

# **KNOWLEDGE TRANSLATION IN INTERPROFESSIONAL EDUCATION:**

A REVIEW OF LITERATURE AND RESOURCES

REPORT PREPARED FOR THE CANADIAN INTERPROFESSIONAL HEALTH  
COLLABORATIVE

MAY 1, 2007



**SUBMITTED BY:**

UBC  
CONTINUING PROFESSIONAL DEVELOPMENT  
AND KNOWLEDGE TRANSLATION  
(UBC CPD-KT)

**JENNIFER CORDEIRO** lead researcher | **KERENZA PLOHMAN** researcher

**VALERIE KILGOUR** researcher | **MÊ-LINH LÊ** researcher

**YOLANDA LIMAN** project coordinator

**SANDRA JARVIS-SELINGER**, project director

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1.0 INTRODUCTION.....</b>	<b>4</b>
<b>1.1 PURPOSE AND SCOPE OF THIS REPORT .....</b>	<b>4</b>
<b>1.2 THE CONCEPT AND SIGNIFICANCE OF KT .....</b>	<b>5</b>
<b>1.3 INTERPROFESSION EDUCATION (IPE) AND COLLABORATIVE PATIENT- CENTRED PRACTICE (CPCP).....</b>	<b>6</b>
<b><i>1.3.1 KT and IPE/CPCP Initiatives.....</i></b>	<b>6</b>
<b>1.4 DEFINITION OF KT FOR THIS REPORT .....</b>	<b>7</b>
<b>2.0 METHODS AND TOOLS .....</b>	<b>8</b>
<b>2.1 SEARCH AND REVIEW STRATEGY .....</b>	<b>8</b>
<b>2.2 THE RESULTS OF THE SEARCH—STRENGTH OF EVIDENCE.....</b>	<b>8</b>
<b>3.0 STATE OF KT LANGUAGE AND TERMINOLOGY.....</b>	<b>9</b>
<b>3.1 DIFFERENT KT DEFINITIONS AND KT RELATED-TERMS.....</b>	<b>9</b>
<b>3.2 THE CIHR DEFINITION OF KT.....</b>	<b>10</b>
<b>4.0 MODELS OF KT .....</b>	<b>12</b>
<b>4.1 CIHR MODEL.....</b>	<b>12</b>
<b>4.2 THE OTTAWA MODEL OF RESEARCH USE (OMRU).....</b>	<b>13</b>
<b>4.3 LAVIS.....</b>	<b>14</b>
<b>4.4 KITSON.....</b>	<b>15</b>
<b>5.0 NON-CLINICAL MODELS OF KT.....</b>	<b>17</b>
<b>6.0 KT STRATEGIES AND TRENDS .....</b>	<b>18</b>
<b>6.1 DIFFUSION: DISSEMINATION TO MAINTENANCE.....</b>	<b>19</b>
<b>6.2 OPINION LEADERS .....</b>	<b>19</b>
<b>6.3 KNOWLEDGE BROKERING .....</b>	<b>20</b>
<b>6.4 MARKETING STRATEGIES .....</b>	<b>20</b>
<b>6.5 RESEARCH ROUNDTABLES .....</b>	<b>20</b>
<b>6.6 TECHNOLOGY-ENABLED KT (TEKT).....</b>	<b>21</b>
<b>7.0 EVALUATION OF KT STRATEGIES.....</b>	<b>22</b>
<b>8.0 KT CHALLENGES AND BARRIERS WITHIN KT AND IPE/CPCP CONTEXTS ....</b>	<b>23</b>
<b>8.1 DIFFERENCES IN LANGUAGE AND TERMINOLOGY.....</b>	<b>23</b>
<b>8.2 DIFFERENCES IN THE VALUES, GOALS, AND PROCEDURES BETWEEN INTERPROFESSIONAL GROUPS .....</b>	<b>24</b>

<b>8.3 A UNI-PROFESSIONAL CULTURE/ COMMUNITY OF PRACTICE .....</b>	<b>24</b>
<b>8.4 EVIDENCE .....</b>	<b>24</b>
<b>8.5 ORGANIZATIONAL .....</b>	<b>25</b>
<b>9.0 RECOMMENDATIONS .....</b>	<b>26</b>
<b>10.0 PROPOSED DISCUSSION FRAMEWORK FOR AN INTEGRATIVE CIHC – KT STRATEGY .....</b>	<b>27</b>
<b>11.0 CONCLUSION .....</b>	<b>29</b>
<b>12.0 GLOSSARY .....</b>	<b>30</b>
<b>13.0 RESOURCES .....</b>	<b>34</b>
<b>14.0 REFERENCES.....</b>	<b>37</b>

## **EXECUTIVE SUMMARY**

The purpose of this paper is to provide the Canadian Interprofessional Health Collaborative (CIHC) with a background paper on KT (KT) in relation to interprofessional education (IPE) and collaborative patient-centred practice (CPCP). The paper is intended to aid in the development and implementation of the CIHC – KT workplan and framework, and to generate ideas to develop and initiate their own KT-IPE framework.

KT is becoming increasingly important as an essential step toward improving health care by bridging the gap between health research findings and practice. Improvements to the health care system have consistently been moving toward interprofessional, collaborative models of practice with a patient-centred view of care. For the purposes of this report, KT within this context has been defined as:

*The review, synthesis and application of the best evidence available by an interprofessional team of researchers, clinicians, and champions for a stronger and more informed collaborative patient-centred practice approach to Canadian health care to improve patient outcomes.*

### *KT Terminology*

A systemic review of the literature from both peer-reviewed and grey literature sources was conducted. The search terms were chosen based on recommendations from the CIHC subcommittee. The results found were limited by language (English only), date (from 2002 to 2007, with some exceptions), and source (primarily Canadian, and subsequently US and international). There was not a great quantity of literature found on KT and IPE specifically.

The literature on KT reveals a lack of agreement on definitions of the various terms involved. CIHR, considered at the forefront of work in KT, identifies three main elements of KT: the application of knowledge, interactions between key players, and improved health outcomes.

### *KT Models*

The health literature contains a variety of frameworks for implementing KT. Four important models—the CIHR Model, the Ottawa Model of Research Use, the Lavis Model, and the Kitson Model—were found to be particularly useful. The most helpful models provide both micro and macro perspectives, and can be tailored to specific settings.

### *Review of KT Settings: Clinical and Non-Clinical Environments*

A secondary search was conducted for KT definitions and models in non-clinical areas such as education, management, economics, and marketing. Some applications were found, indicating that KT is applicable in many non-health-related settings.

For knowledge to be translated in health settings, important factors to consider include presentation of best evidence; improved communication between and within disciplines; and flexibility in implementation as there is no across-the-board solution.

### *KT Trends and Strategies*

The literature review reveals a number of current KT trends, including: *knowledge diffusion* – the way knowledge is diffused throughout an organization or stakeholder groups; the role of *opinion leaders* and *knowledge brokers*; the use of *marketing strategies* and *research roundtables*; and the idea of *technology-enabled KT*.

### *Evaluation of KT Initiatives*

Evaluative components need to be built into KT implementation strategies so the success (or failure) of the intervention can be measured. However, it is suggested that more than simply an outcome evaluation (that is, assessing the end result of the intervention—was it successful or not?) is insufficient; a stronger evaluation would include whether an intervention worked, and why (or why not).

It is further suggested that three key factors to consider in KT evaluations are the adherence to evidence-based practice; organizational change; and patient outcomes. Assessment of these gives a broad understanding of the KT initiative.

### *Challenges*

There are a number of challenges that surround translating knowledge. First, there is no widespread agreement in defining the relevant terminology. Second, health professional groups differ widely in training, education, organizational structure and standards, and knowledge and protocols, making it difficult for the dissemination of change. Third, there are major historical differences in the functions and capacities of university culture and health professional culture, which can make cross-over difficult. Fourth, some evidence may be too 'weak' to be implemented; it is crucial to know which research findings lend themselves to implementation. Fifth, the characteristics of the organizational structure help predict the pace and success of KT; it is important for systems and organizations to be adaptable to change.

### *Recommendation*

The first recommendation is to establish a common language base amongst all participants in a KT intervention, allowing the various stakeholder groups to understand all roles and responsibilities. Secondly, a strong case must be built and maintained in order to strengthen understanding and buy-in from all groups; clear, solid evidence implemented in a cohesive and testable way strengthens and reinforces the initiative. Third, interprofessional relationships must be created and maintained, through mechanisms such as communities of practice and professional forums. This helps create successful team dynamics and encourages team members to support and implement translation processes.

A **Glossary** is appended to this report that lists and explains the commonly used KT terms and definitions found in the KT literature. The **Resources** section collates a variety of KT resources that can be used to reference current and future work being done in KT. The **References** sections provides formal references to all works cited in this report and is organized by thematic area for ease of use.

## **1.0 INTRODUCTION**

### **1.1 PURPOSE AND SCOPE OF THIS REPORT**

The intention of this paper is to provide readers interested in KT and IPE with the background knowledge to generate ideas to develop and initiate their own KT-IPE framework. This paper was developed for the Canadian Interprofessional Health Collaborative (CIHC) and provides a concise, high-level background paper on KT (KT) in relation to interprofessional education (IPE), and collaborative patient-centred practice (CPCP).

The findings outlined in this paper are based on a broad literature review and compilation of KT references and resources. The intended audience of this work was the CIHC KT Sub-committee – to aid in the development and implementation of their workplan and framework as well as CIHC members interested in gaining valuable information about KT and IPE.

The specific goals of this paper were to:

1. Conduct a literature review specifically related to KT and IPE, with adherence to the following guidelines:
  - a. Identification of key search strategies and terms;
  - b. Inclusion of peer-reviewed journals, grey literature and, whenever possible, KT literature that refers to collaborative practice and client centred care;
  - c. Exploration of the various terms and definitions used within the KT literature;
2. Collate a variety of KT references and resources relevant to IPE and health.

To address these objectives, several practical background sections were included including a brief background summary of the fields of KT, IPE, CPCP as well as a glossary of KT terms. Given the myriad of terms and definitions surrounding KT, a working definition of KT in relation to IPE was also developed to add clarity and focus to the paper.

The bulk of this paper reviews and synthesizes the information found within the KT literature, as understood through the following frames of analyses:

- KT terminology
- KT models
- Strategies and trends
- Challenges and barriers
- Recommendations in relation to IPE/CPCP and the CIHC KT Sub-committee

The following sections provide a brief overview of the concept and significance of KT, followed by a summary of IPE/CPCP approaches and initiatives. A working definition of KT for this report follows.

## 1.2 THE CONCEPT AND SIGNIFICANCE OF KT

Health-related research over the past few decades indicates a gap between what is known (research findings) and what is being done. This disjunction, referred to as the 'clinical care gap' (Davis, 2006; National Center for the Dissemination of Disability Research, 2005; Grol, 2003), means that clinical evidence is being generated at an increasingly rapid rate but is often not being made readily available to clinicians (Davis, 2006). Sussman et al. (2006) note that the implementation of clinical innovations has not kept pace with their development; indeed, it is estimated that the average KT cycle takes one to two decades for original research to be translated into routine health practice.

Turning research findings into practice is often a slow and haphazard process (Graham, Logan, Harrison, et al., 2006), and has been described as a complex and messy task (Kitson, Harvey, & McCormack, 1998). KT, as made explicit by the Canadian Institutes of Health Research (CIHR) and various other health research and governing organizations, aims to accelerate this process of transforming research findings into practice (Graham et al., 2006; CIHR).

KT offers an overarching concept for achieving the adoption of best evidence, leading to best health outcomes (Davis, 2006). The process of translating evidence to practice is a shared responsibility of both researchers and those who use the research (Corcoran, 2006). The importance of KT and KT initiatives is reflected in the increasing support for these projects receive by funding agencies, both within Canada (CIHR, Canadian Health Services Research Foundation) and internationally (National Cancer Institute, etc.) (Graham et al., 2006; Sussman, et al., 2006). Funding agencies, policymakers,

researchers, and educators have paid increasing attention to KT in recent years to ensure the best, most up-to-date health care information is provided to patients (Strauss, Graham and Mazmanian, 2006).

### 1.3 INTERPROFESSION EDUCATION (IPE) AND COLLABORATIVE PATIENT-CENTRED PRACTICE (CPCP)

Like KT, the concept of IPE and CPCP aim to use the best practices available to improve health care processes and outcomes (Zwarenstein, 2006). As with the field of KT, there still exists some confusion around the use of terms like IPE and CPCP (Health Canada, 2006).

As patient care becomes more complex, effective collaboration between health care professionals is required (Zwarenstein, Reeves, Barr, Hammick, Koppel, & Atkins, 2007). The concept of IPE provides opportunities to achieve this type of interaction and collaboration (Zwarenstein et al., 2007). The Center for the Advancement of Interprofessional Education (CAIPE) (2002) describes IPE as “occasions when two or more professions learn from and about each other to improve collaboration and the quality of care.” IPE includes any type of educational, training or teaching initiative involving more than one profession in joint, interactive learning.

CPCP is a type of practice orientation that takes a collaborative approach to care, where health professionals work for and with their patients. It involves the continuous interaction of two or more professions or disciplines, organized into a common effort, to solve or explore common issues with the best possible participation of the patient (D'Amour & Oandassan; Health Canada, 2006).

#### *1.3.1 KT and IPE/CPCP Initiatives*

Health Canada's Interprofessional Education for Collaborative Patient-Centred Practice (IECPCP) report found many promising practices in IPE and CPCP following a comprehensive literature review and environmental scan (Health Canada, 2006). The IECPCP report highlighted the work of the National Expert Committee on IPE and CPCP in connecting and consulting with stakeholders about the further development, implementation, and evaluation of IECPCP.

As a result of the report, two rounds of research projects across Canada were commissioned to further understand and promote IECPCP. CIHC is a two-year IECPCP

funded initiative with a mission to facilitate critical connections between many important stakeholders, including those involved in the IECPCP research projects. Its goals are to build the collaborative, identify and share best practices, and translate knowledge.

Developing and implementing KT initiatives is not easy for either small or large scale projects. This is especially true for KT initiatives requiring complex changes in clinical practice or better collaboration between disciplines, which are difficult to implement (Grol & Grimshaw, 2003).

#### 1.4 DEFINITION OF KT FOR THIS REPORT

This operational definition of KT developed for this paper is based on the CIHR definition of KT. The CIHR definition is explored in more detail in the findings section of the paper. Generally, the CIHR KT strategy describes KT as a way to develop a systematic, integrated approach to accelerate optimal use of the best available research evidence in the interest of the health of all Canadians. It includes the following basic principles of KT: (1) use the best available knowledge; (2) build a dynamic inclusive team made up of many different of professionals; and (3) ensure that all KT efforts are directed toward creating better health outcomes (CIHR, KT Strategy, 2004).

The definition proposed follows this general framework but has been tailored specifically for use in IPE contexts. For the purposes of this report, KT in relation to IPE has been defined as:

*The review, synthesis and application of the best evidence available by an interprofessional team of researchers, clinicians, and champions for a stronger and more informed collaborative patient-centred practice approach to Canadian health care to improve patient outcomes*

KT strategies should also include and aid in defining research questions and hypotheses, selecting appropriate research methods, conducting researching, interpreting and contextualizing research findings and applying those findings to resolve practical issues and problems. KT involves all steps between the “creation of new knowledge” and “its application and use to yield beneficial outcomes for society” (CIHR, KT Strategy, 2004).

## **2.0 METHODS AND TOOLS**

### **2.1 SEARCH AND REVIEW STRATEGY**

A systemic review of the literature was conducted of both peer-reviewed and grey literature (e.g. non-peer reviewed publications, conference proceedings, reports, health network websites). The databases consulted were CINAHL, PubMed, Medline, Google, and Google Scholar. Search terms used were:

- Knowledge translation
- Interprofessional education
- Collaborative practice
- Collaborative patient centred care
- Client centred care
- Knowledge exchange
- Knowledge dissemination
- Knowledge to action
- Knowledge transfer
- Implementation

These terms were chosen based on recommendations from the CIHC subcommittee before we began our search. The limits placed on our search were only to consider English-language literature published between 2002 and 2007 with a focus on Canadian content followed by literature from the United States and internationally.

The review began with a keyword search of databases and review of full text articles. Terms were placed into search engines either in isolation or paired with another phrase (for example, “knowledge translation” and “interprofessional education”). Endnotes and bibliographies of these articles were subsequently examined to locate more articles on this topic or identify key researchers/ experts in the field.

### **2.2 THE RESULTS OF THE SEARCH—STRENGTH OF EVIDENCE**

Over 50 articles and reports were used to inform this report. There were not a large number of articles found on KT and interprofessional education specifically. In general, most KT articles were primarily from Canada, although Europe (mostly the UK), the US,

and Australia were also sources of significant literature. Most articles cite CIHR's definition of KT.

Many of the empirical KT research studies included are based on guideline implementation with physicians. Some articles cite a lack of rigorous research in the area of IPE interventions. There was considerable discussion of the confusion and debate around KT terminology. Many of the KT articles are conceptual and discuss theoretical frameworks or ideas.

Some of the latter papers were published before 2002. Because these are considered seminal, and provide a foundation for understanding the development of KT, they have been included regardless of their publication date.

The following sections present the main findings of this literature review.

### **3.0 STATE OF KT LANGUAGE AND TERMINOLOGY**

#### **3.1 DIFFERENT KT DEFINITIONS AND KT RELATED-TERMS**

The KT field has grown significantly over the past decade. In 1990, fewer than 100 articles were retrieved when searching KT terms in Medline. In comparison, a search of the same KT terms in February 2006, several thousand were found. As interest developed, however, so have the multiplicity of definitions and interpretations of KT (Strauss, Graham and Mazmanian, 2006).

Generally, the term 'knowledge translation' has been used in the health care literature to refer to the assessment, review and use of scientific research to inform health practices (National Center for the Dissemination of Disability Research, 2005). KT is about turning knowledge into action and encompasses the process of both knowledge creation and knowledge application (Graham et al., 2006). Many terms are used interchangeably to refer to KT and KT-related activities. Some are used as nouns to describe the entire process that results in the use of knowledge by decision makers. Others are used as verbs to represent actions or specific strategies taken to cause the uptake to occur (Graham et al., 2006).

To identify definitions of these terms, Graham et al. (2006) conducted a series of Google searches. They found:

- 11,800 returns for KT;
- 300,000 returns for knowledge transfer;
- 114,000 returns for knowledge exchange;
- 59,800,000 returns for implementation;
- 18,400 returns for research utilization;
- 8,930,000 returns for dissemination; and
- 7,020,000 returns for diffusion.

Furthermore, they noted how difficult it was to actually find meaningful and consistent definitions despite the considerable and growing interest in the topic.

The meaning of the term 'translation' may vary across different health disciplines (Sussman, et al, 2006). Researchers, authors, policy makers, and health organizations often provide modified definitions of what KT means in their research.

A non-comprehensive list of terms used may include: knowledge translation, knowledge transfer, knowledge exchange, knowledge management, knowledge cycle, knowledge to action, knowledge utilization, research utilization, research transfer, research implementation, implementation, dissemination, diffusion, continuing education, continuing professional development, evidence into practice, capacity building, applied health research, research into practice, science communication and impact (Graham et al., 2006; Maclean, Gray, Narod, & Rosenbluth, 2004).

A review of these phrases provides readers with a sense of what KT, in the broadest sense, can mean. While the terms seem similar, and are used in similar ways, many have small nuances in their definitions (see glossary for further information). Moreover, a number of these terms are based upon or compared to the CIHR definition of KT. Many articles suggested that due to the confusion around the concept of KT, "Knowledge to Action" may be the better descriptor when referring to KT.

### 3.2 THE CIHR DEFINITION OF KT

CIHR is an internationally-recognized body in health-related research and literature. It is one of the foremost champions of KT (Armstrong et al., 2006; Health Infonet, 2004) and

is cited in many KT articles and reports (Ho, 2004). Significant KT work has also been conducted in the United States and the United Kingdom.

Health Infonet, an Australian health website, notes that:

KT is the term popularized by the Canadian Institute of Health Research (CIHR) for the branch of research that focuses on the utilization by potential users of the results of pure and applied research. The process of KT is seen as so important by the Canadian health system that the enabling legislation for the CIHR identifies explicitly the need for KT to link innovative health research with 'improved understandings, processes, services, products or systems' that will result in improved health, more effective health services and products, and a strengthened health care system (<http://www.healthinfonet.ecu.edu.au>)

The CIHR defines KT as:

...the exchange, synthesis and ethically-sound application of knowledge - within a complex system of interactions among researchers and users - to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system (<http://www.cihr.ca/e/26574.html> accessed April 20, 2007)

This definition further suggests there are three essential elements of KT. The first is the *application of knowledge*, indicating that KT is the process and/or strategy of using research findings (scientific knowledge) to inform and improve health care. The second element of KT is *interactions*. KT requires active and continuous engagement and dialogue between researchers and users of the research; these interactions should also include other stakeholders such as policy makers, educators, organizations, and government agencies. Ongoing interaction ensures that the knowledge generated is relevant and applicable to stakeholder decision-making as well as useful to researchers (Institute for Work & Health). It is argued that the most important factors in effective KT are relationship-based (Bowen, 2004).

The third element of KT is *improved health outcomes*. KT takes the best knowledge (evidence) available and applies it to the health care setting with the intention of improving health outcomes and efficiencies of the system (Graham, et al., 2006).

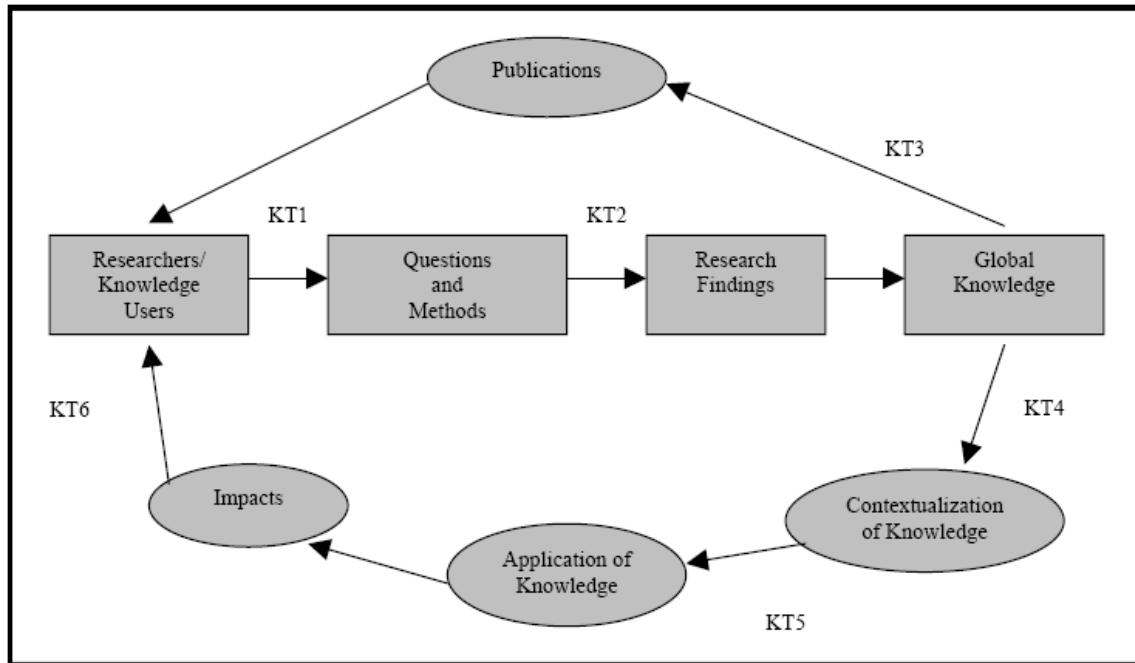
The CIHR understanding of KT emphasizes the quality of the research (or evidence) prior to the dissemination and implementation of research (National Center for the Dissemination of Disability Research, 2005). However, it has been observed that the CIHR definition of KT is not explicit about what is meant by interactions, which can range from simple communication to exchange of knowledge (Graham et al., 2006). Furthermore, CIHR's definition is quite conceptual and inclusive, making it too abstract to be easily applied into research.

## **4.0 MODELS OF KT**

As with diversity of KT terms and definitions, there are a wide variety of KT frameworks within the health literature. According to Davis (2006), a good KT model includes macro (i.e. environmental or organizational) view in tandem with micro perspectives. However, it is also observed that most frameworks provide little information on the most important factors facilitating or hindering change, and what interventions might be useful in specific settings (Grimshaw & Eccles, 2004). Below, we review four prominent models of KT implementation in the literature.

### **4.1 CIHR MODEL (CIHR, 2003 <http://www.cihr-irsc.gc.ca/e/7518.html>)**

The CIHR model situates KT within various points of the knowledge cycle. The six points of the cycle are: (1) defining research questions and methodologies (KT1); (2) conducting research (KT2); (3) publishing research findings in plain language and accessible formats (KT3); (4) placing research findings into the context of other knowledge and sociocultural norms (KT4); (5) making decisions and taking action informed by research findings (KT5); and (6) influencing subsequent rounds of research based on the impacts of knowledge use (KT6). The figure below illustrates this model.



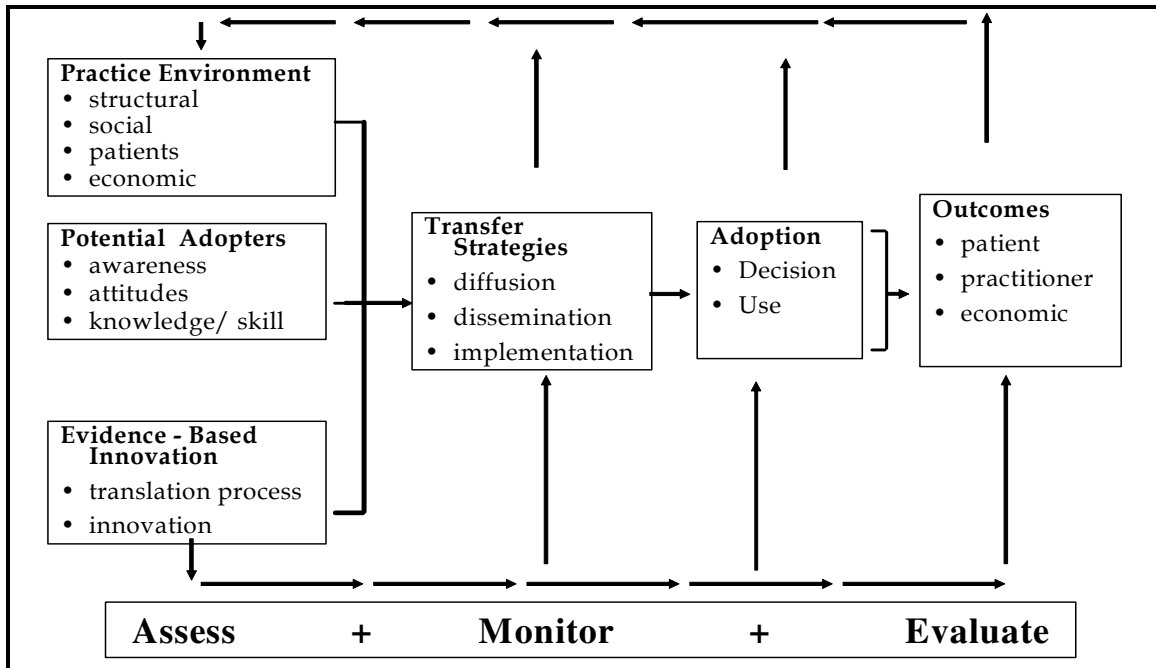
**Figure 1: CIHR KT model (from <http://www.cihr-irsc.gc.ca/e/29418.html>)**

The idea of a cycle is key to the operation of this model; it demonstrates that KT is a continuous process that plays an important role throughout the course of an entire initiative. KT accelerates the knowledge cycle.

#### 4.2 THE OTTAWA MODEL OF RESEARCH USE (OMRU) (Logan & Graham, 1998)

The OMRU is a framework promoting an evidence-based approach to the transfer and use of innovations (research findings). This model developed out of researchers' desire to support the multifaceted work on research transfer occurring between the University of Ottawa and the Clinical Epidemiology Unit of the Ottawa Civic Hospital Loeb Research Institute. As such, the model combines diverse aspects of the process of research into a simple and useful framework.

Six interconnected elements of the evaluation process are incorporated: practice environment, potential adopters, evidence-based innovation, strategies for transferring the evidence into practice, the use of the evidence, and health-related and other outcomes of the process. It is stressed that the OMRU is meant as a guide rather than a recipe, and that the variables within each main element can be expected to differ within diverse settings over time. The figure below depicts an overview of how the six elements work together.



**Figure 2: The Ottawa Model of Research Use (from [http://www.idrc.ca/uploads/user-S/10963022581KT\\_in\\_Health\\_and\\_Development.pdf](http://www.idrc.ca/uploads/user-S/10963022581KT_in_Health_and_Development.pdf))**

While this model has had some validation through attempted applications to two clinical projects, more research is needed to explicate the relationships between and among the elements. Testing is also needed to determine the model's effectiveness in many health-care settings.

#### 4.3 LAVIS (Lavis, Robertson, Woodside, et al., 2003)

The Lavis framework provides an overall approach to KT that can evaluate the KT process as a whole over long periods of time or specific elements over shorter periods of time.

The idea behind the Lavis model is that organizations can guide their transfer of knowledge by asking five key questions:

1. *What message should be transferred to decision-makers?* The literature suggests actionable messages from research evidence should be transferred.

2. *To whom should research knowledge be transferred?* Target audiences must be clearly identified and the specifics of a knowledge-transfer strategy must be fine-tuned to the types of environments in which they work.

3. *By whom should research knowledge be transferred?* The credibility of the messenger delivering the message is important to successful knowledge transfer interventions. It is important to note that this point has only been tested indirectly.

4. *By what process should research knowledge be transferred?* Passive processes are ineffective and interactive engagement may be most effective regardless of audience. Indeed, interaction is the “hallmark” of most effective strategies, especially that between researchers and audiences. A two-way exchange process gives equal importance to what researchers can learn from decision makers and vice versa.

5. *With what effect should research knowledge be transferred?* Performance measures for KT should be appropriate to the target audience and to the objectives of the initiative. The evaluation process may be as simple as wanting to know whether the knowledge produced is having an impact.

The Lavis model is based on qualitative reviews across the five questions, four audiences, and full range of disciplinary perspectives and methodological approaches. The approach to KT based on this framework will differ depending on the answer to each question.

#### 4.4 KITSON (Kitson, Harvey, & McCormack, 1998)

The Kitson model was developed by a team at the Royal College of Nursing Institute in the United Kingdom. It emerged out of working experience of clinicians (mostly nurses) interested in helping improve quality of care.

This model suggests that successful implementation of research into practice is a function of three core elements. The first is the level and nature of the evidence (the research findings). Evidence is a combination of research, clinical expertise and patient choice. Since evidence may be of low quality (e.g., unsystematic, anecdotal, and

descriptive) or high quality (systematic qualitative or quantitative evaluations), the strength of the evidence needs to be assessed.

The second element for implementing research into practice is the context in which the research is to be placed. Context is the environment or setting in which the proposed change is to be implemented. Three important aspects of the context include an understanding of the prevailing culture, the nature of human relationships (leadership roles), and the organization's approach to routine monitoring of systems and services.

The third element in transmitting research into practice is the method in which the process is facilitated. A good facilitator helps people understand what they need to change and how change strategies can be implemented to achieve a common goal. Personal characteristics of a good facilitator include being open to all ideas, supportive, approachable, reliable, self-confident, and non-judgmental. A facilitator seeks to get across professional and organizational boundaries by concentrating on the development of interprofessional and group skills.

All three elements are seen as equally important to implementation. When used together, they result in this model which represents the interplay and interdependence of factors influencing the effective uptake of research evidence into practice. Successful implementation is therefore a function of the understanding of and relation between the nature of evidence, the context in which the proposed change is to be implemented, and the mechanisms by which the change is facilitated.

Studies which have used this model conclude that the most successful implementation occurs when evidence is of high quality, the context is receptive to change, and there is appropriate facilitation of the change. Less successful implementation occurs when both the contextual conditions and facilitation are low and inadequate (however, poor contexts can be overcome by appropriate facilitation).

One weakness of the Kitson framework is that it does not take into account wider organizational, managerial, and political influences. It also does not consider the role of incentives or sanctions for changing practices. It can, though, be used as a self-assessment tool for staff to judge what they have to do to successfully implement research findings.

The models described in this section all provide frameworks that can be used in transferring research knowledge to knowledge users. In choosing an approach to take, it

is important to remember these models should be used as guides, not recipes. The value of each model is dependent on the particular KT initiative and goals.

## **5.0 NON-CLINICAL MODELS OF KT**

A secondary literature search was conducted for KT definitions and models in non-clinical areas, such as: education, management, economics and marketing.

Rikkert and Rigaud (2004) conducted a study in the Netherlands comparing the educational effects of three geriatric training methods on GPs. GPs were offered a choice of three training options in geriatric assessment: a formal one-day teacher-centred conference, an interactive GP-centred day of workshops, or participation in a KT project on geriatric intermediate care. The large group conference was found to be ineffective in improving GPs' geriatric assessment skills, while small interactive workshops and participation in a KT project were effective.

The authors noted that interactive methods of continuing medical education (CME) are more likely to be effective than formal, teacher-centred conferences. CME initiatives should determine physicians learning needs, reach out to non-participating physicians, and focus on relevant problem areas. KT is a novel method of implementing knowledge and skills in clinical practice. KT offers a more holistic construct, builds on the less traditional CME methods, and focuses on changing health outcomes using evidence-based clinical knowledge.

Beal (1980) describes a KT model for disseminating information and technology for effective rural development. The model includes six elements:

- Scientific knowledge production: conducting basic and applied research;
- Knowledge management: information is catalogued and stored in an accessible form;
- KT: synthesize and convert scientific research into information useful to solving problems;
- Product development: combining scientific knowledge and user needs;
- Product dissemination: designing a dissemination and communication strategy, disseminating the product, and monitoring its performance; and
- Product adoption / utilization: users discover and diagnose problems, locate, try-test, adopt, and assimilate solutions into existing systems.

This study indicated that translating knowledge (from research to user need) using this model may not flow smoothly when improving knowledge dissemination in rural development.

Beal and Meehan (1978) observe that the study of knowledge production and utilization deals with the problems of how to translate theoretical concepts and knowledge into practical solutions. They describe a prototype of the six-stage model referred to above.

A 2006 article, “A Master Key to Workforce Skills Development,” released by the Association of Canadian Community Colleges (2006) emphasizes that Canada must design policies and programs which give Canadians entry to skills-based economy and help them remain active participants. Therefore, further investments in human resource capacity must be the priority of Canada's social and economic policy. Issues requiring translation to a results-oriented Workforce Skills Development Strategy should comprise accessibility, affordability, and national funding mechanisms.

## **6.0 KT STRATEGIES AND TRENDS**

Traditional approaches to improve uptake of research findings have tended to focus on improving the availability and presentation of evidence by identifying, synthesizing, and disseminating evidence to physicians in practical, accessible formats (Grol & Grimshaw, 2003). In a review of 235 studies of guideline implementation, there was about a 10 percent improvement in practice behaviour (Grimshaw & Eccles, 2004). Individual professionals clearly need to be informed, motivated and perhaps trained to incorporate the latest evidence into their daily work (Grol & Wensing, 2004).

The success of many KT initiatives is contingent upon the ease of communication and collaboration across disciplines (Sussman, et al., 2006). Strategies for implementation are also influenced by the organizational context within which adoption decisions are made—particularly with respect to factors such as organizational structure, workplace culture, resources, and positioning within the wider institutional setting (Nutley, Davies, & Walter, 2002). To ease communication, it has been suggested that knowledge producers tailor their activities to the needs of potential users as much as possible (Graham, et al., 2006). Multifaceted interventions that address specific barriers to change are more likely to lead to changes in practice; however, some research reviews do not support this claim (Grol & Grimshaw, 1999; 2003). It is generally agreed that passive dissemination approaches have largely been shown to be ineffective (Grol & Grimshaw, 1999).

All interventions have the potential of helping with the effective transfer of evidence to practice (Grol & Grimshaw, 2003). Research so far has not shown one approach to be superior to others for all changes in all situations. All strategies are needed and are useful. There is no research that suggests an effective strategy in one setting will be equally effective in another setting (Agency for Health care Research and Quality, 2001). The following sections outline some of the current trends taking place in the KT literature.

### 6.1 DIFFUSION: DISSEMINATION TO MAINTENANCE (Sussman, et al., 2006)

The concept of diffusion works in conjunction with the concept of the KT as a cycle and can be used as a KT strategy. It consists of four main phases. The first stage is *dissemination*, which is the formal effort of ensuring that health professionals and health organizations (the target audience) are aware of a program change or proposed intervention (based on research findings) and encourage its uptake. The main objectives of this stage are to inform and make aware.

The second phase is *adoption*, which encourages individuals and workplaces to commit to initiating and supporting the changes. Third, *implementation* is the integration of the new knowledge into the existing workplace flow with support being provided to the appropriate people who assist in the delivery. Finally, *maintenance* is the continued support and encouragement provided to those involved in the uptake of the changes to help promote sustainability.

### 6.2 OPINION LEADERS

Little change occurs in organizations without key drivers (Kitson, Harvey, & McCormack, 1998). Opinion leaders (OLs) have been described as clinicians who can encourage learning and enjoy sharing their knowledge; they are experts who are up-to-date in their fields but recognize others as collegial equals (Wright, et al., 2006). OLs tend to be knowledgeable practitioners, educators, and caring professionals (Wright, et al., 2006). They are important in the initial stages of an education intervention when evidence needs to be endorsed and translated into a form that is acceptable to local practitioners (Wright, et al., 2006). Although opinion leaders may be successful in their own “tribes,” there is no evidence thus far that demonstrates their ability to effect change in other disciplines (this has been shown in nursing and medicine) (Kitson, Harvey, & McCormack, 1998).

### 6.3 KNOWLEDGE BROKERING

Knowledge brokering serves as an interface or link between researchers, research users, and policy makers (Sax Institute, 2007). It is concerned with increasing evidence-based decision-making in the organization, management, and delivery of health services (Canadian Health Services Research Foundation) and is also considered the interpersonal connection needed to bridge the clinical care gap (Lomas, 2007). Knowledge brokers can be used to find the right players to influence research use in decision-making, bring these players together, create and help to sustain relationships among them, and help them to engage in collaborative problem-solving.

One of the key strengths in the knowledge brokering strategy is the acknowledgement of the importance of personal interactions in KT (Armstrong, Waters, Roberts, Oliver, & Popay, 2006) and an emphasis on the need to put a human face on any intervention that seeks to link research to action (Lomas, 2007). This strategy may be most useful when working with multiple organizations or professionals.

### 6.4 MARKETING STRATEGIES

Marketing principles have largely been used to influence physician behaviour in regards to prescribing practices (Wright, et al., 2006). Such principles include defining clear educational objectives, focusing programs on specific categories of physicians, establishing 'messenger' credibility, using concise educational materials, and providing positive reinforcement.

Element of marketing strategies used include: conducting interviews to investigate baseline knowledge; focusing programs on specific categories of clinicians; defining clear educational and behavioural objectives; establishing credibility; using concise educational materials; highlighting and repeating essential messages; and providing positive reinforcement. The study finds that social marketing was successfully used to change physician behavior with respect to physician prescribing.

### 6.5 RESEARCH ROUNDTABLES

Research roundtables are considered an effective way to integrate research-based changes into practice (Janke, Dufault & Yeaw 1988). It enables clinicians, researchers and students come together in a reciprocal user-generator relationship to address

specific clinical issues (Dufault, 2004). This strategy is used in the Collaborative Research Utilization (CRU) model (Dufault, 2004).

The CRU intervention has been used to increase awareness of connections between research and practice by enabling nurses and students to teach and learn from one another. This approach has been evaluated in the United States using quasi-experimental pre- and post-test designs across four studies. The studies did demonstrate effectiveness of the model in improving nurses' skills, attitudes and patient satisfaction. The roundtable strategy can also be used to discuss what needs to be researched or explore clinical applicability and potential for integration into practice (Dufault, 2004).

## 6.6 TECHNOLOGY-ENABLED KT (TEKT)

Modern information and communication technologies (ICT) can be effective tools to help in the collection, processing, and targeted distribution of information from which clinicians, researchers, administrators, policymakers in health, and the public can benefit (Ho, 2004). Effective implementation of technology-enabled KT (TEKT) benefits both the individual health professional and the health system (Ho, 2004).

For TEKT to be effective, it requires identifying different types of knowledge and ways in which clinicians acquire and apply knowledge in practice. The conceptual and contextual frameworks of information and communication technologies applied to health systems must be understood, particularly the push, pull, and exchange communication models. There must be widespread comprehension of essential issues in the implementation of ICT as well as strategies to take advantage of emerging opportunities and overcome existing barriers. Finally, a common and widely acceptable evaluation framework must be established in order for researchers to compare various methodologies in their rightful contexts in TEKT research and adoption.

Different instances of TEKT can be used with initiatives such as educational materials, just-in-time decision support, and practice audits. The online environment has opened up enormous opportunities for interaction among students and between students and educators and has brought collaborative learning (i.e. IPE) to the forefront of distance learning (Greenhalgh et al., 2006). Finally, videoconferencing can enable IPE and telemedicine can facilitate CPCP (Ho, 2004).

## **7.0 EVALUATION OF KT STRATEGIES**

KT implementation strategies must have built in evaluative components to ensure the success (or failure) of the intervention can be measured, understood and documented accurately. At the very least, an outcome evaluation is needed to assess the end-result to determine if the strategy was effective in creating a change in practice behaviour.

In addition to establishing whether a strategy was successful, it is also important to understand why. Titler (2004) suggests the aim of KT evaluation studies should be both to test the effectiveness of the strategy and to gain a better understanding of what interventions work in which contexts. Redfern, Christian and Norman (2003) agree and further stress that if evaluations are to contribute to improvements in practice, a shift is needed from an over-reliance on outcome evaluations to those that have a cumulative component and take account of context and process (Redfern, Christian, & Norman, 2003). An in-depth, multifaceted KT evaluation may include research questions such as (Tugwell, Robinson, Grimshaw, & Santesso, 2006):

- Why did the strategy work or not work?
- Under what conditions did the strategy prove to be most successful?
- When/ at what point did change start to occur?
- What strategy used produced the quickest change or the most lasting change in practice behavior?

From a purely methodological perspective, experimental designs such as randomized control trials are considered the ideal approach to evaluation, because they can statistically determine if the impact of the KT strategy on practice behaviour. However, in reality, experimental methods are particularly cumbersome to implement in health care settings, largely because they require control of every factor involved in the study. Evaluations that involve multiple sites and organizations and people, as most IPE initiatives do, such control would be almost impossible to generate.

In addition to such logistical challenges, there are often ethical and political barriers associated with experimental design in health care settings (Tugwell, et al., 2006). An alternative, more accessible approach is to use a quasi-experimental design, or natural experiments, to explore and describe the context, implementation process, and outcomes of a KT strategy. Examples of this type of design include interrupted time-series or before-after (pre-test post-test) designs (Tugwell, et al., 2006).

The purpose of the evaluation, the topic of the intervention (e.g., collaborative practice, practice guidelines, electronic reporting,) and intervention strategy used (e.g., opinion leaders, technology, research roundtables) strongly affects the choice of the method and measures used in the evaluation study (Titler, 2004; Tugwell, et al., 2006). Three key factors to consider in health-related KT evaluation studies are: (1) adherence to evidence-based practice, such as change in behaviour or care process, (2) organizational change, and (3) patient outcomes (Titler, 2004). An examination of these three pieces can provide a broad understanding of the KT initiative.

Specific research methodologies selected for KT evaluation studies must be amenable to the research questions (Titler, 2004). Quantitative and qualitative strategies used in past evaluations of KT within health care practice settings include: surveys and questionnaires, interviews, focus groups, observation and document analysis (Redfern, Christian, & Norman, 2003).

## **8.0 KT CHALLENGES AND BARRIERS WITHIN KT AND IPE/CPCP CONTEXTS**

One of the major challenges to developing and implementing successful KT initiatives in general is the sheer volume of research evidence produced (Grimshaw, Santesso, Cumpston, Mayhew, McGowan, 2006). This challenge is furthered exacerbated when the interprofessional aspect is added, which increases the complexity of the KT initiative. Further, innovations requiring changes in clinical practice or better collaboration between disciplines are difficult to incite (Grol & Grimshaw, 2003). Obstacles to changing practice behaviour can arise at different stages in the health-care system, at the patient level, the individual level, the health-care team, the health-care organization, and the wider environment (Grol & Grimshaw, 2003). It is important to identify and understand barriers to be able to tailor strategies to them.

### **8.1 DIFFERENCES IN LANGUAGE AND TERMINOLOGY**

There is no widespread agreement on definitions for KT-related terminology. Inherently, there is confusion and misunderstanding about the concepts of KT, knowledge transfer, knowledge exchange, research utilization, implementation, diffusion, and dissemination (Graham et al., 2006). Further, the meaning of translation may vary across different health disciplines (Sussman, et al, 2006). Creating and implementing an IPE KT initiative could become quite difficult if working with different ideas or definitions of KT.

## 8.2 DIFFERENCES IN THE VALUES, GOALS, AND PROCEDURES BETWEEN INTERPROFESSIONAL GROUPS

Health professionals are educated and trained in different ways. Different professions (or even groups within a profession) have varying levels of education (Dufault, 2004). There are different assumptions and cultures associated with each profession (Estabrooks et al.). Moreover, they may be trained to do similar procedures in different ways or with a different emphasis. This could cause conflict or confusion.

There may also be different organizational structures between various health care settings. Agencies or professionals working together may have different standards for documentation of care (Dufault, 2004). Knowledge and protocols do not necessarily flow between or even within groups. With similar or identical systems, the flow of information between the groups and/or individuals is eased and ensures sustainability and dissemination of practice changes (Dufault, 2004).

## 8.3 A UNI-PROFESSIONAL CULTURE/ COMMUNITY OF PRACTICE

Social barriers between groups can impede the spread of IPE KT initiatives. As noted by Ferlie, Fitzgerald, Wood, and Hawkins (2005), boundaries created by firmly established professional roles, identities and traditional work practices can be difficult to overcome. Further, redefining roles based on evidence-based practice findings for the purpose of interprofessional teams is a difficult process often met with resistance and anxiety.

Ferlie et al. (2005) suggest this strong intragroup culture may be the result of traditional uni-professional communities of practice, reinforced by a need to seal themselves off from neighboring professional communities for jurisdictional and group identity needs as well as governing institutions that are themselves uni-professional (ex. the Royal Colleges). Due to these conditions, there tends to be little voluntary cross-over between the groups. The authors of this article offer some hope, however, by suggesting social interaction, trust and motivation can help professionals overcome this barrier.

## 8.4 EVIDENCE

It is crucial to know which research findings and evidence lend themselves well to implementation (Sussman, et al., 2006). In the literature on IPE and KT, there is an absence of rigorous research findings due to a lack of randomized control trials in IPE

research studies (Zwarenstein, Reeves, Barr, et al., 2000). While there is other evidence available that does support the merits of IPE interventions, the findings come from other types of study designs.

This divide or conflict between two different research approaches highlights another evidence related issue. Between professional groups different research traditions and conceptions of what constitutes ‘evidence’ and ‘knowledge’ exist (Ferlie, et al., 2005). The different research standards and priorities between IP groups can make it difficult to robustly implement a KT strategy without an agreement on what is or can be considered “strong” evidence. Efforts need to be made in developing a shared definition or set of inclusion/ exclusion criteria for what is considered evidence. Work done by the Canadian Health Service Research Foundation (CHSRF) in the area of conceptualizing evidence may be a starting point for resolving this point of contention (see Resources section).

## 8.5 ORGANIZATIONAL

Characteristics of the social or organizational structure in which an innovation is diffused can predict the pace and success of adoption (Glasgow, Lichtenstein, & Marcus, 2003). If the clinical environment is not adaptable, it is difficult to change patterns of care (Grol & Grimshaw, 2003). High level changes are nearly impossible to instigate and sustain without total support at every level (from the macro to the individual level). Therefore, systems need to be adapted to the changes (the knowledge implementation) (Sussman, et al., 2006).

Different personnel roles are required to facilitate successful translation of research evidence (Sussman, et al., 2006). Most importantly, communication between all levels and groups is needed. Robust infrastructural support must also be in place to host KT interventions (Dufault, 2004). It must be clear that demands and resources are realistic and congruent with what is available and supported.

## **9.0 RECOMMENDATIONS**

The following recommendations were developed to help guide CIHC toward the design and implementation of an effective KT strategy within an IPE context.

### **ESTABLISH A COMMON LANGUAGE BASE THROUGH APPROPRIATE COMMUNICATION CHANNELS**

As the literature revealed, much confusion exists around KT terminology and definitions. To address this challenge, all relevant stakeholders and groups need to come together to discuss their conceptions of KT and establish a joint/ common understanding of the terms and ideas. This may be especially relevant when developing an IPE KT initiative where the groups coming together have different training backgrounds and understandings of the roles and responsibilities of each group. Additionally the various professional groups may also have different language for similar procedures and protocols. The flow of the process requires clear and common language. All stakeholders involved would benefit from a definitive vocabulary created for interprofessional interactions.

### **BUILD AND MAINTAIN A STRONG CASE**

When engaging in a strategy to put research into practice, clear, solid evidence must be used to ensure commitment from all professionals and decrease resistance of adoption by any one group. Having evidence that the IPE strategy or program is effectively improving health care practice strengthens arguments against resistance and galvanizes support among all stakeholders.

Further, KT interventions must be designed and implemented to be readily evaluated rigorously using a cohesive and testable model (Davis, 2006). In addition to having strong evidence at the outset of an initiative, continuous monitoring is necessary to determine how and to what extent best practices are being diffused throughout the potential-adopter group (Graham, et al., 2006). Not only does the evaluation bring awareness to and reinforce the initiative, it can also help refine or add to the strategy to increase the rate of uptake.

## **PROVIDE HUMAN RESOURCES SUPPORT AT BOTH THE INDIVIDUAL AND ORGANIZATIONAL LEVEL**

Share and extend the idea of interprofessional education and collaboration through establishing interprofessional communities of practice. This aspect can be understood as the 'human-side' of KT, in contrast to the 'hard side' which includes using the best available evidence. The human or social side of KT must be applied and understood at both the individual and organizational level. This can be accomplished through the creation of a forum for professionals to meet on a regular basis and start building trusting relationships with each other.

Team dynamics are essential to successfully implementing and carrying out interprofessional initiatives (Dufault, 2004). This opportunity can also be used to engage staff and those involved in implementing a change in discussion about the initiative to help tailor action plans (Kitson, Harvey, & McCormack, 1998).

Once put into action ensure sustainability by slowly introducing the interventions/ changes to minimize intrusions on daily practice operations (Dufault, 2004). New practitioner roles may be needed to be supported at both the individual and organizational level (Sussman, et al., 2006).

### **10.0 PROPOSED DISCUSSION FRAMEWORK FOR AN INTEGRATIVE CIHC – KT STRATEGY**

Table 1 (below) illustrates a proposed framework to stimulate discussion and development of an integrative KT strategy for the CIHC initiative. The table reflects a number of key emergent themes based on the findings of this report.

First, the need for a common language when discussing KT strategy has been well documented. The success of establishing and maintaining this common language requires regular and open communication amongst all stakeholder groups. Such discussions must begin with an agreed upon definition of KT that is both reputable yet relevant to the needs of the project. It is recommended that the CIHC develop its own definition of KT that meets the needs of its processes and stakeholders yet remains as close as possible to the CIHR definition of KT. This approach capitalizes on the national and international reputation of the CIHR definition and approach toward KT, while

recognizing there are modifications necessary to accommodate KT strategies within an IPE environment.

**Table 1: Discussion Framework for an Integrative IPE- KT strategy**

Definition of KT for IPE Context

*The review, synthesis and application of the best evidence available by an interprofessional team of researchers, clinicians, and champions for a stronger and more informed collaborative patient-centred practice approach to Canadian health care to improve patient outcomes*

- Based on CIHR
- Adapted to CIHC project needs
- Engages IPE/CPCP goals and appropriate stakeholders

	MICRO			MACRO		
	Desired Outcome	Workplan and Milestones	Evaluation	Desired Outcome	Workplan and Milestones	Evaluation
<b>Contextualization / Application of Knowledge</b> <ul style="list-style-type: none"> <li>• Real-world implementation</li> </ul>						
<b>Interactions</b> <ul style="list-style-type: none"> <li>• Stakeholder relationships</li> </ul>						
<b>Improved Health</b> <ul style="list-style-type: none"> <li>• Education, Services, System Efficiencies</li> </ul>						

Second, the three basic elements of KT (knowledge application, interactions, and improved health) are utilized to guide the conceptualization of the CIHC-KT framework.

Lastly, in reference to the body of the proposed discussion framework, it is recommended that the process of developing the CIHC-KT framework be developed in a multi-level, step-wise manner. In keeping with the findings on KT models, all KT strategies should include an understanding of the KT process from both a micro and

macro-level perspective. Discussion and planning around desired outcomes, workplan and milestones, and evaluation can then be understood at various scales.

This framework retains many of the key conceptual elements and principles recognized as integral to the development of a successful KT strategy, yet breaks down each concept into smaller more manageable activities.

## **11.0 CONCLUSION**

As a whole, the field of KT has come a long way over the past decade. Still, very little literature exists on KT within the context of interprofessional education specifically and a basic lack of rigorous evaluation research in the area of IPE interventions more broadly. Most KT articles are highly conceptual, discussing theoretical frameworks of KT and philosophical dilemmas.

One of the main problems encountered in relation to KT is the confusion caused by many terms being used interchangeably to describe KT. Knowledge exchange is the term now preferred and was adopted to address some of the concerns about the term knowledge transfer. A key assumption behind this definition is that researchers and decision makers are normally separate groups with distinct cultures and perspectives on research and knowledge, with neither group fully appreciating each others' world – a phenomenon referred to as the “two-communities” theory. Knowledge transfer and exchange in this context involves bringing together researchers and decision makers and facilitating their interaction. Many researchers recommend that “Knowledge to Action” should be the next step to take.

Another challenge is that the groups involved in KT are very distinct, with little voluntary cross-over. KT means different things to different people. Health professionals are educated and trained in different ways and this often leads to conflict or confusion. When embarking on a KT intervention, relevant stakeholders and groups need to come together to discuss their conceptions of KT and establish a common understanding of the terms and ideas. When engaging in a strategy to put research into practice, clear, solid evidence must be used to get input from all professionals and decrease resistance of adoption by any one group. It is important to have a forum for professionals to meet and start building trusting relationships with each other. Team dynamics are essential to successfully implementing and carrying out interprofessional initiatives.

The purpose of interprofessional education and collaborative patient-centred practice is ultimately to use the best practices available to improve health care processes and outcomes. Despite present limitations in our understanding, the concept of KT is perhaps the most comprehensive approach toward improving health outcomes by linking the best research evidence to realizable solutions that can meet health needs at all levels - patients, communities, and society.

## 12.0 GLOSSARY

### KT

- “The exchange, synthesis and ethically-sound application of knowledge – within a complex system of interactions among researchers and users - to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system.”  
(<http://www.cihr-irsc.gc.ca/e/29418.html>  
Last accessed March 15, 2007).
- CIHR definition – “KT is the iterative, timely and effective process of integrating best evidence into the routine practices of patients, practitioners, health care teams and systems, in order to effect to optimal, health care outcomes and to optimize health care and health care systems.”  
(<http://www.cihr-irsc.gc.ca/e/29418.html>  
Last accessed March 15, 2007).
- “The collaborative and systematic review, assessment, identification, aggregation and practical application of high-quality disability and rehabilitation research by key stakeholders (i.e., consumers, researchers, practitioners, policy makers) for the purpose of improving the lives of individuals with disabilities.” US National Center for the Dissemination of Disability Research (NCDDR). (Graham et al, 2006)
- “KT is about turning knowledge into action and encompasses the processes of both knowledge creation and knowledge application.”  
(Graham et al, 2006)
- “KT subsumes and builds on continuing education and continuing professional development.”  
(Graham et al, 2006)

### KNOWLEDGE TRANSFER

- “A systematic approach to capture, collect and share tacit knowledge in order for it to become explicit knowledge. By doing so, this process allows for individuals and/or organizations to access and utilize essential information, which previously was known intrinsically to only one or a small group of people.” Government of Alberta  
(<http://www.pao.gov.ab.ca/learning/knowledge/transferguide/index.html> accessed Jan 24, 2006). (Graham et al, 2006)

- “Successful knowledge transfer involves much more than a one way, linear diffusion of knowledge and skills from a university to industry; it depends on access to people, information and infrastructure.” UK Particle Physics and Astronomy Research Council (PPARC) (<http://www.pparc.ac.uk/in/aboutkt.asp> accessed Jan 24, 2006). (Graham et al, 2006)
- “Knowledge transfer is about transferring good ideas, research results and skills between universities, other research organizations, business and the wider community to enable innovative new products and services to be developed.” UK Office of Science and Technology (<http://www.ost.gov.uk> accessed Jan 24, 2006) (Graham et al, 2006)

### **KNOWLEDGE EXCHANGE**

- “Knowledge exchange is collaborative problem-solving between researchers and decision makers that happens through linkage and exchange. Effective knowledge exchange involves interaction between decision makers and researchers and results in mutual learning through the process of planning, producing, disseminating, and applying existing or new research in decision-making.” Canadian Health Services Research Foundation ([http://www.chsrf.ca/keys/glossary\\_e.php](http://www.chsrf.ca/keys/glossary_e.php) accessed Jan 24, 2006). (Graham et al, 2006)

### **RESEARCH UTILIZATION**

- “The process by which specific research-based knowledge (science) is implemented in practice” (Graham et al, 2006)

### **IMPLEMENTATION**

- “The execution of the adoption decision, that is, the innovation or the research is put into practice” (<http://www.nursing.ualberta.ca/kusp/rustudy2/glossary.htm> accessed Jan 24, 2006). (Graham et al, 2006)

## DISSEMINATION

- “The spreading of knowledge or research, such as is done in scientific journals and at scientific conferences.”  
(<http://www.nursing.ualberta.ca/kusp/rustudy2/glossary.htm> accessed Jan 24, 2006) (Graham et al, 2006)

## DIFFUSION

- “The process by which an innovation is communicated through certain channels over time among members of a social system.” (Graham et al, 2006)

## CONTINUING EDUCATION

- “Continuing Education for Health Professionals: planned educational activities intended to further the education and training of specific health professionals for the enhancement of practice, education, administration and research.”  
Uniformed University Services for Health Sciences  
(<http://www.usuhs.mil/che/definitions.htm> accessed Jan 26, 2006) (Graham et al, 2006)
- “Continuing education is a structured process of educating designed or intended to support the continuous development of pharmacists to maintain and enhance their professional competence. Continuing education should promote problem solving and critical thinking and be applicable to the practice of pharmacy.”  
(<http://www.acpe-accredit.org/pdf/CEDefinition04.pdf> accessed Jan. 24, 2006)  
(Graham et al, 2006)

## CONTINUING PROFESSIONAL DEVELOPMENT

- “Continuing professional development is the process by which health professionals keep updated to meet the needs of patients, the health service, and their own professional development. It includes the continuous acquisition of new knowledge, skills, and attitudes to enable competent practice.” (Graham et al, 2006)
- “CPD... includes educational methods beyond the didactic, embodies concepts of self-directed learning and personal development and considers organizational and system factors.

## 13.0 RESOURCES

### ATLANTIC HEALTH PROMOTION RESEARCH CENTRE (AHPRC)

Associated with Dalhousie University. Conducts and facilitates health promotion research that informs policies and practices and contributes to the health and well-being of Atlantic Canadians.

- Links to KT websites (both national and international)-  
<http://www.ahprc.dal.ca/kt/links.cfm#KT>

### CANADIAN INSTITUTES OF HEALTH RESEARCH (CIHR)

Government of Canada's health research funding agency. CIHR takes a problem-based and multidisciplinary approach to the health challenges facing Canadians. Funding research that improves Canadians' health, health care system and quality of life.

- About KT- <http://www.cihr.ca/e/29418.html>
- KT publications and resources- <http://www.cihr.ca/e/29484.html>
- KT general references- <http://www.cihr.ca/e/7519.html>

### KT IMPROVED CLINICAL EFFECTIVENESS THROUGH BEHAVIORAL RESEARCH GROUP (ICEBeRG)

A team of Investigators, New Investigators and students led by Jeremy Grimshaw and Ian Graham and jointly funded by the Ontario Ministry of Health and Long Term Care and the Canadian Institutes of Health Research. Conducts transdisciplinary research into the barriers and enablers to the development, dissemination and uptake of clinical best practices and evaluations of dissemination and implementation strategies.

- Links to Canadian KT Centres- [http://www.iceberg-grebeci.ohri.ca/resources/enviroscan\\_websites.html](http://www.iceberg-grebeci.ohri.ca/resources/enviroscan_websites.html)

### THE CANADIAN HEALTH SERVICES RESEARCH FOUNDATION (CHSRF)

Supports the evidence-informed management of Canada's health care system by facilitating knowledge transfer and exchange. It is an independent, not-for-profit corporation, established with endowed funds from the federal government and its agencies.

- Conceptualizing and Combining Evidence- [http://www.chsrf.ca/other\\_documents/evidence\\_e.php](http://www.chsrf.ca/other_documents/evidence_e.php)
- Tools to Help Create, Share, and Use Research- [http://www.chsrf.ca/knowledge\\_transfer/tools\\_e.php](http://www.chsrf.ca/knowledge_transfer/tools_e.php)
- Glossary of knowledge exchange terms- [http://www.chsrf.ca/keys/glossary\\_e.php](http://www.chsrf.ca/keys/glossary_e.php)
- Information about knowledge brokering- [http://www.chsrf.ca/brokering/index\\_e.php](http://www.chsrf.ca/brokering/index_e.php)

### INSTITUTE FOR WORK & HEALTH (IWH)

Is an independent, not-for-profit research organization whose mission is to conduct and share research with workers, labour, employers, clinicians and policy-makers to promote, protect and improve the health of working people.

- Knowledge transfer and exchange information- <http://www.iwh.on.ca/kte/kte.php>
- Physicians' Network Tool Kit- [http://www.iwh.on.ca/products/back\\_book.php](http://www.iwh.on.ca/products/back_book.php)

### KT PROGRAM- UNIVERSITY OF TORONTO

Developed in response to the gap between research evidence and clinical practice and the need to focus on the processes through which knowledge is effectively translated into changed practices. Pursuing both models of effective 'KT' and the development of a research agenda in this innovative and trans-disciplinary field.

- KT literature database- <http://www.ktp.utoronto.ca/whatisktp/literature/>
- KT tools- <http://www.ktp.utoronto.ca/whatisktp/tools/>
- KT and continuing education glossary- <http://www.ktp.utoronto.ca/whatisktp/glossary>

### RESEARCH & DEVELOPMENT RESOURCE BASE (RDRB)

A literature database for educators and health professionals to assist them in their study of: program evaluation, physician performance, change and health care outcomes. Collects and disseminates citations in the broad area of continuing health professional education and KT.

- RDRB home page- <http://www.cme.utoronto.ca/rdrb/>

### NATIONAL CENTER FOR THE DISSEMINATION OF DISABILITY RESEARCH (NCDDR)

Encourages the dissemination and use of research results in the field of disability research. NCDDR'S focuses on developing systems for applying rigorous standards of evidence in describing, assessing, and disseminating outcomes from research. Goal is to improving the quality and scope of their dissemination, utilization, and KT outcomes.

- KT references- <http://www.ncddr.org/kt/index.html>
- KT planning process- <http://www.ncddr.org/kt/ktplan.html>
- Selected KT resources- <http://www.ncddr.org/kt/ktresources.html>

### KNOWLEDGE UTILIZATION- CHSRF/ CIHR CHAIR ON KNOWLEDGE TRANSFER AND INNOVATION

Aims to: 1) further scientific understanding of knowledge transfer and innovation in health services, 2) train and support students pursuing Master's and Ph.D.'s in this field, and 3) encourage and facilitate the transfer of knowledge in general. Funded by Capacity for Applied and Developmental Research and Evaluation in health services and nursing.

- Knowledge transfer resources- <http://kuuc.chair.ulaval.ca/english/master.php?url=resource.php>

## 14.0 REFERENCES

### INTRODUCTION

- Canadian Institutes of Health Research (2004). *KT strategy 2004-2009: Innovation in Action*. Ottawa, ON: Canadian Institutes of Health Research  
Retrieved April 26, 2007, from <http://www.irsc.gc.ca/e/26574.html>
- CAIPE (2002) *Interprofessional education – a definition*. Retrieved April 26, 2007, from <http://www.caipe.org.uk/index.php?&page=news&news=18&nav=7>
- Corcoran, M. (2006). Dissemination or KT? *American Journal of Occupational Therapy*, 60, 487-488.
- D'Amour, D. & Oandasan., I. (2005). Interprofessionality as the field of interprofessional practice and interprofessional education: An emerging concept. *Journal of Interprofessional Care*, 1, 8-20.
- Davis, D. (2006). Continuing education, guideline implementation, and the emerging transdisciplinary field of KT. *The Journal of Continuing Education in the Health Professions*, 26, 5-12.
- Graham, I. D., Logan, J. Harrison, M.B., Straus, S.E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in KT: Time for a map? *The Journal of Continuing Education in the Health Professions*, 26, 13-24.
- Grol, R., & Grimshaw, J. (2003). From best evidence to best practice: Effective implementation of change in patients' care. *The Lancet*, 362, 1225-1230.
- Health Canada (2006). *Interprofessional education for collaborative patient-centered practice (IECPCP)*. Retrieved April 26, 2007, from [http://www.hc-sc.gc.ca/hcs-sss/hhr-rhs/strateg/interprof/index\\_e.html](http://www.hc-sc.gc.ca/hcs-sss/hhr-rhs/strateg/interprof/index_e.html)
- Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care*, 7, 149-158.
- National Center for the Dissemination of Disability Research (NCDDR) (2005). *What is KT? Focus: A technical brief from the National Center for the Dissemination of Disability Research*. Retrieved April, 26 2007, from <http://www.ncddr.org/kt/products/focus/focus10/>
- Straus, S., Graham, I., & Mazmania, P.E. (2006). KT: Resolving the confusion. *The Journal of Continuing Education in the Health Professions*, 26, 3-4.
- Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S., & Pentz, M-A. (2006). Translation in the health professions: Converting science into action. *Evaluation and the Health Professions* 29, 7-32.

UK Center for the Advancement of Interprofessional Education (n.d.). *Interprofessional education*. Retrieved April 26, 2007, from <http://www.caipe.org.uk/index.php?&page=define&nav=1>

Zwarenstein, M., Reeves, S., Barr, H., Hammick, M., Koppel, I., & Atkins, J. (2007). Interprofessional education: Effects on professional practice and health care outcomes. *The Cochrane Database of Systematic Reviews*. 2. Article CD002213. Retrieved April 27, 2007, from The Cochrane Library Database.

## STATE OF KT LANGUAGE AND TERMINOLOGY

Armstrong, R., Waters, E., Roberts, H., Oliver, S., & Popay, J. (2006). The role and theoretical evolution of KT and exchange in public health. *Journal of Public Health Advance*, 1-6.

Bowen, 2004. The need to know project evaluation 2002-2004. Retrieved March 22, 2007, from [http://www.rha.cpe.umanitoba.ca/pdf\\_brochures/NTK\\_eval\\_sept\\_04.pdf](http://www.rha.cpe.umanitoba.ca/pdf_brochures/NTK_eval_sept_04.pdf).

Canadian Institutes of Health Research (2004). *KT strategy 2004-2009: Innovation in Action*. Ottawa, ON: Canadian Institutes of Health Research Retrieved April 26, 2007, from <http://www.irsc.gc.ca/e/26574.html>

Graham, I. D., Logan, J. Harrison, M.B., Straus, S.E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in KT: Time for a map? *The Journal of Continuing Education in the Health Professions* 26, 13-24.

Ho, K., Bloch, R., Gondocz, T., Laprise, R., Perrier, L., Ryan, D., Thivierge, R., & Wenghofer, E. (2004). Technology-enabled KT: Frameworks to promote research and practice. *The Journal of Continuing Education in the Health Professions*, 24, 90-99.

Institute for Health and Work (n.d.). *Knowledge transfer & exchange*. Retrieved April 27, 2007 from <http://www.iwh.on.ca/kte/kte.php>

Maclean, H., Gray, R., Narod, S., Rosenbluth, A. (2004). Effective KT strategies for breast cancer. *Prepared for the CIHR*. Retrieved March 22, 2007, from <http://www.crw.org/PDF/KTBC%20Final%20Report.pdf>.

National Center for the Dissemination of Disability Research (NCDDR) (2005). *What is KT? Focus: A technical brief from the National Center for the Dissemination of Disability Research*. Retrieved April 26, 2007, from <http://www.ncddr.org/kt/products/focus/focus10/>

Straus, S., Graham, I., & Mazmanian, P.E. (2006). KT: Resolving the confusion. *The Journal of Continuing Education in the Health Professions*, 26, 3-4.

Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S., & Pentz, M-A. (2006).

Translation in the health professions: Converting science into action. *Evaluation and the Health Professions* 29, 7-32.

## MODELS OF KT

Canadian Institutes for Health Research. (2003). *KT overview*.

Retrieved April 27, 2007, from <http://www.cihr-irsc.gc.ca/e/7518.html>

Davis, D. (2006). Continuing education, guideline implementation, and the emerging transdisciplinary field of KT. *The Journal of Continuing Education in the Health Professions*, 26, 5-12.

Grimshaw, J.M. & Eccles, M.P. (2004). Is evidence-based implementation of evidence-based care possible? *Medical Journal of Australia*, 180, S50-S51.

Kitson, A., G. Harvey, & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care*, 7, 149-158.

Lavis, J. N., Robertson, D., Woodside, J. M., Mcleod, C. B., & Abelson, J. (2003). How can research organizations more effectively transfer research knowledge to decision makers? *Milbank Quarterly*, 81, 221-248.

Logan, J., and Graham, I. D. (1998). Toward a comprehensive interdisciplinary model of health care research use. *Science Communication*, 20, 227-246.

## STRATEGIES AND TRENDS

Agency for Health care Research and Quality (2001). *Translating research into practice (TRIP) – II: Fact sheet*. Retrieved April 13, 2007 from <http://www.ahrq.gov/research/trip2fac.htm>.

Armstrong, R., Waters, E., Roberts, H., Oliver, S., & Popay, J. (2006). The role and theoretical evolution of KT and exchange in public health. *Journal of Public Health*, 28, 384-389.

Canadian Health Services Research Foundation (n.d.). *Knowledge brokering*. Retrieved April 23, 2007 from [http://www.chsrf.ca/brokering/index\\_e.php](http://www.chsrf.ca/brokering/index_e.php).

Dufault, M. (2004). Testing a collaborative research utilization model to translate best practices in pain management. *World Views on Evidence-Based Nursing*, 1, S26-S32.

Ho, K., Bloch, R., Gondocz, T., Laprise, R., Perrier, L., Ryan, D., Thivierge, R., &

- Wenghofer, E. (2004). Technology-enabled KT: Frameworks to promote research and practice. *The Journal of Continuing Education in the Health Professions*, 24, 90-99.
- Graham, I. D., Logan, J. Harrison, M.B., Straus, S.E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in KT: Time for a map? *The Journal of Continuing Education in the Health Professions* 26, 13-24.
- Grimshaw, J.M., & Eccles, M.P. (2004). Is evidence-based implementation of evidence-based care possible? *Medical Journal of Australia*, 180, S50-S51.
- Greenhalgh, T., & Russell, J. (2006). Promoting the skills of KT in an online master of science course in primary health care. *The Journal of Continuing Education in the Health Professions*, 26,100-8.
- Grol, R., & Grimshaw J.M. (1999). Evidence-based implementation of evidence-based medicine. *Joint Commission Journal on Quality Improvement*, 25, 503-513.
- Grol, R. & Grimshaw, J. (2003). From best evidence to best practice: Effective implementation of change in patients' care. *The Lancet*, 362, 1225-1230.
- Grol, R., & Wensing, M. (2004). What drives change? Barriers to and incentives for achieving evidence-based practice. *Medical Journal of Australia*, 180, S57-S60.
- Janken, J.K., Dufault, M.A., & Yeaw, E.W. (1988). Research round tables: increasing student/staff nurse awareness of the relevancy of research to practice. *Journal of Professional Nursing*, 4, 186-191.
- Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care*, 7, 149-158.
- Lomas, J. (2007). The in-between world of knowledge brokering. *British Medical Journal*, 334, 129-132.
- Nutley, S., Davies, H., & Walter, I. (2002). Conceptual synthesis 1: Learning from the diffusion of innovations. St. Andrews, KY, Queen Mary, University of London: 1-29. Retrieved April 28, 2007, from <http://evidencenetwork.org/Documents/wp10.pdf>.
- Sax Institute (2007). *Knowledge brokering*. Retrieved April 25, 2007 from <http://www.saxinstitute.org.au/policyresearchexchange/KnowledgeBrokering.cfm?objid=542>.
- Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S., & Pentz, M-A. (2006). Translation in the health professions: Converting science into action. *Evaluation and the Health Professions* 29, 7-32.
- Wright, F. C., Law, C.H., Last, L.D., Klar, N., Ryan, D.P., & Smith, A.J. (2006). A blended KT initiative to improve colorectal cancer staging. *BMC Health Services Research*, 6, 4-11.

## NON-CLINICAL MODELS OF KT

Association of Canadian Community Colleges (2006). *A master key to workforce skills development*. Retrieved April 27, 2007, from <http://www.accc.ca/ftp/pubs/brochures/200601-skillsdevelopment.pdf>

Beal, G. (1980). Knowledge generation, organization dissemination and utilization for rural development. *Resources in Education, 16*, 20.

Beal, G., & Meehan, P. (1978). Knowledge production and utilization. *Resources in Education, 14*, 19.

Rikkert, M., & Rigaud, A., (2004). Three strategies for delivering continuing medical education in geriatrics to general practitioners. *Educational Gerontology, 30*, 619-626.

## EVALUATION OF KT STRATEGIES

Redfern, S., Christian, S., & Norman, I. (2003) Evaluating change in health care practice: lessons from three studies. *Journal of Evaluation in Clinical Practice, 9*, 239-250

Titler, M.G. (2004). Methods in translation science. *World Views on Evidence-Based Nursing, 1*, 38-48.

Tugwell, P., Robinson, V., Grimshaw, J., & Santess, N. (2006). Systematic reviews and KT. *Bulletin of the World Health Organization, 84*, 643-651. Retrieved April 28, 2007, from <http://www.who.int/bulletin/volumes/84/8/05-026658ab/en/index.html>

## KT CHALLENGES AND BARRIERS WITHIN IPE/CPCP CONTEXTS

Estabrooks, C. A., Thompson, D. S., Lovely, J.J., & Hofmeyer, A. (2006). A guide to KT theory. *The Journal of Continuing Education in the Health Professions 26*, 25-36.

Dufault, M. (2004). Testing a collaborative research utilization model to translate best practices in pain management. *World Views on Evidence-Based Nursing, 1*, S26-S32.

Glasgow, R.E., Lichtenstein, E., & Marcus, A.C. (2003) Why don't we see more translation of health promotion research to practice? Rethinking the efficacy to effectiveness transition. *American Journal of Public Health, 93*, 1261-1257.

Graham, I. D., Logan, J. Harrison, M.B., Straus, S.E., Tetroe, J., Caswell, W., &

- Robinson, N. (2006). Lost in KT: Time for a map? *The Journal of Continuing Education in the Health Professions*, 26, 13-24.
- Grimshaw, J., Santesso, N., Cumpston, M., Mayhew, A., & McGowan, J. (2006). Knowledge for KT: The role of the Cochrane Collaboration. *Journal of Continuing Educations in Health Professionals*, 26, 55-62.
- Grol, R., & Grimshaw, J. (2003). From best evidence to best practice: Effective implementation of change in patients' care. *The Lancet*, 362, 1225-1230.
- Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S., & Pentz, M-A. (2006). Translation in the health professions: Converting science into action. *Evaluation and the Health Professions* 29, 7-32.
- Zwarenstein M, Reeves S, Barr H et al. Interprofessional education: effects on professional practice and health care outcomes. The Cochrane Database of Systematic Reviews 2000, Issue 3.

## RECOMMENDATIONS

- Davis, D. (2006). Continuing education, guideline implementation, and the emerging transdisciplinary field of KT. *The Journal of Continuing Education in the Health Professions*, 26, 5-12.
- Dufault, M. (2004). Testing a collaborative research utilization model to translate best practices in pain management. *World Views on Evidence-Based Nursing*, 1, S26-S32.
- Graham, I. D., Logan, J. Harrison, M.B., Straus, S.E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in KT: Time for a map? *The Journal of Continuing Education in the Health Professions*, 26, 13-24.
- Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care*, 7, 149-158.
- Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S., & Pentz, M-A. (2006). Translation in the health professions: Converting science into action. *Evaluation and the Health Professions* 29, 7-32.