

# What Is Implementation Research?

## Rationale, Concepts, and Practices

Onil Bhattacharyya

Scott Reeves

*University of Toronto*

Merrick Zwarenstein

*St. Michaels Hospital*

Despite the growing knowledge base on evidence-based practices in social work and medicine, there is a large gap between what is known and what is consistently done. Implementation research is the study of methods to promote the uptake of research findings into routine practice. In this article, we describe the rationale for implementation research and outline the concepts and effectiveness of its practices. Despite a large number of systematic reviews of implementation interventions, many of the fundamental questions regarding what approaches should be used in which settings for which problems remain unanswered. We go on to argue that future implementation studies should assess the context of practice and key features of interventions to better inform service quality improvement efforts.

**Keywords:** *evidence-based practice; implementation research; quality improvement; social work research*

The terms evidence-based medicine and evidence-based practice are now firmly entrenched in the lexicon of health care (Dickersin, Straus, & Bero, 2007) and, increasingly, social work (Mullen, Shlonsky, Bledsoe, & Bellamy, 2005; Proctor & Rosen, 2007;). Beliefs about how to promote the appropriate use of these practices, on the other hand, are constantly changing. Medical researcher David Naylor describes four distinct phases that characterize the evolution of attitudes toward evidence in the field of medicine in the 35 years since Archie Cochrane first published "Effectiveness and Efficiency," the first book on evidence-based medicine (Cochrane, 1999; Naylor, 2002). This sequence may be instructive to those who wish to promote evidence-based practices in the field of social work.

The first phase, termed the "Era of Optimism," was characterized by a belief in passive diffusion of scientific evidence into practice. Clinicians would be trained to critically appraise the scientific literature to identify valid new information that could be applied to their practice. In Phase 2, the "Era of Innocence Lost and Regained," numerous studies demonstrated that much of clinical practice was not evidence based, and that it was virtually impossible for providers to keep up with the explosion of medical literature. This led to

the emergence of evidence-based clinical practice guidelines, in which the literature was systematically reviewed and summary recommendations graded according to the strength of the supporting evidence. These would be widely disseminated, providers would read them, and practice would change accordingly. Phase 3, the "Era of Industrialization," began with mounting evidence that passive dissemination of evidence-based guidelines did not change practice. In this case, aggressive implementation strategies were required to cross this "Quality Chasm" (Chassin, Galvin, & the National Roundtable on Health Care Quality, 1998), and performance measurement and reporting were encouraged to make providers more accountable and encourage quality improvement. Many physicians rose to the challenge and developed their own approaches to change management (Naylor, 2002).

The current phase (4) is the "Era of Information Technology and Systems Engineering." This is driven by a belief that it is not sufficient to focus on individual

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**Authors' Notes:** Correspondence may be addressed to Onil Bhattacharyya, MD, PhD, Keenan Research Centre in the Li Ka Shing Knowledge Institute of St. Michael's Hospital 80 Bond St, First floor Toronto, Ontario M5B 1X2; e-mail: [BhattacharyyaO@smh.toronto.on.ca](mailto:BhattacharyyaO@smh.toronto.on.ca).

practitioners, but rather the redesign of service delivery systems to address barriers and incentives is required to bridge the yawning gap between best evidence and common practice. This phase is increasingly driven by a new type of evidence base, one describing the most effective ways to change provider behavior (Naylor, 2002, 2004).

Naylor's last phase describes a relatively new field commonly called implementation research. The first journal devoted to this area, called *Implementation Science*, is in its second year. It defines this field as "the scientific study of methods to promote the systematic uptake of clinical research findings and other evidence-based practices into routine practice, and hence to improve the quality and effectiveness of health care. It includes the study of influences on healthcare professional and organizational behavior" (Implementation Science, 2007). For the purpose of our discussion, we will refer to efforts to promote the uptake of evidence-based practices recommended by clinical practice guidelines. This focuses implementation efforts on the subset of practices, which have strong experimental evidence of benefit.

The complexity of implementation research is daunting. The general purpose of this activity is to help the public by changing the behavior of providers so that it is as close as possible to behaviors that have been tested and shown to be effective. It requires taking into account multiple levels: patients nested within a provider's practice nested within a multidisciplinary team nested within a health facility, nested in local and national health care systems. The conceptual and methodological challenges are significant. This is likely why the average impact of implementation interventions has been found to be quite modest (Grimshaw et al., 2006). Furthermore, the conclusions one can draw about what are the most effective approaches and how they should be applied in a given setting are also limited (Foy et al., 2005). The Cochrane Collaboration has registered over 350,000 randomized controlled trials in clinical medicine (Grol & Grimshaw, 2003) and only 2,400 experimental and quasi-experimental trials of interventions to improve health care delivery (D. Salzwedel, personal communication, December 10, 2007). Given the complexity of changing behavior of organizations and service providers and the potential benefits, this warrants a shift of resources from the development of new treatments to understanding how to consistently deliver what is already known to work (Woolf & Johnson, 2005).

This article provides an overview of this field, as an introduction to the articles in this special issue. First, it covers the rationale for implementation research, examining the gap between knowledge and practice and the

reasons for this gap. Second, we discuss the concept of implementation research and the various steps involved in bringing current practice closer to best practice, as well as the evidence for its effectiveness. As we are all medical researchers, the discussion here will mostly focus on the literature from the health professions, but we hope that many of the conclusions and suggestions will be relevant to the development of this field in social work.

## What is Implementation Research?

In the field of medicine, implementation research is a relatively new concept, and a consensus on the name has yet to emerge. In fact, different names have become popular in different geographic regions, but the underlying concepts are similar. A study of 33 applied research funding agencies in nine countries found 29 terms used to describe some element of efforts to go from knowledge to action (Graham et al., 2006a). Implementation research is popular in the United Kingdom and Europe (Foy et al., 2001), while knowledge translation is the most commonly used term in Canada (Graham et al., 2006a). The concepts underlying this field have been captured in the Canadian Institute for Health Research definition for knowledge translation (which we use interchangeably with implementation research). It defines knowledge translation as "the exchange, synthesis and ethically-sound application of knowledge - within a complex system of interactions among researchers and users - to accelerate the capture of the benefits of research for [people] through improved health, more effective services and products, and a strengthened health care system" (Canadian Institute for Health Research, 2007). Although somewhat complex, this definition includes all of the key elements of this endeavor.

The first part of knowledge translation is exchange, the result of a deliberative process between research producers and users, rather than simply researchers telling frontline service providers what to do. The second is synthesis of knowledge, a distillation of existing knowledge to find the core evidence which should guide practice. The third is ethical application, with the understanding that individual and societal values as well as evidence on clinical effectiveness should be combined when making decisions about which interventions to promote. Finally, the overall goal of this endeavor is not only to improve quality of care (or services) but rather to improve the health and social well-being of the population and ensure that a system for health and social care makes the best use of limited resources.

## Rationale for Implementation Research: Closing the Knowledge to Practice Gap

### What is Knowledge?

There are many types of knowledge: explicit (e.g., clearly articulated theories and empirical observations) and implicit (e.g., the judgment of individuals with extensive experience in an area). The latter form is important because decisions must often be made by clinicians, managers, and policy makers in the absence of any theory or experimental evidence. However, the knowledge or evidence that implementation researchers refer to is reliable information on the effectiveness of therapeutic approaches derived from rigorous trials. This type of (explicit) knowledge is favored because it is easy to articulate and disseminate, and there is good reason to think that these practices will have a favorable impact on the health of individuals and populations. There are different study designs ranging from individual case histories, through prospective cohort studies to randomized controlled trials. These designs are increasingly effective at controlling for bias and give increasingly reliable estimates of the impact of a given therapeutic approach within a particular population (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996).

Although ostensibly at the top of the hierarchy of evidence, randomized controlled trials have been criticized for the carefully selected populations they include, the controlled environment in which they are conducted, and the rigid protocols which are difficult to implement in an everyday care setting (Tunis, Stryer, & Clancy, 2003). These issues can be addressed through pragmatic trials using large heterogeneous populations with limited support for providers, more closely approximating effectiveness in regular practice (Tunis et al., 2003). Meta-analyses are another form of rigorous evidence. They combine the results of multiple comparable trials of the same intervention across a wide range of settings and providers to see whether it has a generally consistent result. These studies minimize the impact of the special circumstances of each individual trial, providing a more generalizable estimate of the effect of the intervention under study (Dans, Dans, Guyatt, & Richardson, 1998).

This has been a shift from “eminence-based” practice derived from the opinions of experts to evidence-based practice developed through synthesis of multiple rigorous studies (Isaacs & Fitzgerald, 1999). Given that there are many specific practice situations and problems for which there is no evidence, professional judgment remains a key skill. However, where evidence for effective practices exists, there is tremendous potential for benefit by promoting their widespread use. The

growing literature on the effectiveness of therapies has made it impossible for a single provider to keep track of all new and relevant studies (Naylor, 2002). Clinical practice guidelines, or “systematically developed statements to assist practitioner and patient decisions about appropriate health care” (Institute of Medicine, 1992), were conceived as a solution to this problem. They provide convenient summaries of available evidence, which can facilitate decision making and provide performance measures with which to evaluate the quality of services (Woolf, Grol, Hutchinson, Eccles, & Grimshaw, 1999).

### How Big is the Gap Between Knowledge and Practice?

In order to measure a gap between knowledge and practice, there must be evidence to create a basis for comparison. However, even when the evidence is very strong, evidence-based practices are not consistently followed. There are many examples of suboptimal care from the medical literature, in part because interventions like drug prescription are easy to document and retrieve from charts and administrative databases. There is less information on psychosocial interventions, but the degree of variation in practice is likely to be of a similar or greater magnitude (McGlynn et al., 2003; Mullen et al., 2005).

Researchers within North America and Europe have demonstrated relatively low levels of recommended practice across acute care, general management of chronic conditions, and preventive care (Collini et al., 2007; Latosinsky, Fradette, Lix, Hildebrand, & Turner, 2007). Evidence from a U.S. countrywide study suggests that, on average, Americans receive approximately 50% of guideline recommended care processes (McGlynn et al., 2003). This study showed that  $\beta$ -blockers, an effective drug for the treatment of heart attacks, were only provided to 45% of applicable study patients, 64% of elderly patients received or were offered a pneumococcal vaccine, and only 38% of study patients had undergone screening colorectal cancer (McGlynn et al., 2003). Adherence to guidelines has also been demonstrated to vary for certain groups. For example, the proportion of recommended care received is reported to be as low as 10% for individuals with alcohol dependence (McGlynn et al., 2003). Practices that involve physical contact or prescription of medication tend to be associated with higher levels of guideline adherence than those requiring counseling or education (McGlynn et al., 2003). This last point has clear implications for the types of interventions conducted in social work.

## Why is There a Gap Between Knowledge and Practice?

*Poor quality of guidelines.* As described above, the literature indicates that clinical decision making is not always evidence informed, despite the availability of practice guidelines. However, before examining the reasons why they are not consistently followed, it is important to assess the quality of guidelines themselves. As there is a wide range of guideline producers, providers may follow all types of recommendations, but high-quality, evidence-based guidelines have the greatest potential to promote better health outcomes. The Appraisal of Guidelines Research & Evaluation Instrument has outlined the criteria that clinical practice guidelines should meet in order to provide practitioners with comprehensive and valid practice recommendations (AGREE Collaboration, 2001). In order for guidelines' quality to be highly rated, they must contain explicit information corresponding to the following six domains:

- scope and purpose;
- stakeholder involvement;
- rigour of development (including quality of evidence informing recommendations);
- clarity and presentation;
- applicability; and
- editorial independence (AGREE Collaboration, 2001).

Research indicates that many guidelines do not satisfy all of these, or related requirements. This therefore renders them more difficult to use and their recommendations potentially less likely to have a positive impact on care. In a review of practice guidelines conducted by Shaneyfelt et al. (1999), criteria pertaining to identification and summary of evidence were poorly met, and the proportion of guidelines specifying targeted health problem and patient population was also low. Disconcerting findings of guideline appraisals point to the relatively high volume of guidelines that are not evidence based (AGREE Collaboration, 2001; Harpole et al., 2003; Oxman, Lavis, & Fretheim, 2007; Veldhuijzen, Ram, van der, Wassink, & van der, 2007). This issue is now being addressed by bodies like the Guidelines Advisory Council in Canada and the National Guideline Clearinghouse, which independently appraise guidelines and disseminate their results. These initiatives are important as the field of implementation research depends on high-quality guidelines if it is to have any impact on population health and improved outcomes for individuals.

*Ineffective guideline dissemination.* The manner in which guidelines are disseminated and implemented can

impact the uptake of recommendations in practice. Passive dissemination (also called diffusion) in which guidelines are distributed electronically, posted online, or mailed in hard copy to offices or clinics, is essentially ineffective when used as the sole means of distribution, and yet is the most often used (Armstrong, Waters, Crockett, & Keleher, 2007; Grimshaw et al., 2006; Lavis, Robertson, Woodside, McLeod, & Abelson, 2003). This is likely because these passive approaches require few resources and do not require efforts to engage participants (Armstrong et al., 2007; Brownman, 2002; Grimshaw et al., 2006; Lavis et al., 2003). Brownman's Clinical Practice Guideline "Life Cycle" distinguishes between *dissemination*, in which practitioners are made aware of current guidelines, and *implementation*, where active approaches to encourage uptake are employed (Brownman, 2002). The lack of effect from passive dissemination of guidelines has led researchers that there must be factors other than availability of a guideline which affect the use of evidence-based practices.

## Barriers to the Uptake of Evidence Into Practice

The rate at which evidence-based best practices become common practices is highly variable, even where information on ground-breaking research is readily available. The estimated 264 years between the evidence for benefit of citrus and sauerkraut in the treatment of scurvy and its widespread use on British ships is thankfully no longer the norm (Berwick, 2003). A more encouraging example is prescriptions of hormone replacement therapy in the United States, which dropped by 56% one year after the publication of the Women's Health Initiative (WHI) trial showing that estrogen and progestin in postmenopausal women produced more harm than benefit (Hersh, Stefanick, & Stafford, 2004). Variations in practice and differing trends in quality of care across settings are due in part to the presence of barriers and facilitators to change in response to new evidence on best practice.

Health and social care practice is affected by a wide range of factors, some of which are within the control of providers or managers and some which are embedded in the larger context. There are multiple models for describing barriers to the uptake of evidence into practice in health care, but most include:

- the guideline;
- the provider;
- the patient;
- the team;

the organizational context; and the health care system (Cabana et al., 1999; Grol & Wensing, 2004).

The first set of factors relate to the characteristics of the guideline, which has an impact on its adoption in practice. Compatibility with the values of users, complexity of the guideline, the degree to which the results can be observed, relative advantage over other approaches, and the ability to test part of the innovation before adopting it completely are all considered to affect uptake of a guideline (Rogers, 1995; Sanson-Fisher, 2004). A series of observational studies in health care settings suggested that the most important factors were compatibility with current values and complexity, particularly being vague and nonspecific and demanding changing routines. (Burgers et al., 2003; Foy et al., 2002; Grol et al., 1998). These are all associations suggested by observational studies, but one randomized trial tested the impact of reducing the complexity and increasing the specificity of guideline instructions found that it improved adherence to recommendations (Shekelle et al., 2000). This work helped demonstrate that modifying the characteristics of the content of guidelines and how they are presented could improve uptake (Michie & Johnston, 2004).

The attitude of practitioners with respect to use of guidelines is an important implementation consideration in all fields, but especially in disciplines where guidelines are a more novel element of practice (Kirk, 1999). Provider factors limiting guideline use include preexisting behavioral routines, lack of outcome expectancy (i.e., the perception that implementing the guideline would not make a difference), lack of self-efficacy (they do not think they can do it), and lack of motivation (Cabana et al., 1999). Patient level factors include knowledge, skills, attitude, and compliance with the recommendation (Grol & Wensing, 2004).

Beyond the provider patient dyad, care is often provided by teams, where behavior of individuals is affected by factors such as the opinion of colleagues, culture of the practice network, nature of interprofessional collaboration, and team leadership. Within the organizational context, there is the structure and resources of the institution, capacity of the staff, and the organization of care processes. Finally, the broader economic and political context has an impact through the nature of financial arrangements (e.g. provider reimbursement), regulation of professions, and broader policies (Grol & Wensing, 2004). This wide range of factors should be taken into account when planning efforts to change clinical practice.

## Implementation Research Concepts and Practices

### Elements of Implementation Research

There are multiple terms to describe implementation research and there are also multiple descriptions of how it is done. The other articles in this special issue will present a multitude of frameworks with a high degree of commonality. However, we will briefly elaborate on the distinction between implementation research and related concepts and quality improvement. Quality improvement has been defined as “systematic, data-guided activities designed to bring about immediate improvement in health care delivery in particular settings” (Lynn et al., 2007). Although both practices aim to improve quality of services, implementation research is directed toward producing generalizable knowledge, while quality improvement is focused on locally applicable knowledge. The result of this is a greater focus on randomized controlled trials and meta-analyses in implementation research to rigorously assess whether observed changes can be attributed to a specific intervention.

The Knowledge Translation Theories Group at the University of Ottawa reviewed 28 different models of implementation research and found 15 distinct steps (Graham, Logan, & KT Theories Research Group, 2006b) The comprehensiveness of the models varied, where some included only 6 of these steps and while others included 12. The steps which occurred in more than 60% of the models were as follows:

1. Identify care gaps and the need for change.
2. Identify barriers to consistent use of guidelines.
3. Review evidence on implementation interventions.
4. Tailor or develop intervention to improve performance.
5. Implement intervention.
6. Evaluate the process of implementation.
7. Evaluate outcomes of the intervention (Graham et al., 2006b).

The following section provides a description of the most common steps in actively promoting the practice of implementation research and the evidence base supporting its utility, drawing on the health care literature. These steps do not necessarily describe how guidelines are actually implemented, which is a more diffuse and iterative process, but rather how one would promote their use (Gabbay & le, 2004).

*Identifying care gaps and the need for change.* The incorporation of implementation research within health

practice is central to providing high-quality patient care, but the availability of rigorous evidence is needed to define best practices and measure quality. Many of the examples cited have been pharmaceutical interventions, but it is important to recognize the role of implementation research within other disciplines. In social work, where implementation research has been a much more recent area of exploration, the development and promotion of practice guidelines should correspond to the availability of high-quality evidence (Kirk, 1999; Mullen et al., 2005). Thus, resources should not be wasted in developing and implementing practice guidelines for areas where the best practices are yet to be determined.

Accurately identifying gaps between current and best practice is the key to effective implementation research. Interventions to reduce these gaps should be focused on quality problems which are frequent, associated with significant health or social consequences, and where there is room for improvement. Given the cost of quality improvement interventions in time and money, it is important to address problems that are sufficiently serious to warrant the investment. Studies have shown that absolute improvement is greater when the quality of care is poorer at baseline, so targeting these areas could maximize impact (Grol & Wensing, 2004; Shojania et al., 2006). The need for change may also be used as a criteria to select quality problems, as it is essential for organizational commitment to the intervention (Solberg et al., 2000).

*Identify barriers to providing optimal care.* There are a wide range of barriers mentioned in the previous section, covering provider, patient, organizational, and broader system factors. However, a recent review of barriers to achieving evidence-based practice emphasized that there are many theories on the subject, that most of them overlap, and most are not supported by evidence of their ability to facilitate change in clinical practice (Grol & Wensing, 2004). An in-depth qualitative analysis of 22 studies which assessed barriers to care in order to develop tailored interventions found that few methods to link identified barriers and interventions were described (Bosch, van der, Wensing, & Grol, 2007). There was often a mismatch between the level of the identified barrier and the type of interventions selected for use. For example, most of the studies that identified barriers at the level of the team or the organization went on to select primarily educational interventions for improvement (Bosch et al., 2007). This suggests that researchers may approach quality problems with an intervention strategy in mind, and tailoring to context is more often evoked than done (at least in the published literature).

It makes intuitive sense that identifying barriers to evidence-based practice and then using these to tailor interventions would be more effective than using generic interventions. A recent Cochrane review on interventions that were tailored to address identified contextual barriers included 15 studies, and though analyses suggested some benefit, they concluded that there was insufficient evidence to assess the impact of this strategy (Shaw et al., 2005). Therefore, while this seems to be a reasonable strategy, it is too soon to assess its effectiveness, since the method of assessing barriers and taking them into account in the design stage are not well developed (Bosch et al., 2007).

*Review evidence on implementation interventions.* Once a performance gap and a series of associated barriers have been identified, the literature should be reviewed to find interventions that might conceivably overcome the barriers and which are known to be effective. These interventions can target provider, team, organizational, or patient factors in order to increase compliance with an evidence-based guideline recommendation. This roster of interventions is derived from the fields of education, social marketing, management, human factors, and industrial engineering, all of which are designed to facilitate changes in behavior. The Cochrane Collaboration's Effective Practice and Organization of Care Group has compiled and categorized an ever-growing list of these interventions (EPOC, 2007). The broad categories are found in Box 1. Examples include providing education to patients on best practice, auditing practice patterns, and providing feedback to providers on their performance, promoting teamwork, and the use of reminders. There are several considerations guiding the choice of intervention: effectiveness, resources required, appropriateness to practice context, and overall cost.

But how does one know which of these approaches is effective or more effective? The strategies used to assess the impact of implementation interventions are detailed in Box 2. They involve rigorously measuring the outcome of interest (either quality of care or a patient outcome) before and after an intervention, ideally with a control group (Eccles, Grimshaw, Campbell, & Ramsay, 2003). These designs attempt to control for confounding factors, which may affect the outcome, including preexisting trends. If quality was already improving before the intervention, then how can one know whether the continued improvements would not have happened anyway? In the case of controlled trials, changes on baseline in the intervention and the control group are compared. In the case of interrupted time series, quality is measured at several points in time before an

**Box 1 Types of Implementation Interventions (Grimshaw et al., 2006)**

- (a) Distribution of educational materials—distribution of published or printed recommendations for clinical care, including clinical practice guidelines, audiovisual materials, and electronic publications.
- (b) Educational meetings— participation of providers in conferences, lectures, workshops, or traineeships.
- (c) Local consensus processes—inclusion of participating providers in discussion to ensure that they agree that the chosen clinical problem was important and the approach to managing the problem was appropriate.
- (d) Educational outreach visits—use of a trained person who met with providers in their practice settings to give information with the intent of changing the provider’s practice.
- (e) Local opinion leaders—use of providers nominated by their colleagues as “educationally influential.”
- (f) Patient-mediated interventions—new clinical information (not previously available) collected directly from patients and given to the provider, for example, depression scores from an instrument.
- (g) Audit and feedback—reporting any summary of clinical performance of health care over a specified period of time.
- (h) Reminders—providing patient or encounter-specific information to prompt a provider to recall information.
- (i) Marketing—use of personal interviewing, group discussion (“focus groups”), or a survey of targeted providers to identify barriers to change and subsequent design of an intervention that addresses identified barriers.
- (j) Mass media—(i) varied use of communication that reaches great numbers of people including television, radio, newspapers, posters, leaflets, and booklets, alone or in conjunction with other interventions and (ii) targeted at the population level.

**Box 2 Types of Implementation Studies**

Uncontrolled before–after: These studies measure performance before and after the introduction of an intervention in the same study sites and observed differences in performance are assumed to be due to the intervention.

Interrupted time series: This design attempts to detect whether an intervention has had an effect significantly greater than the underlying secular trend. They are useful in quality improvement research for evaluating the effects of interventions when it is difficult to randomize or identify an appropriate control group—for example, following the dissemination of national guidelines or mass media campaigns.

Controlled before–after: In this design, the researcher attempts to identify a control population of similar characteristics and performance to the study population and collects data in both populations before and after the intervention is applied to the study population. Analysis compares postintervention performance or change scores in the study and control groups and observed differences are assumed to be due to the intervention.

Randomized controlled trial/cluster-randomized controlled trial: This type of study estimates the impact of an intervention through direct comparison with a randomly allocated control group that either receives no intervention or an alternative intervention. The randomization process is the best way of ensuring that both known and unknown factors that may independently affect the outcome of an intervention are likely to be distributed evenly between the trial groups. As a result, differences observed between groups can be more confidently ascribed to the effects of the intervention rather than to other factors. The unit of randomization may be an individual patient or provider, or in the case of cluster-randomized trials, all patients and/or all providers in a given clinic.

Meta-analyses: Systematic review of available trials on a given subject may include interrupted time series, controlled before–after, and randomized controlled trials, or a subset of these. When interventions and outcome measures are comparable and the data in the studies are complete, it is possible to combine the effects of the individual studies to estimate an average or median effect size.

Adapted from Eccles M, Grimshaw J, Campbell M, et al. (2003). Research designs for studies evaluating the effectiveness of change and improvement strategies. *Quality and Safety in Health Care*, 12, 47-52.

intervention and again at several points after the intervention. This allows us to determine whether the same trend continued or the rate of improvement increased after the intervention. If one randomizes

providers or clinics to an intervention or control, it is more likely that the groups will be comparable and any differences between them will be due to the interventions, yielding the most reliable evidence. Ideally, a

large number of high-quality trials are combined in a meta-analysis to assess the average effect size across multiple settings (Eccles et al., 2003).

The most complete review of the effectiveness of guideline dissemination and implementation strategies included 235 trials conducted between 1966 and 1998 and found that overall methodological quality was quite poor (Grimshaw et al., 2006). Eighty-seven percentage of the studies observed some improvements in quality-of-care processes. They assessed three single interventions (distribution of education materials, audit and feedback, and reminders) and multifaceted interventions including educational outreach. The median absolute improvement in performance (usually a change in prescribing, test ordering, or use of an effective procedure) was calculated. For the interventions with several comparable trials, the median improvement was 14% for reminders, 8.1% for dissemination of educational materials, 7% for audit and feedback, and 6.0% in multifaceted interventions including educational outreach. The overall conclusion of this review was that effect sizes are modest and there is a high degree of variation in results. Furthermore, there was little description of the context of practice and the intervention itself, so it is hard to know whether interventions were implemented with fidelity and whether the results would be applicable to another context (Grimshaw et al., 2006).

Meta-analyses of randomized controlled trials may provide the most rigorous evidence, but they leave many implementation questions unanswered. Foy and colleagues attempted to understand how one could use the results of a Cochrane review on the benefits of audit and feedback to implement a diabetes quality improvement intervention in a specific practice context (Foy et al., 2005). They found that there was limited information on key steps such as how to prepare for an audit, what performance criteria to use, how to implement the audit and, how to sustain the change in practice. Given that the impact of audit and feedback in terms of change in compliance with a given practice varies between a decrease of 10% and an increase of 68%, these details are likely to be very important to the effectiveness of this intervention (Jamtvedt, Young, Kristoffersen, O'Brien, & Oxman, 2006). The limitations of current meta-analyses largely stem from the heterogeneity of studies in the review, the difficulty interpreting subgroups of studies within the larger review, and lack of head-to-head comparisons to answer key questions (Foy et al., 2005).

If it is unclear what implementation interventions work in general, what do we know about what works for a specific problem? The most rigorous review of this question was a meta-analysis of the effects of quality

improvement for Type 2 diabetes on glycemic control (Shojania et al., 2006). This study was interesting for its focus on a patient outcome (control of blood sugar), rather than a process of care (prescription pattern or rates of counseling). It reviewed 66 trials, which found that 9 of the 11 quality improvement interventions studied showed a significant reduction in mean measures of blood sugar. They went on to identify key components of case management, an intervention which was found to be particularly effective. The studies in which case managers (usually nurses or pharmacists) could independently make medication changes were significantly more effective than those that did not. This type of review begins to answer some of the questions on implementation raised above, but it can only be done in an area where there are already a large number of rigorous implementation studies.

Given the significant and highly variable cost of implementation strategies, information on the cost-effectiveness of these approaches is essential to determine which ones should be more widely used. In the systematic review of 235 implementation trials by Grimshaw et al., only 63 studies reported any economic data (Grimshaw et al., 2006; Hoomans et al., 2007). Overall, the methods of the economic evaluations and cost analyses were poor. Only two guidelines provided costs of guideline development, implementation, and treatment, and in none of the studies was the costing information reasonably complete. Thus, there is little information to guide managers in the choice of implementation strategies whose resource implications vary from e-mailing educational materials to hiring a new staff member or changing the way a given group of professionals is paid. Future work should include detailed cost information, such as the cost of implementation of the intervention, comparison with relevant alternatives, incremental costs, and sensitivity analyses to adjust for costs in different settings (Drummond & Jefferson, 1996). This is important since it is unclear which methods are most effective, and the average impact on practice patterns is quite modest (Grimshaw et al., 2006). If an inexpensive approach is moderately effective, it may be a better investment than a very resource-intensive approach which is only slightly more effective.

*Develop and implement intervention to improve performance.* Once one has reviewed the literature and identified what seems to be an appropriate and affordable implementation intervention, the next step is to develop an implementation plan. Since the results of meta-analyses on effectiveness of implementation strategies currently provide limited information on the

practical use of these approaches in a given context, the subsequent steps need to be decided on a case-by-case basis in each setting. Carefully documenting design choices and key contextual factors will make this process more explicit for those who may try to replicate successful experiments (Campbell et al., 2007a; Solberg et al., 2000).

*Evaluate the process of implementation.* Since variations in effectiveness may be due to incomplete implementation of interventions rather than true variations in their effect, it is important to evaluate this process (Habicht, Victora, & Vaughan, 1999). Many contextual factors, such as budget cuts, an uncooperative director, changes in the facilities, and changes in management may affect the observed effectiveness and should be taken into account in the final analysis. Controlled study designs where large numbers of facilities are randomized may minimize the impact of some of these factors, but many studies are not large enough to control for variations in the degree of implementation of the intervention (Eccles et al., 2003). Furthermore, degree of implementation of an intervention demonstrates its feasibility and is an important outcome in its own right. This relates both to the characteristics of the intervention and contextual factors which may facilitate or impede the process.

*Evaluate outcomes of the intervention.* The choice of outcomes will be based in part on the size of the study, the putative effect of the intervention, and the proposed duration of follow-up. Ideally, studies should be large enough to accurately detect modest effect sizes (which is the case for most implementation interventions), gather qualitative and quantitative data, provide a comprehensive accounts of processes and outcomes, and follow providers and patients long enough to know whether the effect persists after the end of the study. The most important outcomes would be patient/client level outcomes which can be measured reliably and matter to key stakeholders. In medicine, these include mortality, blood pressure, and quality of life. End points more relevant to the field of social work would be housing status, employment status, teenage pregnancy rates, and rates of incarceration. The difficulty with these measures is that changes in them may be infrequent, so larger populations need to be studied. They may also take time to develop, so longer follow-up is needed. In addition, they are affected by factors other than the intervention, which may not adequately be controlled for within a study (Freund et al., 1999).

Process measures reflect changes in the way services are provided, such as prescription or counseling rates or rate of use of a screening test, and are usually measured

in service providers rather than clients. They are valid measures when these processes are strongly linked to patient/client level outcomes. In social work, this could be rates of use of an alcoholism treatment intervention with demonstrated effectiveness or referral of clients to a financial aid program. These measures are often chosen because one can demonstrate a change in provider behavior much faster and with a smaller sample size than a client level outcome (Hofer, Bernstein, Hayward, & DeMonner, 1997).

## Future of Implementation Research

The field of implementation research is now at a crossroads. Following in the footsteps of clinical epidemiology, it has developed an evidence base from randomized controlled trials and meta-analyses. Systematic reviews of these trials provide some general indication of the impact of various implementation strategies. However, the interaction of the individual provider and patient psychology, the practice environment, and the broader system are so complex that it is hard to assess the applicability of studies conducted in one setting to a different context. New strategies may be needed to address this issue. One approach has been to develop a series of testable hypotheses and theories to describe these interactions. This would produce more generalizable knowledge, which could help the design of interventions and the interpretation of study results (The Improved Clinical Effectiveness through Behavioural Research Group, 2006). However, this approach has been criticized by authors (including us), who feel that there is already a multitude of overlapping frameworks and theories whose ability to predict the complex interactions in the implementation process is very limited (Bhattacharyya, Reeves, Garfinkel, & Zwarenstein, 2006; Oxman, Fretheim, & Flottorp, 2005). There is still insufficient empirical evidence with which to develop robust theories, and so any theory development may be misleading. The alternative is to carry on with common sense and empirically supported designs while building a series of detailed cases from which theoretical frameworks could eventually evolve. This will require a method of describing practice contexts, barriers to care, interventions, and critical decision points that capture the richness of the process of implementing organizational and behavior change interventions.

Three main challenges currently face the field. First, there is a need to develop a better understanding of the impact of context of practice on effectiveness. Second, we need to develop a better understanding of interventions and their mechanisms of action. Third, we need

to develop appropriate study designs to address key implementation questions. This would do much to provide managers and practitioners with better tools with which to improve practice. The quality of existing study designs could also be improved with higher methodological rigor, attention to the hierarchical levels during analysis (patients nested in providers in organizations), and longer follow-up to assess sustainability of intervention effects. Economic analyses that include the cost of intervention development, implementation, and consequence in terms of the resulting treatments and services should become a routine component of trials.

Despite the lack of clarity about which interventions are most effective and suboptimal average levels of care, there are notable successes that demonstrate that it is possible to improve quality across an entire health system. Researchers noted that in 2000, the percentage of patients receiving appropriate care was 90% or greater for 9 of 17 quality-of-care indicators across the U.S. Veterans Affairs Health Care System (Jha, Perlin, Kizer, & Dudley, 2003). This was a statistically significant improvement in quality of care compared to 1994 and followed profound system reengineering efforts. Within the United Kingdom, the mean practice quality scores for asthma, coronary heart disease, and diabetes improved by 20% between 1998 and 2005 (Campbell et al., 2007b). These systems and other organizations which are quality champions are being studied to see what lessons they hold for other groups seeking to improve the quality of the services they provide.

One of the most comprehensive frameworks for the design and evaluation of complex interventions (like psychosocial interventions and guideline implementation) was developed by the British Medical Research Council (Campbell et al., 2000). They propose a five-phase approach going from the theoretical (why should this intervention work?); to modeling (how does it work?); to an exploratory or pilot trial to optimize outcome measures; then a definitive randomized controlled trial to confirm effectiveness of successful pilots; and finally widespread implementation of beneficial interventions.

This framework places significant emphasis on the design and modeling of interventions prior to pilots or trials. It also places an emphasis on undertaking qualitative research to generate an in-depth understanding of the context into which interventions will be implemented. This is important because of the time and resources that are used to rigorously test interventions and also to facilitate interpretation of both positive and negative trials. An updated version of this framework proposed an iterative process of defining and optimizing the intervention and evaluation before deciding to proceed to a

randomized controlled trial (Campbell et al., 2007a). This approach to implementation research, the combining of inductive (qualitative) and deductive (quantitative) forms of inquiry to understand issues of context before moving to testing approaches in the real world, should be widely promoted as central to maximizing the value of studies in this field.

Social work faces a number of challenges in implementation research. These include a more limited evidence base, the complexity of social work interventions, and more limited administrative databases with which to assess provider behavior. Rigorous evaluations of both efficacy and effectiveness should precede mixed method implementation studies. Evaluation of the comparative effectiveness of different approaches should be encouraged, so that recommendations on "best" practices can truly be made. There are significant barriers to be overcome in terms of the suspicion of providers and managers of research evidence and the "cookbook" approach proposed by guidelines. However, these guidelines are not commands, and providers will always have to call on their experience and judgment when making decisions regarding individual clients. Given its sensitivity to complexity, client characteristics, and the importance of context, social work is well suited to take on the challenges facing implementation research.

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