the drug.

Reasons for the association between tamoxifen use and increased risk of diabetes among older breast cancer survivors are not well understood, and further research is needed. Closer monitoring for diabetes in tamoxifen-treated breast cancer survivors may be warranted.

Lipscombe LL, Fischer HD, Yun L, Gruneir A, Austin P, Paszat L, Anderson GM, Rochon PA. Association between tamoxifen treatment and diabetes. *Cancer*. 2012; 118(10):2615–22.



Low-income girls in Ontario are least likely to complete the HPV vaccine regimen

Identified girls residing in the Kingston, Frontenac, Lennox and Addington public health district who were eligible for Ontario's grade 8 HPV vaccination program in 2007/08 and 2008/09. Determined the proportion that initiated (at least one dose) and completed (all three doses) the vaccine series according to sociodemographic factors, vaccination history, health services utilization and medical history.

Over a hundred million dollars have been invested in offering free human papillomavirus (HPV) vaccination to young girls in Ontario. The vaccine is designed to protect against HPV strains that cause 70% of cervical cancers and 90% of genital warts. What level of coverage has been achieved and what factors are associated with vaccine acceptance in this population?

- Of 2,519 girls, 56.6% received at least one dose of HPV vaccine.
- Among vaccinated girls, 85.3% received all three doses, 11.2% received two doses and 3.5% received only the first.
- Girls who received the measles-mumps-rubella, meningococcal C and hepatitis B vaccines were considerably more likely to also receive the HPV vaccine.
- However, HPV vaccine uptake was more than 20% lower than that of these other vaccines.
- Girls of low income were the least likely to complete the three-dose regimen.

Program delivery should be modified to improve HPV vaccine series completion in vulnerable populations. The association between HPV vaccine uptake and hospital admissions and outpatient visits requires further study.

Smith LM, Brassard P, Kwong JC, Deeks SL, Ellis AK, Lévesque LE. Factors associated with initiation and completion of the quadrivalent human papillomavirus vaccine series in an Ontario cohort of grade 8 girls. *BMC Public Health*. 2011; 11:645

Drug-eluting stents reduce the need for revascularization in the treatment of SVG disease

Identified 2,222 patients who had stent implantation for the treatment of SVG disease from December 2003 to December 2008 in Ontario. The primary safety outcomes were myocardial infarction and all-cause mortality. The primary effectiveness outcome was repeat target vessel revascularization.

Saphenous vein graft (SVG) disease is characterized by stenosis (narrowing) of a SVG following bypass surgery. What is the long-term safety and effectiveness of drug-eluting stents (DES) in treating SVG disease in comparison to bare-metal stents (BMS)?

- Overall, 803 patients received DES and 1,419 received BMS.
- DES were associated with a significant reduction in the need for future revascularization compared to BMS.
- The reduction was largest in patients who were diabetics or had longer lesions.
- Myocardial infarction and mortality rates did not significantly differ in the DES and BMS groups at four years.

While awaiting the results of larger randomized clinical trials with long-term follow-up, these results lend support to the current practice of implanting DES among appropriate patients with SVG lesions.

Ko DT, Guo H, Wijeysundera HC, Zia MI, Dzavik V, Chu MW, Fremes SE, Cohen EA, Tu JV. Long-term safety and effectiveness of drug-eluting stents for the treatment of saphenous vein grafts disease: a population-based study. *JACC Cardiovasc Interv*. 2011; 4(9):965–73.

Poor health status outranks socioeconomic status as the greater predictor of ED use

Linked national health survey responses of 9,323,217 Ontario participants aged 20–74 to physician utilization data for 1999–2001 and ED utilization data for 2002. Less urgent ED visits were defined as those assigned a Canadian Triage and Acuity Scale score of 4 or 5. SES was defined by education (high school completion) and income level.

In a system with publicly funded health insurance, which is the larger predictor of emergency department (ED) use: socioeconomic status (SES) or health status?

- The average age of the overall sample was 46.0 years, and 90.9% of respondents reported having a regular doctor.
- In 2002, 31.4% of the sample visited an ED. The majority of visits (59.1%) were classified as less urgent.
- Fair or poor self-perceived health was the largest predictor of ED use, regardless of visit urgency.
- Those with less education had more ED visits (or higher visit rates) in both the low- and high-acuity categories, after controlling for age, sex, income, self-perceived health, urban or rural location, regular doctor and non-ED physician visits.

This study lends support to findings in other health systems that those using EDs are more ill and more disadvantaged and are not relying on EDs simply as a primary care provider.

Khan Y, Glazier RH, Moineddin R, Schull MJ. A population-based study of the association between socioeconomic status and emergency department utilization in Ontario, Canada. *Acad Emerg Med*. 2011; 18(8):836–43.

Antibiotic use is common among residents of Ontario nursing homes

Tracked antibiotic use among adults aged 66 or older residing in 363 LTC facilities in Ontario between April and June 2009. The facilities were grouped into quintiles according to their average antibiotic dispensing rates, and variation was compared across facilities.

It is estimated that up to half of antibiotic use in hospitals and long-term care (LTC) facilities is unnecessary or inappropriate, leading to a call for the implementation of antimicrobial stewardship programs in these facilities. What is the prevalence of antibiotic use among LTC facility residents in Ontario?

- In total 5.9% of LTC residents (2,190) were receiving antibiotic prescriptions.
- The three most prevalent antibiotics—most commonly used to treat urinary tract infections—were nitrofurantoin (15.4%), trimethoprim/sulfamethoxazole (14.3%) and ciprofloxacin (12.8%).
- The majority of treatment courses (62.6%) were of at least 10 days' duration and 20.9% exceeded 90 days.
- There was substantial variability in antibiotic use across LTC facilities, with a five-fold variation from the lowest-use quintile (2.2%) to the highest-use quintile (10.8%).

Antibiotic use in LTC facilities would benefit from focused antimicrobial stewardship interventions, including reviewing antibiotic utilization on a regular basis, limiting chronic antibiotic prophylaxis for urinary tract infections and promoting short-course therapy for common bacterial infections.

Daneman N, Gruneir A, Newman A, Fischer HD, Bronskill SE, Rochon PA, Anderson GM, Bell CM. Antibiotic use in long-term care facilities. *J Antimicrob Chemother*. 2011; 66(12):2856–63.

More than one in 10 immigrant women develop gestational diabetes

Identified a diagnosis of GDM among 770,875 consecutive deliveries in Ontario between April 2002 and March 2009, including 118,849 deliveries among women who immigrated to Ontario between 1985 and 2000. Calculated the risk of GDM in association with maternal region of world birth.

Compared with Canadian-born women, what is the risk of gestational diabetes mellitus (GDM) among immigrant women from various non-Caucasian ethnic groups?

- Canadian-born women had a 3% rate of GDM. The risk was more than double among immigrant women from the Caribbean (7.1%) and East Asia/Pacific regions (7.5%) and almost quadrupled among those from South Asia (10.4%).

Maternal region of world birth may help identify in early pregnancy those immigrant women who are at highest risk for developing GDM and who might benefit from dietary and activity modification. These findings might also help in deciding which women should be screened for adult-onset type 2 diabetes, since GDM is a recognized long-term risk factor for type 2 diabetes.

Urquia M, Glazier RH, Berger H, Ying I, De Souza L, Ray JG. Gestational diabetes among immigrant women. *Epidemiology*. 2011; 22(6):879–80.

Researchers

From left to right:
Lorraine Lipscombe: *Tamoxifen use is linked to increased diabetes risk in breast cancer survivors*
Jeff Kwong: *Low-income girls in Ontario are least likely to complete the HPV vaccine regimen*
Dennis Ko: *Drug-eluting stents reduce the need for revascularization in the treatment of SVG disease*
Rahim Moineddin: *Poor health status outranks socioeconomic status as the greater predictor of ED use*
Nick Daneman: *Antibiotic use is common among residents of Ontario nursing homes*

NOVEMBER 2011

One in six residents of Ontario long-term care homes receive nine or more medications

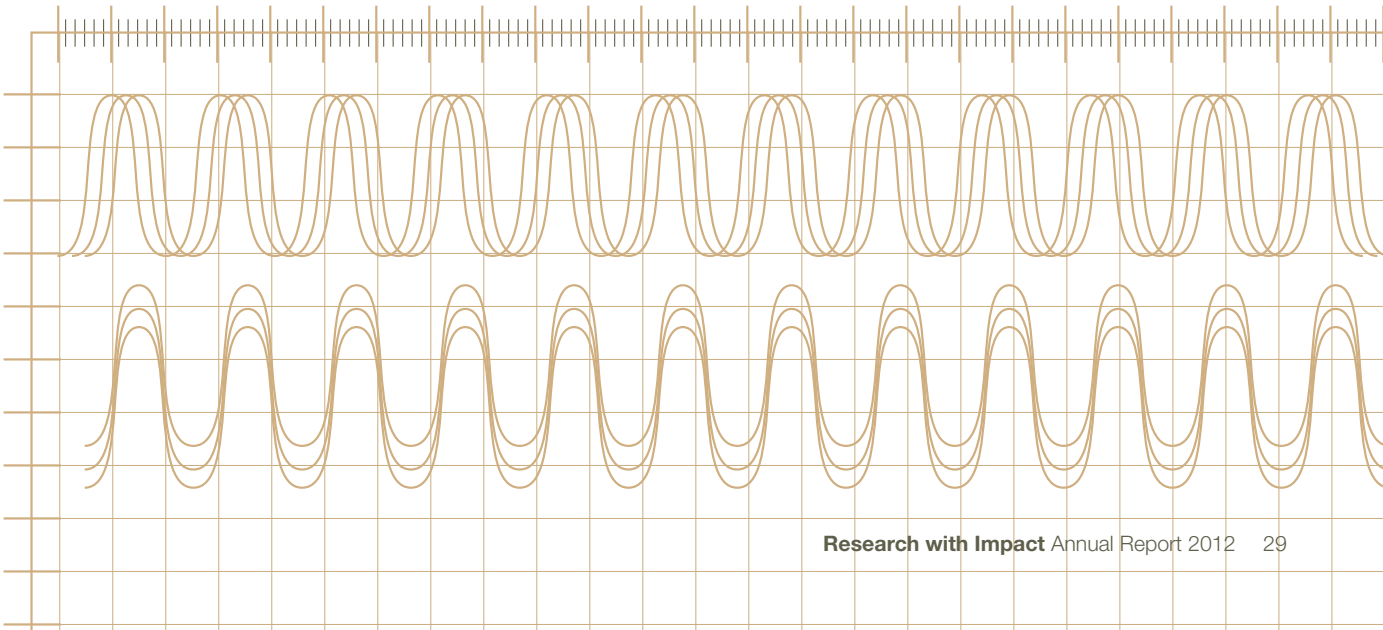
Identified 64,394 residents aged 66 or older in 589 Ontario LTC homes in the fall of 2005 and determined their prescription drug insurance claims. Facility-specific rates of polypharmacy—defined as taking nine or more distinct drug therapies concurrently—were calculated.

Polypharmacy (the use of multiple, concurrent drug therapies) is a concern in long-term care (LTC) settings where frail older adults are at risk for adverse events. What is the scope of this practice in Ontario?

- In total, 15.5% of residents received nine or more drug therapies, and 2.0% received 13 or more.
- Only 2.9% of residents received no drug therapy.
- Among those receiving nine or more drug therapies, diuretics, proton pump inhibitors and ACE inhibitors were the most commonly dispensed.
- There was a three-fold variation in polypharmacy rates across LTC homes (from 7.9–26.2% of residents); 65 homes were classified as high-rate facilities for polypharmacy and 116 homes were considered low-rate.

The high rate of polypharmacy in Ontario LTC homes and the wide variation in rates across the province suggest a role for this measure in guiding drug review at the facility level.

Bronskill SE, Gill SS, Paterson JM, Bell CM, GM Anderson, Rochon PA. Exploring variation in rates of polypharmacy across long-term care homes. *J Am Med Dir Assoc*. 2012; 13(3):309.e15–21.



Regulatory agency warnings reduce pediatric desmopressin prescribing rates

Examined prescribing rates of oral and intranasal desmopressin preparations among children aged younger than 13 years who were eligible for publicly funded drug coverage in Ontario between January 2003 and March 2010.

Desmopressin is an antidiuretic drug sometimes prescribed for bed-wetting. U.S. and Canadian health regulatory agencies issued safety alerts in December 2007 and July 2008, respectively, advising that the intranasal formulation of desmopressin was no longer indicated for the treatment of bedwetting. What impact did these alerts have on desmopressin prescribing rates among Ontario children?

- A total of 3,652 children received 23,104 desmopressin prescriptions during the study period.
- Following the alerts, the average treatment rate for all desmopressin users (oral and intranasal) fell 29.8%: from 6.7 to 4.7 people per 1,000 eligible population.
- The average treatment rate for users of oral and intranasal formulations fell 11.8% and 73.1%, respectively.

These findings highlight the effectiveness of regulatory agency warnings on changing physician prescribing behaviour in a pediatric population.

Gomes T, Juurlink DN, Moore I, Maguire JL, Mamdani MM. The impact of federal warnings on publically funded desmopressin utilization among children in Ontario. *J Pediatr Urol*. 2012; 8(3):249–53.

One-third of Ontarians hospitalized for depression are not receiving recommended follow-up care

Identified Ontarians aged 15 or older hospitalized for unipolar depression from March 2005 to February 2006, and determined their depression-related health service use within 30 days following discharge.

People hospitalized for depression are often discharged before the acute phase of their illness has resolved; to prevent relapse, they need timely care transitions. High rates of postdischarge emergency department (ED) visits or rehospitalizations may signal suboptimal care. Is postdischarge depression care consistent with guideline and policy directions in Ontario?

- During the one-year study period, there were 13,385 hospital discharges for depression.
- Among these, 63% were followed within 30 days by a physician visit, 17% had a subsequent ED visit and 8% were rehospitalized.
- Women and people from urban or high-income areas were more likely to have postdischarge physician visits.
- Residents of rural areas or low-income neighbourhoods were more likely to have a postdischarge ED visit.
- Hospital readmission rates were consistent (6–8%) across age, sex, urban/rural dwelling, neighbourhood income and Local Health Integration Network.

Transitional discharge and outpatient management models, often consisting of physicians and non-physicians, have been demonstrated to provide improved outcomes for people with depression and should be considered as a means to address these gaps in care.

Lin E, Diaz-Granados N, Stewart DE, Bierman AS. Postdischarge care for depression in Ontario. *Can J Psychiatry*. 2011; 56(8):481–9.

Congenital heart defects are more prevalent in children of lower socioeconomic status

Identified children born with CHDs in Ontario between 1994 and 2007 and stratified them into one of five SES groups based on neighbourhood income and education levels. Rates of CHDs, categorized as severe or non-severe, were compared.

Congenital heart defects (CHDs) are the leading cause of death from congenital malformations, accounting for 6–10% of all infant deaths. Early studies observed a higher prevalence of CHDs among children born to mothers from low socioeconomic status (SES) groups. Have trends in the prevalence of CHDs remained the same for high and low SES groups?

- Of 1.87 million children born during the study period, 28,302 (6.8%) were diagnosed with CHDs.
- Children born in low SES areas represented 23% of all births. CHD rates were 20% higher in low-income areas and 26% higher in low-education areas.
- After adjusting for maternal age and maternal diabetes, both low income and low education remained significant risk factors for non-severe heart defects.
- For severe defects, only low education was found to be a significant risk factor.

These findings indicate that free and universal access to health care did not eliminate the SES gap observed in the prevalence of congenital heart disease. Access to prenatal screening and care and pregnancy termination may differ by SES. Identification of these factors and their incorporation into public health policies and practices should lead to further reductions in disease disparity.

Agha MM, Glazier RH, Moineddin R, Moore AM, Guttmann A. Socioeconomic status and prevalence of congenital heart defects: Does universal access to health care system eliminate the gap? *Birth Defects Res A Clin Mol Teratol*. 2011; 91(12):1011–8.

Stroke prevention clinic referrals are linked to significantly lower patient mortality

Tracked 16,468 consecutive patients with TIA or ischemic stroke who were seen in the emergency department or admitted to hospital between July 2003 and March 2008 at 12 stroke centres in Ontario. Patients subsequently referred to outpatient SPCs were matched with those who were not. Secondary prevention measures and all-cause one-year mortality and readmission rates were calculated.

Since 2001, 24 stroke prevention clinics (SPCs) have been established in Ontario to facilitate early assessment, diagnosis and treatment of patients with transient ischemic attack (TIA) or non-disabling stroke. What affect does referral to an SPC after an initial hospital admission for stroke have on mortality and readmission?

- Overall, 7,700 patients (46.7%) were referred for follow-up to a stroke prevention clinic.
- These patients were more likely to be younger and male, reside in higher income neighborhoods and urban areas, have had a TIA, and have been independent before the index event.
- They were also less likely to have had a history of stroke, diabetes, atrial fibrillation, myocardial infarction, congestive heart failure or dementia, but more likely to have had a history of hyperlipidemia.
- After adjusting for age, sex, ethnicity, income, coexisting conditions, stroke symptoms and severity, receipt of thrombolysis, stroke unit care, discharge destination and functional status at discharge, survival analysis showed a 26% reduction in mortality at one year for those referred to SPCs.
- There were no significant differences between the two groups in hospital readmission rates at one year.

These findings provide additional evidence that outpatient SPCs are an important strategy for secondary stroke prevention. Future research could examine whether SPCs are cost-effective in reducing hospital and emergency department visits.

Webster F, Saposnik G, Kapral MK, Fang J, O'Callaghan C, Hachinski V. Organized outpatient care: stroke prevention clinic referrals are associated with reduced mortality after transient ischemic attack and ischemic stroke. *Stroke*. 2011; 42(11):3176–82.

Researchers

From left to right:
Susan Bronskill: *One in six residents of Ontario long-term care homes receive nine or more medications*
David Juurlink: *Regulatory agency warnings reduce pediatric desmopressin prescribing rates*
Elizabeth Lin: *One-third of Ontarians hospitalized for depression are not receiving recommended follow-up care*
Gustavo Saposnik: *Stroke prevention clinic referrals are linked to significantly lower patient mortality*

DECEMBER 2011

Almost one in five methadone patients are filling prescriptions for other opioids

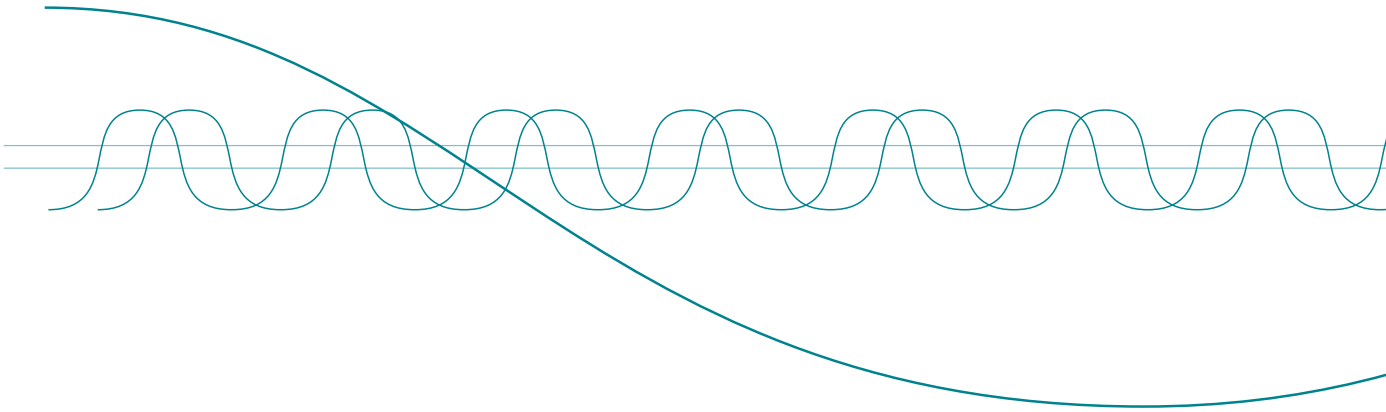
Used the Ontario Drug Benefit database to identify 18,759 Ontarians aged 15 to 64 who received at least 30 days of continuous MMT between April 2003 and March 2010. Determined the proportion who filled at least one prescription for more than seven days of a non-methadone opioid.

Methadone is a long-acting opioid used to treat patients with opioid dependence. To what extent are individuals receiving methadone maintenance therapy (MMT) also receiving prescriptions for other opioids? Do these prescriptions originate from the same physicians or pharmacies involved in MMT?

- In total, 18% of the patients on MMT were prescribed non-methadone opioids concurrently, averaging about 12 prescriptions a year, including oxycodone, codeine and fentanyl.
- Of these prescriptions, 68% were from non-MMT prescribing physicians and 46% were from non-MMT dispensing pharmacies.

Comprehensive, real-time access to prescription claims data may curtail the extent to which other opioids are co-prescribed with methadone. Patients on MMT needing pain management should be prescribed short-acting opioids for short periods of time by their methadone prescriber. Ontario's recently enacted *Narcotics Safety and Awareness Act* is meant to reduce the abuse and misuse of opioids.

Kurdyak P, Gomes T, Yao Z, Mamdani MM, Hellings C, Fischer B, Rehm J, Bayoumi A, Juurlink DN. Use of other opioids during methadone therapy: a population-based study. *Addiction*. 2012; 107(4):776–80.



Multiple factors influence the choice of cardiac procedures across Ontario hospitals

Analyzed the medical charts of 8,972 patients who underwent cardiac catheterization in 17 Ontario hospitals between April 2006 and March 2007. Grouped the hospitals into four categories according to their PCI:CABG ratio: low (less than 2.0), low-medium (2.0–2.7), medium-high (2.8–3.2) or high (more than 3.2). Explored the relative contribution of patient, physician and hospital factors to variations in the likelihood of patients receiving PCI or CABG surgery within 90 days of catheterization.

Percutaneous coronary intervention (PCI) is a safe alternative to coronary artery bypass graft (CABG) surgery for selected patients with coronary artery obstructions. The ratio of PCI to CABG surgery has increased in Ontario, as has its variation across hospitals. What factors are linked to these changes?

- There was a three-fold variation in ratios across the four hospital groups, ranging from a mean of 1.6 in the lowest-ratio group to 4.6 in the highest-ratio group.
- Coronary anatomy was the strongest predictor for PCI, followed by clinical indication for the procedure and treating hospital.
- Among patients with single-vessel disease, the revascularization mode was typically PCI.
- Those with left main artery disease usually underwent CABG surgery.
- Most of the variation in ratios was among patients with non-emergent multivessel disease, who could potentially undergo either PCI or CABG.
- Patients were 40% more likely to get a PCI if their angiogram was performed by an interventional cardiologist.
- Only 4% of cases were discussed in cardiologist-surgeon case conferences.

Patient-centred care with full disclosure of the benefits and harms associated with the two modes of revascularization is essential, as are consistency in decision making and a multidisciplinary team approach.

Tu JV, Ko DT, Guo H, Richards JA, Walton N, Natarajan MK, Wijeysundera HC, So D, Latter DA, Feindel CM, Kingsbury K, Cohen EA, for the Cardiac Care Network of Ontario VRPO Working Group. Determinants of variations in coronary revascularization practices. *CMAJ*. 2012; 184(2):179–86.

Older drivers taking antidepressants with other drugs are at higher risk of car crashes

Tracked Ontario adults who were aged 65 or older between January 2000 and October 2007 to determine how many had an at-fault crash while receiving an antidepressant alone or an antidepressant with another psychotropic drug (either a benzodiazepine or a strong anticholinergic).

About one in 10 seniors take antidepressants, and about one in six motor vehicle crashes involve drivers over age 65. Is there a relationship between antidepressant use and crash risk in older drivers?

- A total of 159,678 older adults had a crash during the study period, of whom 5% received an antidepressant in the month prior to the crash.
- Antidepressants alone did not lead to an increased risk of a crash.
- Patients co-prescribed an antidepressant and a benzodiazepine had a 23% increased crash risk; those taking an antidepressant and an anticholinergic drug had a 63% increased crash risk.

Physicians and pharmacists should warn patients of the risks of driving while taking an antidepressant concurrently with other psychotropic medications that can impair cognition.

Rapoport MJ, Zagorski B, Seitz D, Herrmann N, Molnar F, Redelmeier DA. At-fault motor vehicle crash risk in elderly patients treated with antidepressants. *Am J Geriatr Psychiatry*. 2011; 19(12):998–1006.

ICES study examines health system use by frail Ontario seniors

Examined four vulnerable populations of Ontario seniors with heavy health care needs or inadequate support: older women, individuals with dementia living in the community, home care clients with complex medical needs, and individuals waiting for placement in long-term care homes. Each group's health and functional status, health service use and access to caregiver support were compared in the year prior to and following the baseline date of April 1, 2007.

In 2009, 14% of Canada's population was aged 65 or older; it has been projected that by 2036 this group will account for 24% of the population. While many older adults will require only minimal support as they age, a significant number will have health conditions that require greater care across a broader range of health services and will be most susceptible to long-term care admission.

- Older men and women used hospital and physician services at similar levels; however, older women were more likely to use long-term care services, accounting for 65.6% of placements in long-term care facilities.
- Older adults with dementia were twice as likely to experience a hospital stay as those without dementia and to have a longer average length of stay—14.2 days compared to 8.6 days for adults without dementia.
- Medically complex home care clients discharged from acute care had high rates of multimorbidity and high rates of readmission.
- In total, 63.7% of these patients had 10 or more diagnosed conditions, and 56.5% were readmitted to acute care within one year of discharge.
- Among older adults receiving long-stay home care services, a larger proportion of women lived alone and relied on their children for support, while men also relied on a spouse.
- While waiting for placement in long-term care, older adults made frequent contact with the health care system.
- Of those waiting more than 205 days for placement, 63.5% had emergency department visits and 43.6% had acute care hospital admissions during their wait.

To alleviate some of the challenges faced by frail older adults living with chronic conditions and to reduce pressure on Ontario's health care system, more responsive care options are needed at home and in the community.

Bronskill SE, Camacho X, Gruneir A, Ho MM, editors. *Health System Use by Frail Ontario Seniors: An In-Depth Examination of Four Representative Cohorts*. Toronto: Institute for Clinical Evaluative Sciences; 2011.

Drug combination may lead to hyperkalaemia in the elderly

Identified Ontarians aged 66 or older receiving long-term treatment with spironolactone who were admitted to hospital for hyperkalaemia within 14 days of being prescribed TMP-SMX, amoxicillin, norfloxacin or nitrofurantoin between April 1992 and March 2010. The odds of hospitalization with hyperkalaemia were calculated.

The drug spironolactone—used to treat heart failure, hypertension and kidney disease—is a diuretic that works by helping the body excrete excess water and salt. It also reduces the excretion of potassium. Trimethoprim-sulfamethoxazole (TMP-SMX), an antibiotic commonly used for the treatment of urinary tract infection, also reduces potassium excretion. Are older patients taking spironolactone and TMP-SMX concurrently at increased risk of hospitalization for hyperkalaemia (high blood potassium)?

- During the 18-year study period, 6,903 admissions for hyperkalaemia were identified, 306 of which occurred within 14 days of antibiotic use.
- Overall, 10.8% of spironolactone users received at least one prescription for TMP-SMX.
- Compared with amoxicillin, TMP-SMX was associated with a 12.4% increased risk of hospital admission for hyperkalaemia.
- Norfloxacin and nitrofurantoin were associated, respectively, with a lower risk and no risk of hyperkalaemia.
- Approximately 60% of hyperkalaemia cases in older patients taking spironolactone and treated with an antibiotic could have been avoided if TMP-SMX was not prescribed.

Increased awareness of this drug interaction among pharmacists and physicians is needed to ensure that the potential for life threatening hyperkalaemia is minimized, either by selection of alternative antibiotics when appropriate or by close monitoring of patients treated with both drugs.

Antoniou T, Gomes T, Mamdani MM, Yao Z, Hellings C, Garg AX, Weir M, Juurlink DN. Trimethoprim-sulfamethoxazole induced hyperkalaemia in elderly patients receiving spironolactone: nested case-control study. *BMJ*. 2011; 343:d5228.

Researchers

From left to right:
Paul Kurdyak: *Almost one in five methadone patients are filling prescriptions for other opioids*
Jack Tu: *Multiple factors influence the choice of cardiac procedures across Ontario hospitals*
Muhammad Mamdani: *Drug combination may lead to hyperkalaemia in the elderly*

JANUARY 2012

Serious reactions to measles, mumps and rubella vaccine are uncommon

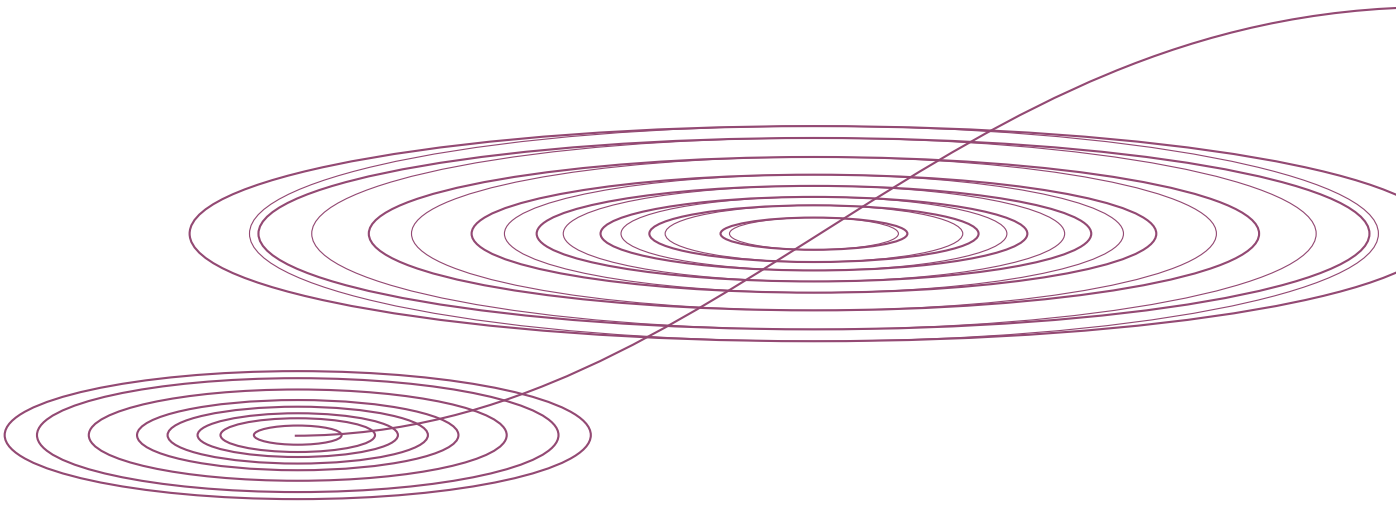
Examined 271,495 12-month vaccinations and 184,312 18-month vaccinations of children born from April 2006 to March 2009. Determined the incidence of emergency department (ED) visits or hospitalizations in one-day intervals following vaccination. These were compared to a control period 20 to 28 days later.

Measles, mumps and rubella (MMR) are highly contagious and can cause serious illness or death. In Ontario, the MMR vaccine is administered at age 12 months with a booster at 18 months. The vaccine has the potential to cause mild reactions (fever and rashes) one to two weeks following vaccination. What is the risk of serious adverse events with these vaccinations?

- Four to 12 days after the 12-month vaccination, children were 1.33 times more likely to visit the ED or be hospitalized compared to the control period. This represented at least one excess event for every 168 children vaccinated.
- Ten to 12 days after the 18-month vaccination, the incidence rate was 1.25 times more than for the control period, representing at least one excess event for every 730 children vaccinated.
- None of the children treated at EDs required hospitalization and none died from side effects.

The increase in ED visits could be a result of insufficient information being provided to parents who may not expect their child to develop a reaction a week after vaccination. Further studies should attempt to predict which children develop postvaccination reactions and whether these events could be prevented.

Wilson K, Hawken S, Kwong JC, Deeks S, Crowcroft NS, van Walraven C, Potter BK, Chakraborty P, Keelan J, Pluscauskas M, Manuel D. Adverse events following 12 and 18 month vaccinations: a population-based, self-controlled case series analysis. *PLoS One*. 2011; 6(12):e27897.



The majority of asthma sufferers have active disease with lengthy periods of remission

Identified 613,394 Ontarians with asthma as of April 1, 1994, and followed them until they left the province, died or March 31, 2009. Determined which of these individuals had one or more physician claims for asthma over the 15 years and of these, which had a gap of two or more years in asthma activity.

Asthma is a chronic respiratory disease known to persist, resolve and/or present with remissions and relapses, making its prognosis difficult to predict. What proportion of patients experience significant gaps in asthma activity? What patient factors are linked to asthma activity?

- In total, 504,851 individuals (82.3%) had active asthma.
- Of those who had complete follow-up, 314,167 (74.6%) experienced a gap of two or more years in physician claims and the remainder had persistent asthma.
- Females were more likely than males to have longer gaps between episodes, as were middle-aged adults and those without chronic obstructive pulmonary disease.

These findings offer some insight into the course of asthma activity and support the hypothesis that once a person has asthma, he or she will have it for life. Further study is needed to confirm these results by using detailed clinical data so that asthma patients and their health care providers can actively predict and manage the disease.

Gershon A, Guan J, Victor JC, Wang C, To T. The course of asthma activity: a population study. *J Allergy Clin Immunol*. 2012; 129(3):679–86.

Preoperative consultation rates vary widely among Ontario hospitals

Reviewed health records of 204,819 patients aged 40 or older who had major elective non-cardiac surgery at 79 Ontario hospitals from April 2004 to February 2009, and identified patient- and hospital-level predictors of consultation.

The preoperative medical consultation may be an opportunity to optimize factors associated with pre-existing medical conditions and begin interventions to reduce surgical risk. What factors determine whether patients undergo consultation and how does this vary by hospital?

- In total, 38.1% of patients had a preoperative consultation.
- They were typically older patients with increased burdens of comorbid disease who had surgery at teaching or higher-volume hospitals.
- Rates of hospital consultation ranged from 10 to 897 per 1,000 procedures; this variation was not explained by medical comorbidities, operative risk, hospital teaching status or surgical procedure volume.

The large interhospital variability suggests that local hospital factors play a large role in the use of preoperative consultation. Further research is needed to better understand the basis for hospital variation and to determine which patients benefit most from the practice.

Wijeysundera DN, Austin PC, Beattie WS, Hux JM, Laupacis A. Variation in the practice of preoperative medical consultation for major elective noncardiac surgery: a population-based study. *Anesthesiology*. 2012; 116(1):25–34.

Stroke patients who receive more inpatient services have reduced mortality from pneumonia

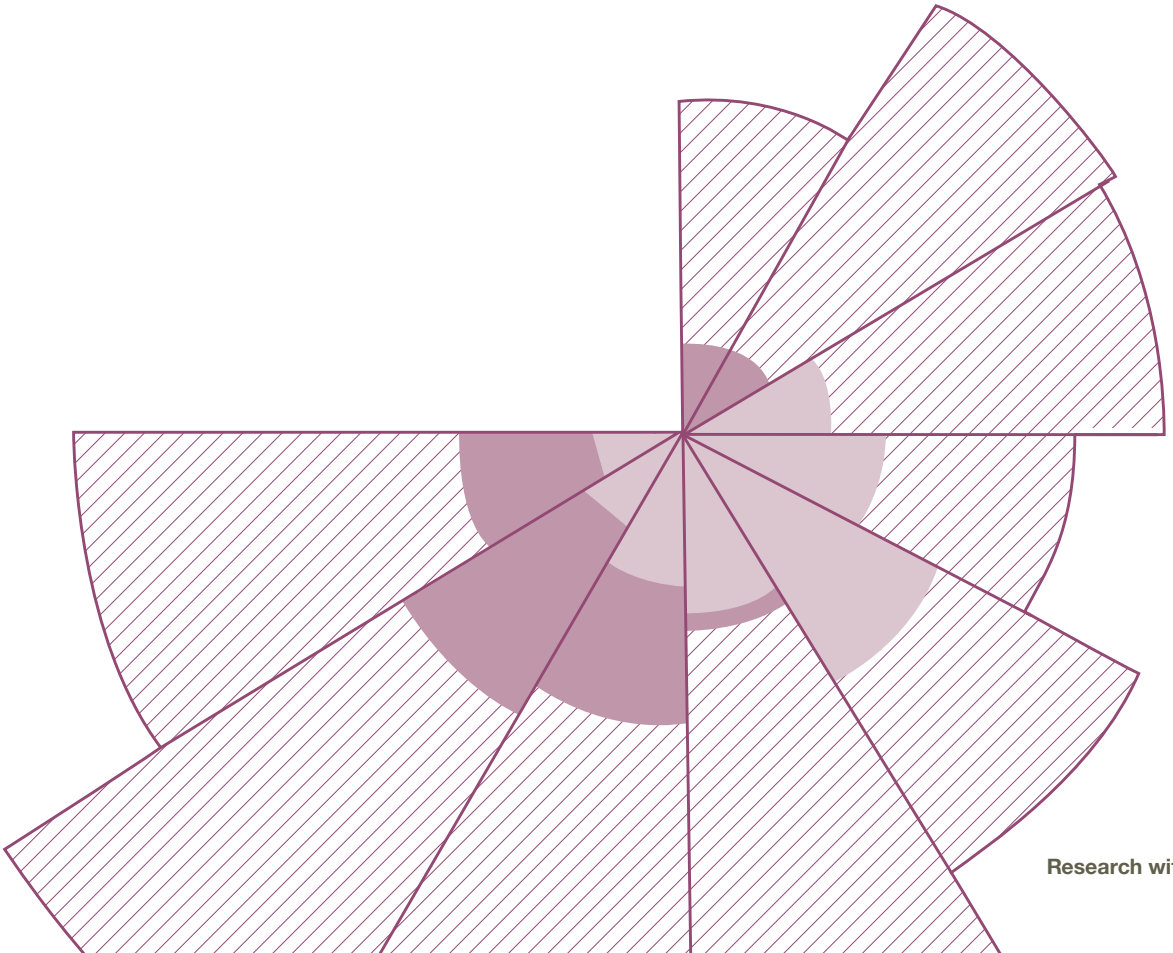
Analyzed 8,251 patients over 18 years of age admitted to regional stroke centres in Ontario within 72 hours of onset of ischemic stroke from July 2003 to March 2007. Identified those who developed pneumonia within 30 days of admission and computed mortality at 7, 30 and 365 days poststroke, controlling for a range of clinical measures. Type of stroke care was assessed.

Pneumonia is the most common medical complication after stroke. What risk factors and comorbid conditions are associated with the development of pneumonia after stroke and what impact does pneumonia have on stroke outcomes?

- Pneumonia was observed in 7.1% of patients within 30 days of stroke.
- The majority of pneumonia cases (97.3%) occurred during hospitalization with the remainder occurring after discharge.
- Pneumonia was associated with poor functional outcome and increased 30-day and 1-year, but not 7-day, mortality.
- Older age, dysphagia, male sex, stroke severity, preadmission dependency, and comorbid conditions (coronary artery disease and chronic obstructive pulmonary disease) were independent predictors of pneumonia.
- Patients who received more inpatient stroke services (occupational therapy, physiotherapy, stroke team assessment or stroke unit admission) had reduced mortality after pneumonia.

These findings show that some factors associated with pneumonia were not attributable to processes of care but rather related to non-modifiable factors, such as age, stroke severity and subtype, and preexisting comorbid conditions. However, care delivery was also a factor, and a better understanding of the risk factors and early outcomes of stroke-associated pneumonia may guide organized stroke care provision.

Finlayson O, Kapral M, Hall R, Asllani E, Selden D, Saposnik G, on behalf of the investigators of the Registry of the Canadian Stroke Network and the Stroke Outcome Research Canada Working Group. Risk factors, inpatient care, and outcomes of pneumonia after ischemic stroke. *Neurology*. 2011; 77(14):1338–45.



Transitions between health care settings present risks for older adults

Identified all Ontario LTC residents aged 66 or older on the day of the 2005 facility census (baseline) and categorized them as one of: newly admitted (30 days or less), shorter-stay (31–90 days) or longer-stay (91 days or more). Within each group, residents were further sub-divided based on having had a recent discharge from hospital. Residents were followed until first ED transfer, direct hospital admission, death or end of follow-up (180 days).

For older adults, important health consequences are associated with transitions between health care settings. Transfer to the emergency department (ED) is an adverse event that can act as a signal for critical gaps in care during these transitions. What is the risk of ED transfer for these two transition types: initial admission into long-term care (LTC), and discharge from an acute care hospital?

- Of 64,589 LTC residents, 3.0% were newly admitted, 4.9% were shorter-stay and 92.1% were longer-stay.
- The cumulative incidence of first ED transfer at six months was 35.0% for the newly admitted, 30.7% for the shorter-stay and 22.0% for the longer-stay.
- Regardless of time since LTC admission, residents with a recent discharge from hospital had a cumulative incidence of nearly 40% and an increase in the odds of ED transfer of at least 50% compared with those who had not been in hospital.

These findings suggest that opportunities to improve the transitional process into LTC, particularly those from hospital, need to be identified. Policy interventions may need to include options such as implementation of standardized posttransition protocols and funding practices that account for the distinct needs of residents newly transferred from the community and hospital settings. Development of quality indicators that describe transitional care may be another policy lever to improve this process.

Gruneir A, Bronskill S, Bell C, Gill S, Schull M, Ma X, Anderson G, Rochon PA. Recent health care transitions and emergency department use by chronic long-term care residents: a population-based cohort study. *J Am Med Dir Assoc*. 2012; 13(3):202–6.

Researchers

From left to right:
Kumanan Wilson: *Serious reactions to measles, mumps and rubella vaccine uncommon*
Andreas Laupacis: *Preoperative consultation rates vary widely among Ontario hospitals*
Moira Kapral: *Stroke patients receiving more inpatient services have reduced mortality from pneumonia*
Andrea Gruneir: *Transitions between health care settings present risks for older adults*

FEBRUARY 2012

Study examines the effect of government policies on payments to Ontario physicians

Using data from six funding sources, estimated public payments to physicians in Ontario by specialty and specialty group between 1992/93 and 2009/10. Analyzed how different payment models contributed to increases in physician payments.

How have government policies in Ontario affected trends in physician payments over time?

- Ontario spent approximately $8 billion on physician services in 2009/10, up from $3.7 billion in 1992/93.
- About 63% of the $4.3 billion increase was related to an increase in physician payments; the remainder was a result of increased physician supply.
- Average payments to physicians remained at or below the rate of inflation until 2004/05, after which they increased sharply and exceeded inflation.
- Efforts to reduce wait times in a fee-for-service environment disproportionately benefited key specialties, including ophthalmology and diagnostic imaging.
- These groups also gained financially from demographic changes, technological advances and increased health system capacity that enabled larger numbers of services to be provided.

These findings cannot answer whether increased investment has led to better patient outcomes or improved functioning of the health care system. Further research is critical to ensuring that taxpayer dollars provide maximal benefits for Ontario patients.

Henry DA, Schultz SE, Glazier RH, Bhatia RS, Dhalla IA, Laupacis A. *Payments to Ontario Physicians from Ministry of Health and Long-Term Care Sources, 1992/93 to 2009/10. ICES Investigative Report*. Toronto: Institute for Clinical Evaluative Sciences; 2012.

Stroke patients treated with tPA progress through inpatient rehabilitation more rapidly

Identified ischemic stroke patients admitted to a hospital and an inpatient rehabilitation unit in Ontario between July 2003 and March 2008 and divided them into two groups: 448 patients who received tPA and 1,514 patients who were medically eligible but did not. Three indicators of rehabilitation progress—gain in functional independence, active length of stay and discharge destination—were compared between the two groups.

Tissue plasminogen activator (tPA), a blood thinner, improves immediate and long-term patient recovery after ischemic stroke if administered within 2.5 hours of onset. Is tPA administration associated with accelerated progress through inpatient rehabilitation?

- On average, patients who received tPA experienced a 4% shorter active length of stay (approximately 1.5 days) and had a 35% greater probability of being discharged home or to the community compared to the non-tPA group.
- No differences were noted on functional independence during rehabilitation.

These findings represent benefits that are not only meaningful to the patient but may also reduce the burden on the stroke rehabilitation system as a whole. Future studies should focus on the impact of the rehabilitation facility on patient progress and explore the differences between tPA patients who do and do not experience posttreatment complications.

Meyer M, Murie-Fernandez M, Hall R, Liu Y, Fang J, Salter K, Foley N, Teasell R. Assessing the impact of thrombolysis on progress through inpatient rehabilitation after stroke: a multivariable approach. *Int J Stroke*. 2012; 7(6):460–4.

Dementia drug does not increase risk of adverse pulmonary outcomes in seniors with COPD

Identified Ontario residents over age 66 who were diagnosed with both dementia and COPD between April 2003 and March 2010 and determined their exposure to ChEIs. The outcome of interest was emergency department (ED) visits or hospitalizations for COPD within 60 days of receipt of a prescription for any ChEI.

Cholinesterase inhibitors (ChEIs) provide cognitive and functional benefits to some individuals with dementia; however, they may worsen airflow obstruction. What is the risk of pulmonary complications in patients with dementia and chronic obstructive pulmonary disease (COPD) who are receiving ChEIs?

- Of 266,840 patients with COPD, 45,503 (17.1%) had a diagnosis of dementia.
- Of these, 7,166 unexposed patients were matched to patients newly exposed to ChEIs.
- New users of ChEIs were not at significantly higher risk of ED visits or hospitalizations for COPD.
- ED visits for any respiratory diagnoses were not increased among new users compared to non-users.

While ChEIs did not increase the risk of acute complications, this study did not include a sub-group analysis of those with severe airflow obstruction. Therefore, individuals with severe COPD may benefit from close monitoring for increased respiratory symptoms after initiation of ChEI medication.

Stephenson A, Seitz DP, Fischer HD, Gruneir A, Bell CM, Gershon AS, Fu L, Anderson GM, Austin PC, Rochon PA, Gill SS. Cholinesterase inhibitors and adverse pulmonary events in older people with chronic obstructive pulmonary disease and concomitant dementia: a population-based cohort study. *Drugs Aging*. 2012; 29(3):213–23.

Women are more likely to experience complications after ICD implantation

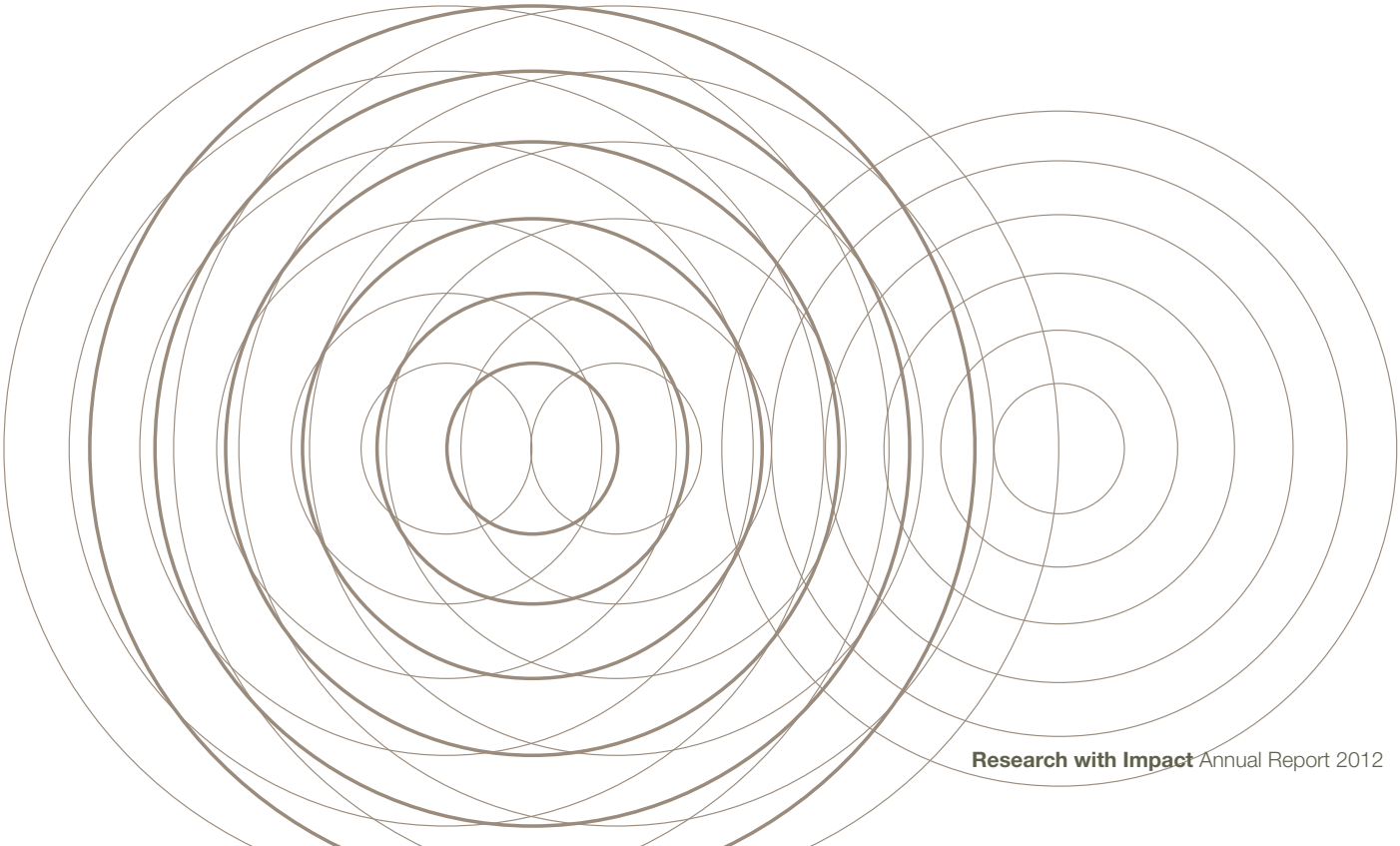
Identified 6,021 patients (4,733 men and 1,288 women) who were referred for ICD implantation at 18 Ontario hospitals between February 2007 and July 2010, and evaluated 45-day complication rates, device outcomes and mortality at one year.

An estimated 2,000 Ontarians receive their first implantable cardioverter-defibrillator (ICD) each year. Do women receive these devices in the same proportion as men and do they experience the same outcomes?

- A total of 5,450 patients received an ICD (4,295 men and 1,155 women). Although women made up a smaller proportion of all referred patients, they were equally likely to be implanted with an ICD after referral.
- Major complications occurred in 5.4% of women and 3.3% of men within 45 days after implantation.
- In longer-term follow-up, 13.9% of women and 7.4% of men developed major complications at one year postimplantation.
- The most common early major complications were lead repositioning in men and lead replacement in women.
- Late complications for both sexes included pocket infection and electrical storm.
- Women who were implanted with an ICD were 31% less likely to receive an appropriate shock and 27% less likely to receive an appropriate therapy from the device.
- One-year mortality rates were similar for women and men.

Although most of the differences in ICD complications were lead-related, differences in body size, delayed presentation in women and innate differences in response to disease may have been contributing factors. The risks and benefits of ICD placement may not be the same for men and women. Clinicians may need to tailor selection criteria in women.

MacFadden DR, Crystal E, Krahn AD, Mangat I, Healey JS, Dorian P, Birnie D, Simpson CS, Khaykin Y, Pinter A, Nanthakumar K, Calzavara AJ, Austin PC, Tu JV, Lee DS. Sex differences in implantable cardioverter-defibrillator outcomes: findings from a prospective defibrillator database. *Ann Intern Med*. 2012; 156(3):195–203.



Funding and safety warnings have a significant effect on ESA use in cancer patients

Identified all ESA initiations among Ontario patients diagnosed with cancer between January 1997 and December 2009 and explored the effects of two formulary changes that liberalized ESA coverage: rescinding the blood transfusion requirement in 2003, and removing all restrictions in 2007. Examined the effect of U.S. and Canadian regulatory warnings issued in 2007. Determined ESA prescription rates for each of Ontario's 14 regional cancer centres.

Erythropoiesis-stimulating agents (ESAs) are used to treat anemia, a common blood disorder in cancer patients. What are the effects of formulary changes and governmental safety warnings on the use of ESAs in this population?

- After the 2003 formulary change, the ESA initiation rate increased to 1.7 new users per 1,000 patients with cancer, 374% more than predicted.
- After the 2007 formulary change, the initiation rate increased to 4.0 new users per 1,000 patients with cancer, 73% more than predicted.
- After the safety warnings were issued, the initiation rate declined 81% by study end.
- There was significant regional variation in ESA use.

Formulary access and safety warnings had significant impacts on the new use of ESAs in patients with cancer, suggesting that both are effective means of influencing use. Variable prescription rates across regions may reflect a lack of consensus regarding the utility of ESAs.

Weir MA, Gomes T, Winquist E, Juurlink DN, Cuerden MS, Mamdani M. Effects of funding policy changes and health warnings on the use of erythropoiesis-stimulating agents. *J Oncology Pract*. 2012; 8(3):179–83.

Researchers

From left to right:
Sudeep Gill: *Dementia drug does not increase risk of adverse pulmonary outcomes in seniors with COPD*
Christopher Simpson: *Women are more likely to experience complications after ICD implantation*

MARCH 2012

Patients prescribed painkillers after minor surgery may become chronic users

Identified Ontario residents aged 66 and older who were dispensed an opioid within seven days of a short-stay surgery (e.g., cataract surgery) between April 1997 and December 2008. Determined if the drug was being used within 60 days of the one-year anniversary of the surgery.

Patients are often prescribed analgesics for short-term use in anticipation of postoperative pain. Older patients have a greater risk of adverse reactions to these drugs. What is the risk of long-term analgesic use after low-risk surgery in older patients not previously prescribed the drugs?

- Among 391,139 opioid-naïve patients undergoing minor surgery, opioids were newly prescribed to 27,636 patients (7.1%) within seven days of hospital discharge and were prescribed to 30,145 patients (7.7%) at one year after surgery.
- Patients receiving an opioid prescription within seven days of surgery were 44% more likely to be chronic opioid users within one year.

Long-term opioid use may best be addressed by preventing its initiation. Interventions such as the development of electronic records and models of care that facilitate communication between peri-operative and family physicians may help reduce the risk of progress from short-term to long-term use.

Alam A, Gomes T, Zheng H, Mamdani MM, Juurlink DN, Bell CM. Long-term analgesic use after low-risk surgery: a retrospective cohort study. *Arch Intern Med*. 2012; 172(5):425–30.

Kidney donors are at no greater risk of heart disease than non-donors

Matched 2,028 people selected to become kidney donors in Ontario between 1992 and 2009 with 20,280 healthy non-donors and followed them until March 31, 2010, death or emigration from the province. The primary outcome was time to death or first major cardiovascular event. The secondary outcome was time to first major cardiovascular event, censored for death.

In the general population, there is an established association between reduced kidney function and an increased risk of cardiovascular disease. Do kidney donors experience the same cardiovascular risk?

- Donors and non-donors were followed for a median of 6.5 years (maximum 17.7 years).
- The risk of the primary outcome of death or major cardiovascular event was lower in donors than in non-donors (2.8 vs. 4.1 events per 1,000 person-years).
- The risk of major cardiovascular events censored for death was similar in the two groups (1.7 vs. 2.0 events per 1,000 person-years).

These results add to the evidence base supporting the safety of the practice of kidney donation among carefully selected donors.

Garg AX, Meirambayeva A, Huang A, Kim J, Ramesh Prasad GV, Knoll G, et al. for the Donor Nephrectomy Outcomes Research Network. Cardiovascular disease in kidney donors: matched cohort study. *BMJ*. 2012; 344:e1203.

Antibiotic and dementia drug combination is not linked to increased cardiac events in seniors

Of Ontarians aged 66 and older who were prescribed donepezil and one of six antibiotics including clarithromycin between July 2002 and March 2010, identified those hospitalized for a cardiovascular event and matched each with five controls by age, sex and residence (community or long-term care).

Donepezil, a drug used to treat mild to moderate Alzheimer's disease, can provoke adverse cardiac events. The antibiotic clarithromycin may increase this risk. What is the association between the use of clarithromycin and adverse cardiovascular events in elderly patients receiving donepezil?

- Identified 83,563 patients who were continuous donepezil users.
- Of these, 17,712 patients received a study antibiotic and 59 of them were hospitalized for bradycardia, syncope or complete atrioventricular block within 30 days.
- In comparison to the other antibiotics, there was no significant association between the use of clarithromycin and a subsequent cardiovascular event.

Given the benefit of antibacterial therapy, it may not make clinical sense to stop using clarithromycin in older people receiving donepezil. If other antibacterials that do not affect donepezil metabolism are equally effective in the specific clinical setting, then it may be wise to use the alternative rather than clarithromycin.

Hutson JR, Fischer HD, Wang X, Gruneir A, Daneman N, Gill SS, Rochon PA, Anderson GM. Use of clarithromycin and adverse cardiovascular events among older patients receiving donepezil: a population-based, nested case-control study. *Drugs Aging*. 2012; 29(3):205–11.

Higher-spending hospitals in Ontario have better patient outcomes

Identified 387,757 Ontario adults aged 18 and older with a first hospitalization for acute myocardial infarction (AMI), congestive heart failure (CHF), hip fracture or colon cancer from 1998 to 2008. Determined mortality and readmission rates at 30 days and one year. For the 129 hospitals included, calculated the average adjusted spending on hospital, emergency department and physician services provided to patients.

To what extent does higher hospital spending produce higher-quality care and better patient outcomes in a universal health care system with selective access to medical technology?

- Spending varied about two-fold across hospitals.
- Higher-spending hospitals tended to be larger, teaching or community hospitals; were located in urban areas; were associated with regional cancer centres; had specialized onsite services such as cardiac catheterization, cardiac surgery and diagnostic imaging; had higher nursing staff ratios; and had attending physicians who were more likely to be specialists or to care for a higher volume of patients with that condition.
- Patients admitted to higher-spending hospitals had longer lengths of stay, were less likely to be admitted to an intensive care unit, had more medical specialist visits during their stay, and were more likely to receive cardiac interventions and evidence-based discharge medications (cardiac patients).
- In highest- vs. lowest-spending hospitals: (i) 30-day mortality rates were 12.7% vs. 12.8% for AMI, 10.2% vs. 12.4% for CHF, 7.7% vs. 9.7% for hip fracture, and 3.3% vs. 3.9% for colon cancer; (ii) 30-day rates of major cardiac events were 17.4% vs. 18.7% for AMI, and 15.0% vs. 17.6% for CHF; and (iii) 30-day readmission rates were 23.1% vs. 25.8% for hip fracture, and 10.3% vs. 13.1% for colon cancer.
- Results were similar after one year of follow-up.

These results suggest that it is critical to understand not simply how health care funding is spent but whether it is spent on effective procedures and services.

Stukel TA, Fisher ES, Alter DS, Guttmann A, Ko DT, Fung K, Wodchis WP, Baxter NN, Earle CC, Lee DS. Association of hospital spending intensity with mortality and readmission rates in Ontario hospitals. *JAMA*. 2012; 307(10):1037–45.

Primary care models vary in their service to Ontario's poor and sick

Examined primary care models in Ontario from April 2008 to March 2010, including: Community Health Centres (CHCs, a salaried model); Family Health Groups (FHGs, a blended fee-for-service model); Family Health Networks (FHNs, a blended capitation model); Family Health Organizations (FHOs, a blended capitation model); Family Health Teams (FHTs, an interprofessional team model composed of FHNs and FHOs); 'Other' smaller models combined; and those who did not belong to a model.

Ontario's health system supports several models of primary care. Are there differences in whom they serve and how often their patients/clients go to the emergency department (ED)?

- Compared with the Ontario population, populations served by CHCs were from lower income neighborhoods, had higher proportions of newcomers and recipients of social assistance, had more severe mental illness and chronic health conditions, and had higher rates of morbidity and comorbidity. In both urban and rural areas, populations served by CHCs had much lower than expected ED visit rates.
- FHGs and 'Other' models had sociodemographic and morbidity profiles that were very similar to Ontario as a whole, but FHGs had a higher proportion of newcomers, likely reflecting their more urban locations. Both urban and rural FHGs and 'Other' models had lower than expected ED visits.
- FHNs and FHTs had a large rural profile, while FHOs were similar to Ontario overall. Compared with the Ontario population, patients in these three models were from higher income neighbourhoods, were much less likely to be newcomers, and were less likely to use the health system or have high rates of comorbidity. ED visits were higher than expected in all three models.
- Those who did not belong to any of the models of care studied were more likely to be male, younger, make less use of the health system and have lower rates of morbidity and comorbidity than those enrolled in a model of care. They had more ED visits than expected.

Ontario's primary care models serve different populations and are associated with different outcomes. The payment and incentive structures underlying these models require re-examination. The CHC model offers an attractive alternative in many respects, but CHCs serve a different role than the other primary care models and are resourced and governed quite differently. Where they fit within primary care in Ontario should be the subject of further policy consideration.

Glazier RH, Zagorski BM, Rayner J. *Comparison of Primary Care Models in Ontario by Demographics, Case Mix and Emergency Department Use, 2008/09 to 2009/10*. Toronto: Institute for Clinical Evaluative Sciences; 2012.

Researchers

From left to right:
Geoff Anderson: *Antibiotic and dementia drug combination is not linked to increased cardiac events in seniors*
Amit Garg: *Kidney donors are at no greater risk of heart disease than non-donors*
Thérèse Stukel: *Higher-spending hospitals in Ontario have better patient outcomes*
Richard Glazier: *Primary care models vary in their service to Ontario's poor and sick*

REPORT OF THE INDEPENDENT AUDITOR ON THE SUMMARY FINANCIAL STATEMENTS

To the Board of Directors of Institute for Clinical Evaluative Sciences

The accompanying summary financial statements, which comprise the summary statement of financial position as at March 31, 2012 and the summary statements of operations and cash flows for the year then ended are derived from the audited financial statements of Institute for Clinical Evaluative Sciences for the year ended March 31, 2012. We expressed an unmodified audit opinion on those financial statements in our report dated June 21, 2012.

The summary financial statements do not contain all the disclosures required by Canadian generally accepted accounting principles. Reading the summary financial statements, therefore, is not a substitute for reading the audited financial statements of Institute for Clinical Evaluative Sciences.

Management's responsibility

Management is responsible for the preparation of a summary of the audited financial statements.

Auditor's responsibility

Our responsibility is to express an opinion on the summary financial statements based on our procedures, which were conducted in accordance with Canadian Auditing Standard (CAS) 810, "Engagements to Report on Summary Financial Statements."

Opinion

In our opinion, the summary financial statements derived from the audited financial statements of Institute for Clinical Evaluative Sciences for the year ended March 31, 2012 are a fair summary of those financial statements.

PricewaterhouseCoopers LLP

Chartered Accountants, Licensed Public Accountants
June 21, 2012
Toronto, Ontario

STATEMENT OF FINANCIAL POSITION

As at March 31, 2012
(in thousands of dollars)

	General Fund		Restricted Fund		Total	
	2012	2011	2012	2011	2012	2011
	$	$	$	$	$	$
Assets						
Current assets						
Cash	577	233	10,076	8,198	10,653	8,431
Accounts receivable	1,596	1,820	285	118	1,881	1,938
Due from Ministry of Health and Long-Term Care	–	–	–	1,408	–	1,408
Prepaid expenses	252	184	–	19	252	203
	2,425	2,237	10,361	9,743	12,786	11,980
Capital and intangible assets	688	722	–	–	688	722
	3,113	**2,959**	**10,361**	**9,743**	**13,474**	**12,702**
Liabilities						
Current Liabilities						
Accounts payable and accrued liabilities	1,269	1,921	–	–	1,269	1,921
Due to Ministry of Health and Long-Term Care	–	–	1,757	829	1,757	829
Due to Sunnybrook Health Sciences Centre	996	198	–	–	996	198
	2,265	**2,119**	**1,757**	**829**	**4,022**	**2,948**
Post-employment benefits other than pensions	160	118	–	–	160	118
Deferred capital grant	688	722	–	–	688	722
Deferred expense grants	–	–	8,604	8,914	8,604	8,914
	3,113	**2,959**	**10,361**	**9,743**	**13,474**	**12,702**

STATEMENT OF OPERATIONS

For the year ended March 31, 2012
(in thousands of dollars)

	General Fund		Restricted Fund		Total	
	2012	2011	2012	2011	2012	2011
	$	$	$	$	$	$
Revenue						
Grants – MOHLTC	4,816	5,643	–	–	4,816	5,643
Interest income	16	6	–	–	16	6
Other revenue	5,497	5,460	–	–	5,497	5,460
Amortization of deferred capital grant	279	305	–	–	279	305
Amortization of deferred expense grants	–	–	6,369	5,731	6,369	5,731
	10,608	**11,414**	**6,369**	**5,731**	**16,977**	**17,145**
Expenditures						
Employee costs	9,020	9,787	5,502	3,364	14,522	13,151
Contracted services	228	199	116	1,701	344	1,900
Information, technology and security	478	605	322	186	800	791
Office and general	363	425	163	66	526	491
Amortization of capital and intangible assets	279	305	–	–	279	305
Professional	339	232	266	414	605	646
Premises	754	432	–	–	754	432
	11,461	**11,985**	**6,369**	**5,731**	**17,830**	**17,716**
Deficiency of revenue over expenditures for the year	(853)	(571)	–	–	(853)	(571)
Indirect Cost Fund recognition	853	571	–	–	853	571
Excess of revenue over expenditures for the year	–	–	–	–	–	–

STATEMENT OF CASH FLOWS

For the year ended March 31, 2012
(in thousands of dollars)

	General Fund		Restricted Fund		Total	
	2012	2011	2012	2011	2012	2011
	$	$	$	$	$	$
Cash provided by (used in)						
Operating activities						
Items not affecting cash						
Increase in post-employment benefits other than pensions	42	24	–	–	42	24
Amortization of deferred capital grant	(279)	(305)	–	–	(279)	(305)
Amortization of deferred expense grants	–	–	(6,369)	(5,731)	(6,369)	(5,731)
Transfer from deferred expense grant	–	–	(2,482)	(68)	(2,482)	(68)
Amortization of capital and intangible assets	279	305	–	–	279	305
Change in non-cash working capital	302	(446)	2,188	(1,728)	2,490	(2,174)
	344	**(422)**	**(6,663)**	**(7,527)**	**(6,319)**	**(7,949)**
Investing activities						
Transfer to deferred capital grant	245	50	–	–	245	50
Purchase of capital and intangible assets	(245)	(50)	–	–	(245)	(50)
	–	–	–	–	–	–
Financing activities						
Deferred operating grants received plus interest income	–	–	8,541	6,491	8,541	6,491
Decrease in cash during the year	344	(422)	1,878	(1,036)	2,222	(1,458)
Cash – Beginning of year	233	655	8,198	9,234	8,431	9,889
Cash – End of year	**577**	**233**	**10,076**	**8,198**	**10,653**	**8,431**

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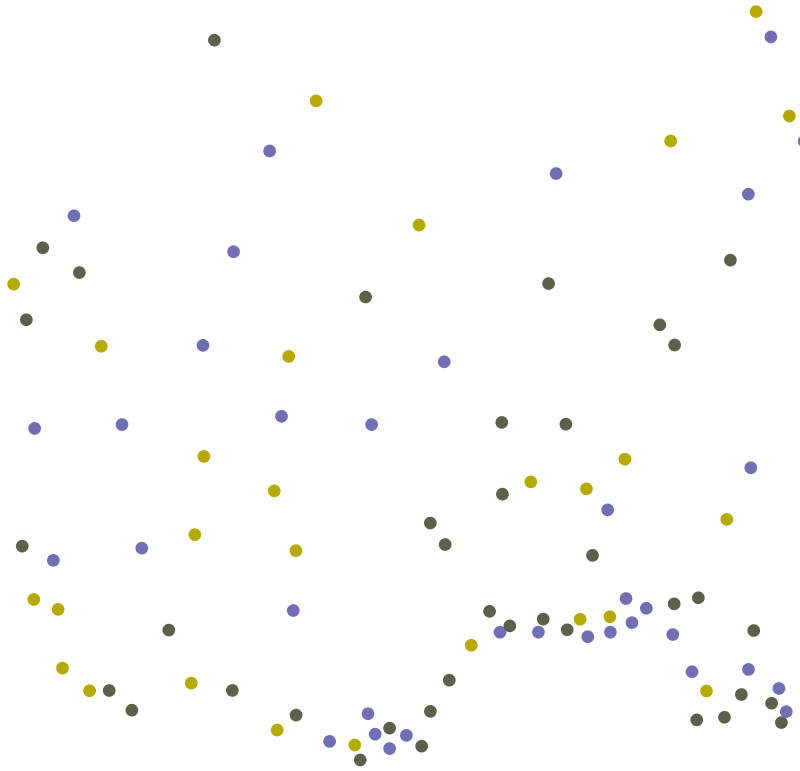

Institute for Clinical Evaluative Sciences
G1 06, 2075 Bayview Avenue
Toronto, ON Canada M4N 3M5

Tel 416.480.4055
Fax 416.480.6048

www.ices.on.ca