

## Innovations

# Knowledge Translation in Developing Countries

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## Abstract

*There is increasing evidence that the application of knowledge in developing countries is failing. One reason is the woeful shortage of health workers, but as this is redressed, it is also crucial that we have an evidence base of what works to minimize the “know-do gap.” The World Health Organization and other international organizations are actively building momentum to promote research to determine effective strategies for knowledge translation (KT). At this time, the evidence base for the effectiveness of those strategies is not definitive in developed countries and is relatively sparse in developing countries. It appears, however, that the effectiveness of these strategies is highly variable and dependent on the setting, and success hinges on whether the strategies have been tailored. A useful framework to provide direction for tailoring interventions is the Ottawa Model of Research Use (OMRU). Underlying OMRU is the principle that success rests with tailoring KT strategies to the salient barriers and supports found within the setting. The model recommends that barriers and supports found in the practice environment or as characteristics of potential adopters and the evidence-based innovation or research evidence be assessed and then the KT strategy tailored and executed. The model also recommends that whether the research has been applied and has resulted in improved health outcomes should be measured. Studies in developing countries, although few, illustrate that the OMRU approach may be a valid method of tackling the challenges of KT strategies to improve health care in developing countries.*

**Key Words:** knowledge translation, research use, evidence-based medicine, developing countries, continuing education

## Background

The *World Report on Knowledge for Better Health* reports that 6 million children die in developing countries every year due to causes that can be prevented by applying simple and effective interventions; that in many African countries, the average life expectancy is less than 40 years while in industrialized nations the

average life expectancy is 80 years or more; and that 1,000/100,000 women giving birth died in Kenya whereas in Japan the rate was 8/100,000.<sup>1</sup> These are only a few statistics—which there are more—that clearly illustrate that the application of knowledge in developing countries is failing.

Why could this be happening? The *World Report on Knowledge for Better Health* points to health systems that are poorly resourced and under severe pressure, and appropriate and effective interventions are not reaching those in need partly because how to effectively implement and use an intervention may not be known. Globally, little money is spent on research into diseases affecting developing countries—less than 10% of health research money is spent on 90% of the world’s health problems: the “10/90 gap”—but there is also a major gap between

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what is known from research and what is done to apply it: the “know-do gap.” This lack of application is particularly important in low- and middle-income countries (LMICs), where there are limited and scarce resources. Developing countries cannot afford to waste money and resources on a treatment that is not effective, nor can they afford the costs when a treatment causes harm.<sup>1,2</sup>

In response to this failure of the application of known efficacious interventions and the resulting global problems, the United Nations Millennium Declaration was written and signed.<sup>3</sup> From the declaration, 8 Millennium Development Goals were developed to mobilize the world’s countries to reduce poverty and improve education and health in the poorest countries. Since then, there has been increasing international activity to plan how these goals will be met by the target date of 2015. Most notably was the Ministerial Summit on Health Research, held in conjunction with the Global Forum for Health Research, which took place in November 2004.<sup>4</sup> The summit brought together ministers of health from around the world with over 900 participants from 109 countries from nongovernmental and government organizations, research institutions and universities, the private sector, and the media. Several key messages to help achieve the Millennium Development Goals emerged from the summit, including the need for more application of existing knowledge and the need for more research into how to do it.

Research and action into the “know” and the “how” are critical. The World Health Organization (WHO) is actively building momentum in this research area internationally. In October 2005, experts in this research area met in Geneva to discuss the concepts of knowledge translation (KT) in global health and to develop priorities and mechanisms for KT research and action. From this meeting, a working definition of KT was developed and will soon be published in the report of the meeting. It is based on the Canadian Institutes for Health Research definition and recognizes that knowledge is more than research

evidence but that it is important to use scientific evidence to inform practice and policy. Their definition of knowledge translation will be used in the following discussion: “the exchange, synthesis, and ethically sound application of knowledge within a complex set of interactions among producers of knowledge and relevant stakeholders to accelerate the capture of benefits of research through improved health, more effective services and products, and a strengthened health care system.”<sup>5</sup>

The WHO has also established a Knowledge Management and Sharing department with a vision for “global health equity through better knowledge management and sharing.”<sup>6</sup> Their key mission is to bridge the know-do gap in global health by ensuring that people have the right information at the right time and by facilitating the application of that information into policy and practice. Detailed plans to implement the knowledge management strategy are currently under development. Other international nongovernmental agencies are also actively taking responsibility for meeting the Millennium Development Goals by setting KT as a priority. In Canada, the Coalition of Global Health Research has brought together global health researchers across Canada and their partners in LMICs to promote better and more equitable health worldwide.<sup>7</sup> One of its task groups is mandated to ensure that KT happens, that research is put into action. Training new global health researchers in KT concepts has been a key task of this group over the past two years. Globally, there is the International Clinical Epidemiology Network (INCLIN), which works to link and train researchers and clinicians in research techniques and their application with an emphasis in LMICs.<sup>8</sup>

But one of the primary challenges facing these initiatives is to plan and determine the most effective strategies to promote the use and application of research. A useful framework to provide direction for planning and guiding knowledge translation activities is the Ottawa Model of Research Use (OMRU) developed by Logan and

Graham.<sup>7,8</sup> This model has been a useful conceptual framework to the authors in the past when planning KT interventions.<sup>10</sup> It is helpful because it provides direction to the issues that should be addressed and the activities that should be used and an approach to selecting and tailoring strategies to promote the application of research. The framework consists of 6 key elements that should be assessed, monitored, and evaluated before, during and after any KT (Figure 1):

1. The barriers and supports
  - A. The structural, social, patient, and economic influences within the practice and policy environment
  - B. The attitudes, knowledge, motivation, and skills of potential adopters or target audiences
  - C. The perceptions of the research evidence and innovation developed
2. The implementation intervention strategies for diffusing, disseminating, or implementing research findings
3. The adoption and use of the innovation
4. The impact or outcomes of research use

Underlying OMRU is the basic principle that the most efficient approach to the application of research evidence rests with tailoring KT strategies to the salient barriers and supports found within the particular and unique setting. The most important barriers and supports are categorized into the practice environment, potential adopters, and the evidence-based innovation (the research evidence). Once the KT strategy has been tailored and executed, then whether the research has been applied and has resulted in improved health outcomes or not should be assessed. This process is neither linear nor sequential, although presented that way in the OMRU model. Because the process is dynamic with interactions and exchanges among researchers, stakeholders, and users, it will take place over time and not necessarily in a specific order.<sup>10</sup>

Below we use the framework of the OMRU model to organize and present the evidence we have about what works to translate knowledge in developing countries. Evidence from systematic reviews and individual studies in developing countries is used, and we provide examples of what

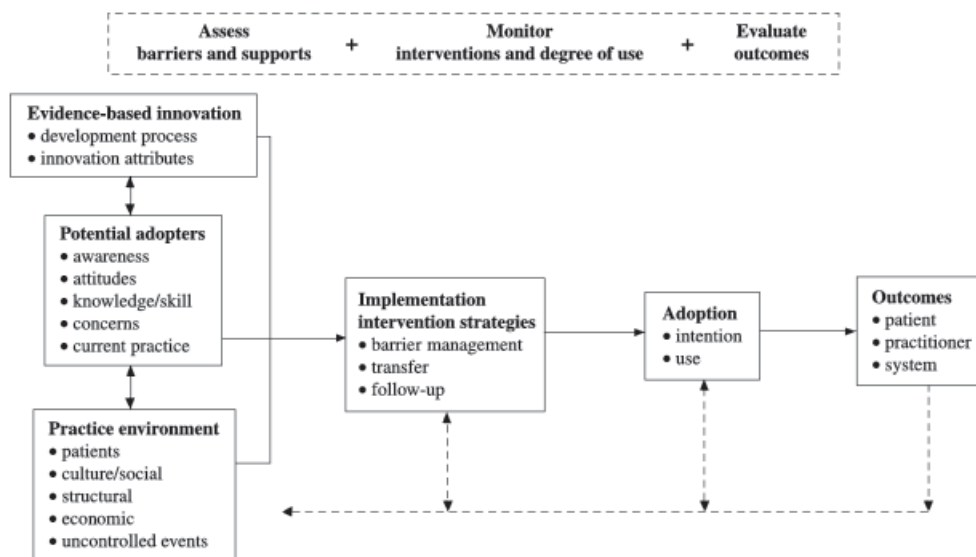


Figure 1 The Revised Ottawa Model of Research Use (Graham and Logan, 2004). Figure used with permission of the *Canadian Journal of Nursing Research*.<sup>10</sup>

works. We also use this framework to emphasize the importance of assessing barriers and supports to KT to develop the intervention and the importance of monitoring and evaluating the impact of the intervention to feedback into the process.

## **Assessing Barriers and Supports**

### **Policy and Practice Environment**

The *World Health Report on Knowledge for Better Health* warns that the Millennium Development Goals may not be met by 2015 because of systemwide barriers from weak health systems, and consequently, it calls for more investment into research on health systems. Perhaps the biggest barrier is structural—namely, the weakness of health information and of health delivery systems in many LMICs.<sup>1</sup> Because KT cannot take place in a vacuum, it has been recognized that there needs to be minimal human resources, financing, drugs, and supply systems before effective interventions can be delivered. The “massive” global shortage of health workers, for example, threatens strategies to improve health in developing countries. The Joint Learning Initiative, a consortium of more than 100 global health leaders who are landscaping human resources for health and identifying strategies to strengthen the workforce of health systems, reports that there is a low density of health workers and high mortality in most LMICs.<sup>11</sup> It is, therefore, critical to consider this barrier and other systems barriers when developing KT strategies.

Once these systems are available, then a second order of barriers needs assessing, including the overall policy environment, political instability, and the quality of governance.<sup>12</sup> At this second level, a systematic review of decision making in health care management and policymaking from Lavis and colleagues identifies that conflicts and rivalries between elected officials and civil servants may decrease the application of research evidence.<sup>13</sup> Similarly, interviews with key informants in KT in developing coun-

tries emphasize that the application of research may be hindered when the political environment is corrupt and unstable and when there is a lack of financial resources.<sup>14</sup> Additionally, pressure from stakeholders and peers, public opinion, and a culture conducive to the use of research can also contribute to the success of KT activities. While true at a health systems level, these factors are especially relevant in clinical practice environments. The deficiencies in the quality of service provision and wide gaps between evidence and practice indicate that changes to health care professionals’ practice are necessary.<sup>15</sup> At a clinical level, research evidence may be competing with institutionalized habits, superstitions, traditions, and cultures.<sup>1</sup>

### **Potential Adopters: Attitudes, Knowledge, Motivation, and Skills**

The OMRU framework directs researchers to identify the characteristics of potential users who can influence the use of research. While many of the characteristics and barriers to research use in potential adopters may be similar between developed and developing countries (Table 1), some characteristics present unique challenges in developing countries. “Evidence-based health policy” and “evidence-based medicine” with the appreciation of the importance of systematic reviews, although now widely included in curricula and continuing professional development in industrialized countries, with a few exceptions such as in the 50 medical schools with INCLEN clinical epidemiology units, are only just beginning to be included in the training of health policymakers and professionals in LMICs. Potential users may simply lack knowledge of the research evidence, or their behaviors may be based on culture, ideologies, or preconceived beliefs instead of evidence. Strategies to address these beliefs would need to be developed. Incentives to change behavior may also be different between developed and developing countries: peer recognition in a small

**Table 1 Barriers and supports to knowledge translation (IDRC 2004)**

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*Practice Environment*

- structural (e.g. health systems)
- interest group pressure or peer pressure on decision makers
- insufficient economic/budget resources and/or time to include research in decision making
- centralisation of power and information, or hierarchy of power
- political instability and high turnover
- lack of access to research, data and analysis
- culture not conducive to evidence based decision making
- censorship and control

*Potential Adopters*

- generation of decision making based on past experiences
- local or indigenous knowledge
- variation in incentives and motivations to change
- lack of communication and contact with researchers
- negative feelings about research and its use
- lack of awareness about relevant research
- lack of skills to apply and use research

*Perception of Evidence*

- lack of timely or relevant research
  - politicisation of research
  - poor quality of research
  - credible evidence
  - inaccessible or useful format
- 

community with few peers may not be a strong motivator for change, and monetary incentives may carry more weight.<sup>14</sup>

### **Perceptions of the Research Evidence and Innovation**

Assessing and evaluating the external factors, such as the characteristics of the users and the environment they work in, are relatively straightforward. Assessing the perceptions of the research evidence, however, is less so. These latter characteristics relate primarily to how the evidence was created and the ease of application. For example, Logan and Graham<sup>9</sup> explain that if the research evidence has been produced

in a rigorous or transparent way or by credible developers, it may be more readily applied. But if the evidence is difficult to apply, not compatible with usual practice, or not seen as advantageous, it may not be applied. Negative feelings about the evidence may also hinder its application. Haines et al.<sup>16</sup> relate these concepts to knowledge transfer to the public. They found that the public is wary of evidence that is not congruent with existing cultural values.

This emphasizes the importance of adapting innovations or interventions to potential users and the setting and creating an innovation or intervention that is perceived positively. An example of a clinical initiative that gives a priority to local applicability is the INCLLEN's



Knowledge “Plus” Program, which is based on the premise that developing, providing access to, and equipping health care professionals to use locally appropriate and equitable guidelines enhances KT in LMICs. The development of these guidelines or Knowledge Plus Packages is through a transparent and systematic process according to local health priorities and the health care environment and involves health care professionals and stakeholders to capture local or “tacit” knowledge. To date, Knowledge Plus Packages for tuberculosis, acute respiratory tract infections, and hyperlipidemia have been developed and are presently being tested in Colombia, India, and the Philippines. Tools to locally adapt the guidelines have also been developed to use in other settings.<sup>17</sup>

A project that takes these principles and applies it to policymakers and the community is the Sexual Violence and HIV Risk in South Africa project supported by the Governance, Equity, and Health program of the International Development Research Corporation and the Swiss Agency for Development and Cooperation. This project works to strengthen the links between the generation and use of knowledge by focusing on the interface between researchers and research users. Specifically, this project, led by the nongovernmental organization CIET, has established a national baseline of sexual violence and attitudes relating to human immunodeficiency virus (HIV) risks among South Africa’s youth and then took this information back to the community and consulted with them to produce locally appropriate recommendations and tailored solutions that have been incorporated into materials and programs to address sexual violence and HIV risk.<sup>18</sup>

### **Determining the Implementation Intervention Strategies**

According to OMRU, once researchers have assessed the salient barriers and supports for KT, they can determine the best strategy to ensure

the application of knowledge in their potential users. Research evidence and experiences evaluating KT strategies for potential user groups also informs decisions about the best strategies to use. A widely used evidentiary resource for KT evidence is available from The Cochrane Collaboration Review Group on Effective Practice and Organization of Care. This group has developed specific methods for finding, analyzing, and synthesizing the evidence about what KT strategies work to change or improve the behavior of health care professionals to ensure the application of knowledge.

Evidence from many reviews of the implementation of research shows that the majority of KT strategies to improve care that are targeted to health care professionals and managers are moderately successful.<sup>19</sup> Unfortunately, it is difficult to point to any one type of intervention that works all of the time because the research shows that there is considerable variation in success within and across interventions.<sup>19</sup>

This variation may be especially relevant when trying to determine if this research into knowledge transfer strategies is applicable to developing countries. Siddiqi and colleagues reviewed the literature in developing countries; they suggest that the success of these interventions is highly dependent on local factors.<sup>15</sup> Overall, they found few studies evaluating interventions to influence health professionals’ practice to improve health care conducted in developing countries. Using the limited evidence from the few studies that were conducted in developing countries, the authors report that audit and feedback was effective at improving professional practice but that the improvement was short term and the studies poorly designed; education meetings and educational outreach were effective, particularly when the local needs and barriers to change were addressed; there was inconsistent evidence for the effectiveness of local consensus development processes to develop guidelines, protocols, and so forth; using local opinion leaders and distributing educational

materials may have been effective, but the studies were likely biased; using multiple strategies was effective; and there were no studies to evaluate marketing and reminders. An exploration into those studies in developing countries that are included in Cochrane Effective Practice and Organisation of Care reviews found that little is written about tailoring and contextualizing the interventions nor why a specific intervention was chosen. Although not a surprise, this lack of rationale—whether simply due to word restrictions in published articles or for other more worrisome reasons such as that tailoring was not done—makes it difficult to generalize findings from developed countries and understand which interventions are effective at influencing health care professionals to use research.<sup>19</sup>

From the few developing country studies that provided some information about tailoring the KT strategy, it is clear that there was pressure to work within an environment of scarce and limited resources and with target audiences with distinct cultural beliefs and traditions. Limited resources included human, financial, and informational ones. A few studies, for example, indicated that providing education one-to-one or face-to-face as in academic detailing or outreach visits, although effective, was not realistic in their country due to limited resources, and therefore educational meetings and workshops targeting many health care professionals at once were provided.<sup>20,21</sup> On the other hand, one study indicated a benefit of limited resources because health care professionals in their region receive little drug information and, therefore, printed education materials that were inexpensive and easy to deliver in their setting were sent to health care professionals, resulting in a successful change in practice.<sup>22</sup> A number of other studies credit their success to assessing and then addressing the beliefs and perceptions of health care professionals before implementing their interventions to change practice.

Interventions to change public behavior are less studied, especially in developing countries.

Haines and colleagues provide a brief summary of the effect of KT strategies to these groups.<sup>16</sup> The Cochrane Collaboration Communication and Consumers Review Group provides a useful classification for interventions involving consumers and the public. Interventions directed at the public, such as media, social marketing, and direct-to-consumer advertising have been used to inform the public of research evidence, but more research is needed to determine their effectiveness. There is some research into interventions for improving the interactions between consumers and health care professionals to encourage the use of evidence. Decision aids to guide the interactions between consumers and professionals have been proven effective in developed countries, but there are ongoing projects in Chile, Mexico, and Thailand to assess whether the aids are also effective in developing countries.<sup>23</sup> Interventions to involve consumers in public participation have been studied, but the success of these interventions to improve the use of research is not clear.<sup>16</sup>

### Measuring and Monitoring Outcomes

The importance of measuring and monitoring the use of the research or innovation and the resulting health outcomes of KT strategies are emphasized in the last 2 elements of OMRU. These 2 elements are distinct from each other but lie on a continuum. First, it is important to determine whether the research is used or consulted by the target audience or is in place and reaching the target audience; outcomes to measure its use are necessary. If the research is used, then the next question to ask is, Does it result in improved health outcomes?, the primary objective of any KT activity.

The distinction between the 2 elements is illustrated in the use of bed nets in Tanzania to prevent malaria. The Ifakara Health Research and Development Centre in Tanzania has developed social marketing strategies that include intense promotion of the use of insecticide-treated mosquito nets in local communities, for example,

through play skits performed in a community. The consistent use, care, and reapplication of insecticide to the bed nets are obviously key to whether the bed nets decrease malaria and mortality in those communities. Therefore, the researchers assessed the number of people who had bed nets, the number of nets in bad condition (e.g., more than 7 large holes), how often people treated the nets with the insecticide, and how nets were washed.<sup>24</sup> This information provided feedback into whether the innovation or research was being used as intended and ultimately to whether the innovation would need to be modified and how it could be modified. To measure the health outcomes, another study was conducted using demographic surveillance techniques. This time the prevalence of malaria and anemia was measured to indicate the success of the social marketing as a KT strategy to communities.<sup>25</sup>

## **Conclusions**

It is clear that research is not consistently used to make health care decisions. This lack of application of research to improve health is a global problem, but it is of particular concern in developing countries where limited resources cannot be wasted on health care interventions that do not work or that cause additional harm. Some strategies to ensure knowledge is used or translated into policy, practice and improved health have been developed, but the evidence base for the effectiveness of those strategies is not definitive in developed countries and relatively sparse in developing countries. It appears, however, that the effectiveness of these strategies is highly variable and dependent on the setting and that success hinges on whether the strategies have been tailored.

OMRU provides a useful framework for systematically assessing the setting and then developing and tailoring strategies. This model directs researchers, policymakers, program managers, and the like to assess, monitor, and evaluate the salient barriers and supports to KT present in the

## **Lessons for Practice**

- The importance of using research in health decision making at the individual and population level has been increasingly recognized not only in industrialized countries but in low- and middle-income countries.
- Low- and middle-income countries face many challenges to applying knowledge due to limited resources.
- Knowledge translation strategies have been developed and continue to be developed to promote the use of evidence and knowledge by policymakers, health care professionals, and the public. But evaluation of these strategies has primarily occurred in developed countries.
- The Ottawa Model of Research Use (OMRU) provides a useful framework to assess, monitor, and evaluate knowledge translation strategies based on barriers and supports to research use. This model may be particularly relevant in developing countries where many barriers to the application of knowledge exist and little evaluation has been conducted.
- More research into effective knowledge translation strategies in developing countries and validation of the OMRU model is needed.

environment, inherent in the potential users, and related to the evidence-based innovation or research. Studies in developing countries that illustrate that supports and barriers can affect the



success of KT strategies, although few, illustrate that the OMRU approach may be a valid method of tackling the challenges of KT to improve health care in LMICs.

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*Knowledge Translation in Developing Countries*

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