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Diffusion theory and knowledge dissemination, utilization and integration

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ABSTRACT

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Many accomplishments of public health have been distributed unevenly among populations. This article reviews the concepts of applying evidence-based practice in public health in the face of the varied cultures and circumstances of practice in these varied populations. Key components of EBPH include: making decisions based on the best available scientific evidence, using data and information systems systematically, applying program planning frameworks, engaging the community and practitioners in decision making, conducting sound evaluation, and disseminating what is learned. The usual application of these principles has over-emphasized the scientific evidence as the starting point, whereas this review suggests engaging the community and practitioners as an equally important starting point to assess their needs, assets and circumstances, which can be facilitated with program planning frameworks and use of local assessment and surveillance data.

Cover Page Footnote
This Frontiers article is a shorter version of the following article: Green LW, Ottoson JM, García,C, Hiatt RA. Diffusion theory and knowledge dissemination, utilization and integration. Annual Review of Public Health 30: 151-174, April 2009. Please enjoy complimentary access, courtesy of the Annual Review of Public Health. Click here to access the review: http://arjournals.annualreviews.org/eprint/wJkG8mB94TyIMupXkZCT/full/10.1146/annurev.publhealth.031308.100134

Public health research and practice are credited with much of the 30-year gain in life expectancy in the United States and internationally. A large part of these increases can be attributed to environmental protections, social and health service reforms, and other population-based interventions. Translating research into practice, however, remains a challenge limiting the impact research has on public health policy and practice. This paper describes the historical trajectory of ideas central to translational research, focusing on concepts of knowledge production, utilization, transfer, and implementation. By utilizing historical and critical views of these concepts as well as of the institutional approaches to producing and vetting research, we examine problems that result in "leaks" and clogs in the pipeline from research to practice. Finally, we suggest ways to blend diffusion with other theories and evidence in guiding a more decentralized approach to dissemination and implementation in public health, including changes in the ways we produce and adapt evidence to fit the circumstances and populations in which it would be applied.

METHODS

Our review presents the theoretical and research streams informing public health approaches to translational research. We examined a subset of literature pertaining to diffusion theory as it has influenced public health dissemination and implementation practices. We also examined literature attempting to explain, predict, and guide efforts in knowledge utilization, transfer, and translation.

RESULTS

The Gap between Science and Practice

Much of the writing about translating research to practice employs a pipeline analogy in which evidence is produced by scientists, then vetted and disseminated to policy makers and practitioners. This pipeline can be seen as a funnel (see **Figure 1)** in which more research must be conducted than is usable in practice (*1*). Research that makes its way into practice has undergone a filtering process that works well in adjudicating biomedical research to evidence-based clinical interventions. Such one-way filtering , however, serves public health interventions less well. The need to consider social-psychological processes, cultural contexts, and socioeconomic conditions of public health practice suggests the need to work in both directions: from research to evidence-based practices *and* from practice-based evidence to better-informed, more relevant and actionable practices and policies.
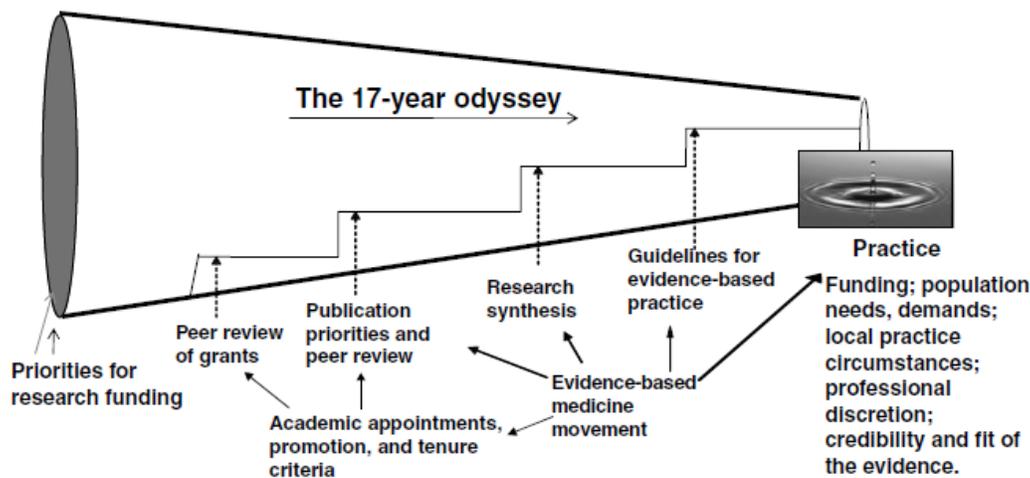
Figure 1

The conceptualization of the production and transfer of knowledge from research to practice and policy usually assumes a pipeline in which the vetting of the research through successive screens assures the quality of the research delivered to practitioners and policy makers, but it does little to assure the relevance and fit of that research to the needs, circumstances, and populations of those practice or policy applications. From Reference 48 with permission.

Diffusion

Diffusion theory represents a long history of attempts to understand the spread of ideas and actions within social systems. Two late 19th Century French social theorists highlight conflicting ideas on how diffusion occurs. Gabrielle Tarde outlined three phases: (1) repetition, in which there is an inventor and an imitator; (2) opposition, in which there are diverse interpretations to the mimicry, especially with diverse or changing circumstances; and (3) adaptation, in which a new balance is achieved by the imitators after reconciling these interpretations (2). Gustav Le Bon, viewed diffusion as the result of a herd instinct or "collective behavior," with little room for interpretive nuance, a perspective embraced by critics of the tyranny of the majority and crowd behavior (3). These early theories on diffusion may help unpack current tensions between the demand for fidelity of evidence-based practices and practitioners' need for adaptability. The practitioners' resistance and adaptation can be viewed not as infidelity to the evidence-based practices, but as a logical and natural adjustment of the intervention to fit varied and evolving situations (4).

From diffusion to dissemination

Whereas diffusion is the natural spread of ideas, dissemination is the conscious effort to spread new knowledge, policies, and practices to target audiences or the public at large. Twentieth century theories of diffusion evolved into more robust theories of knowledge utilization in waves, beginning with research observing and tracking the process of diffusion in agrarian systems, moving to an emphasis on organization and individual adoption of innovations and accountability, and ending with a focus on how knowledge utilization could improve human services in health, education, and social support (5). Currently we are inundated with reviews and guidelines promoting use of under-valued innovations and restraining practices evidence does not support. These guidelines, unfortunately, are often used as official justifications for denying reimbursement or program funding, discouraging local innovation, and imposing rigid standards and quality controls.

Implementation and knowledge utilization theory

Despite numerous reviews and guidelines, a gap still exists in how knowledge is implemented and utilized. Understanding the underlying causes for this gap is central to knowledge utilization theory, making such theories critical components in translational research. The influences on the use of knowledge can be grouped according to source, content, medium, user, and context. **Table 1** summarizes ways to facilitate each of these influences on knowledge utilization.

Table 1: Facilitators to the Utilization of Knowledge				
Source	**Content**	**Medium**	**User**	**Context**
Credibility	Accessibility	Multiple sources or forums for exchange	Early and sustained involvement in the research process	Resources
Relationship building with potential users	Adaptability	Intermediary, linking mechanisms	Readiness to change	Supportive conditions
Realistic expectations of use	Advantage	Concerns for equity	Links among users	A champion for new knowledge
Building in considerations of use	Compatibility with values expectation or policy agenda	Personal interaction	Level of acquisition effort	Slack for change
	Challenge to status quo	Timeliness	Interest and Ideology	No strong political or bureaucratic opposition
	Emphasis on positive behavior with clear, low-cost, action implications	Communicating language		Incentives to change
				Leadership by example
				Support for long term interactive relationships

To illustrate how knowledge utilization, and its composite theories of translation, implementation, diffusion, dissemination, and application, can facilitate utilization, **Figure 2** models a theoretical framework for disseminating policies and practices of surveillance, a core public health function

involving research. It begins with a broad context of the subject matter, in this case surveillance, including multiple understandings of use and users (*6*). Facilitating use begins with a consideration of the end users and their circumstances and needs to emphasize shaping the product, not just disseminating or selling it. The critical pathways in a utilization-focused surveillance system (presented in **Figure 2** with dashed lines) involve social and community factors influencing the users' need for information, as well as creating partnerships in both the design of the surveillance system and in the context specific application and implementation of surveillance products (*6*).
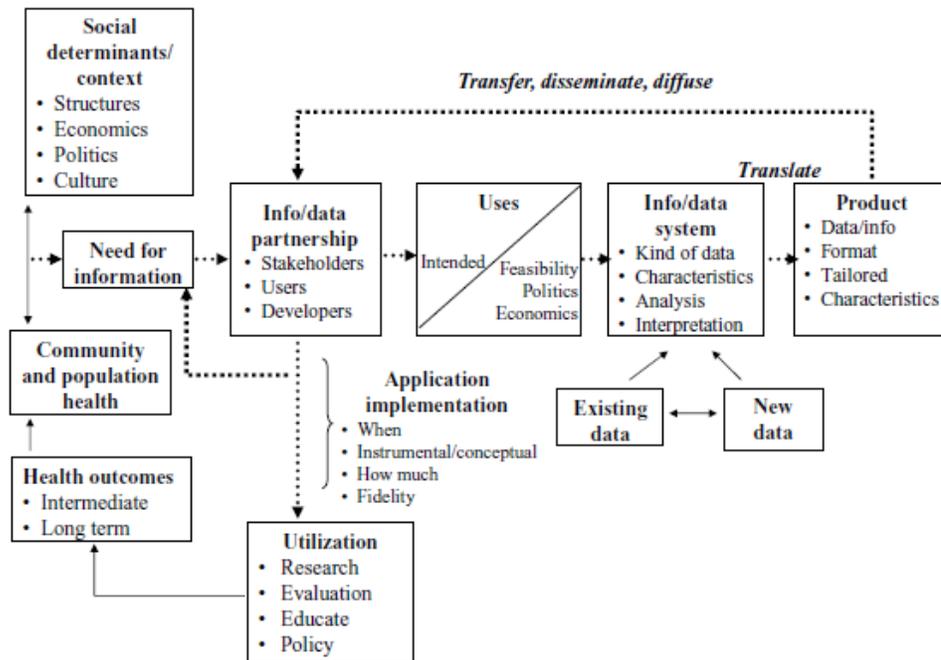
Figure 2
Utilization-focused surveillance framework.

No one theory explains the research-practice gap. Similarly, most of the variables that determine use are beyond the control of any one stakeholder on either the researcher or the user side. Indeed, the user side usually involves multiple levels of multiple organizational decision makers.

IMPLICATION FOR FURTHER RESEARCH

The prevailing disappointment with the flow of scientific information into practice has much to do with misguided expectations from misreadings of diffusion theory and dissemination research that the truths discovered by science, whatever their fit with daily life or practice, should automatically influence behavior. Applied health sciences research would enhance its probability of influencing policy, professional practice, and public responses if it turned the question around from how can we make practice more science-based to how can we make science more practice-based? To achieve this, public health research should be directed by five broad principles (*7*):

1. The needs of patients and populations should dictate the health research agenda (*8*);
2. The research agenda should address contextual and implementation issues;
3. The research agenda should dictate the research methodologies, rather than

methodologies dictating the research agenda (*9*);

4. Researchers and practitioners and other users should collaborate to define the research agenda, allocate resources, and implement the findings;

5. The level of funding for dissemination and implementation research should be proportionate to the magnitude of the task, with more going towards implementation research than dissemination.

Evidence-based public-health carries unique challenges differentiating it from evidence-based medicine. Public health interventions often consist of multiple interventions, and the object is often a diverse population or community. In such circumstances the nature of evidence needs to be reconsidered. The experimental testing of interventions should allow for their form to vary with setting, and test function rather than form using cluster (group) randomized trials (*10*). Additionally, researchers need to build evidence of efficacy using generalizing strategies across topical areas, as opposed to needing efficacy trials within every subject area. Lastly, we need to produce evidence in practice-based settings, in collaboration with community members and other representatives of the intended end users of the products of the research, and with flexibility of form but with fidelity to the function of interventions.

SUMMARY BOX:

What is already known about this topic?

There are well established challenges in translating research into practice. Translational research borrows from theories of diffusion, dissemination, and implementation as well as theories related to knowledge utilization.

What is added by this report?

This report utilizes a historical and critical approach to describe concepts central to translational research as well as the institutional approaches to producing and vetting research. We suggest ways to blend diffusion with other theories and evidence in guiding a more decentralized approach to public health research dissemination and implementation, including changes in the ways we produce and adapt evidence to fit the circumstances and populations in which it would be applied.

What are the implications for public health practice/policy/research?

Particularly with regards to public health research and practice, we need to have evaluative processes that allow for flexibility and adaptability and focus more on function than form. If we want public health research that actually impacts policy and practice we need to focus more on knowledge utilization and redirect from evidence-based practice to practice based-evidence.

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