



Guide to Knowledge Translation Planning at CIHR: Integrated and End-of-Grant Approaches



CIHR is the Government of Canada's agency for health research. Its mandate is to *"excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and a strengthened Canadian healthcare system."*

The Canadian Institutes of Health Research (CIHR) is the Government of Canada's health research investment agency. CIHR's mission is to create new scientific knowledge and to enable its translation into improved health, more effective health services and products and a strengthened Canadian health care system. Composed of 13 Institutes, CIHR provides leadership and support to more than 14,100 health researchers and trainees across Canada.
www.cihr-irsc.gc.ca

Canadian Institutes of Health Research

160 Elgin Street, 9th Floor
Address Locator 4809A
Ottawa, Ontario K1A 0W9 Canada
www.cihr-irsc.gc.ca

Also available on the Web in PDF and HTML formats
© Her Majesty the Queen in Right of Canada (2012)
Cat. No. MR4-11/2012E-PDF
ISBN 978-1-100-20517-5

All people profiled in this guide have agreed to their appearance in it and approved their individual stories.

CIHR would like to thank the seven primary investigators – David Andrews, Geoffrey Fong, Daniel Hackam, Linda Li, Mary Judith Lynam, Maria Mathews, Dianne Russell – who have allowed us to include their research projects as examples in this guide. Also CIHR would like to acknowledge Donna Angus, Linda Piazza and Sharon Strauss for their review and feedback.

Contents

Foreword	ii
Introduction	1
Integrated Knowledge Translation (iKT)	2
Knowledge Translation (KT) Factors for Consideration	2
Integrated Knowledge Translation (iKT) Project Proposal Worksheet	5
Examples of Integrated Knowledge Translation (iKT)	7
A New Approach to Delivering Health Care to At-Risk Families	7
Closing Care Gaps in Cardiovascular Medicine	9
Building Tools to Help Patients Manage Rheumatoid Arthritis	10
End-of-Grant Knowledge Translation (KT)	12
Knowledge Translation (KT) Factors for Consideration	13
End-of-Grant Knowledge Translation (KT) Plan Worksheet	15
Examples of End-of-Grant Knowledge Translation (KT)	18
Protein Transport Into and Across Cellular Membranes	18
Retention of Locally Trained Physicians	19
Knowledge Brokering in Pediatric Rehabilitation	21
Knowledge Translation (KT) in the Fight Against the Global Tobacco Epidemic	23
Knowledge Translation (KT) Resources	26
References	28

Foreword

Knowledge translation (KT) is about raising knowledge users' awareness of research findings and facilitating the use of those findings. Only a minority of researchers would call themselves experts in KT, and with KT still an emerging field, there exists a need to build capacity not only in developing research proposals with a KT approach but also in assessing those proposals for scientific merit and potential impact. The Canadian Institutes of Health Research (CIHR) has written this guide as one resource to fill this knowledge gap. We hope this guide will help to strengthen projects that involve a KT approach, while also ensuring that the review of KT within grant proposals is more rigorous and transparent.

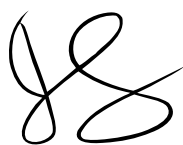
The guide is divided into two sections, each tailored to one of CIHR's two forms of KT: integrated knowledge translation (iKT) and end-of-grant KT. *Integrated knowledge translation* requires that knowledge users (who will be described later in this guide) be members of the research team and participate in many stages of the research process. End-of-grant KT requires applicants to submit a plan for how they will translate their findings when the research is completed. It is worth noting that iKT programs require a dissemination plan, so those involved with iKT proposals should consult both sections. As mentioned, there is a section in the guide specific to each approach. The target audience for this guide is CIHR applicants and reviewers, but the concepts are transferable to a broader audience.

Each section provides:

- a description of the category of KT in question;
- a brief explanation of the relevant KT factors;
- a worksheet with questions pertinent to each factor; and
- examples of strong project proposals from each category to assist you in thinking about your KT approach.

The guide is not meant to replace the review criteria or scoring system used for a funding opportunity. Researchers or knowledge users developing a project proposal should use this guide to supplement and strengthen their research and approach to KT. If you are reviewing a proposal with a KT approach, use the guide to help you reach a conclusion about how well the funding opportunity criteria have been met and integrate this conclusion within your final assessment.

While there is a substantial amount of work to be undertaken beyond the planning stage, with many unforeseen implementation challenges to overcome, we hope this guide will serve as a starting point to developing strong iKT and end-of-grant KT proposals with excellent potential for improving the health of Canadians.



Ian D. Graham, PhD, FCAHS
Vice-President
Knowledge Translation and Public Outreach
Canadian Institutes of Health Research

Introduction

As is clear from CIHR's mandate, a commitment to excellence applies equally to CIHR's support for research and knowledge translation (KT). As Canada's principal health research funding agency, CIHR plays a fundamental role in bridging the "know-do" gap and ensuring that research findings get into the hands of those who can use them.

KT is of critical importance to health research, as it has become clear that the creation of new knowledge often does not, on its own, lead to widespread implementation or impacts on health. From CIHR's perspective, accountability from the federal and provincial governments, as well as the public, makes it increasingly important to demonstrate the benefits of the investment of taxpayer dollars in health research by moving research into policy, programs and practice.

This guide outlines those elements that contribute to strong KT projects. It is intended to be used both by those developing project proposals and by those who are assessing such proposals for the purposes of funding or partnership.

While KT has been given many different labels, CIHR defines it as "a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system." This is by no means a simple process and involves a range of "interactions between researchers and knowledge users that may vary in intensity, complexity and level of engagement depending on the nature of the research and the findings as well as the needs of the particular knowledge user."ⁱ

CIHR has identified two broad categories of KT: integrated KT (iKT) and end-of-grant KT. In iKT,

Knowledge Synthesis

Contextualizing and integrating research studies within the larger body of knowledge on the topic.

Dissemination

Sharing research results by identifying the appropriate audience for the research findings and tailoring the message and medium to the audience.

Knowledge Exchange

Interactions between knowledge users and researchers resulting in mutual learning.

Ethically Sound Application of Knowledge

The iterative process by which knowledge is actually considered, put into practice or used to improve health and the health system. These activities must be consistent with ethical principles and norms, social values and legal and other regulatory frameworks.

Knowledge User

CIHR defines a knowledge user as an individual who is likely to be able to use research results to make informed decisions about health policies, programs and/or practices. A knowledge user's level of engagement in the research process may vary in intensity and complexity depending on the nature of the research and on his/her information needs. A knowledge user can be, but is not limited to, a practitioner, a policy maker, an educator, a decision maker, a health care administrator, a community leader or an individual in a health charity, patient group, private sector organization or media outlet.

potential knowledge users are engaged throughout the research process. This approach should produce research findings that are more likely to be directly relevant to and used by knowledge users. It should also incorporate a dissemination plan to share the results of the project with other interested knowledge users.

With end-of-grant KT, the researcher develops and implements a plan for making potential knowledge-user audiences aware of the knowledge that is gained during a project. End-of-grant KT can involve more intensive dissemination activities that tailor the message and

ⁱ More about knowledge translation at CIHR (www.cihr-irsc.gc.ca/e/39033.html)

medium to a specific audience and, even further along the spectrum, can involve moving research into practice in cases where the strength of the evidence is sufficient. For example, the results of a knowledge synthesis can often lead to actionable messages that can then be communicated to the relevant audience. The commercialization of scientific discoveries is another form of end-of-grant KT.

All CIHR's KT funding opportunities are built on the conceptual definition of KT (see previous page) and include one or both categories of KT. While the information has been developed with CIHR's funding opportunities in mind, it is still very relevant and adaptable to other granting programs that include an iKT or end-of-grant KT approach.ⁱⁱ

A full list of CIHR's KT resources is available at the end of this guide.

Integrated Knowledge Translation (iKT)

iKT is an approach to doing research that applies the principles of knowledge translation to the entire research process. The central premise of iKT is that involving knowledge users as equal partners alongside researchers will lead to research that is more relevant to, and more likely to be useful to, the knowledge users.¹⁻⁹ Each stage in the research process is an opportunity for significant collaboration with knowledge users, including the development or refinement of the research questions, selection of the methodology, data collection and tools development, selection of outcome measures, interpretation of the findings, crafting of the message and dissemination of the results.

It should be noted that iKT programs also require a dissemination plan (end-of-grant KT), so those submitting or reviewing iKT proposals should consult both sections of this guide. Since knowledge users represent a broader audience group, a well-developed KT plan can increase the benefit and potential impact of the research findings.

A Note on Merit Review

At CIHR, projects that take an iKT approach must be evaluated using merit review, in which researchers and knowledge users assess both the scientific merit and the potential impact of the project using separate scores.

For more information on merit review, visit www.cihr-irsc.gc.ca/e/39537.html

iKT has a longstanding tradition in many disciplines but has usually gone by other terms, such as collaborative research, participatory action research, community-based participatory research, co-production of knowledge or Mode 2 research.

For more information on iKT, please refer to the learning module "A Guide to Researcher and Knowledge-User Collaboration in Health Research" on CIHR's website at www.learning.cihr-irsc.gc.ca/course/view.php?id=3.

Knowledge Translation (KT) Factors for Consideration

Proposals should demonstrate that the project has been shaped by the participating knowledge users and responds to their knowledge needs. In applying for funding, proposals should also outline how the project responds to the objectives of the specific funding

ⁱⁱ This guide is based on work done by Suzanne Ross, Paula Goering, Nora Jacobson and Dale Butterill and commissioned by the Canadian Institutes of Health Research, the Canadian Health Services Research Foundation, the National Institute for Health Research Service Delivery and Organisation and the Netherlands Organisation for Health Research and Development. Ross et al. developed their guide based on the literature on knowledge translation, and they piloted it with applicants and reviewers linked to three of the four partner organizations. CIHR has adapted that guide to fit its KT framework and its strategic funding opportunities.

opportunity. The following four factors should be considered when developing a research proposal with an iKT approach.ⁱⁱⁱ

1. Research Question
2. Research Approach
3. Feasibility
4. Outcomes

1. Research Question

It is essential to clearly describe the intent of the research project, including the objectives and an explanation of the knowledge to be translated. An important objective specific to an iKT project is responding to a problem or knowledge gap identified by knowledge users. This must be clearly articulated.

The research question is meant to be targeted to the knowledge users' context and environment, but the research should be transferable enough that similar audiences will benefit. Other audiences become particularly pertinent when there is the intention to disseminate the research results more broadly.

Working with knowledge users is beneficial for meeting all of these goals.

2. Research Approach

The methodology selected for the project should clearly address the proposed research question, while the overall study design should be appropriate and sufficiently rigorous. However, the iKT methodology may evolve as the project proceeds and may not be entirely determined at the outset. The primary audience for an iKT project is the knowledge users participating as part of the project team.

There should be strategies for sustaining the meaningful engagement of participating knowledge users throughout the research process. A project has many stages, and each is an opportunity for knowledge exchange between the researchers and the knowledge users. Proposals should specify when, how and for what purpose the researchers and knowledge users will meet.

All feasible opportunities for knowledge exchange should be explored. The proposal should also demonstrate that the researchers and the knowledge users have collaboratively developed the proposal.

A principal goal of all iKT projects is to incorporate the expertise of knowledge users, who will obviously be experts on their own knowledge needs. They can provide insight into the knowledge needs of other knowledge users in their sector. Knowledge users also have expertise on the context of implementation – the realities of the environment in which the research results will be implemented – which researchers may not necessarily be aware of.

Very strong iKT projects will demonstrate an established relationship with the participating knowledge users, one that hopefully precedes and will outlast the project. How the knowledge users will be involved in developing the research question, collecting and analyzing data, interpreting results, crafting the overall message, developing recommendations and identifying audiences for dissemination should be specified in the project proposal. However, it is important to recognize that iKT approaches will require varying levels of engagement with different knowledge users at various times throughout the process and to ensure that the engagement is appropriate for both the project objectives and the availability of the knowledge users.

Proposals should distinguish between the knowledge users participating in the project and other target audiences that will be reached by the dissemination plan. Proposals should also present realistic strategies that integrate knowledge translation into the project. Finally, an end-of-grant KT plan must be included, detailing strategies that are appropriate to the project's goals and target audiences.^{iv}

3. Feasibility

A number of potential risks can jeopardize the feasibility of an iKT project, and these must be considered. One of the biggest risks is that a knowledge user will change

ⁱⁱⁱ These factors are the same regardless of the domain of research, though *how* they apply will vary.

^{iv} Refer to the End-of-Grant Knowledge Translation (KT) Plan Worksheet on page 15 for information on drafting an end-of-grant KT plan.

job positions and leave the environment that his/her expertise is linked to. Evidence of an ongoing commitment from the organizations and the knowledge users is ideal. Another risk is the possibility of a dispute between the knowledge users and the researchers. A collaborative agreement outlining such things as access to data, the timing of the release of findings and intellectual property – or some other mechanism for resolving disputes – will protect the project against such a contingency. Financial or in-kind support from the knowledge users' organizations is a good sign of engagement and commitment. With iKT projects, there is a greater expectation that the findings or recommendations will be acted on. The knowledge users should be in a position to influence decision-making authority to integrate knowledge into the environment where they practice. Finally, the scope of the research project should be appropriate to the established goals and the resources available. It is important to communicate how the project can be accomplished in the given time frame with the resources described.

For an iKT project, it is expected that a fair amount of detail will be provided about the knowledge users. It is usually a requirement that they submit letters of support as well as CVs. Their role in the project should be clearly stated, and there should be evidence that they have agreed to fulfill their role.

iKT proposals should demonstrate that the knowledge users are the right participants to inform the project and act on the findings and that they understand the roles assigned to them in the project.

4. Outcomes

In conducting research, iKT is likely to increase the uptake of findings and improve the likelihood that the research will have an impact.¹⁻⁹ In this regard, an iKT proposal should clearly illustrate how it will potentially have a demonstrable and sustainable impact on practice, programs and/or policy that could ultimately lead to a change in health outcomes.

While the research question may respond to the needs of the knowledge users, project findings can have an even greater impact depending on the extent to which the results are transferable to other contexts. Capturing the outcomes of research can help in validating the original goals of the study and can serve as a basis for further work stemming from the research findings.

Proposals should include an evaluation plan to assess the process of an iKT approach and to learn about barriers and facilitators for collaboration.

These four factors reflect CIHR's merit review criteria used to evaluate grant proposals requiring iKT and provide a useful framework with which to approach any project that involves iKT.

Merit review takes into account the scientific merit as well as the potential impact of the project. Scientific merit generally reflects the rigour and appropriateness of the proposed research methodology and the strength of the research team. Potential impact reflects the relevance or importance of the project to the knowledge users and the likelihood that the project will have a substantive and sustainable impact in the study context.

Integrated Knowledge Translation (iKT) Project Proposal Worksheet

Using CIHR’s merit review criteria, this worksheet will guide project teams and reviewers through the key questions associated with each factor within a proposal and will provide bottom-line points for consideration.

Factor	What is it?	Key questions	What does this really mean?
Research Question	An explanation of what the research project is aiming to achieve and a justification for the need to conduct the research (i.e. how/why was this topic chosen? What gap will it fill?)	<ul style="list-style-type: none"> <input type="checkbox"/> To what extent does the project respond to the objectives of the funding opportunity? <input type="checkbox"/> To what extent does the research question respond to an important need identified by the knowledge users on the research team? 	<ul style="list-style-type: none"> ➤ Clearly articulate the research question ➤ Be clear about the origin of the research question. Why is it interesting? Who is interested in it? How do the knowledge users’ partners view it? What potential benefit does it bring to the knowledge users?
Research Approach	A detailed description of the research approach and a justification for the proposed methods/strategies	<ul style="list-style-type: none"> <input type="checkbox"/> To what extent is it likely that the proposed methods will address the research question? <input type="checkbox"/> To what extent is the study design appropriate and rigorous? <input type="checkbox"/> To what extent are the knowledge users meaningfully engaged in informing the research plan? <input type="checkbox"/> To what extent does the research team have the appropriate expertise to utilize the best methodologies? 	<ul style="list-style-type: none"> ➤ Be clear and specific about the proposed methods – it should be evident that the project team knows what it wants to do/study ➤ Demonstrate the participation of and commitment to the project by the knowledge users – this can be written into the text or shown through letters of support <ul style="list-style-type: none"> ○ These letters are important; they need to show true iKT-style collaboration, describe the feasibility of the project and speak to methods of study design ○ These letters should not be “cookie cutter”; ensure that they are unique and specific about the knowledge users’ expectations
Feasibility	A clear demonstration that the researcher/knowledge-user team has the requisite skills, experience and resources to complete the project in the proposed time frame	<ul style="list-style-type: none"> <input type="checkbox"/> To what extent are the knowledge users committed to considering application of the findings when they become available and is this application achievable in the particular practice, program and/or policy context? 	<ul style="list-style-type: none"> ➤ Document the expertise of all team members and their role in the proposed study ➤ Demonstrate that this is a doable study from both a scientific and a practical perspective

Continued on next page

Continued from previous page

Factor		Key Questions	What does this really mean?
Feasibility		<ul style="list-style-type: none"> <input type="checkbox"/> To what extent does the researcher/knowledge-user team have the necessary expertise and track record to deliver on the project's objectives, including the objectives of the end-of-grant KT plan? <input type="checkbox"/> To what extent is the project accomplishable in the given time frame with the resources available/described? 	<ul style="list-style-type: none"> ➤ Demonstrate an interest by the knowledge users' partners in the results of the study and the willingness and ability to use the results and move them into action (when appropriate) ➤ Demonstrate that the budget is appropriate for the iKT plan, including the engagement activities/communication needed.
Outcomes	A description of the potential results expected from the successful completion of the project	<ul style="list-style-type: none"> <input type="checkbox"/> To what extent will the project have relevant findings that may ultimately have a substantive and sustainable impact on health outcomes, practice, programs and/or policies? <input type="checkbox"/> To what extent will the project's findings be transferable to other practice, programs and/or policy contexts? <input type="checkbox"/> To what extent will knowledge users be involved in interpreting results and informing KT plans/activities? <input type="checkbox"/> To what extent does the end-of-grant KT plan detail strategies appropriate for its goals and target audiences? <input type="checkbox"/> To what extent does the evaluation plan demonstrate that it will enable researchers to assess the project's impact? 	<ul style="list-style-type: none"> ➤ Consider the potential impact of the study and its transferability <ul style="list-style-type: none"> ○ If it is not transferable, acknowledge and justify this ➤ Include a detailed plan for end-of-grant KT ➤ Develop a reasonable evaluation plan to be able to measure the outcomes and impacts of the study

Examples of Integrated Knowledge Translation (iKT)

The following three examples help to illustrate the factors that make a strong proposal for research with an iKT approach.

A New Approach to Delivering Health Care to At-Risk Families

Despite advances in health care, children who are vulnerable because of their material and social circumstances remain the most likely to suffer the consequences of delayed development and poor health.¹⁰⁻¹⁴ These effects have a long-term, cumulative impact.¹⁵ Lack of access to appropriate health care further compounds these disadvantages and has been identified as an ongoing challenge for children “at risk” in both urban and rural settings.¹⁶⁻¹⁸

Looking to CIHR’s Partnerships for Health System Improvement (PHSI) program, Dr. Mary Judith Lynam’s team proposed to examine an alternative model of community-based health care delivery – the Responsive, Intersectoral-Interdisciplinary, Child-Community, Health, Education and Research (RICHER) model – for children who are vulnerable as a consequence of poverty and exclusion. This innovative proposal involves an interdisciplinary, community-based approach designed to complement existing health services and provide care to those children who are most at risk. The participating practitioners seek to address fragmented care by creating enduring, supportive relationships while also working in partnership with other community organizations. This collaborative relationship building is intended to facilitate access to health services across the continuum of care, from prevention to specialized assessments and treatment, while accommodating natural transitions in service delivery between early childhood, school age and youth or young adulthood.

Excerpt from proposal:

Research Question

In their proposal, the researchers communicate their aim to work in close partnership with leaders in health

services delivery to examine an innovative approach to primary health care (PHC) delivery to a vulnerable population and to involve them in the research process. This aligns well with the objectives of the PHSI grant, to support a collaborative approach to applied health systems and services research that is useful to health system managers and policy makers. The specific research questions to be addressed in the study are outlined in detail. These include examining the perspectives of service providers and at-risk families on the accessibility and responsiveness of existing and proposed models of PHC delivery, exploring the organizational and infrastructure supports needed to sustain a new practice model and identifying appropriate KT strategies to effectively engage knowledge users with the results of the study.

Research Approach

A thorough overview of the study methods is included in the proposal. These methods involve a mixed-methods, collaborative case study approach, with a variety of qualitative and quantitative data collected through interviews and surveys. The project team provides a strong theoretical foundation for the research, drawing upon literature from social pediatrics, child development and health inequities, and supplies ample supporting evidence for this best practice approach to addressing inequities in child health. As the first social pediatrics model of its kind in British Columbia, the proposal highlights the importance the study will have in increasing knowledge about the effectiveness of the model in providing care to at-risk children and their families. It proposes that lessons learned from this study will inform institutional partnerships in other health regions to explore the feasibility of introducing or adapting the model to address health needs of at-risk children in other communities. For this, the researchers outline varied strategies to support ongoing KT activities that will take

place in a number of forums in order to foster dialogue among institutional, clinical and community partners as well as potential knowledge users around the province. By providing different **forms of engagement** through research activities and sharing of emergent insights, the researchers plan to foster a working relationship among formal health services sectors, while also promoting collaboration between the formal sector and community-based resources. The proposal outlines plans for holding annual workshops with provincial health authorities, sponsored by Child Health BC, to discuss emerging insights on access, responsiveness and the organization of care.

Feasibility

The knowledge-user partners involved in the project show a clear commitment to undertaking the study and using the findings to improve practice models, as evidenced by the letters of support that accompany the proposal. Participating knowledge users hold leadership roles in community, provincial and regional health organizations. Given their existing roles in managing and providing health services and care within the study community, they are well situated to inform the project and translate the study findings.

Outcomes

The project team anticipates that the study will produce evidence related to access and responsiveness of community health services, which will inform a new model of delivering PHC to vulnerable pediatric populations. While there are more immediate implications for the delivery of health services within the study location of Vancouver's Downtown Eastside, it is clear that the study findings have strong potential to be transferable to other communities in British Columbia and Canada.

From proposal to reality – where is the project now...

Although data gathering is ongoing, a sufficient amount of qualitative data has been collected to be able to

End-of-Grant KT Plan

The project's principal KT goal is to foster dialogue on issues of accessibility and responsiveness derived from the study data while exploring the feasibility of implementing the proposed model in other communities. As the study unfolds, the project team intends to share emerging lessons through workshops and discussion papers in an effort to engage targeted knowledge users. The strategy requires the involvement of community and knowledge-user partners within the study location of Vancouver's Downtown Eastside, as well as more broadly within other health regions in British Columbia.

describe key features of the practice approach and to capture the organizational processes that have been developed to implement the clinical practice initiative within the community context.¹⁹ The team also adopted a standardized tool to conduct a survey (in English and Chinese) related to PHC access, responsiveness and continuity of care. The standardized survey results suggest that RICHER *does* foster better PHC access for a population made vulnerable by social and material circumstances. Respondents were disproportionately poor, had lower education than the provincial average and had a child or children who had an identified developmental delay or chronic health condition. The results also show that the clinical approach *reflects quality PHC* and that the *clinician's interpersonal style* of compassion and respectfulness is key to empowering patients to care for their health and the health of their children. These findings suggest why aspects of interpersonal communication are important in achieving outcomes of PHC.²⁰⁻²¹

A unique feature of the project is that it has provided the impetus for bringing together knowledge users from all levels of health systems – consumers, practitioners and leaders within health authorities. The project team regularly participates in presentations, workshops and consultations to wide-ranging audiences. These presentations are used to share

information and research insights on the clinical practice initiative, processes of community engagement, the health challenges of children in the target community and evidence related to effective approaches, while also exploring points of connection with other practice contexts. In addition to this, the team partners each year with a provincial child health policy group and organizes a one-day provincial workshop with decision makers from each of British Columbia's health authorities and policy leaders from related portfolios (e.g. Ministry for Children and Families).

Closing Care Gaps in Cardiovascular Medicine

Every seven minutes in Canada, an individual dies from a heart attack or stroke.²² Patients who survive a heart attack or stroke are at increased risk for future cardiovascular events and dying from atherosclerosis (hardening of the arteries).²³ Strong evidence from clinical trials suggests that these patients should receive long-term treatment with an anti-platelet drug (such as aspirin), a cholesterol-lowering drug (such as a statin), an ACE inhibitor or angiotensin receptor blocker and a beta blocker.²⁴ Despite numerous practice guidelines promoting these medications, many affected individuals do not receive these drugs.

Applying for a Knowledge Synthesis grant from CIHR, Dr. Daniel Hackam's team set out to comprehensively review and synthesize the medical literature to determine the most effective strategies for increasing the prescribing of these lifesaving therapies in patients with cardiovascular disease. With the help of its knowledge-user partner, the Canadian Cardiovascular Society (CCS) – in particular, the individuals who sit on the Society's guideline committees – the team plans to disseminate its research results to the cardiovascular community, where it will enter the current guideline creation cycle and enhance ongoing efforts to improve the quality of cardiovascular prevention for Canadians.

Excerpt from proposal:

Research Question

In the project proposal, CCS clearly identifies a pressing need to bridge the gap between the strong research evidence around effective prevention therapy for atherosclerosis and the actual medical treatment received by most patients with vascular disease. Building on this need, the project team proposes to undertake a synthesis of existing treatment strategies for patients with vascular disease, focusing specifically on those receiving ambulatory care and starting with the concept of non-invasive imaging to improve medical risk reduction. The team intends to use the results of its systematic review to inform practice guidelines for the care of the target patient population.

Research Approach

The methods to be used are well described and appropriate to the research question, following established standards for systematic review, meta-analysis and meta-regression. The proposal further outlines in detail the study selection criteria, search strategy, preliminary outcomes and data synthesis. As a participating knowledge user, CCS is clearly engaged throughout the project, from contributing to the research plan to informing the end-of-grant KT plan.

Feasibility

To successfully undertake the proposed study, the project team includes complementary expertise in systematic reviews, quality of care, cardiovascular disease and pharmacoepidemiology and enlists an appropriate blend of clinical researchers and executive staff from CCS. The proposal identifies the potential limitations of the study but also highlights the involvement of CCS as key to facilitating the interpretation and dissemination of the research results, specifically targeting guideline producers and practitioners at key institutions.

Outcomes

Given the current care gaps identified by the project team, the potential impact of this study is significant.

The team has ensured that its proposal underlines the implications of the synthesis results for clinical care and future research. It also indicates that the data produced from the study will permit clinicians, managers and policy planners to select the most appropriate and promising interventions for improving secondary prevention of atherosclerosis.

End-of-Grant KT Plan

A strong partnership with CCS strengthens the project's end-of-grant KT plan and increases the likelihood of broad dissemination to the national cardiovascular community. As the producer of a number of major practice guidelines, CCS is well placed to disseminate study findings to panels in the process of updating these guidelines.

From proposal to reality – where is the project now...

In its work to date, the project team has focused its attention on specific strategies that might improve the application of clinical guidelines to current patient care. As an example, it has systematically reviewed and meta-analyzed whether non-invasive cardiovascular imaging leads to improved cardiovascular clinical care. The results suggest that some process markers do improve in patients randomized to receive non-invasive imaging; while other markers do not. The first publication from the team focuses on primary prevention patients;²⁵ future publications will analyze and present other modalities that influence closure of care gaps in cardiovascular disease.

Building Tools to Help Patients Manage Rheumatoid Arthritis

For someone with rheumatoid arthritis (RA), the period shortly after diagnosis is often filled with uncertainties and anxiety as the patient searches for information to

make treatment decisions. With an aim to improving a patient's ability to participate in shared decision making about a course of treatment, Dr. Linda Li's team is developing a web-based decision aid with the support of a CIHR Knowledge-to-Action grant.

The team proposes to develop and evaluate an Animated, Self-serve, Web-based Research Tool (ANSWER) designed to support people with RA in making decisions about their treatment. ANSWER will combine the best evidence of treatment options, the contextual information about how to make health care decisions and the concept of effective consumers. The project team's proposal highlights the fact that the content, storyline and animation for ANSWER will be developed in collaboration with members from six different disciplines (clinical and health services research, social and information sciences, knowledge translation and graphic design/animation production) as well as knowledge users from the arthritis community, with the final product available for public access at the end of the evaluation.

Excerpt from proposal:

Research Question

The proposal for this project makes a strong case for the need to bridge the gap between the research evidence around RA care and the actual use of effective treatments. The project team outlines in detail its specific objectives for the development of ANSWER, to provide evidence-based information and decision support for people with RA. Justification for the tool is provided, citing research around the factors that affect the treatment decisions of people who have been recently diagnosed with RA and the effectiveness of interactive decision aids in improving care.

Research Approach

The ANSWER team proposes to develop the program based on rigorous criteria outlined in the International Patient Decision Aid Standards and through a collaboration of health researchers, computer animation experts and trainees and RA patients. The tool will be

piloted and further improved based on feedback from a group of target users. Another strength of the ANSWER project is the active and committed involvement of experts from the six relevant disciplines as well as knowledge-user groups. Collectively, members of this team have contributed from the planning phase of the project through to its completion.

Feasibility

The project team highlights existing relationships with key patient and consumer groups, including the Canadian Arthritis Patient Alliance and The Arthritis Society, that are well positioned to assist in the development of KT activities. Recognizing the potential benefit of the ANSWER program for the management of early RA in primary care, the B.C. Ministry of Health has agreed to provide informal consultation for the tool development and to assist in disseminating the final product in primary care settings in British Columbia.

Outcomes

By developing a user-friendly tool that can be distributed widely on the Internet, the ANSWER team is confident that the final product can reach people who may not be familiar with the use of decision support or who have difficulties in completing the existing paper-based RA decision aids. It is expected that in promoting the practice of shared decision making, ANSWER will ultimately help to improve RA patients' ability to be effective users of health care resources.

End-of-Grant KT Plan

The principal goal of the KT plan is to build awareness of arthritis-related decision aids, such as the ANSWER program, and disseminate key findings from the pilot study to target audiences. The team will engage representatives from patient organizations like The Arthritis Society who will act as spokespersons and participate in refining messages for defined audiences. A strategy is in place to evaluate the impact of proposed KT activities and to help determine the uptake of the ANSWER program among targeted groups.

From proposal to reality – where is the project now...

In spring 2011, the ANSWER team completed the program development and usability testing with patients and health professionals.²⁶ The pilot study is currently under way in British Columbia. A total of 51 patients who are newly diagnosed with RA will be recruited to evaluate the effect of the program on the quality of their treatment decisions. Additional funding from the Canadian Initiative for Outcomes in Rheumatology Care will allow the team to expand data collection into Alberta and Ontario.

The ANSWER program was developed in collaboration with four patient/consumers and 15 Masters of Digital Media trainees from the Centre of Digital Media in British Columbia. An achievement of this project is the rich iKT experience that has been provided for these trainees. All of them had expressed an interest in a career of developing health-related online tools and services, but none had worked with people with chronic disease. Through the ANSWER project, the trainees had their first opportunity to work closely with RA patients and to understand their challenges and needs while using web-based tools. This excellent partnership has resulted in a second KT project, which is also being funded by a CIHR Knowledge-to-Action grant.

ANSWER exemplifies how a CIHR-funded KT project can provide unique opportunities for researchers and for those from other innovative disciplines to forge collaborations with knowledge users.

End-of-Grant Knowledge Translation (KT)

End-of-grant KT covers any activity aimed at diffusing, disseminating or applying the results of a research project, as defined below. Methods appropriate to translating research findings range from simple communication activities (diffusion, dissemination) to more intensive knowledge application efforts, such as workshops, academic detailing and tool development (for more on these strategies, please see Strategies on page 13). Conference presentations and publications in peer-reviewed journals have often been the principal modes of communication to researchers. These forms of KT remain the best approach for research at the early stages of discovery, when the knowledge has more relevance to academics who are contributing to a body of evidence that is not yet appropriate for application. Publishing in open-access journals or repositories has the potential of reaching a much broader audience, thus increasing the likelihood of research uptake by those in the academic community as well as knowledge users and the general public.

When there are potential knowledge-user audiences beyond the research community, end-of-grant KT activities should be more intensive and emphasize non-academic modes of communication: the language of publications should be adapted to the target audience (e.g. lay language) and can be presented in popular formats, such as websites or creative media (e.g. film, theatre, art). Sharing of knowledge may be done face to face in a meeting/workshop setting by a knowledge broker (an individual specializing in the communication of findings to knowledge users, in their context) or via emerging online technologies (e.g. podcasting, webinars, YouTube). To disseminate more broadly to the general public, media such as television, radio and print may be engaged.

The KT activities chosen should draw on evidence about what media/formats are most effective for that particular group of knowledge users and should be tailored to their individual needs. Even research aimed at scientific audiences and peer reviewers, including early-stage discovery proposals, should have a lay summary at both proposal and final report stages that clearly delineates where the research is expected to lead.

The development of products and services based on research results, including commercialization activities, is also a form of end-of-grant KT.

Appropriateness

For all KT activities, the most important consideration is *appropriateness*. Each discipline, research project and knowledge-user community is different. When there are limitations on the validity or generalizability of the results, a modest approach is most appropriate. The key to a successful plan is to ensure that there is a match between the expected research findings, the targeted knowledge-user audience and the KT strategies selected.

It may, at times, be appropriate to apply the results of a single study, but the scope and strength of the evidence must be considered when defining the KT activities.

A single study can represent either the culmination of a large body of work ready for application or a nascent area of research where the findings may not yet be generalizable. In the latter case, KT efforts to apply the findings could result in more harm than good. Synthesized evidence is generally more robust and mature, thus it usually constitutes the best knowledge for widespread application.

A good approach to ensure an appropriate KT plan is for the research team to revisit the plan throughout and upon completion of the project and adjust, as necessary, as results evolve.

Knowledge Translation (KT) Factors for Consideration

The following five factors should be addressed in end-of-grant KT plans.²⁷ These factors are the same regardless of the domain of research, though *how* they apply will vary.

1. Goals

There are two broad goals typical of end-of-grant KT activities: raising awareness and promoting action. Whether goals are modest or ambitious, they must be appropriate to the nature of the research findings and the target audience. *Applicants should clearly state and justify their proposed KT goals.*

2. Knowledge-User Audience (outside of project participants)

Applicants should identify the individuals and/or groups that should know about the research findings. A good plan will demonstrate a detailed understanding of its knowledge-user audience. Audiences should be precisely defined with respect to their sector of work and their role in decision making related to the research findings – simply mentioning clinicians, managers, policy makers, etc., is not sufficiently specific to make clear that the audiences selected are appropriate to the identified goals. Applicants should try to understand the current state of the audiences' knowledge, how they tend to use knowledge and the formats in which they prefer to receive their information. For iKT projects, knowledge users participating as members of the research team should be able to assist with this. Depending on the relationship between the research team and its broader knowledge-user audience at the outset of the project, modifications to the end-of-grant KT plan may be required as the plan is being implemented. Because a single project can have several potential audiences, it is acceptable to prioritize, but applicants should provide a rationale for selecting one audience over another. *Applicants should clearly identify and justify their target audiences.*

3. Strategies

Applicants should propose methods to reach their identified audiences and deliver on the KT goals that are appropriate to the research results. End-of-grant KT strategies broadly fall into three categories: diffusion, dissemination and application (explained below). The nature of the target audience and the type of evidence will determine which strategies are appropriate.

1. Diffusion (*let it happen*) is the communication of information using delivery mechanisms for which little customization is required to reach target audiences that typically seek out research evidence.
2. Dissemination (*help it happen*) is more tailored, in that the communication vehicle and messaging are adapted to the specific audience and/or context in which the knowledge will be used. It is important to consider both the processes for adapting the evidence and the strategies for its dissemination.
3. Application (*make it happen*) is more tailored still, as it moves knowledge into use in cases where the strength of the evidence is sufficient. Selected strategies should be well justified in the context of the goals and target audiences and should consider barriers and facilitators to knowledge use. Key messages should be identified.

Applicants should present strategies that support their KT goals and adapt the knowledge to audience needs and context of use.

4. Expertise

Specific expertise might be required to deliver on the identified strategies. For example, the development of specialized products, like DVDs or films, or reaching audiences that are difficult to engage might require intermediaries, such as information technology (IT) experts or knowledge brokers. The expertise

represented should be driven by the KT goals, audiences and strategies. *Applicants should demonstrate that their team includes the appropriate level of expertise to complete the end-of-grant KT plan.*

5. Resources

Applicants should demonstrate that the proposed KT activities can be delivered. Financial resources, human resources and/or access to resources should be considered. *Applicants should demonstrate that the end-of-grant KT plan can be accomplished with the resources available.*

End-of-Grant Knowledge Translation (KT) Plan Worksheet

Factor ^v	Key questions	Options
Goals	<ul style="list-style-type: none"> • Are the KT goals clear, concrete and well justified? • Are the KT goals appropriate to the potential research findings and the target knowledge-user audiences? 	<p>KT goals could include:</p> <ul style="list-style-type: none"> <input type="checkbox"/> increase knowledge/awareness <input type="checkbox"/> inform future research <input type="checkbox"/> inform/change attitudes <input type="checkbox"/> inform/change behaviour <input type="checkbox"/> inform/change policy <input type="checkbox"/> inform/change practice <input type="checkbox"/> inform/change technology <input type="checkbox"/> other:
Audience	<ul style="list-style-type: none"> • Does the plan consider all potentially relevant knowledge-user audiences? • Are the audiences precisely defined in terms of their sector, roles, responsibilities and decision-making needs/opportunities? • Does the plan demonstrate an understanding of the proposed target audiences, including their knowledge needs in the research area and their preferences for using knowledge? 	<p>Target audiences could include:</p> <ul style="list-style-type: none"> <input type="checkbox"/> community-based and not-for-profit organizations <input type="checkbox"/> general public <input type="checkbox"/> health care professionals/service providers <input type="checkbox"/> health system administrators/managers <input type="checkbox"/> industry/venture capital group <input type="checkbox"/> media (print, TV, etc.) <input type="checkbox"/> patients/consumers <input type="checkbox"/> policy makers/legislators <input type="checkbox"/> private sector <input type="checkbox"/> research funders <input type="checkbox"/> researchers <input type="checkbox"/> other:
Strategies	<ul style="list-style-type: none"> • Are key messages clearly identified? • Are the strategies appropriate to achieve the KT goals? • Does the plan take into consideration the context in which the knowledge is to be used? 	<p>KT strategies could include:</p> <p>Diffusion</p> <ul style="list-style-type: none"> <input type="checkbox"/> conference presentations <input type="checkbox"/> non-peer-reviewed publications <input type="checkbox"/> peer-reviewed publications (open-access journal/archive) <input type="checkbox"/> web-based activities (e.g. postings, wikis, blogs, podcasts, etc.) <input type="checkbox"/> other:

Continued on next page

^v These factors are the same regardless of the domain of research, though *how* they apply will vary.

Continued from previous page

Factor	Key questions	Options
Strategies	<ul style="list-style-type: none"> • If appropriate, is there a plan to adapt the knowledge to each specific audience? • Have mitigating factors been considered that might affect the applicability of the research findings or the effectiveness of the planned KT activities? • Does the plan consider barriers and facilitators to knowledge use? 	<p>Dissemination</p> <ul style="list-style-type: none"> <input type="checkbox"/> patient decision-support aids (e.g. paper or web-based tools that provide information about options and outcomes) <input type="checkbox"/> develop new educational materials/sessions <input type="checkbox"/> events/courses (e.g. conference, symposium, continuing medical education) <input type="checkbox"/> interactive small group meeting/workshop <input type="checkbox"/> plain-language summaries <input type="checkbox"/> summary briefings to stakeholders <input type="checkbox"/> reminders (e.g. electronic reminders in patient files, pocket cards) <input type="checkbox"/> social marketing (e.g. Facebook, Twitter) <input type="checkbox"/> knowledge broker involvement (see page 17 for definition) <input type="checkbox"/> media release/outreach campaign <input type="checkbox"/> networks/networking (e.g. creation of relevant networks; presentations to relevant networks) <input type="checkbox"/> patient-mediated intervention (i.e. intervention that actively engages patients to improve their knowledge or health behaviour, etc.) <input type="checkbox"/> performance feedback <input type="checkbox"/> engage champions/opinion leaders (e.g. inclusion of informal leaders to assist with sharing of evidence) <input type="checkbox"/> financial intervention or incentive <input type="checkbox"/> arts-based KT activity (e.g. development of music video to share research message) <input type="checkbox"/> audit and feedback (e.g. chart review to determine number of diagnostic tests ordered) <input type="checkbox"/> communities of practice (e.g. communication of evidence with a group of practitioners that meets to share work practices) <input type="checkbox"/> other: <p>Application</p> <p>Working with knowledge users to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> adapt knowledge for use <input type="checkbox"/> commercialize

Continued on next page

Continued from previous page

Factor	Key questions	Options
Strategies		<input type="checkbox"/> identify barriers/supports to the use of findings <input type="checkbox"/> tailor messages and interventions to promote use <input type="checkbox"/> monitor knowledge use <input type="checkbox"/> evaluate outcomes <input type="checkbox"/> ensure sustainability <input type="checkbox"/> other:
Expertise	<ul style="list-style-type: none"> • Are all necessary knowledge users involved to achieve the stated goals? • Is there a sufficient description of the team’s ability to execute the proposed strategies? • Where appropriate, does the team plan to collaborate with members of its target audiences? 	Expertise required could include individuals in the following roles: <input type="checkbox"/> knowledge broker (see below for definition) <input type="checkbox"/> community leader <input type="checkbox"/> KT specialist (see below for definition) <input type="checkbox"/> communication specialist <input type="checkbox"/> management <input type="checkbox"/> public relations <input type="checkbox"/> volunteer <input type="checkbox"/> website developer/IT expert <input type="checkbox"/> writer/editor/copy editor/videographer <input type="checkbox"/> other:
Resources	<ul style="list-style-type: none"> • Does the budget allocate adequate financial support to implement the plan? 	Necessary resources could include: Personnel <input type="checkbox"/> graphic design/layout <input type="checkbox"/> knowledge broker (see below for definition) <input type="checkbox"/> KT specialist (see below for definition) <input type="checkbox"/> public relations/marketing specialist <input type="checkbox"/> writer/editor/copy editor Consumables <input type="checkbox"/> mailing and postage <input type="checkbox"/> media development and release <input type="checkbox"/> open-access publication fees <input type="checkbox"/> production/printing <input type="checkbox"/> teleconferences/travel <input type="checkbox"/> web-related costs (blogs, podcasts, wikis, website development/maintenance) <input type="checkbox"/> workshops/meetings/networking costs <input type="checkbox"/> other:

Definitions

knowledge broker: an individual specializing in the communication of findings to knowledge users in their context or via emerging online technologies (e.g. podcasting, webinars, YouTube)

KT specialist: an individual with expertise in the theory and/or practice of knowledge translation

Examples of End-of-Grant Knowledge Translation (KT)

The following examples illustrate how end-of-grant KT can be applied in practice.

Protein Transport Into and Across Cellular Membranes

Every cell has a membrane that separates its interior from its environment, regulates what moves in and out and maintains the electrical potential of the cell. Embedded within this membrane are a variety of protein molecules that act as channels and pumps to move different molecules into and out of the cell.

For many proteins, there is a good understanding of the machinery that inserts them into membranes. In 2005, however, we knew very little about a class of proteins called tail-anchor proteins. These proteins are involved in a wide range of crucial cellular processes and have been linked to a number of diseases, including diabetes, myotonic dystrophy, ALS (Lou Gehrig's disease), cancer and autoimmune diseases.

Understanding the specific mechanisms related to tail-anchor proteins is a key development in furthering this field of study. Dr. David Andrews and his team from McMaster University received a CIHR Operating grant from 2005 to 2010 to explore these proteins. Specifically, one of the team's research questions aimed to determine the molecular machinery by which tail-anchor membrane proteins are assembled in the correct subcellular membrane.

The initial grant submission proposal included a KT plan that identified the KT **goal** of increasing knowledge and awareness of this topic area to inform future research. The team identified the key **audience** of this research study to be researchers in the fields of genetics and microbiology. To reach this audience, the team's

proposed **KT strategy** included diffusing its research evidence via academic conference presentations and peer-reviewed publications within the fields of biochemistry, cell biology and microbiology. The **expertise** of the research team clearly identified its ability to communicate with its target audience and publish/present within this field of study. Fees to cover open-access costs and conference registration and travel were included within the grant budget to ensure sufficient **resources** to implement the KT plan.

Throughout this project, the KT plan was revisited and implemented as initially proposed, since it remained appropriate for these early stages of discovery findings. To achieve its goal of increasing knowledge and awareness among its target **audience**, the team submitted peer-reviewed publications. In keeping with the original **KT strategy**, the team's findings have been successfully published in the open-access journals *Molecular Biology of the Cell*, *The Journal of Biological Chemistry* and *PLoS ONE*, as well as conventional journals such as *Biochemical Journal* and others. The methods developed by the group were published in the journal *Methods* and were described for application to pharmaceutical discovery in an article for *American Drug Discovery* magazine. The results were applied to tail-anchor proteins in plants and bacteria by collaboration and were published in *Traffic* and *PLoS ONE*, respectively. Where permitted by the publishers, copies of the papers were posted on the publications page of Dr. Andrews' website (www.dwalab.ca). As an **expert** in this field, Dr. Andrews was invited to give presentations at 16 international meetings, including the Society of Nuclear Medicine Annual Meeting, and was a keynote speaker at the Annual High-Content Analysis Conference. The results were also featured in invited presentations at Johns Hopkins and Saint Louis Universities. In addition to what was initially proposed, presentations were made for the general public at Science in the City in Hamilton and for the international sales force of the scientific supply company PerkinElmer in Los Angeles. The **resources** budgeted in the grant

were sufficient to successfully implement the proposed KT plan and to permit trainees on the project to present their results at international meetings. Based on the

findings of the initial work, a subsequent CIHR Research grant has since been awarded to this research team.

KT plan in project proposal	Additions to KT plan
Goals - increase knowledge/awareness - inform future research	No change
Audience - researchers in genetics and microbiology	Audience - general public - sales force in scientific supply company
Strategies Diffusion - peer-reviewed publications - conference presentations	Strategies Dissemination - presentations to non-academic audiences
Expertise Human resources - research experience - publication experience - presentation experience	No change
Resources - open-access publication fees - conference registration fees - travel costs	No change

Retention of Locally Trained Physicians

Physician shortages have long been identified as a priority issue in reports released by numerous national bodies. These shortages were highlighted in the National Population Health Survey, which reported that 14% of Canadians did not have a regular physician.²⁸ The migration of physicians to other parts of Canada contributes to these shortages, and both Saskatchewan and Newfoundland and Labrador have a long history of physician shortages. Historically, these provinces have relied on international medical graduates to address these gaps, particularly in rural and remote communities.

A research team led by Dr. Maria Mathews, associate professor of health policy/health care delivery at Memorial University of Newfoundland, received CIHR funding via the Partnerships for Health System Improvement program to examine this topic area. Specifically, this project aimed to:

1. describe the number and nature of changes in physician practice location over the course of a physician's career;
2. describe the factors related to changing a practice location; and
3. examine the predictors of University of Saskatchewan medical graduates who work in Canada, in Saskatchewan and in rural communities.

The **KT goals** of this research project included increasing knowledge and awareness of physician relocation patterns and their consequences and informing policy change related to local physician retention. The **KT strategy** concentrated efforts on audiences in Saskatchewan and Newfoundland and Labrador, such as departments of health, regional health boards, health board associations, medical schools and study participants. To reach these **audiences**, the team planned to distribute a summary report written in non-technical language, give presentations (e.g. at meetings of health board medical directors, medical schools, etc.) and conduct one-on-one briefings with provincial health decision makers. The team also intended to utilize the media services available through the participating universities and funding partner organizations to publicize its findings via websites and newsletters. To reach its **secondary audience** of researchers, the team would present at academic conferences and publish in peer-reviewed journals.

In addition to the **expertise** within the research team, an advisory panel consisting of decision makers to whom the results of the study would be particularly relevant (e.g. department of health/health and community services, medical associations, licensing boards) was established in each participating province.

These panels were expected to provide feedback on interview questions, help interpret results, craft recommendations and disseminate study findings. This iKT approach can increase the chances of successfully implementing a proposed KT plan. Included within the grant budget were **resources** to contract a writing consultant to prepare lay summaries of the research findings.

At the conclusion of the research project, the KT plan was revisited and implemented as initially proposed, with some additional components. To achieve its **KT goal** of informing policy change, the research team provided policy briefs to Health Canada and to provincial health authorities across Canada, rather than just within the participating provinces. The expanded **audience** included provincial deputy ministers of health. Also, meetings with local physician recruiters were organized. This altered **KT strategy** was suggested by the advisory panels, whose **expertise** was crucial throughout the project. The policy briefs provided identical information to each province and were built upon the consultant summaries that were included within the **resource** allocation of the original grant proposal.

KT plan in project proposal	Additions to KT plan
<p>Goals</p> <ul style="list-style-type: none"> - increase knowledge/awareness - inform policy change 	<p>No change</p>
<p>Audience</p> <ul style="list-style-type: none"> - Saskatchewan and Newfoundland and Labrador representatives at: <ul style="list-style-type: none"> • departments of health • regional health boards • health board associations • medical schools - study participants 	<p>Audience</p> <ul style="list-style-type: none"> - provincial health authorities across Canada - provincial deputy ministers of health - Health Canada - local physician recruiters
<p>Strategies</p> <p>Diffusion</p> <ul style="list-style-type: none"> - website posting - conference presentations <p>Dissemination</p> <ul style="list-style-type: none"> - plain-language summary - one-on-one briefings 	<p>Strategies</p> <p>Dissemination</p> <ul style="list-style-type: none"> - policy briefs
<p>Expertise</p> <p>Human resources</p> <ul style="list-style-type: none"> - research experience - publication experience - presentation experience - advisory panel 	<p>No change</p>
<p>Resources</p> <ul style="list-style-type: none"> - plain-language writing consultant - conference registration fees - travel costs 	<p>No change</p>

Knowledge Brokering in Pediatric Rehabilitation

When parents first discover that their child has cerebral palsy (CP), a condition that primarily affects motor development, they have many questions about what this means in terms of their child’s movement abilities and capabilities for the future. Researchers have developed a group of clinical tools that can provide physicians and therapists with the evidence-based information they need to talk to families about gross motor development, appropriate goal setting and the

prognosis for future motor development. Despite their widespread use in research, these tools had made only a slow progression into the clinical world.

With researchers from *CanChild* Centre for Childhood Disability Research at McMaster University and collaborators from the University of Alberta, University of Western Ontario, University of British Columbia and several children’s rehabilitation organizations (CROs), Dianne Russell and her team engaged physiotherapists (PTs) within the CROs to become knowledge brokers (KBs). A knowledge broker specializes in the

communication of findings to knowledge users in their context. The study was to determine the effectiveness and impact this role would have in supporting the evidence-based practice of PTs working with children who have CP.

In developing an end-of-grant KT plan for its grant proposal, the team identified the short-term **KT goals** of a face-to-face meeting with the KBs to discuss the preliminary results and get their perspective on the knowledge brokering intervention. The longer-term **KT goal** was targeting the broader community to increase awareness of the KB strategy as a method of supporting the integration of these and other evidence tools into practice. The identified **audiences** for the preliminary results of this research project were service providers for children with CP and CRO administrators. Russell expected the **KT strategy** to include a variety of products (e.g. web postings of summary of results, electronic teaching materials), presentations and workshops at relevant clinical conferences (e.g. American Academy for Cerebral Palsy and Developmental Medicine, Canadian Physiotherapy Association) and peer-reviewed publications. With a research team that included clinicians, clinical administrators and academics, the expertise was in place to undertake the proposed activities. The resources detailed in the proposal budget included funds for the development of these electronic materials and conference registration fees.

At the conclusion of this research project, when peer-reviewed publications were under way,²⁹⁻³¹ Russell and her team identified the need for additional strategies to engage with the participating CROs. Their original **KT goals** remained the same; however, while undertaking their Operating grant, they recognized that traditional dissemination activities included within their **KT strategy** (conference presentations, workshops and journal publications) and a broad mass-media strategy (web postings) were not the most effective means of engaging with all their identified **audiences**. To overcome these barriers, the research team successfully

obtained additional resources via a CIHR Dissemination Event grant. The objectives of this grant were to work closely with the KBs to develop and target the dissemination of user-friendly materials describing the findings from the original study and to provide for an interactive exchange between 28 study sites.

Appreciating both the hectic schedules of administrators and clinicians and the fact that the study sites were situated across three provinces, the team opted to organize a series of teleconferences with all the participants from the original study, including administrators, KBs and PTs. The focus of the teleconferences was to encourage participating sites to discuss the impact of the KB study and whether and how participants might consider implementing a KB role more broadly, thus combining the **expertise** of the research team with its identified audiences. Prior to the teleconference meetings, user-friendly research summaries were developed in collaboration with key stakeholders and circulated by the KBs to their own administrators and PTs.³²

In addition, several discussion questions were pre-circulated to allow dialogue at the individual sites prior to the teleconference, when the participants would be discussing their organizations' ideas and plans with the other CROs and the study team. During the teleconference, suggestions were made for the creation of a one-page summary of study results specifically targeted to the CEOs,³³ the principal decision makers who would ultimately influence the funding of a KB role within rehabilitation organizations. Finally, participants wanted and received a document summarizing the teleconference ideas that they could use for planning,³⁴ a PowerPoint presentation and a poster to further disseminate the study results within their own organizations. An individual from each CRO was identified for a follow-up interview three months post-teleconference to evaluate whether his/her organization was considering implementing a KB role. These follow-up interviews revealed that a KB model had been implemented in two organizations and that another seven were discussing ways to make it happen.

KT plan in project proposal	Additions to KT plan
Goals <ul style="list-style-type: none"> - increase knowledge/awareness - inform/change practice 	No change
Audience <ul style="list-style-type: none"> - cerebral palsy service providers <ul style="list-style-type: none"> • physiotherapists • professional associations • clinical administrators/decision makers 	No change
Strategies <p>Diffusion</p> <ul style="list-style-type: none"> - website posting of project findings - clinical conference presentations and workshops <p>Dissemination</p> <ul style="list-style-type: none"> - plain-language summary - electronic teaching materials - knowledge broker involvement 	Strategies <p>Dissemination</p> <ul style="list-style-type: none"> - interactive small group teleconference meetings - follow-up interviews with site contacts <p>Application</p> <ul style="list-style-type: none"> - tailored messages directly to hospital administrators and posted on web for all stakeholders - interactive interventions to promote exchange and use
Expertise <p>Multidisciplinary research team</p> <ul style="list-style-type: none"> - experienced academics - clinicians/knowledge brokers - health care administrators 	No change
Resources <ul style="list-style-type: none"> - knowledge brokers - production/printing - conference registration fees 	Resources <ul style="list-style-type: none"> - Dissemination Event grant - research coordinator - IT/web support - teleconferencing/printing

To view the entire case study, please refer to our *Knowledge to Action: An End-of-Grant Knowledge Translation Casebook*, see page 26.

Knowledge Translation (KT) in the Fight Against the Global Tobacco Epidemic

An estimated one billion people are projected to die in the 21st century as a result of tobacco use.³⁵ The world's first health treaty, the WHO Framework Convention on Tobacco Control (WHO FCTC), was developed in response to the tobacco epidemic. The

WHO FCTC identifies policies that ratifying nations must implement, such as enhanced warning labels, smoke-free laws, advertising bans and higher taxes.

Since 2002, the International Tobacco Control Policy Evaluation Project (ITC Project), funded by a CIHR Operating grant, has conducted research to evaluate the impact of the WHO FCTC tobacco-control policies in 20 countries inhabited by over 70% of the world's

tobacco users. Research findings from the ITC Project, led by Geoffrey T. Fong, professor of psychology at the University of Waterloo and senior investigator at the Ontario Institute for Cancer Research, have created an evidence base that strongly supports effective implementation of the WHO FCTC policies.

There were many **KT goals** for this project, including informing future research and increasing government decision makers' knowledge of tobacco-use prevalence and its consequences as well as their awareness of the current level of effectiveness of their country's tobacco-control policies. The research team also had a **KT goal** to strengthen policy in participating jurisdictions and, ultimately, to change the behaviour of smokers. The initial relevant audiences for these research findings included researchers, policy makers and advocacy groups. In parallel with traditional dissemination efforts like conference presentations and journal publications, the proposed **KT strategies** included drafting and disseminating plain-language reports, summaries and/or briefing notes of the key findings for government decision makers, with input from knowledge users, including representative policy makers and advocacy groups. The development of these tailored messages, using a broad range of **expertise**, ensured that the reports, along with policy reports prepared for policy makers on specific policy domains (e.g. warning labels, cessation), were properly contextualized and culturally appropriate and addressed the specific tobacco-control policy needs of each country. These resource-intensive activities were

included within the original grant budget because the development and implementation of national tobacco-control policies lie within the domain of governments; therefore, it was important to keep policy makers abreast of the current evidence, not only in their country but also in other countries, particularly those that could serve as models of best practice and inspiration for stronger action in tobacco control.

Upon completion of the original grant, the KT plan was reviewed and implemented with minor changes. However, in seeing how well received the research findings were, the research team determined that the results would also be beneficial for the general public and for decision makers in other jurisdictions. The team applied for and received a Knowledge Translation Supplement grant from CIHR, which allowed the ITC Project research team to further its **KT goals**. To reach this wider **audience**, including attendees at the World Conference on Tobacco or Health and the general public via the Internet, the research team undertook additional **KT strategies** with the development of more ITC Project dissemination products. Such products included national reports for low- and middle-income countries and synthesis reports to summarize survey results on the effectiveness of smoke-free policies and the factors associated with successful smoking-cessation programs and policies. Throughout the many years of this initiative and by working with various knowledge users, the research team gained expertise in reporting research findings to non-academic audiences.

KT plan in project proposal	Additions to KT plan
<p>Goals</p> <ul style="list-style-type: none"> - inform future research - increase knowledge/awareness - inform/change practice - change behaviour of smokers 	<p>Goals</p> <ul style="list-style-type: none"> - influence smokers/public
<p>Audience</p> <ul style="list-style-type: none"> - researchers - tobacco-control policy makers - advocacy groups 	<p>Audience</p> <ul style="list-style-type: none"> - general public - additional countries/jurisdictions
<p>Strategies</p> <p>Diffusion</p> <ul style="list-style-type: none"> - conference presentations - peer-reviewed publications <p>Dissemination</p> <ul style="list-style-type: none"> - engage champions/opinion leaders - plain-language summaries - summary briefings to stakeholders <p>Application</p> <ul style="list-style-type: none"> - tailor messages and interventions to promote use (tobacco warning labels) 	<p>Strategies</p> <p>Dissemination</p> <ul style="list-style-type: none"> - tailored national reports for participating countries - summary of smoke-free policies
<p>Expertise</p> <ul style="list-style-type: none"> - input from representative policy makers and knowledge users - input from representatives from multiple countries - linguistic translation 	<p>No change</p>
<p>Resources</p> <ul style="list-style-type: none"> - production/printing - workshop/meetings/networking costs 	<p>Resources</p> <ul style="list-style-type: none"> - Knowledge Translation Supplement grant - production/printing

To view the entire case study, please refer to our *Knowledge to Action: An End-of-Grant Knowledge Translation Casebook*, see page 26.

Knowledge Translation (KT) Resources

At CIHR:

Knowledge to Action Casebooks

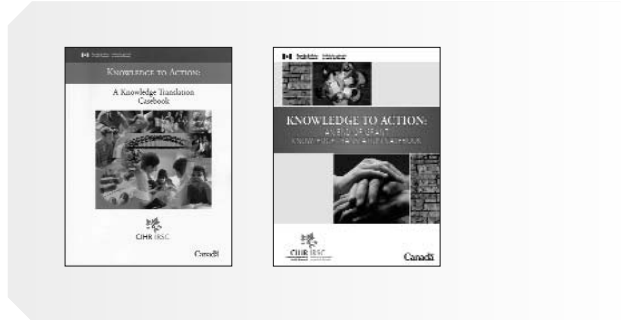
A Knowledge Translation Casebook

An End-of-Grant Knowledge Translation Casebook

In these publications, you will learn about some diverse and interesting KT initiatives. This series of KT cases provides valuable insights into the real world of researchers and knowledge users as they do knowledge translation.

www.cihr-irsc.gc.ca/e/38764.html

www.cihr-irsc.gc.ca/e/41594.html



KT Handbook

Knowledge Translation in Health Care uses the Knowledge-to-Action Cycle as a guiding framework to define and describe KT and outline strategies for enhancing KT capacity and facilitating the implementation of KT activities. The topics presented in this book have important implications for health policy makers, researchers, managers, clinicians and trainees.

www.cihr-irsc.gc.ca/e/40618.html



KT Clearinghouse

The KT Clearinghouse website is funded by CIHR to serve as the repository of KT resources for individuals who want to learn about the science and practice of KT and to access tools that facilitate their own KT research and practices.

<http://ktclearinghouse.ca/>

CIHR's Online Learning Modules

Seven KT learning modules are now freely available at

www.cihr-irsc.gc.ca/e/39128.html. The modules include the following:

- A Guide to Researcher and Knowledge-User Collaboration in Health Research
- Introduction to Evidence-Informed Decision Making
- Critical Appraisal of Intervention Studies
- A Guide to Knowledge Synthesis
- Deliberative Priority Setting
- Knowledge Translation in Health Care: Moving from Evidence to Practice
- Knowledge Translation in Low & Middle-Income Countries

Other KT Guides

Barwick M. 2008. Knowledge Translation Research Plan Template. Available from:
www.sickkidsfoundation.com/grants/knowledge.asp.

Cheikh Faye, Monique Lortie, Lise Desmarais. 2008. *Guide to Knowledge Transfer: Designed for Researchers in Occupational Health and Safety*. Available from:
www.rrsstq.com/stock/fra/p197.pdf. Réseau de recherche en santé et en sécurité du travail du Québec.

Health Research Council of New Zealand. 2006. *Implementing Research: A guideline for health researchers*. Available from:
www.hrc.govt.nz/news-and-publications/publications/research-funding

Landry, Lyons, Amara, Warner, Ziam, Halilem, Kéroack. Two Knowledge Translation Planning Tools for Stroke Research Teams. 2006. Available from:
<http://kuuc.chair.ulaval.ca/ctci/index.php>
Accessed May 26, 2010.

Lomas J. 1993. Diffusion, dissemination, and implementation: who should do what? *Annals of the New York Academy of Sciences*, 703: 226-235.

Rhoda Reardon, John Lavis, Jane Gibson. 2006. *From Research to Practice: A Knowledge Transfer Planning Guide (2006)*. Available from: www.iwh.on.ca/system/files/at-work/kte_planning_guide_2006b.pdf. Institute for Work & Health.

Ross S. (Health Policy Strategies and McMaster University), Goering P., Jacobson N., Butterill D. (Health Systems Research and Consulting Unit, CAMH). "A Guide for Assessing Health Research Knowledge Translation (KT) Plans: Towards More Effective Peer Review of Knowledge Translation Plans in Research Grant Proposals." Developed as part of a research study led by Paula Goering and funded by the Canadian Health Services Research Foundation, Canadian Institutes of Health Research, National Institute for Health Research Service Delivery and Organisation and the Netherlands Organisation for Health Research and Development.

References

1. Cargo, M., and S.L. Mercer. 2008. The value and challenges of participatory research: strengthening its practice. *Annu Rev Publ Health*. 29:325–50.
2. Bowen, S., and P.J. Martens. 2006. A model for collaborative evaluation of university-community partnerships. *J Epidemiol Community Health*. 60(10):902–7.
3. Golden-Biddle, K., T. Reay, S. Petz, C. Witt, A. Casebeer, A. Pablo, et al. 2003. Toward a communicative perspective of collaborating in research: the case of the researcher-decision-maker partnership. *J Health Serv Res Policy*. 8 Suppl 2:20–5.
4. Lomas, J. 2000. Using 'linkage and exchange' to move research into policy at a Canadian foundation. *Health Aff (Millwood)*. 19(3):236–40.
5. Nowotny, H., P. Scott, and M. Gibbons. 2003. Introduction: 'Mode 2' revisited: the new production of knowledge. *Minerva*. 41(3):179–94.
6. Gibbons, M. 2000. Mode 2 society and the emergence of context-sensitive science. *Sci Public Policy*. 27(3):159–63.
7. Kitson, A., and M. Bisby. 2008. Speeding up the spread: putting KT research into practice and developing an integrated KT collaborative research agenda. Edmonton (AB): Alberta Heritage Foundation for Medical Research. Available: www.aihealthsolutions.ca/publications
8. Bartunek, J., J. Trullen, E. Bonet, and A. Sauquet. 2003. Sharing and expanding academic and practitioner knowledge in health care. *J Health Serv Res Policy*. 8 Suppl 2:62–8.
9. Choi, B.C., T. Pang, V. Lin, P. Puska, G. Sherman, M. Goddard, et al. 2005. Can scientists and policy makers work together? *J Epidemiol Community Health*. 59(8):632–7.
10. Barrozzino, T. 2010. Immigrant health and the children and youth of Canada: are we doing enough? *Healthcare Quarterly*. 14(1):52–59.
11. Hertzman, C. 2009. The state of child development in Canada: are we moving toward, or away from, equity from the start? *Paediatr Child Health*. 14(10):673–676.
12. Hertzman, C., and T. Boyce. 2010. How experience gets under the skin to create gradients in developmental health. *Annu Rev Publ Health*. 31(1):329–347.
13. Shonkoff, J.P., W.T. Boyce, and B.S. McEwen. 2009. Neuroscience, molecular biology, and the childhood roots of health disparities. *JAMA*. 301(21):2252–2259.
14. Victorino, C., and A.H. Gauthier. 2009. The social determinants of child health: variations across health outcomes – a population-based cross-sectional analysis. *BMC Pediatrics*. 9:53–65.
15. Power, C., S. Stansfeld, S. Matthews, O. Manor, and S. Hope. 2002. Childhood and adulthood risk factors for socio-economic differentials in psychological distress: evidence from the 1958 British birth cohort. *Soc Sci Med*. 55:1989–2004.
16. Callejas, L.M., M. Hernandez, T. Nesman, and D. Mowery. 2010. Creating a front porch in systems of care: improving access to behavioral health services for diverse children and families. *Eval Program Plann*. 33(1):32–35.
17. Health Officers' Council of British Columbia. 2007. Taking action on child poverty. P.W. Group, Ed. B.C. Conversation on Health: Richmond, B.C.
18. Starfield, B., L. Shi, and J. Macinko. 2005. Contribution of primary care to health systems and health. *Milbank Q*. 83(3):457–502.
19. Lynam, M.J., C. Loock, L. Scott, S. Wong, V. Munroe, and B. Palmer. 2010. Social paediatrics: creating organizational processes and practices to foster health care access for children at risk. *J Res Nurs*. Online first, doi: 10.1177/1744987109360651.
20. Wong, S.T, M.J. Lynam, K.B. Khan, L. Scott, and C. Loock (in review). The social pediatrics initiative: a RICHER model of primary health care for at-risk children and their families. *BMC Pediatrics*.

21. Lynam, M.J., L. Scott, C. Loock, and S. Wong. 2011. The RICHER social pediatrics model: fostering access and reducing inequities in children's health. *Healthcare Quarterly*. (Special Issue: October) 14:40–45.
22. Statistics Canada. Mortality, summary list of causes 2008. Released October 18, 2011.
23. Yusuf, S., K.K. Teo, J. Pogue, et al. 2008. Telmisartan, ramipril, or both in patients at high risk for vascular events. *New Engl J Med*. 358:1547–59.
24. Yusuf, S., S. Islam, C.K. Chow, S. Rangarajan, G. Dagenais, R. Diaz, R. Gupta, R. Kelishadi, R. Iqbal, A. Avezum, A. Kruger, R. Kutty, F. Lanas, L. Lisheng, L. Wei, P. Lopez-Jaramillo, A. Oguz, O. Rahman, H. Swidan, K. Yusoff, W. Zatonski, A. Rosengren, and K.K. Teo; on behalf of the Prospective Urban Rural Epidemiology (PURE) Study Investigators. 2011. Use of secondary prevention drugs for cardiovascular disease in the community in high-income, middle-income, and low-income countries (the PURE Study): a prospective epidemiological survey. *Lancet*. 378(9798):1231–43.
25. Hackam, D.G., K.G. Shojania, J.D. Spence, D.A. Alter, R.S. Beanlands, G.K. Dresser, A. Goela, A.H. Davies, L.P. Badano, D. Poldermans, E. Boersma, and V.Y. Njike. 2011. Influence of non-invasive cardiovascular imaging in primary prevention: systematic review and meta-analysis of randomized trials. *Arch Intern Med*. 171(11):977–82.
26. Li, L.C., P.M. Adam, A.F. Townsend, D. Lacaille, C. Yousefi, S. Turnau, et al. 2011. Development and usability testing of ANSWER: a web-based methotrexate decision aid for patients with rheumatoid arthritis. (Abstract 1669). *Arthritis Rheum*. 63(10):S652.
27. Ross, S., et al. 2007. A guide for assessing health research knowledge translation (KT) plans: towards more effective peer review of knowledge translation plans in research grant proposals.
28. Talbot, Y., E. Fuller-Thomson, F. Tudiver, Y. Habib, and W.J. McIsaac. 2001. Canadians without regular medical doctors: who are they? *Can Fam Physician*. 47, 58–64.
29. Russell, D.J., L.M. Rivard, S.D. Walter, P.L. Rosenbaum, L. Roxborough, D. Cameron, D.J. Bartlett, J. Darrah, S.E. Hanna, and L.M. Avery. 2010. Using knowledge brokers to facilitate the uptake of pediatric measurement tools into clinical practice: a before-after intervention study. (Highly accessed article) *Implementation Science*. 5:92 (www.implementationscience.com/content/5/1/92)
30. Rivard, L.M., D.J. Russell, L. Roxborough, M. Ketelaar, D. Bartlett, and P. Rosenbaum. 2010. Promoting the use of measurement tools in practice: a mixed-methods study of the activities and experiences of physical therapist knowledge brokers. *Phys Ther*. 90:1580–1590.
31. Cameron, D., D.J. Russell, L. Rivard, J. Darrah, and R. Palisano. 2011. Knowledge brokering in children's rehabilitation organizations: perspectives from administrators. *J Contin Edu Health Prof* 31(1):28–33.
32. (www.canchild.ca/en/ourresearch/resources/FINAL2009KBStudyReportVersion3.pdf).
33. (www.canchild.ca/en/resources/KBStudy_CEO_InBrief_Apr20_10.pdf)
34. (www.canchild.ca/en/resources/Participant_InBrief_Apr20_10.pdf)
35. Murray, C.J., and A.D. Lopez. 1997. Alternative projections of mortality and disability by cause 1990-2020: global burden of disease study. *Lancet*, 349 (9064):1498–1504.

