

Innovations

A Guide to Knowledge Translation Theory

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Abstract

Despite calls over several decades for theory development, there remains no overarching knowledge-translation theory. However, a range of models and theoretical perspectives focused on narrower and related areas have been available for some time. We provide an overview of selected perspectives that we believe are particularly useful for developing testable and useful knowledge-translation interventions. In addition, we discuss adjuvant theories necessary to complement these perspectives. We draw from organizational innovation, health, and social sciences literature to illustrate the similarities and differences of various theoretical perspectives related to the knowledge-translation field.

A variety of theoretical perspectives useful to knowledge translation exist. They are often spread across disciplinary boundaries, making them difficult to locate and use. Poor definitional clarity, discipline-specific terminology, and implicit assumptions often hinder the use of complementary perspectives.

Health care environments are complex, and assessing the setting prior to selecting a theory should be the first step in knowledge-translation initiatives. Finding a fit between setting (context) and theory is important for knowledge-translation initiatives to succeed. Because one theory will not fit all contexts, it is helpful to understand and use several different theories. Although there are often barriers associated with combining theories from different disciplines, such obstacles can be overcome, and to do so will increase the likelihood that knowledge-translation initiatives will succeed.

Key Words: Knowledge translation, research utilization, knowledge utilization, models, theory

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Introduction

Theory is needed in the knowledge translation field in order to develop testable and probably useful interventions. However, the question, “which knowledge translation theory might I use?” remains stubbornly resistant to satisfactory answers. Despite calls over the last four decades for theory development,^{1–6} currently there is no satisfactory overarching knowledge-translation theory and, in fact, some question as to whether there can or should be such an overarching theory. While not frequently used in the health sciences, the theory closest to achieving this status is that of diffusion of innovation.⁷ Innovation diffusion, while not entirely synonymous with

knowledge translation, shares many of the properties of knowledge translation. Alternatively, one can locate a range of models and theoretical perspectives focused on narrower and related areas that have been available for some time. Grol et al.,⁸ for example, included a chapter reviewing over one dozen such theories in their *Improving Patient Care* text.

In the organizational innovation literature, the following are examples of the types of models that can be found: a model of territorial rights and boundaries⁹; a dual-core model of innovation¹⁰; the ambidextrous model³; alternatives to an efficient choice model, such as fashion, fad, forced selection, and bandwagon models¹¹; and a “desperation-reaction” model of medical diffusion¹² (Table 1). Generally, these

models tend to focus on explanation rather than prescription and are circumscribed in the particular aspect of innovation they address.

In the social sciences literature, which focuses largely on how research affects policy, Weiss’ 7 general models of research utilization¹³ represent another approach to conceptualization. Her structure includes the knowledge-driven model, the problem-solving model, an interactive model, a political model, a tactical model, and an enlightenment model (Table 1).

In nursing, several prescriptive models of research utilization have been developed, the major ones being Conduct and Utilization of Research in Nursing,¹⁵ Western Interstate Commission on Higher Education in Nursing,¹⁶ Nursing Child Assessment Satellite Training,¹⁷

Table 1 Models of Knowledge Translation

Model	Factors
Organizational Innovation Models	
Model of Territorial Rights and Boundaries ⁹	Innovations are perceived as threats to existing organizational practices and interests.
Dual Core Model of the Innovation ¹⁰	Innovations in an organization originate from cores that serve different purposes. The primary purpose of a core will determine how the innovation is diffused. Organizational and environmental variables may effect innovation activity in one case but not the other.
Ambidextrous Model ^{3, 60}	High structural complexity, low formalization, and low centralization help initiate an innovation but the inverse conditions facilitate implementation. Organizations with diverse and differentiated task structures initiate more innovations, and those with formalized and centralized structures implement more innovations.
Bandwagon Models ¹¹	Organizations are prompted to adopt an innovation through fear that other organizations are benefiting from adoption. Bandwagon occurrence, extent, and persistence is effected by organizational differences. Adoption occurs regardless of how the innovation is perceived by an organization.
Desperation Reaction Model ¹²	Innovations intended to address desperate situations diffuse differently than other innovations. Extensive diffusion occurs during a period of small-scale experimentation.

(continued)

Table 1 (continued)

Model	Factors
Social Sciences: General Models of Research Utilization	
Problem Solving Model ¹³	The existence of a problem pulls knowledge into practice. The need to generate a solution or choose among alternatives is the impetus for knowledge translation.
Interactive Model ¹³	Knowledge translation is not linear and is part of a much broader equation involving multiple inputs.
Political Model ¹³	Knowledge translation occurs for self-serving purposes to support a particular viewpoint.
Tactical Model ¹³	The process of doing research is valued over the content of the research. Proposes that research is used for purposes that have little relation to it's substance.
Enlightenment Model ¹³	Knowledge of the concepts and theoretical perspectives behind research drive knowledge translation.
Knowledge Driven Model ¹³	Knowledge is pushed into practice simply because it exists. Assumes a linear push approach from basic research to applied research which leads to development and application.
Research Utilization Models in Nursing	
CURN ¹⁴ (Conduct and Utilization of Research in Nursing)	Knowledge is transferred through linkages when a practice problem is encountered. Relies on a reciprocal relationship between users and producers of knowledge. Underpinned by a problem solving solution.
WICHEN ¹⁵ (Western Interstate Commission on Higher Education in Nursing)	Five-phase resource linkage model based on concepts of diffusion of innovation and planned change. Relies on nurses being organizational change agents. Uses problem solving approach.
NCAS ¹⁶ (Nursing Child Assessment Satellite Training)	Knowledge translation occurs through social channels in a predictable way. Researchers involve practitioners through the entire research process. Relies on researchers to translate and push findings through channels.
Stetler Model ¹⁷	Knowledge transfer is influenced by internal processes and external contexts. Relies on individuals and organizations to pull research into practice. Assumes clinician is knowledge oriented rather than rule oriented.
Iowa Model of Research Use in Practice ¹⁸	Triggers in practice act as catalysts for knowledge seeking. Relies on clinician to pull research into practice when a trigger is encountered and traditional knowledge cannot be used to solve a problem.
Health Promotion Models	
Readiness to Change Model ¹⁹	Focused on an individual's motivation or intention for change. Based on sequential phases in the motivation for change.
Social Influences Theory ²⁰	Decisions to change occur in a social context. Group members create and exert facilitators and barriers to change.

the Stetler model,¹⁸ and the Iowa model of research in practice.¹⁹ In health promotion, a dominant theory has been Prochaska's readiness-to-change model²⁰ and, in medicine, the social influences theory²¹ (Table 1). Against this backdrop of theories and models, the individual investigator or team must try and find a fit with their beliefs, expertise, and needs.

Purpose

We address the issue of available theory in the knowledge-translation field. In doing this, we first clarify terms and the need for theory and then provide an overview of selected theoretical perspectives. Finally, we discuss a selection of adjuvant theory necessary to complement these perspectives.

Definitional Clarity

Definitions of knowledge translation and related concepts are frequently missing or absent from articles, different disciplines use different terminology, most of the literature rests on assumptions that are rarely made explicit, and investigators often assume that terminology and concepts from other disciplines are readily transferable to their own.^{22,23} The Canadian Institutes of Health Research defines *knowledge translation* as the "exchange, synthesis and ethically-sound application of knowledge—within a complex system of interactions among researchers and users." (<http://www.cihr-irsc.gc.ca/e/8505.html>). Health researchers frequently use the term *implementation research*. Implementation research aims to uncover the influences on health care practitioners' beliefs, choices, and decision making in order to identify what combination of methods would achieve the behavioral shifts required to improve practice. In the literature generally, *knowledge utilization* is a more common term than either research implementation or knowledge translation and of the many terms available, we argue, is probably

most closely related to knowledge translation. Backer defined knowledge utilization as including "research, scholarly, and programmatic intervention activities aimed at increasing the use of knowledge to solve human problems."²⁴(p226) That is, knowledge may be, using Phenix's²⁵ terms, synoptic (philosophical, historical, religious), empiric, aesthetic, moral, synoetic (personal), or symbolic (discursive, nondiscursive, mathematical). Alternatively, Carper²⁶ suggested that in nursing, knowledge could be classified into empirics (the science of nursing), aesthetics (the art of nursing), personal knowledge, and ethics (the moral component).

The ends to which knowledge is used have been treated in a variety of ways. Eraut,²⁷ for example, considers that knowledge is created and used in 3 contexts: (the academic context where action has no part for only knowledge confers status; the policy context, which requires special social and political skills; and the action context, which entails a pragmatic orientation and where the aim is action. His work is useful because it is within the action context that clinicians use knowledge. Kerr²⁸ offered an epistemological treatment of knowledge utilization sharply critiquing the bureaucratization and the professionalization of knowledge, advocating instead a Lakatosian or revised-liberal conception²⁹ where knowledge develops competitively between research programs. That view is consistent with Laudan's³⁰ problem-solving approach to knowledge creation and use. Kerr's work serves as a useful reminder that the dominant perspective within the professions, knowledge as professional or expert, is not immune to the need for reevaluation.

Although there are important differences between and among terms used in this field, for the purposes of this article, we use *knowledge translation* and take it to generally encompass terms such as *evidence-based decision making*, *research utilization*, *innovation diffusion*, *knowledge transfer*, *research dissemination*, *research implementation*, and *research uptake*. While the

term knowledge translation itself is not limited to the translation of scientific knowledge (i.e., research), when we and others use the term, we are often implying scientific knowledge in particular, as is the case in this article.

Knowledge and Evidence

As we can see from the discussion above, knowledge takes many forms, each of them rooted in particular epistemological traditions. We align ourselves with Upshur's³¹ argument that the epistemological theory that best fits medical evidence is that of fallibilism. In this framework, evidence is provisional, defeasible, emergent, incomplete, constrained, collective, and asymmetric.³¹ There are, of course, other perspectives equally as forcefully argued as Upshur's (see for example, the work of Latour and Woolgar³² in sociology or Mitchell³³ in nursing). Others have provided thorough and informed arguments on the nature of evidence. See for example, Upshur and colleagues^{31,34,35} in medicine, Rycroft-Malone et al.³⁶ and Romyn et al.³⁷ in nursing, and Dickinson³⁸ in sociology. An in-depth discussion of the nature of evidence, however, is beyond the scope of this article.

Why Theory Matters to Knowledge Translation

While one occasionally finds a call for less use of theory or even no theory,³⁹ most scholars would align with recent calls in the literature for the use of theory in designing implementation research.⁴⁰ We argue that theory matters because it is necessary in order to develop testable and probably useful interventions. However, a range of theories is necessary to guide such development and testing at the various levels (e.g., individual behavioral, team, and organizational levels). In the next section, we overview 5 knowledge translation (or knowledge or research utilization) theories and frameworks that we believe have the potential to serve research design in the health sciences.

Following that, we overview selected adjuvant theories that we believe are among those able to inform knowledge-translation research in the context of health care settings.

Knowledge-Translation Theories

Diffusion of Innovation Theory

Diffusion of innovation theory⁷ seeks to explain the spread of new ideas. First developed in the early 1950s using research in rural sociology, it continues to be widely used. Rogers⁷ proposed 4 main elements that influence the spread of a new idea: the innovation, communication channels, time, and a social system. That is, diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Individuals progress through 5 stages: awareness, persuasion, decision, implementation, and adoption. If the innovation is adopted, it spreads via various communication channels. During communication, the idea is rarely evaluated from a scientific standpoint; rather, subjective perceptions of the innovation influence diffusion. The process occurs over time. Finally, social systems determine diffusion, norms on diffusion, roles of opinion leaders and change agents, types of innovation decisions, and innovation consequences. To use Rogers' model in health requires us to assume that the innovation in classical diffusion theory is equivalent to scientific research findings in the context of practice, an assumption that has not been rigorously tested.

Research Development Dissemination Utilization Framework

Rogers' model informed the work of Havelock and colleagues in the late 1960s in their development of the research development dissemination utilization conceptual framework.⁴¹ Havelock developed this framework to address 2 social forces gaining momentum in society at that time: the explosion of scientific knowledge

and the increasing expectation by policymakers, governments, business, and society that scientific knowledge should be useful to society—forces that have not abated. Havelock argued that the development of a new discipline of knowledge utilization required the components of knowledge building and institutionalizing. Knowledge building would address the need for systematic integration of theories to replace scattered and fragmented approaches, and institutionalizing would create an accessible and dynamic science for researchers, policymakers, and practitioners by establishing a range of teaching and research programs. Collaborative interactions and trusted linkages between various individuals were proposed as mechanisms to ensure that problem framing and solutions were relevant and useful. These relationships of trust between researchers, practitioners, and policymakers were viewed as conduits for the dissemination and transfer of information and scientific knowledge. Havelock used the communication formula “who says what to whom by what channel and to what effect” to classify 2,643 research studies. From that work, themes were clustered into 7 general factors that he argued could account for most scientific knowledge dissemination and utilization efforts, namely: linkage, structure, openness, capacity, reward, proximity, and synergy.⁴¹(pp11–20) Many of Havelock’s ideas and concepts, developed in the 1960s, have “trickled down” and appear in various nursing models, for example, and in some of the positions held by contemporary funders: for example, the Canadian Health Services Research Foundation (<http://www.chsrf.ca>).

How to Spread Good Ideas: Greenhalgh’s Synthesis

Recently, Greenhalgh and colleagues⁴² conducted a systematic review of diffusion of innovation work in health services organizations and developed a comprehensive series of recommendations. Although not a theory, this impressive

synthesis expands Rogers’ work and merits serious consideration by researchers, decision makers, and policymakers. Operationalization of the Greenhalgh framework, however, would be an unusually complex undertaking. Greenhalgh argues that further research to address identified knowledge gaps should have the following characteristics: “be theory-driven, process rather than ‘package’ oriented, ecological, address common definitions, measures, and tools, be collaborative and coordinated, multidisciplinary and multi-method, meticulously detailed, and participatory.”⁴²(pp615–616) She presents a unifying model of innovations in health care organizations developed from the synthesis.

Promoting Action on Research in Health Services Model

Kitson and colleagues^{36,43} developed the Promoting Action on Research in Health Services framework in response to their dissatisfaction with what they believed had been a flawed emphasis to date in the health sciences on rational decision making and linear processes and a failure to account for the important influences of context. They argue that successful research implementation is a function of the relationship between evidence, context, and facilitation. They hypothesize that research implementation occurs when a group has (1) robust scientific evidence that matches clinician consensus and patient needs, (2) a context supportive of change (a positive culture, strong leadership, appropriate monitoring and feedback), and (3) skilled internal and external facilitators involved. While a flexible and intuitively appealing framework, the group’s claims are to date largely untested, and researchers will find as-yet-limited direction for design aside from facilitator roles for changing individual provider behaviors.

Ottawa Model of Research Use

The proponents of the Ottawa Model of Research Use (OMRU)⁴⁴ claim there are 6 elements that one

must evaluate and address when developing a program to introduce research into practice: the practice environment, the potential research adopters of the evidence, the evidence-based innovation, research transfer strategies, the evidence adoption, and health-related and other outcomes. Logan and colleagues argue that “integral to the OMRU process is the systematic assessment, monitoring, and evaluation of the state of each of the six elements prior to, during and following any research transfer efforts.”^{45(p39)} Its strengths included its definition of key elements in the process of research use and its usefulness to policymakers, practitioners, and researchers. It requires further development in incorporating the need for rapidly changing clinical assessments and in the area of validated instruments supporting its elements and the relationships between them.

Adjuvant Theories

There are numerous domains in which additional necessary theories are located. Among them are the domains of decision theory, group and organizational theory, and social and interpersonal theory. Our research group focuses primarily on the levels of the group and the organization, and so we overview those perspectives. However, decision theory such as cognitive continuum theory, proposed by Hammond,⁴⁶ is critical to those investigators intending to study decision-making processes of providers, an area of central importance in the knowledge-translation field.

Organizational Theories

An episodic or punctuated equilibrium model of change⁴⁷ suggests that the norm is relative stability, but from time to time change occurs in spurts and is initiated by some sort of external stimulus (external jolt gets it started). Then the system settles into a new equilibrium until the next jolt occurs. This model assumes that change is rapid, episodic, and radical.

Situated-change theory⁴⁸ argues that change occurs slowly over time (no big jolts) as people

develop new (and to them, better) ways of doing things. This is in opposition to ideas of planned change. Situated or continuous change is grounded in the “practice literature”: focusing on the ongoing practices of organizational actors. Change emerges as a result of people’s “accommodations to and experiments with the everyday contingencies, breakdowns, exceptions, opportunities, and unintended consequences that they encounter.”^{48(p65)}

Agency theory⁴⁹ focuses on 2 types of people: principals and agents. Principals want a particular outcome (e.g., stockholders) but must rely on someone else (an agent) to accomplish their goals (e.g., the CEO). The agency problem is that the CEO has more incentive to maximize his or her own income than to maximize the income of stockholders. Therefore, to solve the agency problem, there must be either monitoring strategies to check up on the behavior of the agent or mechanisms to bring the agent’s incentives in line with those of the principal. Overlaying this onto knowledge translation, hospital elites (or well-educated academics) may want front-line health providers to adopt new work practices based on sound research findings. If they can easily monitor and control the behavior of health providers, they will probably do that. When monitoring and control are expensive or impossible, then other mechanisms are required.

Institutional theory⁵⁰ originally primarily explained continuity: why do so many organizations look the same? Over time, it has been extended to explain “institutional change” or change from one “institutionalized form” to another. Some investigators have looked at microprocesses of change associated with institutional change. Using this theory, we could try to understand how a new practice is institutionalized. How is the old way of doing things deinstitutionalized; how do new ideas arise, undergo testing, catch on, diffuse, and become institutionalized into a new taken-for-granted way of doing something?

Social Theories

Social capital theory⁵¹ addresses the nature and extent of social relationships and associated norms of reciprocity and advantage. Social capital refers to networks with bonding, bridging, and linking capacity to facilitate cooperative, collective, inclusive action and reduce opportunistic behavior. It represents a range of key resources that exist in social relationships, networks, links, connections, associations, customs, and norms. The importance of social connectedness to health and well-being has been well established by Durkheim, Putnam, and other social and epidemiological researchers. Bonding social capital refers to strong connections to people “like you” and has intrinsic value associated with identity and strategies for “getting by” in the family and the workplace. Networks or ties with bridging social capital have weaker connections with people “not like you” but can provide strategies and opportunities for “getting ahead” in social and career relationships. Linking networks have capacity to connect one to others in positions of power. These relationships are crucial for service delivery and leveraging resources. The effectiveness with which structural social capital in the form of associations and networks transfers information depends on group structure, membership, moral intentions, and norms. Groups with linkages often have better access to resources, especially from outside the community.

Social network analysis investigates individuals and their links with the larger population or network. Social network theory provides a perspective on the value of dense networks to those in the network. Social network theory has been described by West et al.⁵² as a dense social network that can support communication and knowledge. The parallel between bonding and bridging social capital can be drawn with the notion of the dense social networks in this theory, whereas linking social capital is similar to the notion of top-down “cascading information”

and evidence, as described by West et al.^{52(p644)} A counterargument to the value of the density of networks is the concern about individuals who are outside or excluded from these networks and the information or support derived from membership. Granovetter⁵³ proposes the strength of weak ties or networks as having capacity to include and thereby provide individuals with the benefits of the network even though they may be weakly linked to the group. In health care organizations, we know many health care practitioners move in and out of teams but need information, evidence, and support to do their job. Hence, “structural holes and weak ties” are crucial components in organizational and team dynamics and provide points where brokering between disconnected networks can occur.

Community of practice theory originated in education.^{54,55} The formation of community is thought to be essential for both the production and the transfer of knowledge. It suggests that providers do not always act in prescribed or predictable ways; instead, they interact creatively with colleagues using the tools and resources at hand. Through this negotiation of what does and does not work and how to get around, subsets of health providers work together to create a community of practice.⁵⁵ A central concept in the idea of communities of practice is that learning is social. People learn in practice—by doing and interacting with others. In this sense, communities of practice theory emphasize the craft or artful elements of many providers’ practices. It implies some kind of apprenticeship. Apprenticeship is a social process implicitly involving the notion of someone with less knowledge following, watching, and in a difficult-to-articulate way, absorbing the knowledge that he or she needs to become skilful—to have the “knowledgeable skills” required for practice.

Cultures of knowing, “epistemic cultures,” refer to communities in which people learn and share knowledge and which are also the sites of knowledge production. To understand how providers use knowledge, we need to understand

how they produce knowledge as well. Our research has shown that knowledge is produced from negotiations among people as they go about their everyday practice. It is produced over time as groups solve problems. Further examination of how providers make use of the mutually reinforcing sources of knowledge of interaction and experience may help us to understand these various epistemic communities⁵⁶ at work in health care settings.

Finally, and of importance, there are what we have termed general theories of culture. Scott-Findlay and Golden-Biddle⁵⁷ have argued that organizational culture shapes the research-implementation behaviors of clinicians by providing a context where particular ideas, activities, or events are more highly valued than others. They propose that patterns of thinking and action (including those required for research use) are manifestations of underlying systems of meaning. In their work they drew on the work of Schein⁵⁸ in organizational studies. Other useful cultural theory includes the work of Hatch,⁵⁹ who extends Schein's work, and Martin.⁶⁰

Conclusion

Theories provide maps for different kinds of terrain. The terrain of the health care setting comprises providers and groups of providers from different professions (not always working in harmony) as well as administrators, regulators, patients, and advocacy groups. These people work in complex and varying contexts that are variously resourced and subject to complex internal and external forces. Just as maps must of necessity be geographically specific, so should theory be context specific. The traveler does not use one map on a complex road trip. At minimum, the traveler needs a large map of the country and several detailed maps of provinces and municipalities as he or she plots a cross-country journey. So, too, do we need an armamentarium of maps—in this case, theories—as we attempt to navigate the knowledge-translation field.

Lessons for Practice

- Theory is needed to develop testable and probably useful knowledge-translation interventions.
- Multiple theoretical perspectives are more powerful than an overarching theory for guiding knowledge-translation processes.
- Appropriate knowledge-translation theory is located in many disciplines and is not specific to a health discipline.
- Transferring theories between disciplines is challenging given the terminology and assumptions associated with different backgrounds.
- It is critical to find a fit between the theoretical perspective and the context in which it is to be applied.

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