



# SHOW ME THE EVIDENCE

## CIHR-SUPPORTED RESEARCH IMPROVING PATIENT CARE

For more than a decade, the Canadian Institutes of Health Research (CIHR) has supported some of the best and brightest health researchers in the world in their quest to improve the health and well-being of Canadians through research. CIHR-funded research and researchers have delivered better care, earlier diagnosis, improved quality of life and cost savings.



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As the Government of Canada's health research investment agency, the Canadian Institutes of Health Research (CIHR) enables the creation of evidence-based knowledge and its transformation into improved treatments, prevention and diagnoses, new products and services, and a stronger, patient-oriented health care system. Composed of 13 internationally recognized Institutes, CIHR supports health researchers and trainees across Canada. [www.cihr-irsc.gc.ca](http://www.cihr-irsc.gc.ca)

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# INTRODUCTION

“Too often, we think of innovations in health care solely in terms of developing new preventive, diagnostic and treatment interventions for health, and forget that the synthesis, dissemination and integration of these new tools into care require an equal amount of creativity and ingenuity – of innovation.”

CIHR President Dr. Alain Beaudet

## WELCOME TO THE FIRST ISSUE OF *SHOW ME THE EVIDENCE*

For more than a decade, the Canadian Institutes of Health Research (CIHR) has supported some of the best and brightest health researchers in the world in their quest to improve the health and well-being of Canadians through research.

But their discoveries and research findings do not become innovations until they are actually applied. Research results need to be integrated into clinical practice. They need to form the basis of effective and efficient health policies and programs. They need to be translated into new services and products to prevent, diagnose and treat disease.

Knowledge translation (KT) is the process by which this happens. There are many paths to effective KT. This publication is one of them.

*Show me the Evidence* was conceived as a way of showcasing some of the high-quality and relevant research supported by CIHR. Canada faces a number of key health and health system challenges, challenges that CIHR has responded to by setting research priorities for the organization and health research across the country. In all, there are five priorities:

- Enhance patient-oriented care and improve clinical results through scientific and technological innovations.
- Support a high-quality, accessible and sustainable health care system.
- Reduce health inequities of Aboriginal peoples and other vulnerable populations.
- Prepare for and respond to existing and emerging global threats to health.
- Promote health and reduce the burden of chronic disease and mental illness.

The first issue of *Show me the Evidence* will address one of these priorities, presenting a range of stories about important research findings and how they are having an impact.

This premier issue presents three stories about initiatives that have the potential to improve the delivery of health services to Canadians:

- the benefits of integrating pharmacists into primary health care teams for elderly patients and others who take several different prescription drugs;
- the role of research evidence in prompting treatment changes in obstetric medicine; and
- a standardized test for diagnosing and monitoring the progress of osteoarthritis in hips and knees.

All of these stories focus on different patient groups and different aspects of health care delivery. Yet they share a patient-centric focus that has resulted in real and tangible improvements to the care provided to Canadians.

CIHR-funded research and researchers have delivered:

- **BETTER CARE**
- **EARLIER DIAGNOSIS**
- **IMPROVED QUALITY OF LIFE**
- **COST SAVINGS**

We hope you enjoy this first issue of *Show me the Evidence*. We look forward to presenting many more stories of Canadian health research in action.

# BAD DRUG REACTIONS JEOPARDIZE PATIENT SAFETY

Pharmacists on health care teams reduce adverse drug events and improve health and safety of seniors

## AT A GLANCE

**WHO:** DR. LISA DOLOVICH, FACULTY OF MEDICINE, MCMASTER UNIVERSITY  
**ISSUE:** 51.5% OF ALL EMERGENCY DEPARTMENT VISITS EACH YEAR ARE DUE TO ADVERSE REACTIONS TO MEDICATIONS IN ADULTS AGED 50 AND OVER, ACCORDING TO A STUDY BY THE US SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION. AMONG SENIORS, 62% ARE ON 5 OR MORE DRUGS, WHILE ALMOST 30% AGED 85 OR OLDER ARE TAKING 10 OR MORE DRUGS DAILY.<sup>1</sup>

**RESEARCH:** DR. DOLOVICH'S STUDY, A TWO-YEAR PROJECT NAMED IMPACT (INTEGRATING FAMILY MEDICINE AND PHARMACY TO ADVANCE PRIMARY CARE THERAPEUTICS), INVOLVED 1,554 PATIENTS BEING REFERRED TO A PHARMACIST FOR A COMPREHENSIVE ASSESSMENT OF THEIR PRESCRIBED MEDICATIONS.<sup>2</sup>

**IMPACT:** THE STUDY CAUGHT AND AVERTED ADVERSE DRUG REACTIONS FOR 241 PATIENTS. THE RESEARCH HAS ALSO BEEN USED AS EVIDENCE TO SUPPORT NEW PHARMACIST POSITIONS IN FAMILY MEDICINE TEAMS IN ONTARIO AND SASKATCHEWAN.

**SOURCES:** INTEGRATING FAMILY MEDICINE AND PHARMACY TO ADVANCE PRIMARY CARE THERAPEUTICS. *CLINICAL PHARMACOLOGY AND THERAPEUTICS*. 2008; 83 NO.6: 913-17.

Seventy-one-year-old Rhoda Malone (a pseudonym) was experiencing dizziness, fatigue and swollen ankles when a pharmacist working with McMaster University pharmacy professor Lisa Dolovich took a look at her medications.

Diagnosed with low blood pressure, Malone was having an adverse drug reaction as a result of the two drugs she had been prescribed to treat the problem. Once the pharmacist worked with Malone's doctor to lower the dose of one drug (metoprolol) and switch from one kind of medication used to control blood pressure (a calcium channel blocker) to a different kind of medication (a diuretic), Malone started feeling better. Her dizziness disappeared, her energy improved and the swelling in her ankles went down.

Because of the pharmacist's knowledge of drug interactions and teamwork with Malone's doctor, she was saved from a fall or another potentially serious effect resulting from the drug interaction and adverse effects.

Thanks to the study that Dolovich was working on when her team examined Malone, thousands of seniors in Ontario, Saskatchewan and Alberta are getting the same benefits from having a pharmacist as part of their health care team right in their doctor's office or clinic.

Dolovich, an associate professor at McMaster University in Hamilton, Ontario, and a scientist and associate director with the Centre for Evaluation of Medicines at St. Joseph's Healthcare in Hamilton, studied seven pharmacists working with 70 doctors at family practices in Ontario to see how they affected prescribing and medication practices among 14,000 patients.

The two-year project, named IMPACT (Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics), led to 1,554 patients being referred to a pharmacist for a comprehensive assessment. The pharmacists identified at least one drug-related issue in 93% of the patients, finding 3,974 drug-related problems in total. Those problems included adverse drug reactions in 241 patients (26.5%) and 315 adverse drug reactions or potential reactions in total.

The research is particularly important because people aged 75 and over take an average of six to eight medications every day. The potential for adverse drug reactions increases with every medication they add to their regimen, since drug interactions account for 15-20% of those adverse events.

Working closely with pharmacists enabled the doctors participating in the IMPACT study to correct the problems and prevent serious adverse reactions in the seniors. The project also provided the evidence for placing pharmacists on family health care teams, something Ontario, Saskatchewan and Alberta have all done on the basis of Dolovich's work.<sup>3</sup>

"You can find research going back about 20 to 25 years ago where some pharmacists were doing this," says Derek Jorgenson, an assistant professor of pharmacy at the University of Saskatchewan. "But it was never studied on a large scale, using quality research methods."

Once Dolovich's work was published (13 studies emerged from the IMPACT project), Jorgenson stopped being the only pharmacist in Saskatchewan working in a primary health care setting. He used the McMaster research to help persuade the province to pay 25 pharmacists to work on health care teams. "I wouldn't say IMPACT is the only reason this model has expanded, but it's been a big reason why health ministries around the country have bought into it and supported it," Jorgenson said.

## THE EVIDENCE: IMPROVED QUALITY OF LIFE

**THE STUDY IDENTIFIED PROBLEMS IN AN INCREDIBLE 93% OF CASES STUDIED, OR NEARLY 4,000 DRUG-RELATED PROBLEMS OVERALL. THE STUDY CAUGHT AND AVERTED ADVERSE DRUG REACTIONS FOR 241 PATIENTS.**





# INCREASED INVOLVEMENT OF PHARMACISTS

## THE EVIDENCE: COST SAVINGS

**THE COSTS OF PREVENTABLE, MEDICATION-RELATED INCIDENTS AND DEATHS IN SENIORS ALONE ARE ESTIMATED AT \$11 BILLION ANNUALLY IN CANADA.**

Ontario took note. Dolovich's work provided the evidence that was needed to include pharmacists on health care teams. When new proposals now come to the Ontario Ministry of Health and Long-Term Care, "we want to make sure pharmacists are included in the design," says Mary Fleming, director of the Ministry's Family Health Teams unit. "Right now we have 170 teams in various stages of implementation," she said. Most have pharmacists on them,<sup>4</sup> including those that participated in the IMPACT study.

The research also changed the way medical students at McMaster are trained. Their professors now teach doctors to encourage patients to contact them about any side effects they experience from medication, and to discuss with patients ways to improve the way they take medication by using organizers, reminders and other tools.

"In Ontario, it's moved from evidence to implementation," says Dolovich. In Rhoda Malone's case, the intervention of a pharmacist not only prevented a serious adverse event from occurring as a result of her medication, it also improved her overall quality of life. During the assessment, the pharmacist answered Malone's questions about whether she would become too dependent on over-the-counter pain relievers if she took them at night. The pharmacist let Malone know it was okay to take acetaminophen at bedtime for pain, which helped her sleep and improved her overall quality of life. That experience is consistent with Dolovich's subsequent research, which has shown that pharmacists working in these family health care settings improve not only medication management, but also monitoring for chronic diseases, and blood pressure and cholesterol control.

Overall, Dolovich's research has provided evidence for the increased involvement of pharmacists on health care teams and community intervention programs as a way of improving health outcomes for seniors in Canada.

The costs of preventable, medication-related incidents and deaths in seniors alone are estimated at \$11 billion annually in Canada.<sup>5</sup> Given that family doctors are hard-pressed to keep up with the adverse events associated with new medications and most are not trained to identify drug interactions, a team approach that allows them to work closely with pharmacists in their practices seems a cost-efficient and effective change whose worth is demonstrated by this groundbreaking research.

### FOR FURTHER READING:

iIMPACT website: [www.impactteam.info/impactHome.php](http://www.impactteam.info/impactHome.php)  
CIHR Research Profiles – Pharmacy Practice and Medicine: [www.cihr-irsc.gc.ca/e/43748.html](http://www.cihr-irsc.gc.ca/e/43748.html)

Ontario Ministry of Health and Long-Term Care Family Health Teams: [www.health.gov.on.ca/transformation/fht/fht\\_mn.html](http://www.health.gov.on.ca/transformation/fht/fht_mn.html)

- [http://www.cihi.ca/CIHI-ext-portal/pdf/Internet/SENIORS\\_DRUG\\_INFO\\_EN](http://www.cihi.ca/CIHI-ext-portal/pdf/Internet/SENIORS_DRUG_INFO_EN)
- Pharmacist's identity development within multidisciplinary primary health care teams in Ontario: qualitative results from the IMPACT project. *Res Social Adm Pharm.* 2009 Dec;5(4):319–26. Epub 2009 Apr 25.
- Ontario began including pharmacists on teams in 2004, Alberta in 2006 and Saskatchewan in 2008.
- As of August 2010, the number of Family Health Teams totals 200.
- [http://www.healthcouncilcanada.ca/docs/rpts/2009/HCC\\_NPS\\_StatusReport\\_web.pdf](http://www.healthcouncilcanada.ca/docs/rpts/2009/HCC_NPS_StatusReport_web.pdf).

# OBSTETRICS STUDY LEADS TO CHANGES IN PRACTICE AND GUIDELINES

Researcher studies a common procedure, finds it is not effective

**AT A GLANCE** WHO: DR. WILLIAM D. FRASER, UNIVERSITY OF MONTREAL

**ISSUE: MECONIUM ASPIRATION SYNDROME (MAS) IS A LIFE-THREATENING COMPLICATION IN LATE-TERM PREGNANCIES. AMNIOINFUSION IS A WIDELY USED TREATMENT TO PREVENT MAS; HOWEVER, EVIDENCE OF ITS EFFECTIVENESS WAS LIMITED.**

**RESEARCH: A CIHR-FUNDED STUDY BY DR. FRASER LAUNCHED IN 2003 INCLUDED 1,800 WOMEN FROM 56 CENTRES IN 13 COUNTRIES WHO HAD MECONIUM-STAINED AMNIOTIC FLUID.**

**IMPACT: AS A RESULT OF DR. FRASER'S RESEARCH, MULTIPLE MEDICAL ASSOCIATIONS AROUND THE WORLD CHANGED THEIR GUIDELINES FOR PREVENTION OF MECONIUM ASPIRATION SYNDROME.**

**SOURCES: AMNIOINFUSION FOR THE PREVENTION OF THE MECONIUM ASPIRATION SYNDROME. N ENGL J MED. 2005; SEP 1;353(9): 909-17.**

Sometimes, advances in health care come not from newly developed treatments or technologies, but from finding out that a common procedure isn't as effective as once believed.

This is what happened when Dr. William D. Fraser began investigating the effectiveness of a treatment called amnioinfusion (AI). Amnioinfusion is a procedure used on certain women about to give birth to remove meconium from their amniotic fluid. Meconium is the earliest stool produced by an infant and is typically expelled shortly after birth.

When women have meconium in their amniotic fluid, meconium aspiration syndrome (MAS) can result. MAS, a life-threatening condition, occurs when amniotic fluid contaminated with meconium is inhaled by an infant either before or during birth. Meconium in the airway can lead to airway obstruction, lung or cardiovascular dysfunction, hypoxia (lack of oxygen), pneumonia or neurological effects.

"We know that babies normally practise breathing in utero. They're not breathing air but they're doing respiratory movements where fluid is moved up and down the airways. There is the potential for meconium to enter the airway before the baby takes its first breath," Dr. Fraser said. Dr. Fraser is an obstetrician and professor as well as Chair of the Department of Obstetrics and Gynecology at the University of Montreal.

Meconium is found in amniotic fluid in up to 22% of all deliveries.<sup>1</sup> MAS occurs in anywhere from 2% to a third of these.<sup>2</sup> AI is an intervention in which physicians infuse sterile fluid into the amniotic fluid surrounding the near-term infant in an attempt to dilute the concentration of meconium. The idea is that a diluted meconium would affect the infant's lungs less severely. It was a routinely used treatment in clinics around the world for the prevention of MAS in at-risk women.

However, "AI presents a potential risk to the mother. The technique involves the transfer of significant quantities of fluid through a catheter into the uterine cavity during labour," Dr. Fraser said. With the introduction of the fluid comes a possible increase in pressure within the amniotic cavity which could occasionally lead to a severe adverse event – amniotic fluid embolism, a potentially fatal condition for the mother.

And in Latin America and other parts of the world, the presence of meconium in the amniotic fluid was a leading cause of Caesarean sections – a procedure in its own right that puts mothers at increased risk of infection and other complications.

Back in the late 1990s, Dr. Fraser became aware that AI for the prevention of MAS lacked good quality studies proving its effectiveness. There were some studies that said it helped, but others that said it wasn't beneficial. But these studies tended to be small and didn't have the statistical weight to prove its effectiveness one way or another. The question was whether the procedure was truly beneficial, or whether it was adding an additional risk to mothers and their infants.

"Yet, at the time, the technique had been adopted by practitioners worldwide in an attempt to prevent MAS," he said.

## DOCTORS DIVIDED

According to Dr. Thomas Wiswell, prior to Dr. Fraser's study, practitioners were divided as to whether or not they thought AI was an effective approach.

"I'd work in one hospital one day and they'd say they never do AI because they believed the literature did not support it. The next day I'd be at a different hospital and all the obstetricians performed AI because they thought it was a good approach. It showed the divergence of opinions back in the 1990s," he said.

Dr. Wiswell is a professor of pediatrics at the University of Florida and also works as a newborn intensivist at Florida Hospital for Children in Orlando. There were no good, large studies proving its usefulness one way or the other, he said.

To solve this dilemma, Dr. Fraser launched a study in 2003 to determine whether or not AI was effective in the treatment of MAS. In order to get the statistical numbers needed, the study included 1,800 women from 56 centres in 13 countries who had meconium-stained amniotic fluid. That many countries needed to be included in order to get large enough numbers to be meaningful statistically, Dr. Fraser said.

Centres in Europe, South America, South Africa, the United States and Canada participated, making it a truly international effort. Results from the study were published in the prestigious *New England Journal of Medicine* in 2005, and demonstrated that AI is not effective in preventing MAS.

The study showed that cases with meconium in the amniotic fluid are equally likely to develop MAS regardless of whether AI is performed.



## THE EVIDENCE: BETTER CARE

**IN RESPONSE TO DR. FRASER'S FINDINGS, THE AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS ISSUED A STATEMENT SAYING AI IS NO LONGER A RECOMMENDED PROCEDURE FOR MECONIUM-STAINED AMNIOTIC FLUID. DR. FRASER'S WORK ANSWERED A VERY IMPORTANT QUESTION AND HAS LED TO A CHANGE OF PRACTICE IN MANY PLACES WORLDWIDE.**



Within three years of the study being published, multiple medical associations around the world changed their guidelines, recommending that AI no longer be used as a way to prevent MAS. Among the first to change their guidelines were the American Academy of Pediatrics, the Neonatal Resuscitation Program, and the Society of Obstetricians and Gynaecologists of Canada.

Dr. Wiswell notes that after Dr. Fraser's study came out, the American College of Obstetricians and Gynecologists issued a statement saying AI is no longer a recommended procedure for meconium-stained amniotic fluid.<sup>3</sup>

"The authors commented that this trial really answered the question," Dr. Wiswell said. Dr. Fraser's work answered a very important question and has led to a change of practice in many places worldwide.

However, there is one caveat to the findings. Dr. Fraser points out that the study was performed in centres where electronic fetal heart rate monitoring (EFHRM) technology was used. EFHRM is used to monitor an infant's heart rate and can be an indicator of changes in oxygen status. The study clearly showed AI does not offer any advantage in centres where EFHRM is routinely used, but its role is still unclear in places where EFHRM is not available.

In fact, in some parts of the world where this monitoring device is not available, there may still be a role for AI. This is an area that still needs research, he said.

The effects of this Canadian-led study were felt internationally. The research had the effect that a treatment that was not only ineffective but had rare, albeit serious complications ended up being removed from practice.

1 Intrapartum assessment of the postdate fetus. *Am J Obstet Gynecol.* 1981; 141: 516-20.

2 [http://www.umontreal.ca/medias/english/press\\_releases/2005-2006/press\\_20050901.html](http://www.umontreal.ca/medias/english/press_releases/2005-2006/press_20050901.html).

3 Amnioinfusion does not prevent meconium aspiration syndrome. *Obstet Gynecol.* 2006; 108: 1053-5.

4 Evidence for changing guidelines for routine screening for retinopathy of prematurity. *Arch Pediatr Adolesc Med.* 2001; 155: 387-95.

## CHANGES

**CANADIAN NEONATAL NETWORK**  
DR. FRASER'S WORK IS PART OF A BROADER RESEARCH EFFORT IN CANADA TO IMPROVE THE CARE OF NEWBORNS. CIHR FUNDING HELPS SUPPORT THE CANADIAN NEONATAL NETWORK. TO REDUCE COSTS AND IMPROVE CARE, NETWORK MEMBERS SHARE INFORMATION ABOUT THE TYPE OF CARE GIVEN AND THE OUTCOMES OF TREATMENT. THE NETWORK LINKS 27 NEONATAL INTENSIVE CARE UNITS ACROSS CANADA. NEW AND SIGNIFICANT FINDINGS HAVE RESULTED FROM THE NETWORK'S DATABASE. FOR INSTANCE, ALL NEWBORNS ARE ROUTINELY SCREENED FOR A CONDITION THAT CAN CAUSE BLINDNESS, KNOWN AS RETINOPATHY OF PREMATURITY. INFORMATION COLLECTED BY THE NETWORK HAS HELPED DETERMINE WHEN SCREENING IS NECESSARY, A CHANGE THAT WILL REDUCE COSTS BY MORE THAN \$1 MILLION PER YEAR.<sup>4</sup>

### FOR FURTHER READING:

Canada Research Chairs bio of Dr. Fraser: [www.chairs-chaires.gc.ca/chairholders-titulaires/profile-eng.aspx?profileID=982](http://www.chairs-chaires.gc.ca/chairholders-titulaires/profile-eng.aspx?profileID=982)

Society of Obstetricians and Gynaecologists of Canada: [www.sogc.org/](http://www.sogc.org/)

CIHR Research Profiles – Child and Youth Health: [www.cihr-irsc.gc.ca/e/43090.html](http://www.cihr-irsc.gc.ca/e/43090.html)

# STANDARDIZED EXAMINATIONS OF THE KNEE AND HIP HELP CATCH OSTEOARTHRITIS EARLY

Detecting OA before it shows up on X-rays

## AT A GLANCE

**WHO:** DR. JOLANDA CIBERE, UNIVERSITY OF BRITISH COLUMBIA

**ISSUE:** OSTEOARTHRITIS IS A CONDITION THAT TAKES YEARS TO DEVELOP, AND DIAGNOSIS IS ONLY CONFIRMED WELL AFTER PHYSICAL CHANGES IN THE JOINTS CAN BE SEEN ON X-RAYS.

**RESEARCH:** DR. CIBERE STUDIED NUMEROUS KNEE EXAMINATION METHODS AND CAME UP WITH A STANDARDIZED EXAM.

**IMPACT:** THE NEW AND PROVEN METHODOLOGY STANDARDIZING EXAMINATION OF THE KNEE DETECTS THE DISEASE MUCH EARLIER – BEFORE IT SHOWS UP ON X-RAYS. THE NEW METHODOLOGY IS BEING USED IN SEVERAL MAJOR INTERNATIONAL RESEARCH PROJECTS.

**SOURCES:** RELIABILITY OF THE KNEE EXAMINATION IN OSTEOARTHRITIS: EFFECT OF STANDARDIZATION. *ARTHRITIS RHEUM.* 2004; FEB; 50(2): 458-68. ASSOCIATION OF CLINICAL FINDINGS WITH PRE-RADIOGRAPHIC AND RADIOGRAPHIC KNEE OSTEOARTHRITIS IN A POPULATION-BASED STUDY. *ARTHRITIS CARE RES (HOBOKEN).* 2010; DEC; 62(12):1691-8. EPUB 2010 JUL 27.

## THE EVIDENCE: EARLIER DIAGNOSIS

**THE GOLD STANDARD FOR THE DIAGNOSIS OF OA WAS WHAT COULD BE SEEN ON X-RAYS. A NEW AND PROVEN METHODOLOGY STANDARDIZING EXAMINATION OF THE KNEE DETECTS THE DISEASE MUCH EARLIER – BEFORE IT EVEN SHOWS UP ON X-RAYS. DR. CIBERE’S RESEARCH FOUND 49% OF PATIENTS HAD EARLY OA THAT DID NOT SHOW UP ON X-RAYS.**

In the late 1990s when Dr. Jolanda Cibere was recruiting patients for a study of osteoarthritis (OA), she suspected that many people who applied had the disease. Unfortunately, they did not qualify for the study. Why? Because signs of their disease did not yet show up on X-rays. They had pain, stiffness and other symptoms, but at the time the gold standard for the diagnosis of OA was what could be seen on X-rays.

Osteoarthritis is a degenerative disease of the cartilage in the joints and is the most common form of arthritis. It can be a long-term consequence of mechanical injury to the joint. Other risk factors for OA include old age, heredity and obesity, and it can affect any joint in the body. Joints in the hips, knees, spine, feet and hands are all vulnerable. An estimated 10% of Canadians live with symptomatic OA,<sup>1</sup> and the disease is the leading cause of knee replacements.<sup>2</sup>

While osteoarthritis is a condition that takes years to develop, diagnosis tends to be made after symptoms occur. Traditionally, diagnosis is confirmed well after physical changes in the joints can be seen on X-rays.

“If it were diagnosed earlier, strategies and treatments could be put in place that would potentially slow the progression of the disease, reduce disability, and reduce long-term costs associated with the disease,” said Dr. Cibere, a rheumatologist and assistant professor of medicine at the University of British Columbia. A 2005 survey in Ontario of over 1,200 people with hip and knee OA reports an average annual cost of \$12,200, mainly in time lost from work and for unpaid, informal caregivers.<sup>3</sup>

Back in the 1990s when Dr. Cibere was working on that first study, she realized a lot of patients could get help earlier if relying on X-ray evidence was not the only means of defining the disease. And, that there would be value in studying patients early on to learn more about how the disease progresses, including why it progresses more quickly in some and takes its time in others.

“I became interested in early-stage disease at that point,” she said.

There was one problem: there was no standardized way of detecting the disease early. In fact, there were over 40 existing physical signs and techniques available to rheumatologists and researchers to help assess the knee, but there were questions about just how accurate and reliable these tests were and it was unclear which tests were most useful to diagnose the disease earlier.

The tools and techniques for examining knees for OA varied between centres and practitioners, and little work had been done to assess how well they worked. Dr. Cibere decided it was time to learn more about early-stage disease, find ways to better detect it, and see if it was possible to develop standardized testing with good scientific evidence behind it.

“The first thing I had to do is standardize how we examine the knee,” she said. This was not an easy task, but she launched a study to assess those forty-odd physical signs and techniques, and published her findings in 2004.<sup>4</sup> The study highlighted which of the existing tests were the most helpful, and she came up with a process for using them in a standardized fashion. It also showed that a standardized examination for detecting the disease early on works.

“What we can say for sure is that certain findings from knee examination are highly predictive of early-stage disease,” Dr. Cibere said. Since then, the standardized knee exam has become a valuable tool and is used around the world.

### STANDARDIZED EXAMINATION USED INTERNATIONALLY

One researcher who is using the standardized protocol is Gayle Lester, PhD, project officer for the US National Institutes of Health Osteoarthritis Initiative (NIH-OAI). The NIH-OAI is a long-term, prospective, observational study of knee osteoarthritis which began in 2002. Over 5,000 people from eight countries who are at risk of developing OA are enrolled, and it is the largest project of its kind in the world. The researchers use the standardized knee examination as the key tool for assessing knee health.

If the standardized knee exam weren’t around, “we would’ve used something less complete. What this has helped us do is use one exam protocol that covers all aspects,” Dr. Lester said. The examination is relatively quick to perform, and can be carried out by nurses and clinical staff who have undergone training.

Michael Nevitt, PhD, principal investigator for the NIH-OAI, adds that, in general, existing exams “are difficult to standardize because they are based on the perceptions of individual clinicians on whether a physical finding is present. Dr. Cibere’s advice was instrumental in helping us decide which of the usual joint exams could be adequately standardized,” he said. Dr. Nevitt is an adjunct professor of epidemiology and biostatistics at the University of California, San Francisco.

Researchers in the United Kingdom are also using the standardized examination. In 2008, Dr. Cibere was contacted by Lyndsey Goulston, a rheumatology research physiotherapist at the Southampton General Hospital. Goulston was interested in the possibility of adapting the standardized knee exam for a large, long-term population study.

Called the Chingford Study, the project is a prospective population-based longitudinal study that is following a cohort of women over a 20-year period and tracking trends in health. As part of the study, participants are seen annually to determine risk factors for osteoarthritis and osteoporosis. The Chingford Study began in 1989 and examination protocols for the knee were needed for a 20-year follow-up.

“The 20-year follow-up would involve myself performing physical knee and hip examinations on each of the remaining women in the cohort. I asked Dr. Cibere if she would share her standard operating protocols for the knee and hip examinations ... She very kindly obliged and emailed me descriptions of the knee and hip examinations used in her papers,” Goulston said. The Chingford group is using the examination strictly as a research tool, and Dr. Cibere helped adapt it so non-physicians could perform the exams.

### STANDARDIZED HIP EXAMINATION

Dr. Cibere’s research into OA doesn’t stop there. She went beyond the knees and developed a standardized hip examination for determining early OA in the hip joints. This work was published in 2008 and is also being used as a research tool.<sup>5</sup> In fact, the Chingford Study research group is also using the standardized hip examination.

In addition, Dr. Cibere has been involved in studies of pain related to OA, population patterns and trends of OA, knee mechanics, and more. Plus, beyond the realm of research labs, Dr. Cibere’s group has developed short educational videos available to health care workers. They demonstrate how to perform standardized knee examinations.

But there are always more steps in research. “We don’t just want to diagnose people earlier, we want to be able to figure out who is at risk of getting worse, who is at risk of progressing,” she said. Standardized testing is helping researchers find answers to these questions.

1 [http://www.phac-aspc.gc.ca/publicat/ac/ac\\_2e-eng.php](http://www.phac-aspc.gc.ca/publicat/ac/ac_2e-eng.php).

2 [http://www.cihi.ca/CIHI-ext-ortal/Internet/en/Document/Types+of+care/specialized+services/joint+replacements/STATS\\_CJRR\\_2010\\_FIG1](http://www.cihi.ca/CIHI-ext-ortal/Internet/en/Document/Types+of+care/specialized+services/joint+replacements/STATS_CJRR_2010_FIG1).

3 The economic burden of disabling hip and knee osteoarthritis (OA) from the perspective of individuals living with this condition. *Rheumatology*. 2005; 144: 1531-7. <http://rheumatology.oxfordjournals.org/content/44/12/1531.full.pdf>.

4 Reliability of the knee examination in osteoarthritis: effect of standardization. *Arthritis Rheum*. 2004; Feb; 50(2): 458-68.

5 Reliability of the hip examination in osteoarthritis: effect of standardization. *Arthritis Rheum*. 2008 Mar 15; 59(3): 373-81.

### FOR FURTHER READING:

Dr. Cibere demonstrating standardized knee exam: [www.youtube.com/watch?v=kCBu3Y7pbuQ](http://www.youtube.com/watch?v=kCBu3Y7pbuQ)

Arthritis Research Centre of Canada: [www.arthritisresearch.ca/](http://www.arthritisresearch.ca/)

CIHR Research Profiles – Arthritis Research: [www.cihr-irsc.gc.ca/e/40065.html](http://www.cihr-irsc.gc.ca/e/40065.html)

NIH Osteoarthritis Initiative: [www.niams.nih.gov/Funding/Funded\\_Research/Osteoarthritis\\_Initiative/](http://www.niams.nih.gov/Funding/Funded_Research/Osteoarthritis_Initiative/)

“If it were diagnosed earlier, strategies and treatments could be put in place that would potentially slow the progression of the disease, reduce disability, and reduce long-term costs associated with the disease”

# EARLY DETECTION



# GATHERING MORE EVIDENCE

## **FUTURE PATIENT-ORIENTED RESEARCH INITIATIVES**

IMPROVING PATIENT-ORIENTED CARE IS AN IMPORTANT PRIORITY FOR CIHR. THE ORGANIZATION HAS RECENTLY LAUNCHED A NUMBER OF MAJOR INITIATIVES TO INCREASE INVESTMENT IN THIS AREA. CIHR ROADMAP SIGNATURE INITIATIVES WILL HELP CIHR ALLOCATE ITS RESOURCES TO MAKE THE STRONGEST POSSIBLE IMPACT ON HEALTH AND HEALTH CARE – TODAY, TOMORROW AND WELL INTO THE FUTURE.

## **CIHR INITIATIVE ON COMMUNITY-BASED PRIMARY HEALTH CARE**

COMMUNITY-BASED PRIMARY HEALTH CARE IS A CORNERSTONE OF GOOD HEALTH. IT IS THE CARE CANADIANS RECEIVE FROM THEIR FAMILY DOCTORS, NURSES AT THE NEIGHBOURHOOD CLINIC, PHARMACISTS, SOCIAL WORKERS, DIETICIANS AND MANY OTHER HEALTH PROFESSIONALS. AN EFFECTIVE PRIMARY CARE SYSTEM PROVIDES PATIENT-CENTRED TREATMENT THAT IS BOTH HIGH-QUALITY AND COST-EFFECTIVE. CIHR HAS IDENTIFIED COMMUNITY-BASED PRIMARY HEALTH CARE AS AN AREA IN WHICH CANADA CAN IMPROVE.

THIS INITIATIVE WILL MAKE STRATEGIC INVESTMENTS IN COMMUNITY-BASED PRIMARY HEALTH CARE RESEARCH AND THE TRANSLATION OF RESEARCH KNOWLEDGE INTO PRACTICE AND POLICY.

## **CIHR INITIATIVE ON PERSONALIZED MEDICINE**

MEDICAL TREATMENT IS NOT A ONE-SIZE-FITS-ALL PROPOSITION. DRUGS THAT HELP ONE PATIENT MAY BE INEFFECTIVE OR EVEN HARMFUL FOR ANOTHER. EMERGING TECHNOLOGIES IN GENOMICS, NANOTECHNOLOGY, MOLECULAR DIAGNOSTICS AND IMAGING ARE MAKING IT POSSIBLE TO PERSONALIZE OR “STRATIFY” TREATMENT TO IMPROVE HEALTH OUTCOMES.

THIS INITIATIVE AIMS TO CAPITALIZE ON THE STRENGTHS OF CANADIAN HEALTH RESEARCHERS IN IDENTIFYING DISEASE-RELATED GENES AND BIOMARKERS AND IN TRANSLATIONAL RESEARCH IN ORDER TO INTEGRATE EVIDENCED-BASED MEDICINE AND PRECISION DIAGNOSTICS INTO CLINICAL PRACTICE.

## **DRUG SAFETY AND EFFECTIVENESS NETWORK (DSEN)**

CIHR AND HEALTH CANADA HAVE COLLABORATED TO ESTABLISH DSEN, A NETWORK DEDICATED TO POST-MARKET DRUG RESEARCH. DSEN WILL HELP TO IMPROVE PATIENT CARE BY INCREASING CANADA’S CAPACITY TO STUDY THE SAFETY OF MEDICATIONS IN THE “REAL WORLD.”

### **FOR FURTHER READING:**

Draft Strategy on Patient-Oriented Research: [www.cihr-irsc.gc.ca/e/41232.html](http://www.cihr-irsc.gc.ca/e/41232.html)

Roadmap Signature Initiatives: [www.cihr-irsc.gc.ca/e/43567.html](http://www.cihr-irsc.gc.ca/e/43567.html)

# NEED MORE EVIDENCE?

Thank you for reading **Issue No. 1** of *Show me the Evidence*. We hope that you enjoyed learning more about the impact of Canadian health researchers and encourage you to visit CIHR's website [www.cihr-irsc.gc.ca](http://www.cihr-irsc.gc.ca) and social media [www.cihr-irsc.gc.ca/e/42402.html](http://www.cihr-irsc.gc.ca/e/42402.html) sites to learn about other CIHR-funded success stories.

**IN ISSUE NO. 2 WE WILL BE LOOKING AT THE CARE AND MANAGEMENT OF CHRONIC DISEASES – WHAT HAVE CANADIAN RESEARCHERS CONTRIBUTED TO EASE THE BURDEN OF CHRONIC CONDITIONS SUCH AS MENTAL HEALTH?**

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**CIHR CAFÉ SCIENTIFIQUE BLOG**

<http://cihrcafescientifique.com/>

**YOUTUBE**

<http://www.youtube.com/HealthResearchCanada>