

CIHR/CMAJ: TOP ACHIEVEMENTS IN HEALTH RESEARCH

Essay for the CIHR/CMAJ award: improving access to hip and knee replacement and its quality by adopting a new model of care in Alberta

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See related articles by Kelsall at www.cmaj.ca/cgi/doi/10.1503/cmaj.110255, by Hull at www.cmaj.ca/cgi/doi/10.1503/cmaj.110364, and by Devereaux and colleagues at www.cmaj.ca/cgi/doi/10.1503/cmaj.110292.

Russell Hull, the POISE-1 investigators, and Cyril Frank and colleagues for the Alberta Bone and Joint Health Institute are the highest-ranking winners of the 2009–2010 CIHR/CMAJ competition for the Top Achievements in Health Research. Dr. Frank and colleagues describe the impact of an Alberta pilot study for improving care in joint replacement in the following essay. Dr. Hull's essay, the essay by Dr. Devereaux and colleagues, and synopses of the other three winning achievements are available at cmaj.ca.

Joint replacement is a proven, cost-effective treatment for severe osteoarthritis in the hip and knee.¹⁻³ It successfully alleviates chronic pain, returns mobility and restores quality of life for people of all ages who want to remain active.¹⁻³ Massive increases in clinical demand for these procedures in our aging population,⁴ along with a system ill equipped to deal with such volume, has produced waiting periods that last from months to years. Wait times often exceed the optimal time for many patients.^{5,6} The care patients receive can vary based on factors such as their socioeconomic status, age and geographic location.⁷

Health care practitioners may not feel their patients' physical pain, but they do share their patients' frustration with the variability in service and access to care. It was this sense of frustration that led Alberta's orthopedic surgeons and a group of partners to take a fresh-start approach to fixing these problems in 2004. The Alberta Orthopaedic Society began with a comprehensive analysis of hip and knee replacement services to identify deficiencies in the continuum of care. This was followed by the design of an evidence-based model of care that would enhance service quality and improve access for patients while increasing efficiency in the public health system.

New model of care

Designing the model of care was a highly collaborative effort between orthopedic surgeons, general practitioners and other clinicians, public health care administrators and researchers. Each group contributed its unique knowledge and expertise. The Alberta Bone and Joint Health Institute helped coordinate plans and informed discussions with syntheses of evidence.

The new model that emerged included a well-defined, evidence-informed path of care spanning referral, patient assessment, patient presurgery optimization, surgery, in-patient care, subacute care, recovery, rehabilitation and monitoring. Standardized practices and protocols were set out to ensure consistent and equitable service for patients regardless of socioeconomic status or location. One-stop clinics were designed to serve as patient-centred service hubs that provided access to fully integrated care delivered by multi-disciplinary teams. Case managers in the clinics helped each patient navigate the path of care

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KEY POINTS

- An innovative model of care for hip and knee replacements was designed to improve the quality of service and the access to care for patients in Alberta and increase efficiency in the public health system.
- Knowledge translation was a critical feature of the pilot study to evaluate the new model and the subsequent collaborative efforts to implement the model across Alberta and ensure its sustainability.
- Deep-rooted changes in policies, practices and relationships have occurred in Alberta as a result of the collaboration and extensive knowledge translation associated with both the pilot study and the implementation efforts.
- The Alberta model has sparked change beyond Alberta's borders, including the creation of the Canada-wide Hip and Knee Knowledge Translation Network.

according to plan and kept care providers informed of patient outcomes and progress.

The tools developed for the path of care included care maps charting treatment and services in a logical progressive sequence, referral templates and contracts stipulating the responsibilities of both patient and clinic.

Development of the pilot project

With the initial design complete, the Alberta Orthopaedic Society enlisted the participation of Alberta's Ministry of Health and Wellness, the province's health authorities, and the Alberta Bone and Joint Health Institute to refine the new model and to test it against the standard of care.⁸

The Alberta Orthopaedic Society provided clinical expertise and a frontline view of service, and the Society facilitated surgeon consensus on new processes. The health authorities provided administrative expertise, surgical facilities and teams, and hospital data, and served as agents of change for systems and processes. Alberta Health and Wellness contributed \$20 million of funding for clinical care and created a supportive policy environment. The Alberta Bone and Joint Health Institute provided expertise in health-system design, project management and scientific evaluation; it also contributed private funding for measuring the clinical effectiveness of the pilot project.

To support the evaluation of the pilot project, the Alberta Bone and Joint Health Institute built a measurement framework with evidence-based benchmarks tied to key indicators of performance. These indicators were developed in the six dimensions identified by the Health Quality Council of Alberta to measure health service quality: effectiveness, acceptability, appropriateness, efficiency, accessibility and safety.⁹

The pilot project was launched in the spring of 2005 to test the model over a 12-month period in the health regions serving Calgary, Edmonton and Red Deer. These regions were responsible for approximately 80% of all joint replacements in the province.

The randomized controlled study involved 3434 patients who were randomly allocated to two groups for total hip or knee replacement: 1722 patients were placed in an intervention group that followed the new path of care and 1712 were placed in a control group that received conventional services. Patients in the two groups had similar baseline characteristics, including demographics, comorbidity and health-related quality of life.⁸ During the 12-month study, 1066 patients in the intervention group had surgery; 504 patients in the control group had surgery.

Evaluation of the pilot project

The study showed evidence of positive effects of the path-of-care approach on health-related quality of life (unpublished data). The new path of care produced improvements in five of the six dimensions of quality.¹⁰

Effectiveness

Patients in the intervention group had statistically significant improvements in disease-specific quality of life 3 and 12 months after surgery, as measured by improvements in their Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores; these patients also experienced less pain than patients in the control group, as shown by their short-form 36 (SF-36) health survey pain scores.

Acceptability

A randomly sampled subset of patients in the intervention group were more satisfied with their overall health care experience than their counterparts in the control group; 96% of patients in the intervention group described the length of their wait time as "fair," compared with 63% of patients in the control group.

Appropriateness

There were several examples of resources being used more appropriately and changes to clinical practice during the pilot study. For example, 85% of patients in the intervention group were mobile the day of their surgeries, compared with only 31% of patients in the control group.

Efficiency

The length of stay in hospital was significantly shorter for patients in the intervention group (4.6 days) than for patients in the control group (6 days). The estimated costs associated with a stay in hospital were thus reduced by 15%.

Accessibility

In this research environment, patients in the intervention group had considerably shorter waits for consultation and surgery than patients in the control group. Patients in the intervention group waited 21 working days from referral to consultation with a surgeon and 37 days from consultation to surgery, compared with 145 working days and 290 working days, respectively, for patients in the control group. Faster access was reflected in the numbers of surgeries done in the two study groups — the number of patients from the intervention group who received surgery during the study period was more than twice the number of patients from

the control group who received surgery during the same period.

Safety

Major complications affected less than 1.1% of patients in either group. Rates in the intervention group were similar to rates seen in contemporary administrative data and some rates in the control group were unusually low. The study was not powered to compare the rate of adverse events, so no statistical comparisons were made.

Implementing the model of care

Based on these positive results, Alberta Health and Wellness encouraged the provincial implementation of this new model of care. The Alberta Bone and Joint Health Institute was asked to help the Health Regions in Alberta translate what was learned in the pilot study to routine practice.

Knowledge translation was a critical feature of the pilot project and remains central to the ongoing efforts to implement the new path of care provincially and to ensure that the new system is sustainable. The formal structure created for implementation — a provincial oversight committee, a project steering group, a clinical committee and working groups — became a highly effective multilayered enabler of knowledge translation, providing information to providers and to decision-makers.

Since the pilot project ended in 2006, deep-rooted changes in policies, practices and relationships have occurred in Alberta as a result of collaboration and extensive knowledge translation. In 2009, shortly after its formation as the single health authority for the province, Alberta Health Services created a “Bone and Joint Clinical Network” in which clinicians, administrators and policy makers work together at a level and to a degree never before seen in Alberta. Under that new network, health administrators, surgeons, general practitioners and other care providers are currently engaged directly in service planning and implementation, in developing clinical practice improvements, and in enhancing quality and service.

A new physical structure is also taking hold as new hip and knee clinics are being established in different areas of Alberta to act as service hubs for the new path of care. Some clinics are also now considering the inclusion of other areas of bone and joint care. Multipurpose clinics could thus expand the on-site specialist team, creating an environment for increased knowledge translation among various health care professionals.

As of 2010, most of the orthopedic surgeons in Alberta who do joint replacement surgery had

adopted the new path of care in their practices. Surgeons who follow the hip and knee path of care also have an option to receive periodic, confidential, quality improvement reports. Prepared by the Alberta Bone and Joint Health Institute using patient data supplied by the surgeon, these reports help individual surgeons compare their performance with results from their peer group and with the evidence-based benchmarks for the key performance indicators in the measurement framework.

Change is also occurring beyond Alberta's borders. The Alberta Bone and Joint Health Institute and Bone and Joint Decade Canada, part of the World Health Organization Bone and Joint Decade, have collaborated to create a National Hip and Knee Knowledge Translation Network for Canada. A national core model of care for patients having hip and knee replacement surgeries and a tool kit for implementing the model have been developed through the knowledge translation network with substantial input from the Alberta Bone and Joint Health Institute. The concept of central intake for hip and knee replacement is now taking hold in as many as eight provinces.

The widespread changes inspired by Alberta's hip and knee replacement pilot study are well timed. Canada's population — aging, living longer¹¹ and growing more obese¹² — will undoubtedly need more and better care for hips, knees and other joints. The Canadian Institute for Health Information's 2008–2009 Canadian Joint Replacement Registry report offers some indication of the pressures ahead. It reports that Canadians aged 65 years or older accounted for almost two-thirds of hip and knee replacements done in 2006–2007. It also reports 62 196 admissions to hospital for hip and knee replacements in Canada in 2006–2007, a 101% increase from 10 years earlier and a 6% increase from the previous year.¹³

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