

# Use of diffusion of innovations theory to drive a federal agency's program evaluation<sup>1</sup>

Susan M. Hubbard, Ph.D.<sup>\*</sup>, and Susan W. Hayashi, Ph.D.

*Johnson, Bassin & Shaw, Inc. 8630 Fenton Street, 12<sup>th</sup> Floor, Silver Spring, MD 20910, USA*

## Abstract

This article provides the conceptual framework for the Treatment Improvement Protocols (TIPs) Evaluation Project. The diffusion of innovations theory is used as the theoretical foundation to understand and assess the development and dissemination of TIPs. The article introduces the TIP series and reviews the relevant literature. Diffusion theory is summarized and an explanation of how the theory was used to create a model of the TIPs diffusion process is made. Finally, the article discusses how the TIPs Diffusion Model was used to structure the studies conducted under the TIPs Evaluation Project.

*Keywords:* Treatment Improvement Protocols (TIPs); substance abuse; substance abuse treatment; diffusion of innovations theory; diffusion theory; best practice guidelines; development, dissemination, adoption, and implementation of best practice guidelines

## 1. Introduction

Development of practice guidelines in the substance abuse treatment field is proceeding quickly despite a shortage of data regarding the process by which guidelines can most effectively be developed, disseminated, and evaluated (Shaneyfelt, Mayo-Smith, & Rothwangl, 1999). The Center for Substance Abuse Treatment (CSAT) conducted a multi-year, multi-method evaluation project designed to assess the effectiveness of the Federal Government's efforts at developing and disseminating best practice guidelines in substance abuse treatment. Specifically, CSAT funded a 4½-year program evaluation designed to measure the impact of its Treatment Improvement Protocols (TIPs) on practices within the substance abuse treatment field. The TIPs Evaluation Project consisted of three major studies (the Retrospective Study, the Addiction Treatment Transfer Center Study, and the Prospective Study) and a series of special studies. Together, these studies were designed to meet the following objectives:

- (1) to assess the extent to which members of the TIPs target audience are aware of, read, and implement practices recommended in TIPs
- (2) to evaluate the effects of TIPs on the delivery of addiction treatment services\
- (3) to learn ways to strengthen the development, formatting, marketing, dissemination, use, and evaluation of TIPs to ensure effective use of future Federal resources devoted to TIPs

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<sup>1</sup>The opinions and assertions contained in this article are the private views of the authors and are not to be construed as official or as reflecting the views of the Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration, or the Department of Health and Human Services.

<sup>\*</sup>Corresponding author. Tel.: 1-301-495-1080. *E-mail address:* shubbard@jbs1.com (S. Hubbard).

The TIPs Evaluation Project represents the first attempt by the Federal Government to evaluate the effectiveness of any practice guidelines on the process of addiction treatment. As such, it has the potential to offer valuable information to other Federal agencies interested in the development, dissemination, and evaluation of treatment guidelines. In addition to being the first study of its kind, the TIPs Evaluation Project is timely in that it coincides with the implementation of the Government Performance and Results Act (GPRA). Under GPRA, the intuitive assumption that a program works is no longer sufficient grounds for continued Federal funding. Instead, programs are required to have stated goals and objectives, and have evaluation plans in place to monitor the achievement of these objectives. If TIPs are going to continue to be published and disseminated, evidence that TIPs have a positive impact on the substance abuse treatment field will need to be gathered. This TIPs Evaluation Project offers evidence that the TIPs program has had an impact on the substance abuse treatment field.

## **2. Treatment Improvement Protocol (TIP) Series**

TIPs represent one of CSAT's best known product lines. TIPs are designed to transfer state-of-the-art protocols and guidelines for the treatment of substance abuse from acknowledged clinical, evaluation, and administrative experts to the substance abuse treatment field. TIPs are developed with the input of a consensus panel made up of experts in substance abuse treatment, reviewed in the field, and then disseminated to members of the treatment field. As of June 2002, 38 TIPs have been developed and disseminated. TIPs are designed to present best practices rather than only a body of tested findings based on research. In the substance abuse treatment field the scientific research base is limited so the development of TIPs primarily relied on the expert judgment of treatment practitioners. Unlike medical guidelines, which tend to be short and question-focused, the TIPs are comprehensive and cover broad treatment issues, such as recommending a total care continuum for pregnant, substance-abusing women. The TIPs are particularly designed to address the needs of vulnerable populations, which are not likely to be addressed in guidelines created by private sector organizations.

Although TIPs have clear objectives and are designed to reach specific target populations, there is little knowledge of whether TIPs meet their stated goals. The TIPs Evaluation Project was designed to evaluate the impact of TIPs.

## **3. Practice guidelines**

TIPs fall into the general category of clinical aids aimed at improving health care practices (i.e., practice guidelines). Practice guidelines are defined as "systematically developed statements to assist practitioners and patient decisions about appropriate health care for specific clinical circumstances" (The Institute of Medicine [IOM], 1990b; Walker, Howard, Lambert, & Suchinsky, 1994). Although practice guidelines have been used in health care for over 50 years, the rate at which they are published has increased dramatically (Woolf, 1990). Non-Federal agencies that develop and disseminate guidelines include, but are not limited to, the American Medical Association (AMA), the American Psychological Association, the American Psychiatric Association, the American Academy of Pediatrics, and the American Society of Addiction Medicine (ASAM). Federal agencies involved in guideline development/dissemination include, but are not limited to, the Agency for Healthcare Research and Quality (AHRQ), the National

Institutes of Health (NIH) including the National Institute of Drug Abuse (NIDA), the Health Care Financing Administration (HCFA), and the Substance Abuse and Mental Health Services Administration (SAMHSA), including the initiator of TIPs, CSAT (Citrome, 1998). Because guideline development is growing so rapidly, an expanding body of research exists on the development, dissemination, and adoption of health care guidelines. The majority of this research focuses on physicians and is medically based, but it can be used as a starting point to understand the development, dissemination, and adoption of the TIP series. Previous research on guideline development, in addition to the results of the TIPs Evaluation Project, may also be useful to the many other agencies that develop and disseminate best practice guidelines.

#### **4. Development and dissemination of practice guidelines**

Until the 1980s, the prevailing approach to guideline development was based on the personal opinions of expert panels (Woolf, DiGuseppi, Atkins, & Kamerow, 1996). An evidence-based approach to guideline development began with the 1984 initiative by the U.S. Preventive Services Task Force (USPSTF) to only recommend services that meet predetermined criteria. Today, efficacy trials are the basis of many guideline development programs including NIH's Consensus Development Conferences, the Evidence Reports sponsored by AHRQ, AMA's *Guidelines for Clinical Preventive Services*, and the guidelines issued by the USPSTF. Although the motivation behind an evidence-based approach to guideline development is admirable, the increasing numbers of efficacy trials have resulted in multiple, often contradictory, guidelines (Woolf et al., 1996). Lomas (1991) identifies several problems with using randomly controlled trials as evidence. These problems include the following: (1) studies are limited in number and are infeasible in some areas; (2) studies often do not address costs, ethics, or other social concerns; and (3) unproven interventions are diffusing into practice and the lack of "negative evidence" will permit the practice to continue (Lomas, 1991). Faced with multiple guidelines from a variety of sources, it is again the job of expert panels to determine which guidelines to recommend.

There are currently three consensus models used for guideline development. These are a *judicial model* in which the evidence is weighed by knowledgeable, impartial judges or juries; a *scientific meeting model* in which experts present work and discuss it with their peers; and/or a *town meeting model* in which a meeting provides a forum for all interested parties to express their views (Mullan & Jacoby, 1985 as discussed in IOM 1990b). Most guideline development processes, including NIH Consensus Development Statements, use components of all three models. The TIPs development process (discussed below) relies primarily on a consensus panel comprised of experts in substance abuse treatment. When research is available on a particular topic, the consensus panel weighs the evidence and decides whether to incorporate that evidence into the TIP.

Similar to guideline development, the dissemination of evidence-based practice guidelines has been studied extensively in the literature (see Davis & Taylor-Vaisey, 1997 for a review). Although the majority of these studies found that patient outcomes improve when practice guidelines are used (Grimshaw, Eccles, & Russell, 1995; Grimshaw & Russell, 1993; Humphreys, 1997; Worrall & Chaulk, 1996; Worrall, Chaulk, & Freake, 1997), other studies found that clinicians, especially primary care physicians, are not systematically using guidelines

in practice (Barkin, 1998; Carpenter, Johnson, & Rosenfeld, 1998; Ely et al., 1998; Frolkis, Zyzanski, Schwartz, & Suhan, 1998; Grili et al., 1991; Heath et al., 1997; Sumartojo, Geiter, Miller, & Hale, 1997; Walker et al., 1994; Woolf, Bower, Marbella, & Casanova, 1998). Additionally, the lack of use of practice guidelines does not seem to be directly related to the lack of awareness of the guidelines (Ferguson, 1993). A more likely explanation for the gap between clinical practices and what are recommended in published guidelines is the barriers associated with implementing scientific literature into practice (Greer 1987, 1994; Greer & Greer, 1991). Documented barriers include: (1) the practical problem of dealing with the amount of guideline materials currently available (Rogers & Scott, 1997); (2) the differing perspectives of the scientist and practitioner (expansion of knowledge vs. immediate practice) (Greer, 1987; Ferguson, 1995a; Ferguson, 1995b); (3) the demands and constraints placed on the practitioner as an actor in the larger community system of norms, values, and expectations (Elster & Kutznets, 1994; Flemming, Barry, Manwell, & Johnson, 1997; Schonberg, Blasinsky, Czechowicz, Klitzner, & Sanders, 1988); (4) the extent to which science can be useful to the practitioner (Brook, 1993); and (5) the organizational factors that may shape clinical practice—guidelines can be effectively used only if they are supported by supervisors, if necessary resources are available, or if the procedures and practices recommended are reimbursable (Cook, Greengold, Ellrodt, & Weingarten, 1997; Ellrodt, Conner, Riedinger, & Weingarten, 1995; Laffel & Blumenthal, 1989). Because many barriers to implementing guidelines into practice exist, several studies (Conroy & Shannon, 1995; Haynes, 1993; Walker, Howard, Walker, Lambert, & Suchinsky, 1995) claim that regardless of clinicians' awareness of the guidelines, practice guidelines will not improve patient outcomes unless they are disseminated in a way that encourages their implementation and adoption (Conroy & Shannon, 1995). Thus, to help ensure the success of TIPs, it is important to consider how both the TIPs' development and dissemination process impact the implementation of the practice guidelines outlined in TIPs.

## **5. Development and dissemination of TIPs**

Although research on the development and dissemination of health care guidelines can be used as a starting point to understand the development and dissemination of the TIP series, there are significant differences between substance abuse and other medical conditions. One difference is the stigma associated with substance abuse that does not exist for most other illnesses. A second difference is the legal and ethical issues that surround substance abuse that is not encountered in the treatment of most other conditions. Both of these issues must be addressed in substance abuse treatment protocols. Finally, there is less research on which to base substance abuse treatment guidelines than there is for areas such as hypertension or bypass surgery. Therefore, substance abuse treatment guidelines must rely heavily on expert opinion. This reliance alters the dynamics of the development and dissemination of those guidelines and may also affect the ability of substance abuse treatment guidelines such as the TIPs to be implemented into practice.

Because research on the effectiveness of substance abuse treatment is relatively new, TIPs are developed primarily with the input of a consensus panel made up of experts in substance abuse treatment. The core of the TIPs development process has remained the same since the inception of TIPs in 1991. The current process is displayed in Figure 1. Essentially, the development of a TIP starts with the recommendation of a substance abuse problem area by a national TIPs Editorial Advisory Board. This board is made up of experts in substance abuse treatment and

consists of clinicians, researchers, program managers, and professionals in such related fields as social services or criminal justice. Once a topic area is selected, a Resource Panel made up of members of Federal and national organizations is created. This panel reviews the state-of-the-art in treatment and program management in the selected area. Recommendations from the Resource Panel are communicated to the Consensus Panel chosen to help with writing the TIP. The Consensus Panel members must be experts in the selected topic area and be non-Federal employees. Most Consensus Panels are made up of individuals from substance abuse treatment programs, hospitals, community health centers, counseling programs, criminal justice and/or child welfare agencies, private practitioners, researchers, and/or administrators. Headed by a Panel Chair, the Consensus Panel meets for 5 days in the Washington, D.C. area to make recommendations and to come to agreement on protocols. The consensus reached by the Panel is the foundation for the TIP that is drafted. The draft is reviewed by a diverse group of experts in the field, and revisions are made. When a final draft is completed, the panel chair approves the TIP for publication, concept and content clearance is obtained from the Department of Health and Human Services, and the TIP is disseminated to members of the substance abuse treatment field.

*...INSERT: Fig. 1. Steps in TIPs development process.*

Currently several mechanisms are used to disseminate TIPs to the substance abuse treatment field. These mechanisms include the mail, exhibit booths at conferences, conference sessions, electronic dissemination, large training group activities, and hands-on technical assistance.

### *5.1. Mail*

Copies of TIPs are mailed directly to the Single State Agencies responsible for overseeing all federally funded substance abuse treatment programs in the State.<sup>2</sup> TIPs are also routinely mailed to TIP Consensus Panel members and to TIP field reviewers. The National Clearinghouse for Alcohol and Drug Information (NCADI) is the general public's link to TIPs; TIPs can be ordered by phone or electronically via NCADI's Web site ([www.samhsa.gov/publications/publications.html](http://www.samhsa.gov/publications/publications.html), n.d.).

### *5.2. Exhibit booth at conferences*

Exhibit booths at conferences are used to increase awareness of TIPs and to disseminate large quantities of TIPs to substance abuse treatment professionals attending conferences and meetings. Conference attendees complete an NCADI order form, and TIPs are delivered directly to interested parties after the completion of the conference.

### *5.3. Conference sessions*

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<sup>2</sup>There are 57 Single State Agencies. Each of the 50 states has Single State Agency which is overseen by CSAT. The other 7 Single State Agencies are in Washington, D.C., 5 U.S. territories (Puerto Rico, Virgin Islands, American Samoa, Guam, and Northern Mariana Islands), and the independent state of the Republic of Palau.

An effective way TIPs have been disseminated is through presentations by the TIPs panel chairs and panel members at conferences. To encourage the use of TIPs at conferences, each consensus panel meeting is ended with a formal workshop on dissemination. Panel members are asked to be dissemination agents (“champions”) for the TIP. This consists of panel members making presentations at conferences of their professional organizations and also recommending strategies for getting TIPs announcements into pertinent professional journals. TIPs panel members are often officers of national organizations in their area of expertise and have a network of peers that can use and further disseminate the TIP. Thus, presentation at conferences offers a powerful dissemination mechanism for TIPs.

#### *5.4. Electronic dissemination*

All TIPs are available through the Internet. Users can access TIPs through the National Library of Medicine’s Web site (<http://hstat.nlm.nih.gov/hq/Hquest/screen/Contents/s/53212>, n.d.).

#### *5.5. Large training group activities*

TIPs are disseminated at large group training sessions such as those conducted at the annual State Systems Development Program Conference and in courses held by CSAT sponsored Addiction Technology Transfer Centers (ATTCs). These activities go further than just disseminating TIPs because they also provide training in how to implement the guidelines discussed in TIPs into practice.

#### *5.6. Hands-on technical assistance*

A final mechanism for TIPs dissemination is hands-on technical assistance (TA) at treatment facilities. TIPs are used in conjunction with these TA events and are disseminated to the organization by those conducting the TA.

It is evident from the above discussion that both the TIPs development and dissemination processes contain elements that are systematic in their approach. Although both processes have been refined through the years, they have never been formally evaluated. The TIPs Evaluation Project offered the chance to rigorously evaluate the effectiveness of the current methods of disseminating best practices for substance abuse treatment. Results of the evaluation will help identify which dissemination channels are most effective and which channels need improvement. This, in turn, will allow modifications to the TIPs’ current marketing and dissemination plans in order to improve the dissemination and use of TIPs. Because several Federal and non-Federal agencies develop and disseminate practice guidelines, results from the TIPs Evaluation Project will also provide other agencies insight into the most effective mechanisms to use when developing and disseminating their products and services.

### **6. Theoretical framework for the project: Diffusion of innovations**

Diffusion of innovations theory (Rogers, 1995) provided the theoretical framework for the TIPs Evaluation Project. Diffusion is defined by Rogers (1995) as “the process by which an innovation is communicated through certain channels over time among members of a social

system” (p. 5). The theory attempts to explain how new ideas and practices spread throughout a community over time. Three important components characterize diffusion: (1) it occurs over time; (2) people do not adopt innovations instantly, but rather pass through stages in the adoption process; and (3) characteristics of the innovation, the organization, and the individuals affect the rate of adoption.

Fundamental to the theory is that the diffusion of an innovations takes place over an extended period of time. In general, a new idea or practice enters a community from an external source; however, the adoption of the new idea or practice then flows through interpersonal contact networks. As might be expected, not everyone adopts an innovation immediately. Some people adopt an idea or practice right away, while others wait to see how successful it is before deciding to adopt. These individuals are classified as early adopters and late adopters, respectively. Over time the proportion of individuals who engage in this new practice increases until the potential audience for the new idea or product is saturated. This accumulation of people who accept the new behavior often results in an S-shaped adoption curve (See Figure 2). The S-shaped pattern of diffusion has been demonstrated in prior research in the diffusion of medical innovations (Coleman, Katz, and Menzel, 1957), educational innovations (Carlson, 1965), new medical technology (Anderson & Jay, 1985; Greer, 1977), policy innovations among States (Walker, 1966), and many more topics (Griliches, 1957; Ryan & Gross, 1943; Valente and Rogers, 1995; see Hamblin, Jacobson, & Miller, 1973 and Rogers 1995 for reviews).

...*INSERT: Fig. 2. Cumulative adoption curve.*

Although some people may adopt an innovation earlier than others, all people pass through five stages on their way to adoption. These stages include *knowledge*, *persuasion*, *decision*, *implementation*, and, finally, *adoption*. Before individuals adopt a new practice, they must be aware that the innovation exists. Awareness of innovations thus precedes adoption, and many dissemination programs are created to raise awareness of some issue or behavior. After people are exposed to the new idea or practice, they intentionally or unintentionally learn more about it. Then, they make a conscious decision to either try or not try the innovation. If a decision is made to try the innovation, the person must obtain it. Implementing, or actually trying, the innovation is the next step. Finally, if implementation leads to positive outcomes, the individual adopts the behavior into his or her normal way of doing things. In many diffusion studies (Rogers, 1995) these stages have been collapsed into three most important ones: knowledge, attitudes and practices. Studies using this framework are often referred to as KAP studies (i.e., knowledge, attitudes, and practices studies).

The third major element of diffusion theory asserts that the rate of diffusion is influenced by the perceived characteristics of the innovation, as well as by the structural characteristics of the organization and the personal characteristics of the target audience. Characteristics of the innovation include the innovation’s *relative advantage* compared to current practices and behaviors, its *compatibility* with current practices, the *complexity* of the innovation (which relates to the ease with which individuals can *try the innovation*), how *radical* the innovation is compared to existing practices, the ability to *observe* others using it effectively, and the *cost* of implementing the innovation into practice.

Structural characteristics of the organization that affect the rate of adoption include the organization's *centralization* (the degree to which power and control in an organization are concentrated in the hands of a few individuals), its *complexity* (the degree to which members of an organization possess a high degree of knowledge and expertise), its *formalization* (the degree to which an organization stresses following rules and procedures), its *interconnectedness* (the degree to which the units in a social system are linked by interpersonal networks), and its *organizational slack* (the degree to which uncommitted resources are available to an organization). Generally, the diffusion process is facilitated in organizations with low centralization, high complexity, low formalization, high interconnectedness, and a lot of organizational slack (Rogers 1995, p. 379). Finally, personal characteristics such as age and socioeconomic status, in addition to characteristics of the targeted community, have been found to affect the rate of adoption (Rogers 1995).

Diffusion theory was used as the theoretical framework to understand the extent to which TIPs, and the guidance they offer, have spread throughout the substance abuse treatment system. The TIPs Diffusion Model (see Figure 3) presents a model which applied the key elements of diffusion theory to the dissemination and adoption of TIPs. This model was used to structure the TIPs Evaluation Project by providing a conceptual framework which was used to: (1) formulate the research questions for the studies, and (2) identify key dependent measures used to design the measurement instruments for the project's three major studies. The final article in this special issue (Hubbard, Huang, & Mulvey, in press) explains in greater detail how the concepts of diffusion theory were used to design the measurement instruments for the project. In addition, Hubbard et al. (in press) also explores how diffusion theory can be used to evaluate other products and services besides TIPs. Here we discuss how CSAT used diffusion theory to create the TIPs Diffusion Model, and how this model guided the main research questions for the TIPs Evaluation Project.

...*INSERT: Fig. 3. TIPs Diffusion Model.*

As discussed above, although an innovation tends to be introduced to a community from an outside source, the dissemination and adoption of it typically occurs through interpersonal communication networks. Furthermore, adoption of an innovation does not occur immediately after its introduction. Instead, adoption occurs over an extended period of time. The TIP series represents an innovation to the substance abuse treatment field in that the establishment of "best practices" is relatively new. As with most other innovations, TIPs were introduced to the substance abuse treatment community from an outside source; CSAT first introduced TIPs in 1991.

After the TIPs were introduced, it was unclear how TIPs were being received and disseminated throughout the treatment field. Anecdotal evidence suggested that substance abuse treatment professionals were following a typical pattern of innovation adoption in that they did not immediately adopt TIPs after their introduction in 1991. Rather, awareness of the TIPs' existence seemed to spread slowly throughout the treatment field and substance abuse treatment professionals slowly began to adopt TIPs into practice. CSAT believed the rate and pattern of adoption of TIPs by the treatment community could be assessed by a formal evaluation of the TIP series. Furthermore, diffusion of innovations provided a framework through which to

examine how TIPs were being received, disseminated, and used. Thus, the TIPs Evaluation Project was conceptualized and implemented in 1998. To structure this evaluation, CSAT created the TIPs Diffusion Model (see Figure 3).

The top portion of the model represents the mechanisms by which TIPs are currently disseminated to the field (e.g., directly from CSAT, through interpersonal communication, conferences, etc.). The lower portion of the TIPs Diffusion Model was created by using the other key elements of diffusion theory. Specifically, research has found that individuals tend to pass through five stages on their way to adopting a new practice or procedure (e.g., *knowledge, persuasion, decision, implementation, and, adoption*).

The TIPs Diffusion Model broke down this five-stage process into three distinct areas of research interest (i.e., knowledge, attitudes and practices). The far left hand portion of the model represents the knowledge stage of the diffusion process. To capture the knowledge stage of the diffusion process, CSAT wanted to know if substance abuse treatment professionals were aware of TIPs, and if they were, did they have knowledge of the information contained in them? The persuasion, decision, and implementation stages of the diffusion process were represented by the middle portion of model (see attitude section of Figure 3). Specifically, if individuals start to formulate attitudes toward an innovation once they become aware of it, then CSAT wanted to measure treatment professionals' attitudes toward TIPs and determine how these attitude affected the decision whether or not to try (i.e., implement) TIPs in practice. In addition, attitudes towards, and ultimately use of, an innovation have been found to be impacted by personal characteristics, organizational factors, and perceived characteristics of the innovation itself. thus, these three factors were included in the model and assessed in the project studies. Finally, the right-hand portion of the model depicts the adoption stage of the diffusion process by representing how TIPs are used in practice.

Because TIPs represent best practices in substance abuse treatment, the ultimate goal for TIPs is adoption of the practice guidelines by the substance abuse treatment community. With this goal in mind, an evaluation of TIPs would need to examine both the extent to which and how TIPs have been adopted. By using the process of diffusion documented in the literature to create the TIPs Diffusion Model, CSAT was able to identify and refine three research questions which guided the entire TIPs Evaluation Project. These questions were:

- (1) Are substance abuse treatment professionals *aware* of TIPs and *knowledgeable* about them?
- (2) What are substance abuse treatment professionals' *attitudes* towards TIPs?
- (3) How do substance abuse treatment professionals use TIPs in *practice*, and how has using TIPs impacted the substance abuse treatment field?

From these questions, three key dependent measures were identified and used in each of the project studies. These dependent measures were substance abuse treatment professionals' (1) knowledge, (2) attitudes, and (3) practices regarding the TIP series.

Results from the TIPs Evaluation Project on providers' current knowledge of TIPs, their attitudes toward the TIP series, and their current uses of TIPs in practice provide data which can be used in making decisions about how to modify current and future TIPs to more fully meet the needs of the substance abuse treatment professionals. Furthermore, information regarding the characteristics of TIPs will provide a reasonable expectation for which types of materials will

most likely be adopted. In addition, identifying characteristics of providers, their organizations, and/or barriers to adoption will help determine the best methods to transfer knowledge contained in TIPs into practice. The ability to predict what types of materials or tools will be most effective in influencing attitudes and behaviors, who will be most effective in transmitting them, what barriers to implementation exist, and what methods will help most in transferring information into action is important to the success of the TIP series (Hubbard, et al., in press).

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## References

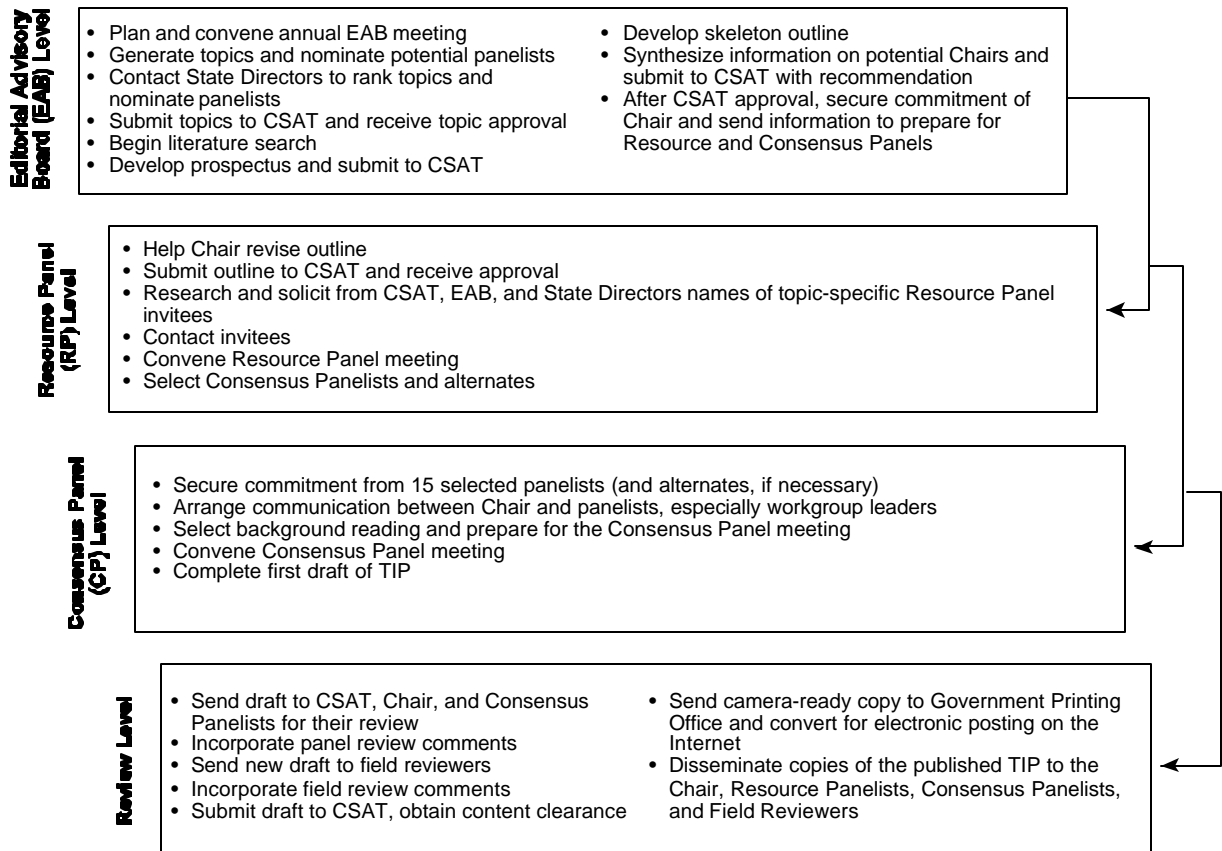
- Anderson J.G., & Jay S.J. (1985). Computers and clinical judgment: The role of physician networks. *Social Science Medicine*, 20 (10), 969–79.
- Barkin, S., Duan, N., Fink, A., Brook, R.H., & Gelberg, L. (1998). The smoking gun: Do clinicians follow guidelines on firearm safety counseling? *Archives of Pediatric Adolescent Medicine*, 152 (8), 749–756.
- Brook, R.H. (1993). Using scientific information to improve quality of health care. *Annals of the New York Academy of Sciences*, 703, 74–85.
- Carlson, R.O. (1965). *Adoption of educational innovations*. Eugene, OR: University of Oregon, Center for the Advanced Study of Educational Administration.
- Carpenter, C.E., Johnson, N.E., & Rosenfeld, J.F. (1998). The impact of clinical guidelines on practice patterns: Doing more versus doing less. *American Journal of Medical Quality*, 13 (2), 98–103.
- Citrome, L. (1998). Practice protocols, parameters, pathways, and guidelines: A review. *Administrative Policy in Mental Health*, 25 (3), 257–269.
- Coleman, J.S., Katz, E., Menzel, H. (1957). The diffusion of an innovations among physicians. *Sociometry*, 20, 253-270.
- Conroy, M., & Shannon, W. (1995). Clinical guidelines: Their implementation in general practice. *British Journal of General Practice*, 45 (396), 371–375.
- Cook, D.J., Greengold, N.L., Ellrodt, A.G., & Weingarten, S.R. (1997). The relation between systematic reviews and practice guidelines. *Annals of Internal Medicine*, 127, 210–216.
- Davis, D.A., & Taylor-Vaisey, A. (1997). Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *Canadian Medical Association Journal*, 157, 408–416.
- Dillman, D.A. (2000). *Mail and Internet surveys: The tailored design method* (2nd edition). New York: John Wiley & Sons, Inc.
- Ellrodt, A.G., Conner, L., Riedinger, M., & Weingarten, S. (1995). Measuring and improving physician compliance with clinical practice guidelines. A controlled interventional trial. *Annals of Internal Medicine*, 122, 277–282.
- Elster, A., & Kutznets, N. (1994). *AMA Guidelines for Adolescent Preventive Services (GAPS): Recommendations and rationale*. Baltimore: Williams & Wilkins.

- Ely, J.W., Goerdt, C.J., Bergus, G.R., West, C.P., Dawson, J.D., & Doebbeling, B.N. (1998). The effect of physician characteristics on compliance with adult preventive care guidelines. *Family Medicine*, 30 (1), 34–39.
- Ferguson, J.H. (1993). NIH consensus conferences: Dissemination and impact. *Annals of the New York Academy of Sciences*, 703, 180–198.
- Ferguson, J.H. (1995a). Patient participation in medical consensus conferences. *Annals of Oncology*, 6 (Suppl. 2), 3-4.
- Ferguson, J.H. (1995b). The NIH consensus development program. *Joint Community Journal on Quality Improvement*, 21, 332–336.
- Fleming, M.F., Barry, K.L., Manwell, L.B., Johnson, K., & London, R. (1997). Brief physician advice for problem alcohol drinkers. A randomized controlled trial in community-based primary care practices. *Journal of American Medical Association*, 277 (13), 1039–1045.
- Frolkis, J.P., Zyzanski, S.J., Schwartz, J.M., & Suhan, P.S. (1998). Physician noncompliance with the 1993 National Cholesterol Education Program (NCEP-ATPII) guidelines. *Circulation*, 98 (9), 851–855.
- Greer A.L. (1977). Advances in the study of diffusion of innovations in health care organizations. *Health and Society*, 55 (4), 505-32.
- Greer, A.L. (1987). The two cultures of biomedicine: Can there be consensus? *Journal of American Medical Association* 258(1):2739–2740.
- Greer, A.L. (1994). Scientific knowledge and social consensus. *Control Clinical Trials*, 15, 431–436.
- Greer, A.L., & Greer, S. (1991). *Medical technology decisions in hospitals: changes since 1980. Final report to the Agency for Health Care Policy and Research, Grant HS06054.* Milwaukee, WI: Urban Research Center, University of Wisconsin-Milwaukee.
- Grioli, R., Apolone, G., Marsoni, S., Nicolucci, A., Zola, P., & Liberati, A. (1991). The impact of patient management guidelines on the care of breast, colorectal, and ovarian cancer patients in Italy. *Medical Care*, 29 (1), 50-63.
- Griliches, Z. (1957). Hybrid corn: An exploration in the economics of technological change. *Econometrica*, 25, 501-522.
- Grimshaw, J., Eccles, M., & Russell, I. (1995). Developing clinically valid practice guidelines. *Journal of Evaluation in Clinical Practice*, 1 (1), 37–48.
- Grimshaw, J., & Russell, I. (1993). Effect of clinical guidelines on medical practice: A systematic review of rigorous evaluations. *Lancet*, 342 (8883), 1317–1322.

- Haynes, R.B. (1993). Some problems in applying evidence in clinical practice. *Annals of the New York Academy of Sciences*, 703, 210–224.
- Hamblin, R.L., Jacobson, R.B., & Miller, J.L. (1973). *A mathematical theory of social change*. New York: Wiley.
- Heath, K.V., Hogg, R.S., Singer, J., Schechter, M.T., O’Shaughnessy, M.V., & Montaner, J.S. (1997). Adherence to clinical guidelines for the therapeutic management of HIV disease. *Clinical and Investigative Medicine*, 20 (6), 381–387.
- Hubbard, S.M., Huang, J.Y., & Mulvey, K.P. (in press). Application of diffusion of innovations theory to the TIPs Evaluation Project results and beyond. *Evaluation and Program Planning (Special Issue)*.
- Humphreys, K. (1997). Clinicians’ referral and matching of substance abuse patients to self-help groups after treatment. *Psychiatric Services*, 48 (11), 1445–1449.
- Institute of Medicine. (1990b). *Consensus development at the NIH: Improving the program*. Washington, DC: National Academy Press.
- Laffel, G., & Blumenthal D. (1989). The case for using industrial quality management science in health care organizations. *Journal of American Medical Association*, 262 (20), 2869–2873.
- Lomas, J. (1991). Words without action? The production, dissemination, and impact of consensus recommendations. *Annual Review of Public Health*, 12, 41–65.
- Mullan, F., & Jacoby, I. (1985). The town meeting for technology. The maturation of consensus conferences. *Journal of American Medical Association*, 254 (8), 1068–1072.
- National Library of Medicine, HSTAT. (n.d.). Retrieved June 26, 2002, from <http://hstat.nlm.nih.gov/hq/Hquest/screen/Contents/s/53212>.
- Rogers, E.M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
- Rogers, E.M., & Scott, K.L. (1997). The diffusion of innovations model and outreach from the National Network of Libraries of Medicine to Native American Communities. Draft paper prepared for the National Network of Libraries of Medicine, Pacific Northwest Region, Seattle, WA.
- Ryan, B., & Gross, N. (1943). The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology*, 8, 15–24.
- SAMHSA’s National Clearinghouse for Alcohol and Drug Information. (n.d.). Retrieved June 26, 2002, from <http://www.samhsa.gov/publications/publications.html>.

- Schonberg, K., Blasinsky, M., Czechowicz, D., Klitzner, M., & Sanders, J. (Eds.). 1988. Substance Abuse: A Guide for Health Professionals. Chicago: American Academy of Pediatrics.
- Shaneyfelt, T.M., Mayo-Smith, M.F., & Rothwangl, J. (1999). Are guidelines following guidelines? *Journal of the American Medical Association*, 281 (20), 1900.
- Sumartojo, E.M., Geiter, L.J., Miller, B., & Hale, B.E. (1997). Can physicians treat tuberculosis? Report on a national survey of physician practices. *American Journal of Public Health*, 87 (12), 2008–2011.
- Valente, T.W., Rogers, E.M. (1995). The origins and development of the diffusion of innovations paradigm as an example of scientific growth. *Science Communication*, 16 (3), 242-263.
- Walker, J.L. (1966). The diffusion of innovations among the American States. *American Political Science Review*, 63, 880-899.
- Walker, R.D., Howard, M.O., Lambert, M.D., & Suchinsky, R. (1994). Medical practice guidelines. *Western Journal of Medicine*, 161, 39–44.
- Walker, R.D., Howard, M.O., Walker, P.S., Lambert, M.D., Suchinsky, R. (1995). Practice guidelines in the addictions. Recent developments. *Journal Substance Abuse Treatment*, 12, 63-73.
- Woolf, M., Bower, D.J., Marbella, A.M., & Casanova, J.E. (1998). US family physicians' experience with practice guidelines. *Family Medicine*, 30 (2), 117–121.
- Woolf, S.H. (1990). Practice guidelines: A new reality in medicine. I. Recent developments. *Archives of Internal Medicine*, 150, 1811–1818.
- Woolf, S.H., DiGiuseppi, C.G., Atkins, D., & Kamerow, D.B. (1996). Developing evidence-based clinical practice guidelines: Lessons learned by the US Preventive Services Task Force. *Annual Review of Public Health*, 17, 511–538.
- Worrall, G., & Chaulk, P. (1996). Hope or experience? Clinical practice guidelines in family practice. *Journal of Family Practice*, 42 (4), 353–356.
- Worrall, G., Chaulk, P., & Freake, D. (1997). The effects of clinical practice guidelines on patient outcomes in primary care: A systematic review. *Canadian Medical Association Journal*, 156 (12), 1705–1712.

**Fig.1 Steps in TIPs development process**



**Fig.2 Cumulative adoption curve**

