Scanning the horizon
Informing Decision Makers About Emerging Medical Technologies, Policies, Practices, and Research

Welcome to the tenth issue of Health Technology Update. This first newsletter of 2009 brings you more information about technologies that could significantly impact the health of patients and lead to high quality, efficient, and sustainable health care in Canada.

Our feature article highlights assisted reproductive technologies, specifically in vitro fertilization. While this technology is not new, high costs and health interests have influenced its rate of diffusion and made it a significant policy concern. This issue of Health Technology Update also focuses on a number of innovative emerging technologies in cardiology, including genetic testing for heart failure therapy and 3-D cardiac mapping. As always, updates and links related to recent health technology assessment and clinical practice guidelines in Canada have been provided.

We hope you find this issue informative and useful. From all of us at CADTH, we wish you a healthy, peaceful, and prosperous 2009.
Assisted Reproductive Technologies in Canada

Assisted reproductive technologies (ART) are a policy concern in Canada due to the continued prevalence of infertility and the recent rise in the number of multiple pregnancies. The issue of access, funding, and the regulation of ART’s — in vitro fertilization (IVF) in particular — has generated considerable debate.

The Issue

Currently, universal IVF is not publically funded in Canada. Only 15% of couples affected by infertility can afford IVF treatment; consequently, they turn to cheaper fertility treatments that are believed to significantly increase the rate of multiple pregnancies (e.g., two or more babies). There are immediate and long-term health complications associated with multiple pregnancies, such as an increased risk of fetal or neonatal mortality, preterm birth and low birth rate, as well as mental and physical defects. Maternal complications, such as preeclampsia, gestational diabetes, placental previa, placental abruption, and caesarean delivery are also associated with multiple pregnancies.

IVF with single embryo transfer (SET) has been shown to almost completely eliminate multiple pregnancies. There is a belief that the public funding of IVF with SET is a more sustainable strategy, as it offsets the downstream costs associated with the ramifications of multiple pregnancies. However, many couples prefer dual embryo transfer because it maximizes the possibility of pregnancy whilst potentially eliminating the need for subsequent costly IVF cycles.

More than 30% of ART pregnancies are multiples and over 50% of all ART neonates are the product of multiple gestations. This represents a significant short- and long-term health and monetary concern.

How it Works

Assisted reproductive technologies are infertility treatments that involve fertility drugs and the management of eggs, sperm, and/or embryos outside of the human body. This typically includes IVF and IVF-related procedures such as intracytoplasmic sperm injection. Some definitions also include intrauterine insemination.

Conventional IVF treatment involves the stimulation of the ovaries using hormonal medications, the retrieval of eggs from the ovaries, the fertilization of the eggs outside the body, and the transfer of the resulting embryo into the uterus.

Provincial Activity

In December of 2008, Quebec’s Ministry of Health pledged to reimburse the cost of IVF treatment. In 2009, under a new plan, a minimum of two cycles of IVF will be remunerated in Quebec.

Quebec will be the only province to reimburse universal IVF treatment. Canada’s current access to publicly funded IVF is limited to women living in Ontario who have bilaterally blocked fallopian tubes.

In response to the mounting concerns about infertility, Ontario appointed an expert panel to examine options for people facing reproductive challenges. In the summer of 2009, the panel will publish recommendations on ways to increase the accessibility and affordability of fertility treatments.

At this time, Alberta is considering policy options with regard to ART regulation and the funding of fertility treatments. Other jurisdictions may revisit their policies in light of Quebec’s decision.

Who Might Benefit

Infertility is a significant problem in Canada, affecting about 8.5% to 16% of couples of reproductive age.

Regulatory Status

In 2004, the federal government enacted legislation to regulate assisted reproduction. The Assisted Human Reproduction Act, which governs the clinical and research activities of medically assisted human reproduction, identifies activities that either are prohibited or are subject to regulation.
In 2006, Assisted Human Reproduction Canada was established to implement and enforce the Act’s principles.

The constitutional validity of the Act has come under attack from several provinces. In 2008, the Quebec Court of Appeal challenged several provisions of the Act, contesting that they are not matters of criminal justice and do not put the public’s health at risk and, therefore, should be governed by provincial legislation.

The Supreme Court of Canada will hear the matter in April of this year. If the Quebec judgment is confirmed, sections of the Act could be handled by each provincial jurisdiction.

**Cost**

One cycle of IVF costs approximately $7,750 to $12,250 ($250 for semen analysis, $2,500 to $7,000 for medications, and $5,000 for IVF). In comparison, IUI costs approximately $450, in addition to the cost of medications ($27-$2,500).

**Evidence**

Two Canadian technology assessments have reported on IVF and multiple pregnancies, the most recent of which, from the Institute of Health Economics, will be published early this year. The purpose of this report was to clarify the cost burden of multiple pregnancies on health resources and potential cost impacts of ARTs in Alberta.

According to Dr. Anderson Chuck, the lead author of the Institute of Health Economics report, the evidence indicates that reducing the number of embryos transferred per IVF cycle to a SET reduces the number of multiple births, health complications, and costs associated with multiple gestations. Transferring one embryo was regarded as being less costly than transferring two embryos; however, the effectiveness of SET was closely related to a woman’s age. In women younger than 37, transferring one embryo was noted as being as effective as transferring two embryos. In women older than 37, SET was less effective than transferring two embryos and, subsequently, more IVF cycles are required to achieve comparable birth rates. The evidence from this report indicates that reimbursing IVF procedures which transfer fewer embryos was associated with a decrease in the number of multiple births and health services costs. However, a greater number of single embryo transfer cycles may be required to produce equivalent results (i.e., transferring more than one embryo per in vitro fertilization cycle).

Hence, savings from reduced multiple pregnancies and births will be offset by the number of additional single embryo transfer cycles needed to produce acceptable birth rates and health outcomes.

A 2006 assessment of IVF treatment and its role in reducing the rate of multiple births was published by the Ontario Ministry of Health and Long-Term Care. This clinical- and cost-effectiveness assessment concluded that IVF-SET is an effective treatment for infertility that avoids multiple pregnancies. However, an Ontario-based economic analysis included in the assessment showed that reduced costs associated with a reduction in multiple pregnancies after IVF-SET did not compensate for the cost of universal IVF-SET coverage; furthermore, the province currently funds intrauterine insemination, which has been shown to be as effective as IVF for certain types of infertility and is significantly less expensive.

A newer enhanced IVF technology is being developed that is intended to double the chance of conception while reducing the prospect of multiple pregnancies. The technology, known as array comparative genomic hybridization, is in the early stages of development but it could potentially make the current ART landscape obsolete.

**National Canadian Guidelines and Recommendations**


**References**

8. Talaga T. Toronto Star 2008 Dec 27.
Hip Protectors in Long-Term Care

Over 300,000 Canadians live in long-term care facilities. Hip injuries are a significant health concern for these residents. Each year, about half experience at least one fall, and 5% to 10% of these falls result in fractures.

The impact on health care costs and resident health is significant. There is an additional cost of approximately $34,000 per resident to provide long-term care during the first year following a hip fracture. Approximately 20% of those who experience a fracture due to a fall die within one year of the event.

One approach to the prevention of hip fractures is the use of hip protectors. These consist of garments with protective padding worn under clothing to protect the body from hip fractures in the event of a fall.

In May of 2008, CADTH published an assessment of hip protectors in long-term care. The assessment included a review of the best available evidence on the clinical- and cost-effectiveness of hip protectors, an economic evaluation in a Canadian setting, as well as guidelines and evidence on the limitations of these devices in long-term care settings.

The assessment was shared with health care decision makers at a CADTH-organized information session in the health care authority of Eastern Health in Newfoundland and Labrador. CADTH worked with the staff of Eastern Health’s Corporate Strategy and Research division to plan the session. This collaborative approach provided the audience with a comprehensive overview of the CADTH report, organizational data on the use of these devices, and front line health care professional perspectives on issues such as compliance and clinical practice guidelines.

Respondents to the session evaluation noted the importance of the information in guiding policy development, funding decisions, and professional development and education. Participants also provided positive feedback on the inclusion of local contextual information on the status of this technology at long-term care facilities throughout the region.

Hip Protectors in Long-Term Care: A Clinical and Cost-Effectiveness Review and Primary Economic Evaluation

What are your experiences with using CADTH reports? Write to us! We value your feedback on the utility of our services in supporting health care decisions throughout Canada.
Contact: andram@cadth.ca.

Central Venous Catheters

Even small changes in well-established technologies can spur the need for research-based evidence.

The continuing evolution of medical devices can lead to significant changes in health care policies, practices, and procedures, driving the need for evidence to support those changes. Such was the case when the Lloydminster Hospital in Saskatchewan’s Prairie North Health Region considered the adoption of new central venous catheter (CVC) technology. As staff at Lloydminster worked on a new education package and procedures for CVCs, they wondered if there was a positive pressure cap that could be used with both valved and non-valved CVCs. Lorna Hoglander, a Clinical Educator at Lloydminster, turned to CADTH’s Health Technology Inquiry Service (HTIS) for the answer.

“I found the exact information I was looking for on the link HTIS provided,” said Lorna. “The quick response from your people was very impressive.”

The information included not only the answer the Lloydminster staff required, but also the background behind the long-established technology. With CVCs, tubes are inserted into large veins to deliver medication or nutrition, or monitor a patient’s hemodynamic status. In 1991, as infusion technology evolved, manufacturers developed needleless connectors for CVCs — a significant step in safeguarding health care workers from needlestick injuries.
and blood-borne pathogen exposure. Needleless access devices have become integral components of infusion systems today, but they’re not without issues.

Following their introduction, patient safety concerns arose, among them increased risk of infection that could lead to prolonged hospital stay or, in some cases, death. In working to address this issue, manufacturers developed a number of solutions, including positive pressure caps which keep the blood from entering the tip of a catheter when a syringe is disconnected.

Thinking about Uncertainty

It has been argued that the health system should try to maximize the amount of health gain with available resources. This means that decisions about efficient reimbursement strategies need to consider how much health various strategies produce, and their associated costs. If a unit of health (an extra year of healthy life, for example) can be produced more cheaply using one strategy versus another, it is said to be a cost-effective use of resources. A health care intervention may also produce more health than another strategy at additional costs. At this point, a decision maker will have to decide whether or not these additional costs are justifiable in a health care budget.

Even under tightly controlled conditions, measuring health effects and health care resources can never be done with absolute certainty. This means decisions considering this information can never be certain. Analysts can support decision makers by examining the effects of statistical uncertainty or “known unknowns” on their decisions.

A popular graphical method of doing this is the cost-effective acceptability curve (CEAC). A CEAC is a visual representation of uncertainty. It shows the probability that any one intervention is cost-effective, depending on how much a decision maker values an additional unit of health.

In the visual example on this page, given the uncertainties from the data obtained, intervention B leads to the best trade-off of health for resources unless there is a willingness to pay of more than $45,000 per life-year gained. At this point, intervention E is most likely to be cost-effective.

Suggested Reading

*Guidelines for the Economic Evaluation of Health Technologies: Canada* [http://cadth.ca/media/pdf/186_EconomicGuidelines_e.pdf](http://cadth.ca/media/pdf/186_EconomicGuidelines_e.pdf)


HTA Harmonization

Health technology assessment (HTA) plays an essential role in modern health care by supporting evidence-based decision making in health care policy and practice.

Differences in the content and application of HTA have raised the question of whether or not some degree of harmonization of HTA between various jurisdictions and countries would be worthwhile. The improvement of efficiencies across assessment agencies by avoiding unnecessary duplication of effort has been a recurring theme.³

Information from HTAs can be categorized into three areas: clinical effectiveness, cost-effectiveness, and health system delivery impacts, such as ethical, psychosocial, and legal issues. Clinical-effectiveness evidence is generally considered to be the most context-free, while economic aspects of HTA are more context-specific. Ethical, legal, or psychosocial aspects of HTA appear until recently to have received less attention in individual reports,
making judgment on the scope for harmonization of these elements more difficult.\textsuperscript{1}

CADTH has fostered coordination and harmonization of HTA activities across multiple jurisdictions in Canada through numerous ventures. CADTH’s health economic guidelines and the Health Technology Analysis Exchange are examples of CADTH’s commitment to embracing harmonization efforts. These initiatives provide guidance for analysts and support information-sharing, the coordination and leveraging of resources for HTA work, and continuous quality improvements in the production and use of evidence-based information.

International harmonization initiatives are also underway. The European network for Health Technology Assessment (EUnetHTA) has developed an HTA tool kit to assist local health systems and support countries with limited HTA experience.

The International Network of Agencies for Health Technology Assessment (INAHTA) has a variety of initiatives that facilitate exchange and collaboration among agencies. One initiative involves the development of frameworks and methods to improve the quality of HTA reports within INAHTA (including a manual on handling ethical issues in HTA).

The International Society for Pharmacoeconomics and Outcomes Research is working towards a priority list for the development of good research practices for use in health technology assessment and health care reimbursement policies, including transferring economic data and analyses across jurisdictions.

Genetic testing aims to identify genes that can help predict risk factors for heart failure in asymptomatic patients. It can also help individualize pharmacologic treatment, by helping predict who might benefit or be harmed by therapy. An awareness of predispositions to heart disease can help physicians develop tailored health plans for risk reduction and prevention. This has the potential to reduce the prevalence of the disease and minimize health care costs associated with heart failure.


References

Useful Links

Emerging Issues in Cardiac Health Technology

Living Heart Transplant

In Canada, the number of people requiring heart transplants far exceeds the number of available donors. And, at the same time, many hearts available for donation go unused.

There is now an emerging technology that is intended to improve the survival of transplanted patients, prevent transplanted hearts from decaying, and increase the availability of viable organs. The technology expands the window of transplant opportunity from four to six hours, to 12 hours or more. Organ damage during the transportation process is limited because a warm blood perfusion technology keeps the heart beating as it would inside the body.

This form of heart transplant is made possible with the TransMedics Organ Care System. The system integrates a perfusion module, a portable platform with wireless monitor, and a solution set.


Genetic Testing for Heart Failure Therapy

It is estimated that there are 400,000 Canadians living with congestive heart failure. Approximately 40% to 50% of newly diagnosed patients will die within five years of diagnosis, according to the Heart and Stroke Foundation.
3-D Cardiac Mapping

Heart rhythm disorders are a leading cause of heart disease, stroke, and sudden death, affecting approximately 200,000 to 250,000 Canadians.

There is a technology available that provides more precise visualization of heart arrhythmias; 3-D cardiac mapping locates heart rhythms by mapping the heart’s anatomy. This information is intended to make better-informed decisions on appropriate therapeutic courses of action.

The 3-D cardiac mapping is a minimally invasive procedure that involves the insertion of electrode catheters into the heart. The signals from the electrodes are translated into 3-D maps that are used to detect the originating site of an arrhythmia.

Catheter ablation, a popular non-surgical treatment for arrhythmias, can then be performed immediately following mapping.


Navistar® Thermocool® for Atrial Fibrillation

The Navistar® RMT ThermoCOOL® Catheter was licensed for use in Canada for atrial fibrillation in February 2008. It uses a catheter ablation technique to destroy abnormal heart rhythms.

This procedure involves a catheter being threaded through to the heart via the femoral vein. An attachment on the tip of the catheter delivers radio frequency heat to the area of heart muscle giving off electrical signals that stimulate abnormal heart rhythms. This results in a localized burn that destroys the heart cells responsible for the arrhythmia.

This device is used with the NIOBE® Magnetic Navigation System, which helps steer a catheter remotely and guide ablation to targeted areas that require treatment.


Circumferential pulmonary vein ablation. ASERNIPS, 2008 http://www.surgeons.org/Content/ContentFolders/News/ASERNIPS/PrioritisingSummary/RPT2008-prioritisingsummary_Circumferential_pulmonary_vein_ablation.pdf

Percutaneous Aortic Valve Replacement

Over 13,000 Canadians undergo surgery every year to replace defective aortic valves. Seventy five to 80% of people who have damaged aortic valves will die within three to five years of diagnosis without a replacement valve.

Percutaneous valve replacement is a minimally invasive therapeutic alternative for aortic valve repair surgery. A guidewire catheter with a self-expanding stent is threaded through either the femoral artery or vein to the faulty heart valve. The replacement valve is inserted within the centre of a pre-distended existing damaged valve.

This procedure is intended to reduce surgical trauma, shortens hospital stays, and to be used with patients who are too sick for conventional open-heart surgery. It is usually performed under local anesthesia and light sedation.


Recent HTAs

These reports are available without cost at the websites below:

CADTH HTAs


- Computed tomographic colonography for colorectal cancer screening in an average risk screening population: Systematic review and economic evaluation. Dec 2008: http://www.cadth.ca/media/pdf/H0474_tr_CTC_for_colorectal_cancer_screening_tr_e.pdf


- Home telehealth for chronic disease management. Dec 2008: http://www.cadth.ca/media/pdf/H0475_Home_Telehealth_tr_e.pdf

HTAs from Other Organizations

- Screening for diabetic retinopathy in Québec. AETMIS, 2008; http://www.aetmis.gouv.qc.ca/site/250.1105.0.0.1.0.phtml

**Liquid-based cytology.** McGill TAU of the MUHC; 2008

**Mesalamine MMX (Mezavant ®) for induction of remission in patients with active mild to moderate ulcerative colitis.** Therapeutics Initiative; 2008. http://www.ti.ubc.ca/node/264


**New Canadian Practice Guidelines**

- **Diagnosis and treatment of dementia: 5. Nonpharmacologic and pharmacologic therapy for mild to moderate dementia.** Third Canadian Consensus Conference on the Diagnosis and Treatment of Dementia; CMAJ 2008:179(10): http://www.cmaaj.ca/cgi/reprint/179/10/1019
- **Foodborne infections.** Canadian Paediatric Society; Paediatr Child Health 2008:13 (9): http://www.cps.ca/english/statements/ID/FoodborneInfections.pdf
- **Head lice infestations: a clinical update.** Canadian Paediatric Society; Paediatr Child Health 2008:13 (8): http://www.cps.ca/english/statements/ID/id08-06.pdf
- **Telepathology: guidelines and technical standards, literature review.** AETMIS, 2008: http://www.aetmis.gouv.qc.ca/site/250.1106.0.0.1.0.phtml

**Production Notes**

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