5 The Role of Economic Evaluation in Dissemination and Implementation Research

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■ INTRODUCTION

Over the past several decades, many new and highly efficacious interventions have been developed in health and public health settings thanks to considerable investments in intervention research. Unfortunately, these advances in the development of interventions have not been accompanied by their spread to real-world, community settings. In several health-related disciplines, there is a considerable lag between the ideal, espoused by the science of interventions, and the actual, exemplified by clinical practice in community settings. This lag has led to a state where the Institute of Medicine estimates that only between 10 and 27% of individuals are receiving care consistent with scientific principles,[1] and where it reportedly takes 17 years to incorporate advances in clinical research into everyday practice.[2]

Bridging this gap between science and practice is a principal goal of dissemination and implementation (D&I) research, the former being concerned with increasing the use of evidence-based interventions widely by a target population, and the latter being concerned with the integration of evidence-based interventions within particular service settings such as schools or worksites (please see the Glossary for more formal definitions of these terms). D&I research focuses on processes or strategies by which interventions can be spread to, or adopted by, target audiences. In the field of implementation science, where the study of these processes is more developed, there are several distinct implementation strategies, which are designed to systematize the uptake of an intervention in a provider setting.

The challenge for the target audience of D&I research, whether a population of clinicians or a provider organization, is that many of these processes and strategies are highly complex endeavors and, consequently, are likely to be very expensive to deploy. Most health and public health settings in the community do not have access to research funds, and current reimbursement mechanisms do not cover the costs of disseminating and implementing interventions.

For these reasons, an economic analysis of D&I processes and strategies is required, one that systematically examines what outcomes a strategy—or a set of competing strategies— achieves, and the costs of achieving those outcomes. Once a provider organization knows how much it will cost them to implement an intervention, for example, and what the returns are likely to be of spending those dollars, it can then take an informed decision regarding whether or not to participate in such

an implementation. Economic evaluations can also be of use to D&I researchers. A very expensive implementation strategy that produces small improvements in outcomes is likely to be less attractive than another implementation strategy that produces the same improvement but at a fraction of the cost. Conducting economic evaluations of competing implementation strategies is one way in which D&I researchers can justify scaling up the use of their implementation strategy.

This chapter presents an overview of how D&I research can be evaluated from an economic point of view. This chapter does not discuss or evaluate any intervention that may be disseminated and implemented; its efficacy is assumed. Because implementation science has better developed strategies whose costs can be assessed, we accentuate implementation strategies in this chapter and illustrate costing one particular implementation strategy as a case example. This approach, however, can be also extended to quantifying the costs of dissemination processes. D&I researchers are interested in both proximal outcomes—such as fidelity (an implementation outcome), or timeliness of care (a service outcome)—as well as distal outcomes, such as improvements in client health and well-being.[3] Each of these types of outcomes can be subject to an economic evaluation. As a first step, researchers might quantify the relative costs of different implementation strategies and compare changes in an intermediate outcome, such as fidelity, resulting from the use of those strategies. This type of an analysis provides a researcher with the incremental costs of improving the fidelity to an intervention. The next step might be to examine if these improvements in fidelity have resulted in improvements in a distal outcome, such as improved client health. This type of an analysis provides information on whether the costs of implementation are a good value for a provider organization attempting to deploy a given evidence-based intervention.

The chapter begins by providing a brief review of economic concepts and in the next section discusses cost and outcome estimation from a D&I perspective. Using the Breakthrough Series Collaborative as a case study, a suggested approach is outlined to costing this implementation strategy and comparing its costs versus a "usual" implementation. Finally, observations are provided regarding the implications of economic evaluations for the field of D&I research in particular, and for policy in general.

■ BRIEF REVIEW OF ECONOMIC EVALUATIONS

Economic evaluations use a formal methodology to quantify whether or not the money that is spent on the purchase of health care goods and services represents the best use of that money.[4] This kind of information is one among many other factors (such as availability of a good or service, or clinician familiarity with an intervention, for example) that drive decision making. This information is important not only for policymakers but also for administrators, executive directors, and budget managers within hospitals and health care facilities who each day face decisions regarding whether their organizational expenditures are producing the biggest "bang for the buck."

More formally, economic evaluations have been defined as the "...comparative analysis of alternative courses of action in terms of both their costs and

consequences."[4] This definition suggests that economic evaluations are characterized by two features. First, they are *comparative*, requiring a choice between two proposed alternatives. Second, this comparison between the two proposed alternatives is based on the analysis of the *costs* and *consequences* (or outcomes) of each alternative. Comparing approach A against approach B is what makes economic evaluations *incremental*, in that it is the relative difference in costs and consequences between the two alternatives that is used to drive decision making.

A common type of economic evaluation used in the health care literature is the *cost-effectiveness analysis*, which examines the relative costs of different interventions designed to affect a health outcome. A cost-effectiveness analysis expresses its results in the form of a ratio,

$$\text{Cost-effectiveness ratio} = \frac{\text{Cost}_{\text{Intervention A}} - \text{Cost}_{\text{Intervention B}}}{\text{Outcome}_{\text{Intervention A}} - \text{Outcome}_{\text{Intervention B}}},$$

where the denominator reflects the gain in a health outcome resulting from Intervention A measured in, say, years of life gained, or reductions in the value of an abnormally high laboratory test result. The numerator reflects the increased costs required to procure that gain.[5]

The task for decision makers is easiest if Intervention A is cheaper and produces better outcomes than Intervention B; in this case Intervention A is the obvious choice from a cost-effectiveness perspective. If Intervention A is costlier than Intervention B but produces better outcomes, then administrators have to decide whether those increased outcomes are worth the added cost. Or, given that Intervention B produces worse outcomes than the more expensive Intervention A, administrators will have to decide if they and their patients can afford to live with the poorer outcomes given the lowered costs of Intervention B. It is perhaps obvious that these are not purely economic decisions, and policymakers have to consider other elements that go into the making of a decision regarding adopting a given strategy.

A related type of economic evaluation is the *cost–utility analysis*, where the goal is to measure costs associated with changes in client-level or patient-level health-related quality of life (which incorporates preferences with regard to a health outcome instead of using the health outcome per se). These preferences are operationalized and expressed in changes in quality-adjusted life years (QALYs), which forms the denominator in these types of studies.[6] Another type of economic evaluation, *cost–benefit analysis*, examines only those outcomes that can be quantified in dollar terms. Unlike cost-effectiveness analyses and cost–utility analyses, which allow the determination of cost-per-unit-outcome, cost–benefit analyses place dollar values on the outcome and compare whether or not the monetary benefits of an intervention are greater than its costs.[7]

Not all analyses consider costs as well as consequences. Studies frequently deal with either comparisons or costs or consequences, but not all of these. Studies may compare alternatives but only consider either cost or consequences. Other studies examine *cost-offsets*, for example, examining if costs of treating depression can be partially recouped by reductions in utilization of general medical services

by patients suffering from depression.[8] These types of studies are not considered in this chapter; we confine our discussion to economic evaluations that compare both costs and consequences between two or more competing approaches. Further details on how to perform economic evaluations in health care are available elsewhere.[5,9–11]

Examples from the Literature

In the field of health care, much of the focus of economic evaluations has been on analyzing *interventions*, a term that we use to encompass activities that are preventative as well as curative in purpose. For example, cost-effectiveness studies have been performed on the use of vaccines to prevent cervical cancer caused by the human papilloma virus (HPV),[12] on screening for maternal depression following childbirth,[13] and on the use of exercise-based treatments in various diseases,[14] among several others. These analyses are designed to provide guidance to health care administrators and payers—to continue the above examples—on whether or not to deploy an immunization program using the HPV vaccine, whether or not to screen for maternal depression following childbirth, or whether or not to add an exercise treatment to extant treatment for individuals suffering from various diseases. In other words, they are all designed to provide an answer to the question, "What intervention makes the most economic sense to deploy?"

■ ECONOMIC EVALUATIONS IN DISSEMINATION AND IMPLEMENTATION RESEARCH

Dissemination and implementation research, however, requires the answer to a slightly different question—"What are the costs of a particular dissemination approach?" or "Does deploying a formal implementation strategy really make the most economic sense?" D&I researchers who develop implementation strategies and organizations considering using an implementation strategy to deploy a desired intervention both want to know whether the money used to deploy that implementation strategy represents the best use of organizational dollars. Is it really necessary to spend the money on a lengthy process to train, evaluate, and supervise clinicians in delivering an intervention? Or will a weekend seminar suffice? Is the added cost of deploying that implementation strategy really that much better than the seminar when it comes to, say, how well clinicians learn to use that intervention (an intermediate outcome), or how well their clients get (the final outcome)?

The answer to this question requires an adaptation to D&I research of the economic evaluation approach described in the previous section. In other words, the purpose of conducting a cost-effectiveness analysis of an implementation strategy, for example, is to quantify the following ratio:

$$\text{Implementation cost-effectiveness ratio} = \frac{\text{Cost}_{\text{Implementation Strategy}} - \text{Cost}_{\text{"Usual" implementation}}}{\text{Outcome}_{\text{Implementation Strategy}} - \text{Outcome}_{\text{"Usual" implementation}}}.$$

Here, "usual" implementation refers to the way an organization routinely supports skill development in its clinicians, whether this involves undergoing a training program, having them read a book and discuss as a group, requiring peer supervision and consultation, or attending the aforementioned weekend seminar. "Implementation Strategy" refers to one of many formal approaches to implement interventions in clinical settings (discussed below). The denominator quantifies the gains in an intermediate or final, clinical outcome; the numerator compares the costs required to achieve those gains; hence, in this equation, a candidate implementation strategy is being compared to usual clinical practice on relative measures of costs and ability to produce outcomes. As in the intervention example in the prior section, the choice for administrators depends on their valuation of the relative costs and outcomes of one implementation strategy over another.

There are several named or "branded" implementation strategies, including leadership facilitation; community development teams[15]; the Breakthrough Series Collaborative[16]; the Translating Initiatives for Depression into Effective Solutions (TIDES) model[17]; the Network for the Improvement of Addiction Treatment model[18]; Cascading Diffusion; Research Practice Partnership; Quality Enhancement Research Initiative (QUERI)[19]; the Availability, Responsiveness, Continuity (or ARC) model[20]; Replicating Effective Programs[21]; the IDEAL model[22]; and several others.[23] The (usually) highly structured nature of these strategies allows them to be subject to an economic evaluation. In contrast, models of diffusion[24] present greater challenges to economic evaluators because each of their elements needs to be operationalized before costs can be attached to them. The overall goal of economic evaluations of D&I approaches is to quantify their incremental costs associated with producing change in intermediate or final outcomes.

Perspective

What costs to capture usually depends on whose perspective is adopted. The cost of a single day of hospital care, for example, is either the amount of money paid to the hospital by the health plan (health plan perspective); the total expenditure undertaken by the hospital on that patient that day, including labor costs, medicines, and overhead (organizational perspective); out-of-pocket payments made to the hospital (patient perspective); or *all* costs associated with the hospital stay, irrespective of who incurs them, including the opportunity costs of all resources donated to the hospital (societal perspective).[10] Economic evaluations of interventions usually take a variety of perspectives, including those of the social planner (societal perspective) as well of the entity making the decision whether or not to adopt the intervention being evaluated (i.e., the payer). The latter perspective is important because the payer is making the decision of whether or not to adopt the intervention; the reason the societal perspective is also important is because the payer may vary by intervention and disease, so results using the societal perspective provide a common metric for comparing all treatments across all disorders across all patient populations.

Implementation studies seem largely to adopt the organizational (or program) perspective, which is likely appropriate given that organizations bear the costs of implementing interventions. Currently, third-party payers do not as yet explicitly resource the costs of implementation in their rate-setting decisions, basing reimbursement either on the intervention or, additionally, on the type of provider delivering the intervention. Given current approaches to the financing of services, such an organizational perspective is probably appropriate for economic evaluations of implementation. Dissemination studies, by corollary, should likely take the perspective of the organization disseminating the information—a not-for-profit entity, a professional society, or some other knowledge purveyor.

Cost Estimations

In this chapter, costs are classified into direct labor, indirect labor, and nonlabor costs.[25] *Direct labor costs* are the costs associated with client contact, for example, the cost of delivering an intervention by a clinician, and are measured by the time cost for the clinician to deliver that intervention. *Indirect labor costs* are also associated with client contact but occur outside of an examination or intervention room, for example, the time cost of scoring a rating instrument. *Nonlabor costs* are overhead and include costs associated with clients (e.g., the actual cost to obtain that rating instrument), as well as costs that cannot be assigned to a particular client (e.g., the cost of utilities, administrative support, and building space that are necessary to deliver interventions). The costs of treatment (i.e., service costs), therefore, are the sum of direct labor costs, indirect labor costs, and nonlabor costs associated with delivering that intervention. The costs of disseminating and implementing that intervention are the sum of indirect labor costs and nonlabor costs associated with all implementation activities. Examples of the indirect labor costs of implementation include the cost of clinician time spent in training and supervision, foregone clinical revenues due to the loss of these clinicians' billable hours, and the time cost of the supervisor assisting the clinicians in delivering the intervention. Examples of nonlabor costs include the costs of tuition and manuals, and the costs of travel, if necessary (please see Table 5–1 for an example of these costs as applied to implementation).

Outcomes

As in economic evaluations of interventions, economic evaluations of D&I are also concerned with the achievement of client-level health outcomes. However, clinical outcomes are but one type of outcome of interest to dissemination and implementation scientists.[26] Proctor and colleagues define implementation outcomes as "...the effects of deliberate and purposive actions to implement new treatments, practices, and services").[3] These outcomes not only encompass distal clinical outcomes, but also more proximal implementation and service outcomes (Figure 5–1). Hence, cost-effectiveness analyses can be conducted on the costs of achieving gains on a measure of clinician fidelity to an intervention (an implementation outcome), or on the costs of achieving gains on a measure of timeliness of care (a service outcome), or both.

Some implementation scientists may want to compare implementation strategies on gains in patient quality-adjusted life years or QALYs (cost–utility analysis). Scientists interested in capturing clinician preferences across competing

TABLE 5-1. *Implementation Costs for the Breakthrough Series Collaborative*

	Time in Hours (a)	Hourly Wage (Inclusive of Fringe Benefits) (b)	Cost (a)*(b) = (c)
Indirect Labor Costs			
Prework			
Clinician			
Online training course			
Familiarization with training methodology			
Readiness assessment			
Initial skills-based training			
Administrator			
Familiarization with training methodology			
Readiness assessment			
Manager/Supervisor			
Familiarization with training methodology			
Readiness assessment			
Learning Session			
Clinician			
Time cost of training			
Administration of instruments			
Scoring of instruments			
Administrator			
Time cost of participation			
Quality assurance			
Manager/Supervisor			
Time cost of participation			
Quality assurance			
Action Period			
Clinician			
Time cost of participation in case conference			
Nonlabor Costs			
Prework			
Tuition costs			
Cost of curriculum (manual and materials)			
Audiotapes, DVDs, and other recording materials			
Travel costs			
Airfare			
Hotel stay			
Meals and other expenses			
Learning Session			
Costs of supervision/case consultation			
Telephone charges			
Travel costs			
Airfare			
Hotel stay			
Meals and other expenses			
Action Period			
Costs of supervision/case consultation			
Telephone charges			
Costs of audiovisual materials (DVDs, etc.)			
Mailing charges			

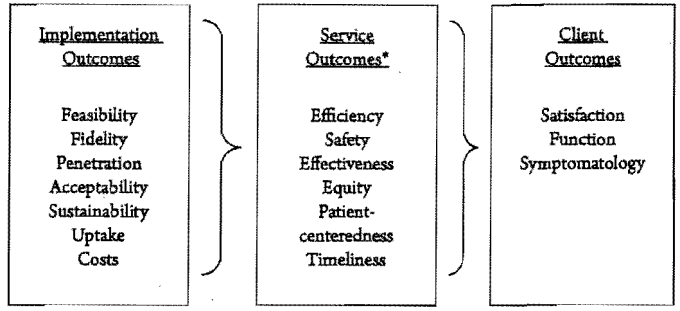

Figure 5-1. Implementation outcomes (from Proctor and colleagues[3]).

implementation strategies can use an instrument like the Evidence-Based Practice Attitude Scale.[27] Such studies examining gains in clinician preference across competing implementation strategies may be useful to implementation scholars seeking an alternative way to examine implementation outcomes such as clinician acceptability of an intervention. Clinician-level outcomes can also be measured directly. In mental health, for example, clinician fidelity to an intervention is an important metric. (Fidelity is the extent to which an intervention as implemented resembles the original protocol of the investigators who developed the intervention.[28,29]) Using fidelity as a clinician-level outcome, implementation strategies can be compared with respect to the congruence between the deployed intervention and original protocol, and the costs that are necessary to achieve such congruence.

The field of operationalizing D&I outcomes is relatively new, and more development needs to occur before these can be used in economic evaluations. Conceptually, however, implementation outcomes perhaps are of more relevance to D&I scholars than are clinical outcomes, and future work that conducts economic evaluations using these consequences is necessary.

Time Horizon

A time horizon (or analytic horizon) is a period of time within which all costs and consequences can be expected to occur. Intervention researchers commonly use long time horizons because client outcomes following an intervention may take decades (survival after chemotherapy for a malignancy, for example). If D&I researchers are also examining clinical (patient) outcomes, then the issue of specifying an appropriate time horizon is critical. If, however, D&I researchers are only studying dissemination or implementation or service outcomes, and if these outcomes are coterminous with D&I costs, then the issue of specifying a long time horizon is less critical.

Discounting

Discounting is a way to downwardly adjust future costs and consequences in order to derive their present value. Costs are discounted because the value of receiving $1

today is more than the value of receiving $1 ten years from now. An individual can invest that $1 today, and reinvest any interest earnings and obtain in 10 years a sum of money greater than $1. Health outcomes are also discounted because most people would rather enjoy better health now than better health 10 years from now.[30] If D&I researchers focus on dissemination and implementation costs, and on implementation and service outcomes, all occurring within a short time horizon, then discounting is of lesser relevance. D&I researchers studying client outcomes will need to identify and incorporate appropriate cost and health outcome discounting approaches.

Examples from the Literature

The bulk of the literature on economic analyses of D&I seems to have focused on the implementation of clinical practice guidelines (also known as practice parameters or clinical protocols). Economic evaluations of selected preventive interventions recommended by the Task Force on Community Preventive Services have also been conducted.[31]

A systematic review of guideline implementation studies by Grimshaw and colleagues[32] revealed that 63 of 235 studies (approximately a third) provided information on costs of implementation. Strategies to implement these clinical guidelines varied and included dissemination of educational materials, educational meetings, audit and feedback, and the use of clinical reminders, deployed either singly or in combination. Over half of these 63 studies were cost-outcome studies that did not compare alternative implementation strategies, some were cost descriptions, and 11 were cost-effectiveness studies. Many guideline implementation studies since the date of publication of that review seem to focus on cost analyses,[33,34] although cost-effectiveness and cost–benefit studies offer support for patient-focused educational strategies in the implementation of practice guidelines in diabetic care,[35] and in asthma care.[36]

Researchers publishing in other disciplines have also conducted economic analyses of D&I within their own disciplines. In the field of infectious diseases, for example, researchers have conducted cost descriptions of competing strategies to ensure infection control,[37] have compared competing vaccination strategies with respect to costs and consequences,[38] and have reported cost analyses of alternative strategies to perform screening for a variety of communicable diseases.[39] Researchers have also performed cost descriptions of a Community-Directed Intervention strategy to implement treatments to reduce roundworm infestation,[40] and of a community health worker-based implementation strategy to deploy interventions to reduce malaria.[41] In the field of pharmaceutical services research, scholars have conducted cost analyses of a strategy to optimize use of a certain high-risk class of medications,[42] and a review reported on equivocal results of cost studies designed to implement strategies to reduce prescribing of acid-suppressive medications.[43] Reviews of studies examining implementation of clinical pathways (which are structured intervention protocols also called *care protocols* or *care pathways*) for a variety of illnesses have also reported modest, though highly heterogeneous and variable, reductions in hospital costs.[44]

While few of the above referenced studies are explicitly economic evaluations, several studies currently underway will provide greater information on the economics of implementation. Published protocols on the use of implementation strategies to reduce colorectal cancers among individuals with heightened familial risk of such cancer[45] and cost analysis of an implementation of Dutch national guidelines designed to reduce vaginal breech deliveries[46] are all examples of studies that can provide valuable information once they are completed.

Two principal challenges seem to characterize this burgeoning literature on the economics of implementation. First, there is disagreement in the literature regarding which activities should have costs attached to them when it comes to implementation. In a study of guideline implementation, for example, should the cost of developing the guideline be counted, as some authorities suggest?[47] It is not entirely clear that it should be. In mental health, for example, there is considerable information on the costs of treatment;[48–52] to include all of these costs within the costs of implementation would comingle an economic evaluation of treatment with an economic evaluation of its implementation. One study valued the time spent by teachers, parents, school administrators, and project staff associated with implementing a behavioral intervention for children at risk for conduct problems.[53] While time costs are a critical element of the costs of implementation, equating time costs with the costs of implementation can underestimate the true cost of implementing interventions when there are (expensive) manuals and other nonlabor costs associated with implementing the intervention. Another study of service costs included the costs of quality assurance—a category that included "clinical case review, clinical supervisions, team meetings, and case staffing"[25]—in addition to case management and the costs of treatment, but did not include added costs associated with implementation. Other studies that have examined cognitive behavioral therapy implementation have calculated the time taken to train the clinicians, as well as the costs of ongoing supervision, but not nonlabor costs associated with implementation,[54–56] while other studies have excluded costs of supervision from the costs of implementation.[57] Clearly, some unifying framework for cost estimations is necessary in the field of implementation research. It also seems necessary to distinguish between one-time (fixed) costs, such as the costs of initial training; regularly-scheduled but fixed costs, such as the costs of ongoing supervision; and variable costs that increase incrementally with, say, providing client services, such as the costs of rating instruments and their administration.

Second, many studies examine heterogeneous implementation outcomes. Some focus on clinical (patient) outcomes only,[40] a justifiable outcome given that the ultimate goal of implementation is to improve client or patient well-being. Others examine provider behavior,[43] while others study various other aspects of the implementation enterprise. In order to standardize the economic evaluation of implementation, some agreement on the appropriate outcomes for implementation is necessary.

■ CASE STUDY—COSTING THE BREAKTHROUGH SERIES COLLABORATIVE IMPLEMENTATION STRATEGY

With the above caveats, one suggested approach to assessing the costs of D&I within a short time horizon from an organizational perspective is described below. Table 5–1

displays a worksheet listing the various elements of a typical Breakthrough Series Collaborative (BSC) strategy, which has been primarily used to implement interventions, but which could be adapted to the use of diffusion researchers. Table 5–2 displays elements of a weekend seminar (the "usual" dissemination or implementation approach); costs can be attached to each of the elements listed in the tables. The difference in costs between the BSC and "usual" implementation forms the numerator of a cost-effectiveness analysis for the BSC implementation strategy. Tables 5–1 and 5–2 are largely based on the idea that one way to capture costs associated with D&I is to adapt methods of service costing [9,58] to a D&I approach. This approach assumes that the same intervention can have varying D&I costs depending on whether it is implemented using a weekend seminar or a multimonth implementation strategy. These added costs make one implementation strategy more expensive than another.

Costing a D&I strategy requires a close familiarity with the strategy. A full description of the BSC model is beyond the scope of this chapter, and the reader is referred to overviews of this strategy.[16] *Indirect labor costs* of the BSC model are generated by clinicians, administrators, and supervisors. During the *prework* phase, much of the time of clinicians, administrators, and supervisors is spent in familiarization with the BSC training model (the Institute of Healthcare Improvement requires the formation of three-member teams comprising of clinicians as well as administrative staff). This stage also requires an organizational assessment, which must be completed prior to participation in the model. All of these indirect labor costs can be quantified by using the same approach as used for service costs—they

TABLE 5–2. *Implementation Costs for a Weekend Seminar ("Usual" Implementation)*

	Time in Hours (a)	Hourly Wage (Inclusive of Fringe Benefits) (b)	Cost (a)*(b) = (c)
Indirect Labor Costs			
Prework			
Clinician			
Reading intervention materials			
At the Seminar			
Clinician			
Time cost of training			
Nonlabor Costs			
Prework			
Tuition costs			
Cost of curriculum (manual and materials)			
Audiotapes, DVDs, and other recording materials			
Travel costs			
Airfare			
Hotel stay			
Meals and other expenses			
At the Seminar			
Telephone charges			
Travel costs			
Airfare			
Hotel stay			
Meals and other expenses			

represent time costs of participating in these activities. If the time taken in these tasks by clinicians and other personnel is quantified, this time can be multiplied by wage and fringe information, resulting in the cost of participation.

These three sets of personnel also incur opportunity costs during the *learning session* phase, where teams gather in person to discuss the results of their implementation, establish new goals for treatment, and strategize about ways to overcome observed challenges. These learning sessions lead to *action periods*, where clinicians actually deploy the strategies elicited during the learning session. Implementation costs are incurred by clinicians, supervisors, and administrators during these action periods. The BSC model is cyclical, iterative, and cumulative, with learning sessions leading to action periods, which in turn lead to new learning sessions. Hence, organizations have to be prepared to invest in several iterations of this process in order to successfully achieve implementation.

The BSC model is also associated with *nonlabor costs*. In the *prework* phase, these include the costs of procuring training in the intervention using the BSC model (tuition, and other materials) as well as travel expenses for (minimally) one clinician, an administrator, and a supervisor. Costs of tuition involves two types of costs—the costs of learning about the intervention (which are charged by its developers) and the costs of learning how to implement it using the particular implementation strategy (e.g., the costs of training in the BSC methodology, which are charged by the Institute of Healthcare Improvement). Although organizations bear the costs of learning about the intervention (which is a part of treatment cost), we only suggest counting the costs of implementation here. It may be difficult to disaggregate costs of an implementation strategy from the costs of the treatment that will be deployed using it. In other words, there may be no way to teach the "how" of an intervention without also teaching the "what" of an intervention. (It is, however, possible to do the reverse—teach the "what" of an intervention without teaching the "how" of it.) If researchers find themselves in this quandary, a sensitivity analysis that clearly distinguishes the costs of treatment from the costs of its implementation should be shown.

Implementation costs of the BSC approach during the learning sessions and action periods are largely time costs associated with case consultation, and the material costs associated with developing audiovisual materials of sessions undertaken by trainee psychotherapists (DVDs or videotapes), and then mailing them to trainers. To the extent that some learning sessions occur in person rather than over the telephone, travel costs need to be factored into the indirect nonlabor costs. The estimation of these costs is done in the same manner as for nonlabor costs for the service (treatment). All of these costs unfold over time (since the BSC approach may spill over into a succeeding fiscal year), and with stage of the implementation process (as different elements of the implementation process manifest and recede with implementation). Organizations undertaking their cost estimations will need to be cognizant of these time horizons and use appropriate discounting for complicated, multiyear implementation endeavors.

These cost domains can be easily generalized to other implementation strategies so long as all these strategies require time for learning, ongoing supervision, case consultation, curricula and other materials, and travel. Some types of generic

training will require the resourcing of idiosyncratic costs, and provider organizations will need to identify and quantify these idiosyncratic costs in order to accurately capture their overall cost of implementing a treatment.

The denominator of an economic evaluation depends on whether investigators are interested in clinical outcomes, or in a particular intermediate outcome. In the latter instance, to some extent, the denominator also depends on the intervention that is being implemented. Researchers wishing to study client improvement across several mental health interventions can use a generic instrument such as the Child Behavior Check List[59,60] and examine improvements in this measure across the BSC and "usual" implementation conditions. Researchers wishing to study a particular implementation outcome such as fidelity will need to use a fidelity scale developed for a specific intervention—if the intervention is trauma-focused cognitive-behavioral therapy,[61,62] then investigators will need to use the fidelity scale developed for this intervention.[63] The difference in fidelity measures between clinicians participating in the BSC implementation strategy and those participating in the weekend seminar, then, forms the denominator in the cost-effectiveness intervention.

■ IMPROVING THE STATE OF THE ART IN THE ECONOMICS OF DISSEMINATION AND IMPLEMENTATION

The relative paucity of studies reporting on economic evaluations of D&I suggests that researchers are currently focused on developing and refining implementation strategies rather than on evaluating them from an economic perspective. This section outlines some overarching themes emerging from this review.

First, the bearers of the costs of D&I efforts are likely to emerge as its key stakeholders. Provider organizations currently bear much of the costs of implementation, and information purveyors and health communicators bear much of the costs of dissemination. These organizations will need to be cognizant of the added costs imposed as a result of the use of D&I strategies, and clearly distinguish them from intervention costs. As discussed earlier, much of the variations in D&I costs likely result from the complexity of the D&I strategy, and approaches that require a large number of stakeholders and change agents interacting with various individuals within an organization over prolonged periods of time, or approaches that use highly expensive communicative media like television, likely will be very expensive with respect to D&I costs. In contrast, leaner approaches involving fewer personnel who do much of their work using videoconferencing, telephone consultations, and remote viewing of trainee's sessions will incur fewer implementation costs. Provider organizations that do not possess many resources will need to carefully consider their financial ability to implement treatments using expensive D&I approaches, and D&I scholars developing new approaches should provide data on the long-term advantages of their approaches to these various stakeholders.

Second, because D&I approaches have associated costs, this cost information can be used to develop a future research agenda on the comparative cost-effectiveness of D&I strategies. Currently, there seems to be little literature directly comparing one implementation strategy against another on their relative ability to achieve

implementation, service, or clinical outcomes. Incorporating costs into the mix will permit researchers to ask not only if a particular implementation strategy works, but also whether its outcomes are worth the money. Those strategies that produce greatest change in outcomes at lowest cost are likely to be the ones that are most practicable in everyday use. Much like for service costs, the costs of D&I are a function of price (the expense of various elements that go into a given approach) and quantity (how long it takes to disseminate or implement a treatment using this strategy, and with what intensity), aggregated over all resources required for the D&I effort. Thus, the most cost-efficient implementation strategies are likely to be the ones that reduce the complexity of the D&I process, the various resources necessary for the strategy, and the total duration of D&I while still producing desirable outcomes.[26]

Third, the rate-limiting step in the economics of D&I research is the nascent operationalization of implementation and service outcomes, and the need for greater development of dissemination processes and outcomes. D&I researchers interested in examining client outcomes can simply adopt the outcomes of cost-effectiveness studies on interventions. Other implementation outcomes such as fidelity, and some service outcomes such as timeliness, can be adequately operationalized given the current state of the science. However, researchers interested in other D&I outcomes will need to wait until many of these are better operationalized and measured.

Delivering a treatment, especially one that comes with expensive D&I costs, is very expensive; high-fidelity implementation requires considerable investment of organizational resources. Because multiprovider organizations are more likely to possess the kinds of resources and the economies of scale required to undertake successful implementation, it is likely that much of the traction in the economics of implementation will occur within large organizations. It also seems apparent that an organization's returns to investment in a treatment are greatest when most of the organization's clients are those who require that particular treatment. To train all clinicians in all treatments is likely to be cost prohibitive. For this reason, the economics of implementation also suggest greater organization and specialization in the health care enterprise.

From a policy perspective, the principal challenge is how to pay for implementation.[64] In health care, there are efforts focused around twin approaches of *value-based purchasing*[65]—assisting health care purchasers to contract with plans that offer greater value rather than merely lower cost—and *pay-for-performance*[66]—which involves tying fiscal and nonfiscal rewards and punishments to a variety of performance outcomes, such as health outcomes, patient satisfaction, scores on quality scorecards, screening rates, prescribing practices, adherence to clinical guidelines, and investments in information strategy, among others. More recently, pay-for-performance approaches have also been proposed for population-level health outcomes such as health inequalities.[67] Scholars have proposed methods for determining the policy cost-effectiveness of implementation, which attempts to provide guidance to policymakers on the relative costs and outcomes of implementation strategies and is expressed as a function of the cost-effectiveness of treatment, and cost-effectiveness of the practice (organization).[68] But in many disciplines, such as in mental health, the data necessary to determine these cost-effectiveness ratios are not extant. Paying for implementation, then, is an

alternative to paying for outcomes in such cases where outcomes are very difficult to pay for given problems in assessing risk.[69] If efficacious treatments are identified, then the task for policymakers is to help resource the delivery of these treatments by paying for their implementation.

■ SUMMARY

D&I imposes costs upon knowledge purveyors, provider organizations, public health organizations, and payers. However, whether these added costs will result in improved service delivery and, perhaps more importantly, client outcomes and improvements in population health remains an open question. If emerging studies reveal that defined implementation strategies are more cost effective than "usual" implementation, then policymakers and service providers will need to resource these added costs of implementation in order to assure the success and sustainability of high-quality health services over the long term.

SUGGESTED READINGS

Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. *Methods for the economic evaluation of health care programmes.* 3rd ed. New York: Oxford University Press; 2005.

This is a standard textbook for economic evaluation in health care. It includes a helpful critical appraisal checklist that can be applied to an intervention study.

Gold MR, Siegel JE, Russell LB, Weinstein MC. *Cost-effectiveness in health and medicine.* New York: Oxford University Press; 1996.

This text is the result of the deliberations of the Panel on Cost-Effectiveness in Health and Medicine. It is a seminal text in providing a clear and consistent set of methods for performing cost-effectiveness analysis.

Kilo CM. A framework for collaborative improvement: lessons from the Institute for Healthcare Improvement's Breakthrough Series. *Quality management in health care.* Sep 1998;6(4):1–13.

This article was used to motivate the Breakthrough Series case. The Breakthrough Series Collaborative is a specific type of implementation strategy, originally developed as a quality improvement tool in manufacturing, that is now widely used in health care settings.

Fixsen DL, Naoom SF, Blase KA, Friedman RM, Wallace F. *Implementation Research: A Synthesis of the Literature.* Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network; 2005.

Proctor EK, Landsverk J, Aarons G, Chambers D, Glisson C, Mittman B. Implementation research in mental health services: an emerging science with conceptual, methodological, and training challenges. *Administration and Policy in Mental Health.* 2009;36(1):24–34.

These are two good overviews of the field of implementation research. The review by Fixsen and colleagues is a comprehensive summary of the literature on implementation science that illustrates several conceptualizations relevant to the field, emphasizes programmatic aspects of the implementation enterprise, and provides recommendations for various stakeholders involved with implementation. The article by Proctor and colleagues conceptualizes implementation from a variety of perspectives and advances the operationalization of implementation outcomes.

Weinstein MC, Siegel JE, Gold MR, Kamlet MS, Russell LB, for the Panel on Cost-Effectiveness in Health and Medicine. Recommendations of the panel on cost-effectiveness in health and medicine. *JAMA.* 1996;276:1253–1258.

A consensus statement that outlines appropriate methodology for the use of cost-effectiveness analyses in health.

SELECTED WEBSITES AND TOOLS

Task Force on Community Preventive Services. Economic Reviews. http://www.thecommunityguide.org/about/economics.html#where. The Community Guide provides a repository of the 200+ systematic reviews conducted by the Task Force, an independent, interdisciplinary group with staff support by the Centers for Disease Control and Prevention. This link is for their economic reviews section, which reviews the applications of cost-effectiveness analyses to interventions analyzed by the Community Guide.

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