



The Colorado Implementation Science Center for Cancer Control



ACCORDS
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A COSTING GUIDEBOOK FOR IMPLEMENTATION SCIENTISTS

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CHAPTER 1: INTRODUCTION AND GETTING STARTED

Purpose of this Guidebook.

As more evidence-based programs emerge, demand for feasible ways to implement them increases, and one of the key issues to ensuring a program's successful adoption and sustainment is its cost. This guidebook is intended to walk implementation scientists and their team members through the process of developing and conducting cost analyses. It will explain basic principles and key methods for conducting cost analyses and reporting your results, primarily focusing on a micro-costing method called activity-based costing (ABC), which assesses costs by focusing on resources and time-use rather than dollars. The methods described in this guidebook are not an exhaustive one-size-fits-all solution to all costing and economic evaluation questions, but they will help you start conducting cost analyses on your own implementation science projects.

To watch our introductory video to our Costing Guidebook, click on this icon:



Who this Guidebook Is for:

This guidebook is *intended for implementation scientists, program evaluators, quality improvement specialists*, or similar professionals to use with their implementation partners and teams. It is always helpful to involve an economist, and this guidebook should help you identify issues where you need to collaborate with an economist. You will also learn about techniques, such as micro-costing and activity assessments, that you can often conduct independently, using this guidebook as your aid.

Possibly the best way to use this guidebook is to prepare for a conversation or consultation with an economist. This guidebook will provide background, approaches, and materials for cost assessments to make your interactions with an economist more efficient and productive.

Issues of feasibility, cost, burden, sustainability and scale-up of programs and implementation strategies are important issues for implementation scientists and prospective decision-makers. In conducting several implementation projects, we realized that it would be very helpful to have a handy guidebook and resource to educate about the *costing issues most relevant to implementation science* and help the development of cost analyses in projects. We also know that many implementation researchers and evaluators do not have access to an economist. There are numerous publications and authoritative texts on the details of health economics and advanced techniques, but to our knowledge no straightforward guide to implementation costing.

What this Guidebook Will Provide:

This guidebook will walk you through developing your own implementation costing methods and analyses. It will cover understanding types of costs, what costs to include, microcosting featuring activity based costing (ABC), process mapping, methods for collecting costs, how to report costs, and

estimating replication and sustainment costs. We *recommend proceeding sequentially through the guidebook unless you are familiar with micro-costing and ABC*, in which case you may wish to go directly to relevant chapters or appendices. Below, you will find a brief description of what will be included in this guidebook. At the end of each chapter, we provide a recap or summary to help you review key elements.

Is this Guidebook Right for You? What this Guidebook Will Not Provide:

The scope of this guidebook is purposively limited. First, as discussed in more detail in Chapter 7, it does not include instructions on conducting a Cost-Effectiveness Analysis, Budget Impact Analyses, or other more comprehensive and complex economic evaluations that assess downstream healthcare costs. Second, ABC, which is the primary micro-costing approach we describe, is technically not the same as time-driven activity-based costing (TDABC), as described by Kaplan et al. (2011). Third, there is no “one size fits all” approach to doing cost analyses; you will have to make decisions about precision versus feasibility and adaptations in conducting your own ABC. Questions around methods and procedures will invariably arise, as will considerations of which costs should be included.

The guidelines, tips, and examples throughout should provide sufficient information to collect and calculate basic costs based on time and resources spent by various staff and implementation partners, but *consultation with an economist, preferably one familiar with implementation research, is recommended and may be necessary for anything more involved*, such as cost-effectiveness or return-on-investment analyses. This guide is limited to helping you address the question of what it will cost to deliver and sustain your program, but we’ll cover more on this later.

After You Finish the Guidebook:

Your feedback is important to us!
Please click this icon to complete a short survey about our Guidebook:



Key References

At the end of each chapter, we will highlight a few key references in a short, annotated bibliography. All key and additional references are cited in the References section at the end of this guidebook.

Barnett et al. (2020). Collaborating with health economists to advance implementation science: a qualitative study. *Implement Sci Commun.* 2020 Sep 29;1:82. doi: 10.1186/s43058-020-00074-w. <https://pubmed.ncbi.nlm.nih.gov/33005901/>

Conducted semi-structured interviews of eight health economists and eight implementation science researchers with the goal of understanding the current capacity for collaborative research. Found that although there was a desire for collaborative research among both groups of researchers, there needs to be a stronger effort to build relationships outside of one's discipline and understand other disciplinary methodologies.

Dopp, A. R., Walker, S., & Raghavan, R. (in press). The role of economic evaluation in dissemination and implementation research. In R. C. Brownson, G. A. Colditz, & E. K. Proctor (Eds.), *Dissemination and Implementation Research in Health: Translating Science to Practice* (3rd edition) (pp. 232-250). Oxford University Press.

This chapter gives a brief review of economic evaluation, presents examples of economic evaluation in dissemination and implementation science literature, and proposes ways to improve (and promote) economic evaluations in implementation science.

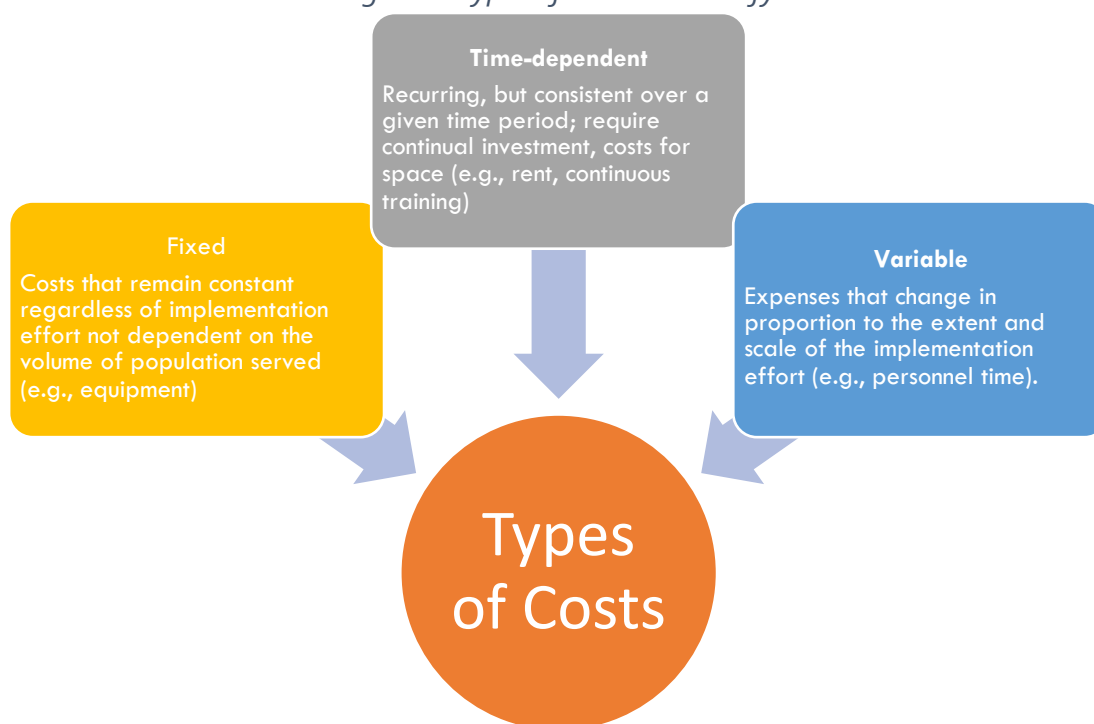
CHAPTER 2: KNOW YOUR COSTS

Background

Economic evaluations involve two main considerations: cost and effectiveness. While a program's effectiveness is certainly important, you may find conversations with potential adopters of your evidence-based program stop if you are unable to answer, "What is this going to cost me?"

To answer this question, let's start with some basics. In economics, costs are the monetary value of the resources required to produce a good or service. There are many types of costs used in economic literature, but we find it helpful to focus on the following for implementation projects: fixed-startup, time-dependent, and variable (displayed in Figure 1). Fixed-startup costs are 'one-time' costs that become negligible over time (e.g., equipment). Time-dependent costs, such as rent or continuous training, are recurring but consistent over a period of time; they require continued investment but are unchanged by the volume of participants for your program. Variable costs change as a direct function of how many participants your program or intervention is reaching; the staffing and personnel time spend delivering services are examples of variable costs.

Figure 1: Types of Costs to Identify



Incremental costs, a major bedrock to cost assessments in implementation science, represent the additional cost required to implement a new program in place of an alternative (frequently the status quo).

Note: An important corollary to incremental cost is opportunity cost. Any implementation project poses an opportunity cost: the adoption of one intervention may come at the expense of other programs, treatments, or daily work practices.

Another important consideration is which costs to include. A good rule of thumb is that **researchers should exclude any activity or cost that is required for research or would otherwise not be incurred outside the context of your research project.** Additionally, you want to be careful to collect costs on the implementation strategies used to deliver your project (e.g., intervention facilitation, adaptations, etc.). Intervention costs are included sometimes, but it depends; time and resources spent training staff to use the intervention would be included; whereas the time and resources that your research team spent developing a training program would usually be excluded. The table below provides more detail.

Ask Yourself:

- What resources are necessary for the successful implementation of this intervention in the 'real world' while achieving the same level of effectiveness observed in the trial?
- Would this resource be needed for replication or dissemination of this project?

Table 1: Which costs do we include?

Include: Costs that would be incurred if replicated outside a research setting	Exclude: Costs that would NOT be incurred if replicated outside a research setting
<ul style="list-style-type: none"> • Costs of Implementation <ul style="list-style-type: none"> ○ <i>Example: Time spent training and educating staff or adapting an existing program</i> 	<ul style="list-style-type: none"> • Costs of developing the intervention and its resources <ul style="list-style-type: none"> ○ <i>Example: Cost of creating a training program</i>
<ul style="list-style-type: none"> • Personnel and labor in delivering the program <ul style="list-style-type: none"> ○ <i>Example: Time in clinical visits with patients discussing continuous glucose monitoring</i> 	<ul style="list-style-type: none"> • Research-specific costs <ul style="list-style-type: none"> ○ <i>Example: Research staff time spent conducting IRB consent with participants</i>
<ul style="list-style-type: none"> • Equipment, materials, and supplies used to deliver program <ul style="list-style-type: none"> ○ <i>Example: Cost of printing patient materials, such as patient decision-aids</i> 	<ul style="list-style-type: none"> • Those which would not be replicated or needed beyond the scope of your research project <ul style="list-style-type: none"> ○ <i>Example: Time spent recruiting research participants (if different from non-research-based recruitment efforts)</i>
<ul style="list-style-type: none"> • Intervention costs that are incurred by the community member, patient, or implementation site <ul style="list-style-type: none"> ○ <i>Example: Cost of a medicine, treatment, or program participation to patient</i> 	<ul style="list-style-type: none"> • Intervention costs that are covered or incurred by an outside party or organization <ul style="list-style-type: none"> ○ <i>Example: Costs billed to Medicare, unless assessing from a societal perspective</i>
<p>NOTE: There is much debate regarding the inclusion of intervention costs vs. implementation costs. While there is no consensus on the matter, a general rule of thumb is to capture <u>all costs of implementation</u> (e.g., implementation strategies) and to <u>only include intervention costs that are being incurred by your research participants</u> (e.g., patients, families, practices, schools) as opposed to costs incurred to other organizations (e.g., Medicare).</p>	

One approach to identify and value the costs to deliver a program that is especially relevant to implementation science is micro-costing. Micro-costing measures each input in the delivery of an intervention and derives its cost. In this sense, micro-costing offers a precise “bottoms-up” approach. Resources to identify and measure as costs include but are not limited to equipment, materials, staffing, labor time, and FTE.

There are many ways to micro-cost, but one pragmatic approach that usually fits for implementation research is Activity-Based Costing (ABC) – a key focus of this guide. Kaplan et al. first developed ABC, and later TDABC, as a management approach to increase business profits (1991; 2007). They later introduced it into healthcare, and we find it an effective way to assess costs in implementation research, especially when many of the costs are due to personnel time (Kaplan et al., 2011; Cidav et al., 2020).

Note: Activity-based costing is a broadly applicable accounting method that breaks a program or process into discrete activities, measuring the time, resources, and cost associated with each activity.

The methods described in this guidebook are a simplified version of ABC, which falls short of true TDABC in a few ways. TDABC involves “constructing a dollar-per-minute capacity cost rate for each clinical resource” whereas our simplified version ABC is less interested in these measures of productivity (Kaplan 2014). Additionally, ABC heavily relies on self-reported time-based activity logs, rather than TDABC’s direct observation and measurement of time for each discrete activity (Cidav et al., 2020). For the purposes of cost analyses in implementation science, ABC is sufficient, but more information about TDABC can be found in Kaplan (2011), cited at the end of this chapter.

Perspective: for Whom and What Are You Costing?

It is important to decide the primary purpose for which you are costing. Is it to inform 1) sponsors of your research what it cost to deliver your program (or implementation strategies- the methods in the guidebook can be used for both) in your research evaluation; 2) potential adopters of the program what it will cost them in their setting; or 3) to report your findings to the research community. Your team should also consider what economists call perspective and standing, which dictate whether you should assess costs relevant to society as a whole (e.g., including national agencies such as the CDC); a private organization (e.g., a healthcare system); a clinical or practice setting (e.g., a primary care clinic and their staff); or the person who receives the services being studied (e.g. patients or employees).

Note: The perspective taken in a cost assessment impacts which costs you include, measure, and report. The methods described in this guidebook largely focus on costs to implementation teams, but you may need to broaden or narrow your scope if you are assessing the costs to the patient, organization, or society.

Regardless of which group of implementation partners (we use this term instead of stakeholders) you select, it is critically important to *involve them in the beginning and throughout your evaluation*. You will want to be sure you are assessing and reporting the costs that are of highest priority to them and which they will weight most heavily in making decisions.

Pros, Cons, and Alternatives to Activity-Based Costing (ABC)

As mentioned in the introduction, key benefits to the ABC approach of cost analyses are its feasibility and broad applicability. Micro-costing is considered one of the most precise and accurate methods of deducing costs in healthcare or community settings (e.g., schools, workplaces) (Keel et al., 2017). ABC has proven value in both the short and long term (Kaplan & Anderson, 2007). Processes can be redesigned or improved based on ABC, reducing costs and inefficiencies while doing so (Kaplan & Anderson, 2007).

Table 2: Pros & Cons to Activity-Based Costing	
Pros	Cons
Pragmatic and feasible: ABC as an approach is often easier to apply under budget, research, and time constraints. It usually does not require added economist support or expertise	ABC does not evaluate the health outcomes and effectiveness of an intervention. Its scope is limited only to the cost of implementing a program.
Generally, ABC is a precise and accurate method for determining healthcare and program delivery costs (Keel et al., 2017). It also offers transparency into activity and component costs.	The method of data collection can vary in precision and accuracy of results – e.g., observation is more precise than self-reported time estimates (Chapel & Wang, 2019).
ABC has short- and long-term value: it can assess costs of relevant alternatives or adaptations and identify potential for process redesigns or improvements (Kaplan & Anderson, 2007).	Unlike other analyses, ABC does not account for economic features, such as patients' or decision-makers' "preferences" or "willingness-to-pay." While a delivery setting might reduce costs by delivering an alternative, that intervention may cost more to the consumer, and ABC alone will not be sufficient to determine if the increased cost is worth it to the patient (Neumann et al., 2016).
ABC can be used iteratively to produce rapid feedback, informing management, personnel, and feasibility decisions (Kaplan & Anderson, 2007).	ABC does not directly address technology costs, capital infrastructure, or management costs that can alter or improve personal productivity. If not identified and measured, it can underestimate these costs.

If ABC isn't right for you, don't worry! There are other options. Many overlap, but each has its own features, uses, and burdens. You can find information about other economic evaluations, such as

cost-effectiveness analyses and cost-benefit analyses (Drummond et al., 2015) in Chapter 7. These are not one-for-one substitutes to ABC – in fact, micro-costing can be used to assess the cost component of each – but they explore additional economic questions (e.g., do the benefits outweigh the costs?)

Let's recap!

- ✓ Costs represent the resources it takes to deliver a good or service.
- ✓ As a rule of thumb, identify costs to include and exclude by asking: What will it take to replicate this project?
- ✓ Micro-costing and activity-based costing (ABC) are generally precise, accurate, and transparent approaches to cost measurement, but ABC's data validity can vary depending on cost-collection methods (e.g., self-report measures).
- ✓ ABC involves breaking down a project into discrete activities and evaluating: Who does what, for how long, at what cost, and with what additional resources?

Key References

Cidav et al. (2020). A pragmatic method for costing implementation strategies using time-driven activity-based costing. *Implementation Sci* 15, 28 (2020). <https://doi.org/10.1186/s13012-020-00993-1>

This article presents a new method for economic evaluation, combining time-driven activity-based costing and Proctor implementation framework. Use of this method is demonstrated with synthetic data.

Dopp et al. (2019). Mixed-method approaches to strengthen economic evaluations in implementation research. *Implementation Sci* 14, 2 (2019). <https://doi.org/10.1186/s13012-018-0850-6>

Provides examples of multiple methods to estimate costs and discusses the importance of different approaches each of which has strengths and limitations.

Kaplan et al. (2014). Using time-driven activity-based costing to identify value improvement opportunities in healthcare. *Journal of Healthcare Management*, 59(6), 399–412.

<https://doi.org/10.1097/00115514-201411000-00005>

After introducing TDABC into healthcare in 2011, Kaplan and the Harvard Business School piloted the micro-costing approach in local organizations. This paper explores the findings of that research and reports the informative value that TDABC offers in healthcare.

CHAPTER 3: HELPING YOU GET STARTED

To help you get started doing ABC for your project’s cost analysis, we want to walk you through the first step: **outlining your project** and **process mapping**. Process mapping is a way to understand the discrete, step-by-step activities involved in implementing and delivering your program, strategy, policy, or process (Antonacci et al., 2018; Antonacci et al., 2021). Mapping your workflows is not required, and it might not fit in all settings (e.g., classrooms), but from our personal experience it is highly recommended where applicable.

Notes Before Process-Mapping:

- We are using the terms “workflow diagram,” “process flow,” and “process map” interchangeably.
- Mapping your workflows is not required but recommended where applicable.
- You can draw your processes in Microsoft Vizio, Microsoft PowerPoint, Smartsheet, a comparable software application, or even by hand.

Let’s get started. Before mapping it out, we begin with a simple outline of your program or intervention. Frequently, these notes come from a discussion with the most knowledgeable individuals from your project – such as investigators or worksite supervisors. From them we want to learn a few key things: (1) what discrete activities are involved in delivering your program, (2) who will do them, (3) in what order, and (4) what resources will be needed to do so? Below you will find a sample work outline.

Table 3: Example Work Outline			
Shared-Decision Making Regarding Lung Cancer Screening (LCS)			
When does this occur?	What is the activity?	Who does it?	With what materials or resources?*
I. Patient Identification and Recruitment	A. Pull list of eligible patients	Front desk staff	Electronic health record (EHR) on computers
	B. Patient outreach	Front desk staff	Phones and computers
II. Patient Arrival and Eligibility Determination	C. Patient registration	Front desk staff	Paper forms and EHR
	D. Patient completes smoking status questionnaire	Front desk staff	Paper forms
	E. Document answers in chart and flag for LCS	Medical assistants	Paper forms and EHR
III. Visit with Clinician	F. Tobacco cessation counseling	Provider	Quit-line brochure

	G. Shared-decision making to get LCS or not	Provider	Decision-making aid (printed flyer for patient)
IV. Follow-up Activities	H. Insurance authorization	Front desk staff	Computer and EHR
	I. LCS: low-dose computerized tomography (LDCT) Order	Provider and medical assistant	Computer
	J. Scheduling and referral to hospital for LDCT scan	Front desk staff	Computer
	K. Review results with patient	Provider	Virtual visit via secure telehealth platform
<p><i>*TEST YOUR KNOWLEDGE: Can you identify which equipment and material costs should be included? Hint: Which ones are (1) specific to this intervention and (2) would be replicated in future LCS efforts? ANSWER: Smoking questionnaires, Quit-line brochures, and the decision-making aid are specific to this intervention and should be <u>included</u>. Other equipment (e.g., computers, phones, virtual health platform, EHR) are not directly attributable to this project and should therefore be <u>excluded</u>.</i></p>			

Process Mapping:

Great, we now have a full outline that captures (1) what the activities are, (2) who does them, and (3) what materials are necessary to do them. Next, we can put it together in a pretty process map, which we will demo in a video using Microsoft Vizio. While we like to use Microsoft Vizio, you may find PowerPoint or Excel suitable to mapping out your workflow.

For a more thorough demonstration
Of mapping out your work processes,
click the following video icon:



There are not hard-and-fast rules to follow when drawing your process maps, but we find it useful to organize them with horizontal rows representing staff roles and vertical columns for different stages in the workflow. This approach sets up a left-right approach, but some people will prefer to illustrate the workflow from top-down. After laying out personnel and time-points, start entering bubbles or boxes for each discrete activity in your outline. Once they appear in a sequential order that makes sense, you can begin connecting them with arrows.

Regardless of your approach, we ***highly recommend developing your maps collaboratively and iteratively with your implementation teams and partners.*** It is finished when it reasonably reflects the current workflow in practice (including optional activities) and has been checked by those implementing the program. You will also find additional examples of process maps below, organized in increasing order of complexity and nuance.

Figure 2: Process Map of Annual Wellness Study

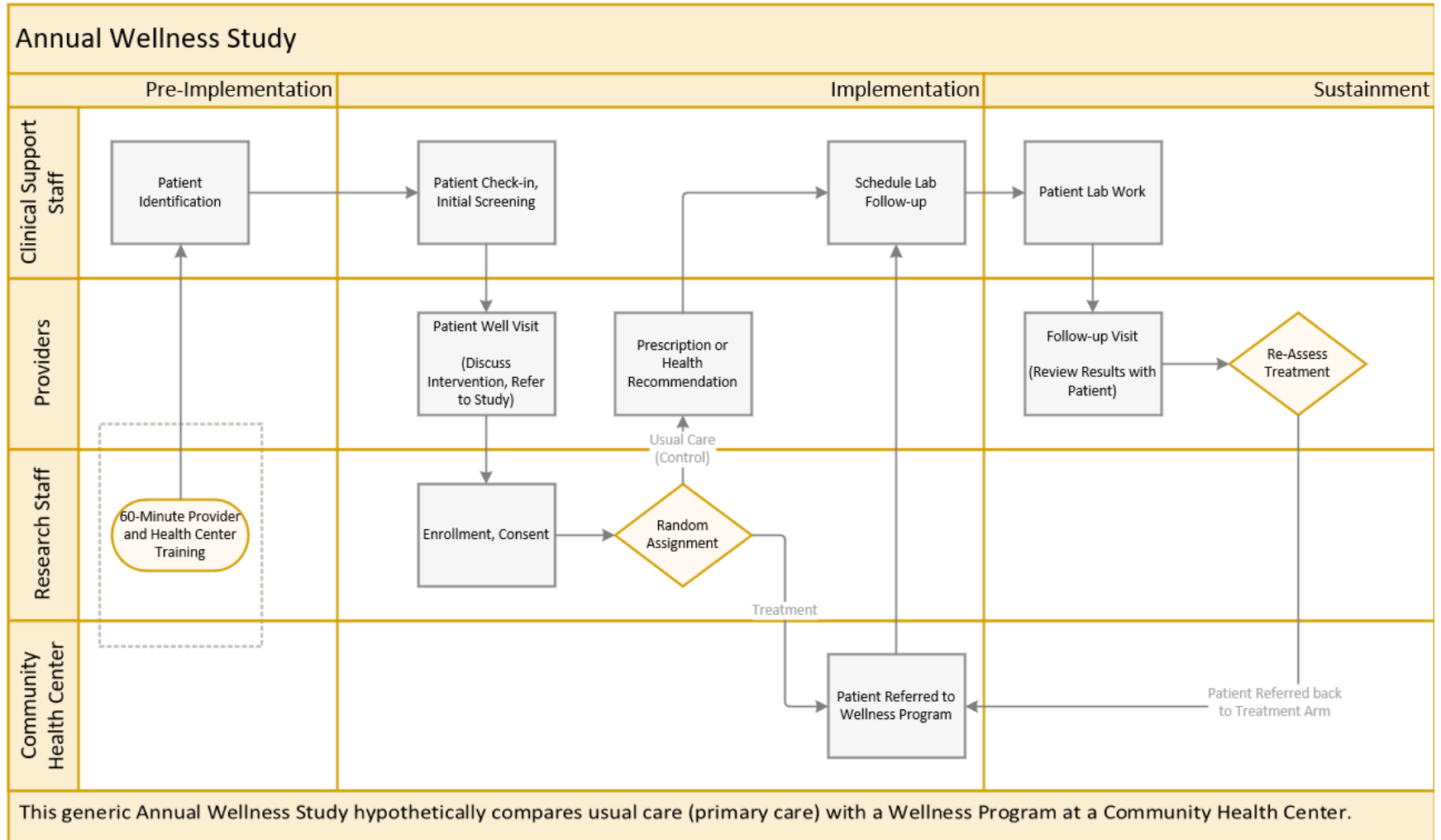
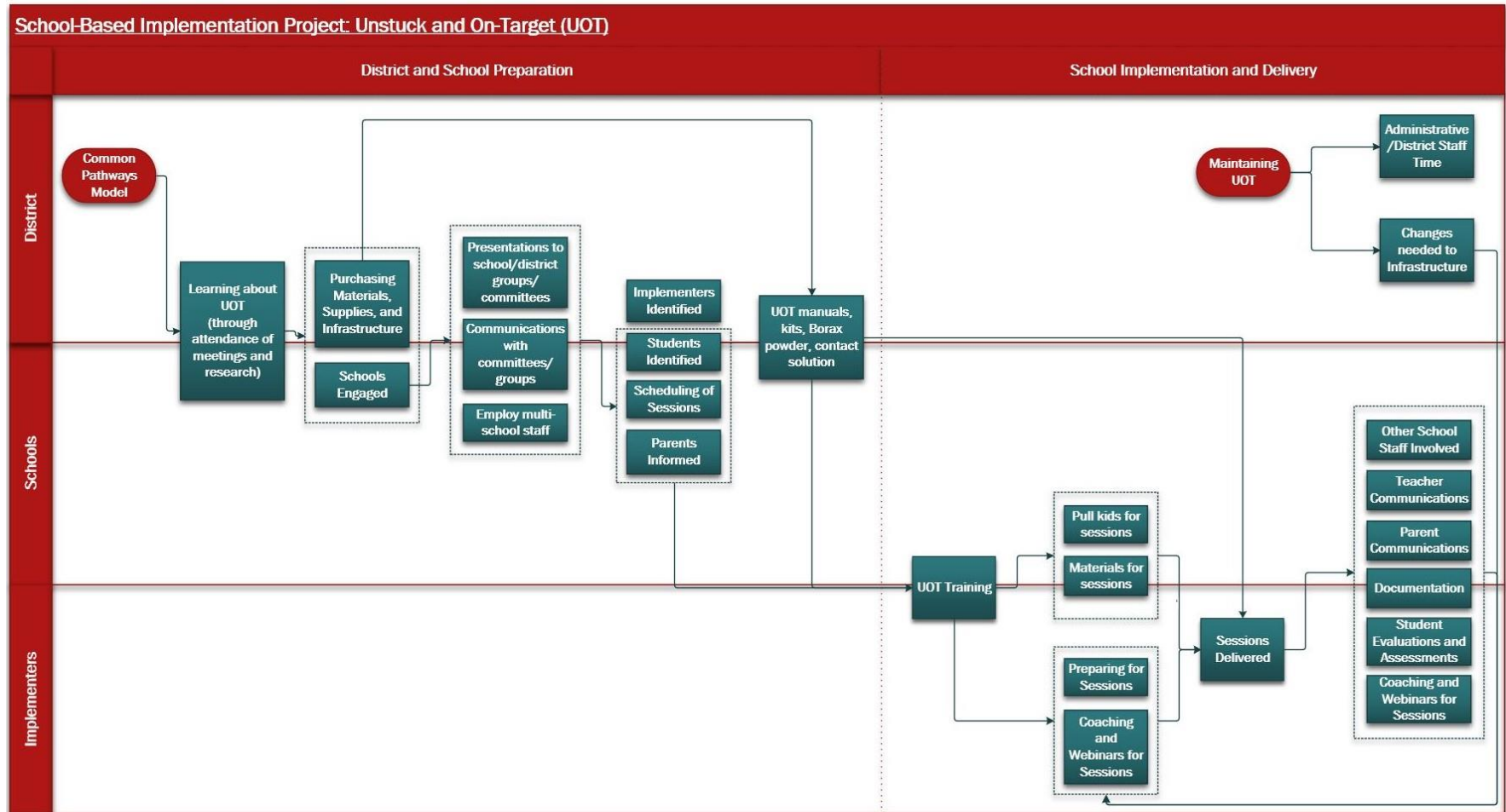
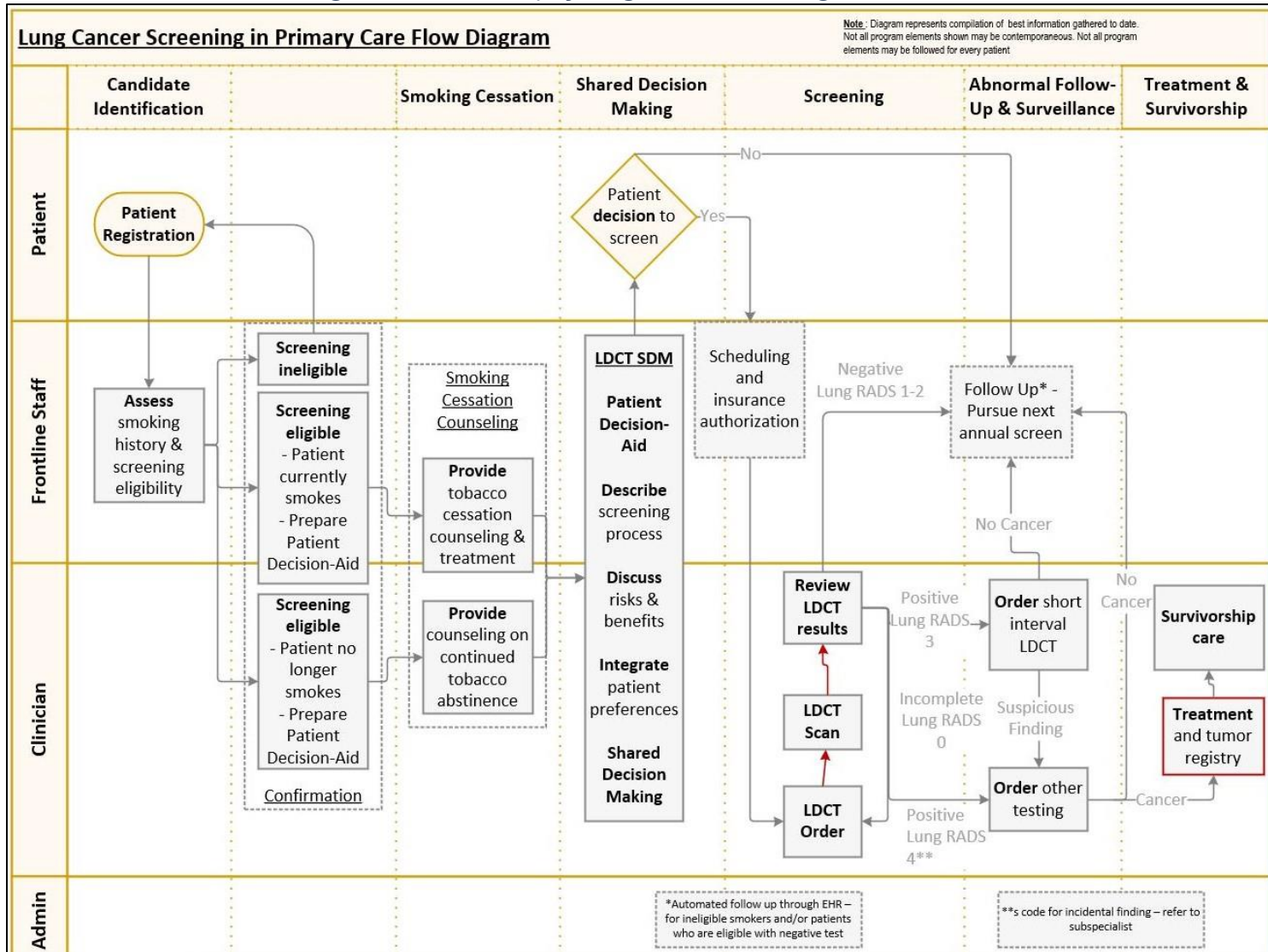


Figure 3: Process Map of School-Based Intervention



This process map was developed for the implementation of Unstuck and On-Target (UOT) in CO and VA schools.

Figure 4: Process Map of Lung Cancer Screening Intervention



This intervention used shared-decision making to facilitate lung cancer screening via low-dose computerized tomography (LDCT).

An Alternative to Process Mapping:

Process mapping might not fit in all projects and settings. For example, some programs in education settings might involve a less structured workflow when delivered during routine class time. Using the workflow outline could be sufficient to collect activity-based costs, but another alternative exists: the Cost of Implementing New Strategies (COINS) (Saldana et al., 2014).

Table 4: Alternative Costing Approach (adapted from Saldana et al., 2014): Education Implementation Program					
Phase	Stage	Activities (What?)	Who?	How long? (Hourly Rate)	Total Cost
I. Pre-Implementation	1. Engagement	Learn about program	Administrators	4 hours	\$100
	2. Consideration of feasibility	Internal communications and presentations	Administrators	6 hours	\$150
	3. Readiness planning	Identify implementers	Administrators	4 hours	\$100
II. Implementation	4. Staff hired and training	Implementer training	Teachers	20 hours	\$575
	5. Fidelity monitoring processes in place	Implementers prepare to implement	Teachers	18 hours	\$500
	6. Services and consultation begin	Implementation and delivery begin	Teachers	54 hours	\$1,500
	7. Ongoing services, consultation, fidelity monitoring, and feedback	Activity logs completed; fidelities conducted	Teachers	N/A	N/A
III. Sustainability	8. Competency	Qualitative interviews conducted	Teachers and administrators	N/A	N/A
<p>SUMMARY: This table details a hypothetical application of Saldana et al.'s COINS method in an education setting (2014). Although not fully depicted here, basic economic principles should still guide your cost assessment. <u>To determine "what will it take to replicate this project," you must determine total costs from fixed (capital), time-dependent (continuous training), and variable (personnel wages and labor) costs.</u></p>					

The COINS method uses the Stages of Implementation Completion (SIC) to assess costs across the duration and stages of an implementation project (Chamberlin et al., 2011). In Table 4 above we adapted the COINS approach and integrated it into our “phases of a project” perspective. We illustrate how this approach, which is less detailed than a process map, can be used to cost different project phases. If you do not have the time or need the level of detail generated by a process map, you can use some version of a COINS approach.

Costing an Intervention versus Implementation Strategies:

- As described in Table 1, there is much debate about whether cost assessments should consider implementation versus intervention costs.
- The answer to this debate lies with your project’s perspective and discussions you have with implementation partners and economists.
- Include implementation strategies (e.g., training modules) and interventions in your workflows and process maps.
- Our general rule of thumb is to collect cost data for all implementation strategies but only collect intervention costs incurred by whichever perspective your assessment assumes.
 - E.g., The perspective of a primary care clinic only considers the resources the clinic purchases to implement your program and deliver your intervention.

Let’s recap!

- ✓ Making a workflow outline prior to process mapping is helpful. For each activity, note: who, what, when, and with what materials or equipment? But don’t lose sight of which costs to include and exclude!
- ✓ Process maps are not mandatory, but they are highly recommended to facilitate cost-collection.
- ✓ One alternative to process-mapping is the Cost of Implementing New Strategies (COINS) method. Even with COINS, do not forget to follow the basic economic principles described in this guide.

Key References

Antonacci, G., Lennox, L., Barlow, J., Evans, L., & Reed, J. (2021). Process mapping in Healthcare: A systematic review. *BMC Health Services Research*, 21(1). <https://doi.org/10.1186/s12913-021-06254-1>

This systematic review of process mapping in healthcare outlines ten criteria for process map development. The authors also determine benefits of this approach, namely informing the "scope, design, development, and evaluation of interventions."

Keel, G., Savage, C., Rafiq, M., & Mazzocato, P. (2017). Time-driven activity-based costing in Health Care: A systematic review of the literature. *Health Policy*, 121(7), 755–763.

<https://doi.org/10.1016/j.healthpol.2017.04.013>

This systematic review of TDABC finds that most applications of the accounting methodology in healthcare involve the development of process maps or chronological process steps. It recommends using process maps when applying the principles of TDABC, initially developed with staff and then through contextual observations.

Ritzwoller et al. (2009). Costing behavioral interventions: a practical guide to enhance translation. *Ann Behav Med*. 2009 Apr;37(2):218-27. doi: 10.1007/s12160-009-9088-5.

<https://pubmed.ncbi.nlm.nih.gov/19291342/>

This paper recommends steps to evaluate the cost and cost-effectiveness of interventions. The authors emphasize distinguishing intervention costs from R&D/recruitment costs and including sensitivity analyses, principles which can be used to identify which costs to include and exclude when outlining your workflows.

Saldana et al. (2014). The cost of implementing new strategies (COINS): a method for mapping implementation resources using the stages of implementation completion. *Children and youth services review*. 2014 Apr 1;39:177-82.

Provides a method, instructions and examples of assessing costs of each of several steps in an implementation project. Designed to be used with the Stages of Implementation Completion by Saldana et al.

CHAPTER 4: HOW TO COLLECT COST DATA

At this point, you should have developed a work outline or process map. Now, it is time to select some of your methods, namely how you will be collecting the cost data. There are several options available, each with its own pros and cons, strengths and limitations.

Below you will find a table of several cost collection methods. Each approach varies in scope, burden, and timeframe. For example, observation requires research staff able to travel to study sites for data collection; whereas, time diaries shift that burden to implementation partners, asking them to self-report time data in recurring activity logs. Other approaches, such as targeted questionnaires or key informant interviews, can minimize burden on your implementation partners at the sacrifice of precision and accuracy of data. The onsite database or electronic health records (EHR) approach is included but still largely unproven. In theory, it would provide precise, real-time data; in actuality, it requires programming and pre-existing infrastructure in EHR systems, and it can have its own issues with precision and reliability.

Method	Definition	Strengths	Drawbacks	Resources Needed
Direct Observation	A member of your research team watches and records the time and resources needed to complete each activity.	"Gold standard" for the measurement of time data.	Places a high burden on research team.	Staffed observers, a travel budget, and time dedicated to observation. Alternatively, equipment and staff to arrange for audio or video recording.
Time-Diaries / Activity Logs	Implementation staff record the time and resources necessary to deliver the program or intervention.	Self-report time can be precisely attributed to each discrete activity.	Burden is placed on respondents, and self-report measures may result in accuracy and data quality issues.	A way of distributing time diaries, surveys, or questionnaires (e.g., REDCap); implementers willing and able to complete diaries on recurring basis; and research staff to create and distribute time diaries.
Targeted Questionnaires	Delivery staff indicate resources necessary to implement the program in a standardized questionnaire.	Responses can provide additional insight into implementation process.	Results may be less generalizable and precise.	A way to distribute questionnaires (e.g., REDCap); implementers willing and able complete questionnaires periodically; and research staff to create and distribute questionnaires.

Method	Definition	Strengths	Drawbacks	Resources Needed
Key Informant Interviews	Trained research staff interview knowledgeable informants regarding time and resources necessary for the intervention.	Like targeted questionnaires, you can learn more about implementation process through interviews.	Depending on their scope and depth, interviews may be less precise and generalizable.	Research staff trained to complete interviews and implementers willing to be interviewed who are knowledgeable of the whole program.
Onsite Database (or EHR-based) approaches	Delivery staff use their internal database to capture time spent on intervention activities.	In theory, an onsite database can provide real-time data; it can potentially provide automated collection of time-stamps; and it can also alleviate burden on research team.	In addition to programming issues, EHR-based approaches are largely unproven and have wide margin for error.	Pre-existing, internal database infrastructure that is adaptable to your project.
<p>For more information on various cost collection methods, see:</p> <p>Chapel, J. M., & Wang, G. (2019). Understanding cost data collection tools to improve economic evaluations of health interventions. <i>Stroke and Vascular Neurology</i>, 4(4), 214–222. https://doi.org/10.1136/svn-2019-000301</p> <p>Keel, G., Savage, C., Rafiq, M., & Mazzocato, P. (2017). Time-driven activity-based costing in Health Care: A systematic review of the literature. <i>Health Policy</i>, 121(7), 755–763. https://doi.org/10.1016/j.healthpol.2017.04.013</p> <p>Huebschmann, A. G., Trinkley, K. E., Gritz, M., & Glasgow, R. E. (2022). Pragmatic considerations and approaches for measuring staff time as an implementation cost in health systems and clinics: Key issues and applied examples. <i>Implementation Science Communications</i>, 3(1). https://doi.org/10.1186/s43058-022-00292-4</p> <p>Levy, D.E., Singh, D., Aschbrenner, K.A. et al. Challenges and recommendations for measuring time devoted to implementation and intervention activities in health equity-focused, resource-constrained settings: a qualitative analysis. <i>Implement Sci Commun</i> 4, 108 (2023). https://doi.org/10.1186/s43058-023-00491-7</p>				

Deciding which approach is right for your project is largely a question of resources, fit, and the frequency that you will be able to collect costs. Consider your workflow when choosing your method, as developed in Chapter 3. We strongly recommend working with your implementation partners to decide on the best data collection approach for your project

Still struggling to decide? Ask yourself:

1. How does a cost assessment fit into your implementation project? Is it intended to report costs of implementation for publication, or do you intend to use it internally to inform decision-making?
2. What is your delivery setting (e.g., in-person clinic, classrooms, online platform, etc.)?
3. Keeping in mind the burden you are placing on your implementation partners, what is the most precise and accurate data collection approach that your team could feasibly conduct?
4. How could you modify a cost collection method to meet the needs of your project?

There are other important considerations to making this decision. For one, what is the frequency with which you can collect data from your research sites (e.g., daily, weekly, or monthly)? Second, can you modify each cost collection approach to accommodate the needs of your implementation partners, such as collecting data at “key” or “random moments” during implementation? Lastly, what method is available to you, based on the phase of your implementation project – defined here as planning, implementation, and sustainment?. As it is essential to collect costs across each stage, you may find that retrospective methods, such as interviews or questionnaires, are better suited to your circumstances. The current stage of your project can place constraints on the methods you choose.

Table 6: Tailoring Methods to Your Needs

<u>Method</u>	<u>Frequency</u>	<u>Resource-Saving Modifications</u>
Direct Observation	Daily or weekly	To conserve project time and resources, conduct observation via moment sampling, such as: <ul style="list-style-type: none"> • Key Moment Sampling • Random Moment Sampling
Time Diaries / Activity Logs	Daily, weekly, or monthly	Time diaries offer great flexibility, adapting to many contexts. They can be done daily, weekly, or in real-time. You can also collect them at key or random moments.
Targeted Questionnaires	Monthly or by phase of project (e.g., planning, implementation, and sustainment)	Questionnaires can be rolled out prospectively, retrospectively, or at key moments.
Key Informant Interviews	By phase of project (e.g., planning, implementation, and sustainment)	To minimize burden on your implementers, interviews can be conducted retrospectively. To maximize precision, interviews can be conducted periodically.
Onsite Database (or EHR-based) approaches	Real-time data can, in theory, be collected for the entire duration of project	If your team or organization has a savvy computer programmer, collection of this time-based data can be conducted automatically.

We strongly recommend collecting cost data at a minimum of two or three time points during a project. This is because how long it takes to conduct activities often varies over time. Staff can become much more efficient over time, or adaptations may alter time and costs. Whenever possible, we recommend collecting costs in each phase of your implementation project – defined here as planning (or very early implementation), mid-implementation (or steady-state), and sustainment at the end of your project. Since it is essential to collect costs across each stage, you may find that retrospective methods, such as interviews or questionnaires, are better suited to your circumstances. The current stage of your project can place constraints on the methods you choose.

NOTE: Ultimately you need to answer, “what will this program cost to implement in this setting?” And to answer that question, you need to collect costs across all program phases.

Regardless of your chosen method, you will want to make sure to ask for and obtain information about costs and time data associated with each key stage: **planning, implementation, and sustainment.**

And we strongly recommend collecting costs at a minimum of two or three different points during a project’s duration.

For Your Consideration: For many Implementation Science projects, we find that **Activity Logs** make the most sense. Despite potential inaccuracy in their self-report methods, they offer precision and reliability while also being malleable to some resource-saving variations. However, the options should always be weighed against each other to determine the right fit for your project.

Cost Collection Templates and Forms

You should now have made some preliminary decisions regarding your methods for cost collection. Next, you need to develop the forms or templates to conduct the collection.

When developing your cost collection template, keep in mind:

1. Which costs to include and exclude (Chapter 2)
2. What types of costs you are collecting and measuring (Chapter 2)
3. Your process map (Chapter 3)
4. Your cost-collection methods (Chapter 4)
5. Time-based costs, including but not limited to delivery of the intervention and your implementation strategies
6. Costs that are not time-based, such as equipment, materials, and capital
7. Staff credentials and/or salaries are essential to valuing all time data

Depending on your method, your cost collection forms can take many forms. They can be interview guides, questionnaires, templates, or spreadsheets. Consider each item listed above when developing your forms. Sometimes it makes sense to start with a generic template that captures all essential data before adapting it into an activity log or interview guide. Below you will find a sample cost collection template. *In the appendix, you can also find other useful tools, such as interview guides, example templates, and how to use publicly available compensation data, such as via the Bureau of*

Labor Statistics (BLS), for your assessment. You are free to use the resources in our appendix to guide the development or adaptation of your own cost collection forms.

Table 6: Cost Collection Template (Personnel Costs)

Personnel Resources: For each staff member involved in the delivery of your program, indicate their name, credentials and salary. Then, note the amount of time in minutes that they spend on each activity in your process map on a typical patient encounter. Your <u>best estimate</u> is sufficient.																				
	Staff Member	Credentials	Annual Salary	Fringe Benefits	Per-Minute Wage	New Hire?	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7	Activity 8	Activity 9	Activity 10	Additional Notes	Total Time	Total Cost	
Ex:	Sally Smith	RN	\$82,750.00	31%	\$0.87	No	0	10	5	3	0	0	0	5	5	0	-	28	\$24.32	
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The example template above allows you to collect personnel cost and time data. But as we learned earlier, that is only one element of the cost data you need to collect. Below you will find a template that collects costs for equipment and materials of your intervention. Both templates are linked in the appendix.

Table 7: Cost Collection Template (Resources, Materials, and Equipment)

Additional Resources and Equipment: What additional resources, materials, and equipment were necessary to deliver your program? Indicate each item, its cost, its quantity, and the frequency that cost recurs (if ever). Your <u>best estimate</u> is sufficient.					
	Items or Materials	Cost	Quantity	Frequency	Notes
Ex:	CGM Demo Devices	\$200	5	once every 3 months	-
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-

NOTE: While the tables displayed are purposely limited to personnel- and resource-based costs, do not forget to consider all types of costs, namely those described in Chapter 2 and Figure 1.

Before It's Too Late – Estimating Costs Before You Start Implementation

The tools and methods in this guidebook should allow you to successfully collect, analyze and report your implementation costs. However, many effective interventions are not always feasible to conduct in non-research settings, and it can be more efficient to estimate and predict your implementation costs on the front end of your project. Conducting a cost projection or estimation when planning your project can be very helpful and save the time and money involved in implementing and evaluating a program that it is clear from the outset will be way too expensive to ever be adopted in any real world settings. There are even some formal cost estimation and prediction models available to use (O'Leary et al., 2022).

"Back of the Envelope" Costing Checklist

- Personnel Salaries
- Personnel Time
- Equipment
- Materials
- Space/Facilities

Where formal methodologies for cost estimation will likely have greater accuracy and validity, informal approaches, such as "back of the envelope" estimations or "sniff test" approximations may prove sufficient to inform your decision-making partners. For example, if you can estimate the essential resources of a cost evaluation – that is: staff time delivering the intervention, staff salaries, and costs of training, equipment and materials – that would provide you with a rough estimate. Summing the value of these important resources might be acceptable to serve as a conversational starting point with potential decision-makers.

Let's recap!

- ✓ To help you decide which cost collection method to use, ask yourself: What is the most precise and accurate data collection approach that your team could feasibly conduct?
- ✓ You can always modify or tailor an approach to meet the needs of your project.
- ✓ Time and cost data are essential for each phase of implementation: planning, implementation, and sustainment.
- ✓ Cost collection templates must include staff credentials, labor time, and resources. Additionally, do not forget to consider which costs should be included and excluded!
- ✓ "Back of the envelope" estimations can inform decision-making on the frontend, when considering a program or intervention.

Key References

Eisman et al. (2021). Implementation science issues in understanding, collecting, and using cost estimates: a multi-stakeholder perspective. *Implementation Science* (2021) 16:75

<https://doi.org/10.1186/s13012-021-01143-x>

This paper provides examples of key cost components especially important to different perspectives. It provides specific guidance and recommendations for cost assessment activities that address the concerns of various parties, identifies areas of agreement and conflict in priorities, and outlines theoretically informed approaches to understanding conflicts among the perspectives of different groups and processes to address them.

Saldana et al. (2014). The cost of implementing new strategies (COINS): a method for mapping implementation resources using the stages of implementation completion. *Children and youth services review*. 2014 Apr 1;39:177-82.

Provides a method, instructions and examples of assessing costs of each of several steps in an implementation project. Designed to be used with the Stages of Implementation Completion by Saldana et al.

Chapel, J. M., & Wang, G. (2019). Understanding cost data collection tools to improve economic evaluations of health interventions. *Stroke and Vascular Neurology*, 4(4), 214–222.

<https://doi.org/10.1136/svn-2019-000301>.

This literature review of cost collection methods in micro-costing evaluations looks at each alternative approach outlined above in this chapter.

CHAPTER 5: REPORTING YOUR RESULTS

You have collected time and cost data. Now what? Calculate and analyze. Although we have thus far focused on time data, do not forget that you need to value that time with salaries and wages! You may pull that information from either publicly available compensation data, such as the Bureau of Labor Statistics (BLS) or with real-world salaries.

A Note on Salaries:

- Most projects use aggregated salaries from the Bureau of Labor Statistics (BLS). They provide good generalizability, but face challenges of their own:
 - Some occupations are not included in BLS's list or do not fit neatly into their boxes.
 - A national average can be a poor reflection of local market salaries or conditions.
- Real-world salaries – the actual wages that your implementation partners earn – may not be as generalizable, but they can inform decision-making within their specific workplace. However, many organizations are not comfortable disclosing that information.
- Either option, or anything in between, will require use of fringe benefits rates to determine per-minute wages. Failure to do so will result in an underestimation of costs by approximately 31%.

Calculating and summarizing your costs:

Now that you have staff time for each individual activity in your process maps, you can translate that into a simple spreadsheet for analysis. To calculate costs, please follow these steps:

Calculating Your Results Step-by-Step:

1. List everyone involved in the delivery of your program or intervention, along with their credentials.
2. For each individual, sum their reported time across each category to determine their total time.
3. Calculate their per-minute wage:
 - a. Calculate the dollar value of their fringe rates by multiplying their rate by their annual salary (e.g., 31% x \$118,040 for the Nurse Practitioner in the table below).
 - b. Sum their annual salary with the dollar value of their fringe rates to get total compensation.
 - c. Convert the per-year total compensation to a per-minute wage by dividing it by 52 weeks and 40 hours per week.
4. For each individual, multiply their total time reported (number of minutes) by their per-minute wage to determine the cost of labor for that individual.
5. Then, separately, sum the time and labor cost for each individual to determine total personnel time and cost.
6. Do not forget to account for other types of costs (fixed, variable, and time-dependent) – such as resources, materials, and subscriptions – and multiply according to their temporality and recurrence.

Table 8 shows sample results of personnel cost in the program or intervention, developed using the steps detailed above.

Table 8: Personnel Costs					
Credentials	Time	Salary	Fringe Benefits	Per Minute Wage	Personnel Cost
NP	93	\$118,040	31%	\$1.24	\$115.23
MD	31	\$252,480.00	31%	\$2.65	\$82.16
MD	24	\$252,480.00	31%	\$2.65	\$63.61
DO	116	\$252,480.00	31%	\$2.65	\$307.43
Front Desk	38	\$42,580	31%	\$0.45	\$16.98
LPN	33	\$51,850	31%	\$0.54	\$17.96
MA	8	\$38,190	31%	\$0.40	\$3.21
MA	26	\$38,190	31%	\$0.40	\$10.42
PA	25	\$119,460.00	31%	\$1.25	\$31.35
PA	43	\$119,460.00	31%	\$1.25	\$53.92
PA	79	\$119,460.00	31%	\$1.25	\$99.06
Total	516			\$14.74	\$801.33

While this time-based personnel cost is informative and important to report, it needs to be added together with all other reported costs, such as equipment, materials, space, overhead, and training, wherein training is a key implementation strategy being used. Using the above summed total of time-based personnel cost and other costs gives you your total cost, and it is displayed in the table below, which compares costs across each phase of implementation. For simplicity, Table 9 does not break costs down into fixed, variable, and time-dependent, but it is essential that all calculations take into account the temporality and recurrence of all measured resources.

Table 9: Total Costs			
	Planning	Implementation	Sustainment
Personnel Time (minutes)	115.0	516.0	350.0
Personnel Cost (\$)	\$ 178.25	\$ 801.33	\$ 542.50
Training Costs (\$)*	\$ 447.00	\$ 78.00	\$ 0.00
Space and Overhead Costs (\$)*	\$ 396.00	\$ 396.00	\$ 396.00
Equipment and Materials Costs (\$)*	\$ 12.00	\$ 42.00	\$ 38.00
Total Cost (\$)	\$ 586.25	\$ 1,239.33	\$ 976.50
*Note: Your equipment, training, and overhead costs may very well be recurrent. They may also be fixed or time-dependent costs. Make sure to adjust calculations accordingly before determining Total Cost.			

Don't Forget: It is essential that you collect, analyze, and report costs for each phase of implementation: planning, implementation, and sustainment.

Although the above table helps you determine the total cost, that does not mean your analysis is completed. Recall that you need to determine what it costs to implement a program, and this means you need to determine the costs before and after. In economic terms, this is called the **incremental cost**; it is also the **total cost of implementation** in implementation science. Although this principle usually compares a new intervention to the status quo (Equation 1), you can also use it to compare multiple alternatives, such as implementation strategies (Equation 2).

$$\begin{aligned} \text{Equation 1: Total Cost of Implementation} &= \text{Incremental Cost} \\ &= \text{Total Cost After (Intervention)} - \text{Total Cost Before (Status Quo)} \end{aligned}$$

$$\begin{aligned} \text{Equation 2: Comparing Costs of Different Implementation Strategies} \\ &= \text{Total Cost (Strategy 1)} - \text{Total Cost (Strategy 2)} \end{aligned}$$

What if we don't know what our implementation sites' costs were before? Ask yourself:

- Were they delivering this care, program, or alternative service prior to implementation?
- If you were to start this program from scratch in another setting, what resources, supplies, and labor would be necessary?
 - To answer these questions, you may need to estimate and/or make assumptions about costs in the status quo, prior to implementation, or in the alternative states.
 - An economist can help you consider and estimate these costs to determine the total cost of implementation and incremental cost.

The changes in costs and time between each period also highlight important findings. Are startup costs higher than implementation costs? Do implementing personnel become more efficient in delivering the program? For how much of the total costs do fixed-startup (e.g., equipment) and time-dependent costs (e.g., rent or subscriptions) account?

What other analyses can we do with our data?

- Sensitivity analyses – how do costs change if different personnel are involved?
- Percentage change between periods of implementation
- Breakdown of costs per activity in your process map or phase of implementation
- Display the allocation of time and costs per implementing staff role or occupation

Reporting your costs:

Once you have completed your analyses, report them in simple, reader-friendly tables or graphics. The essential elements are: (1) personnel time, (2) personnel costs, and (3) all other costs. More detailed assessments will display these by period of implementation and by types of costs: fixed, variable, and time-dependent.

Additionally, not all dollars are equal! Due to inflation and the time value of money, the value of 2013 dollars differ from those of 2023 and 2033. When reporting results, note the currency and year used for your assessment – and possibly suggest that decision-makers discount costs accordingly to obtain present day estimates before implementing in new settings.

Table 10: Tips for Reporting Results	
In Publications	To Implementation Partners
<ul style="list-style-type: none"> • Be succinct and focus on methods, such as the who, what, and when of your cost data collection • Follow one of the reporting guidelines for economic analyses: e.g., CHEERS • Be very clear about the perspective: clinic or organization; patient or family; payer; society • Specify and report your assumptions • Conduct sensitivity analyses and provide caveats and limitations to analyses • Taking into consideration the time value of money, note the currency and year used for your assessment 	<ul style="list-style-type: none"> • Have 1-2 pages of clear conclusions and more details as desired or requested • Use figures or clear tables to describe your main findings and results • Think from the partners' perspectives and anticipate their questions; anticipate and answer those proactively • Note major factors that could change your conclusions • Provide examples of things that might change the conclusion: e.g., staffing differences; personnel time; automated tablet • Consider discounting costs according to the time value of money

Sample Figures:

Below are sample figures reporting costs from Cidav et al. (2020), followed by a couple sample figures of our own. While the bare essentials of reporting costs are reflected by Figure 4 and Table 11, additional figures provide implementation partners and prospective readers more insight into what aspects of the project bear most of the costs.

Figure 5: Percentage of Total Implementation Costs, Cidav et al. (2020)

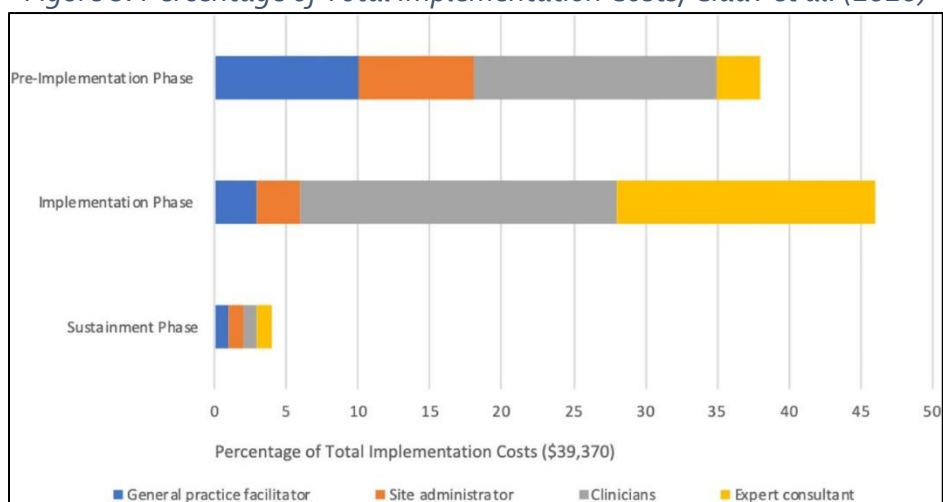


Figure 6: Time Spent by Activity

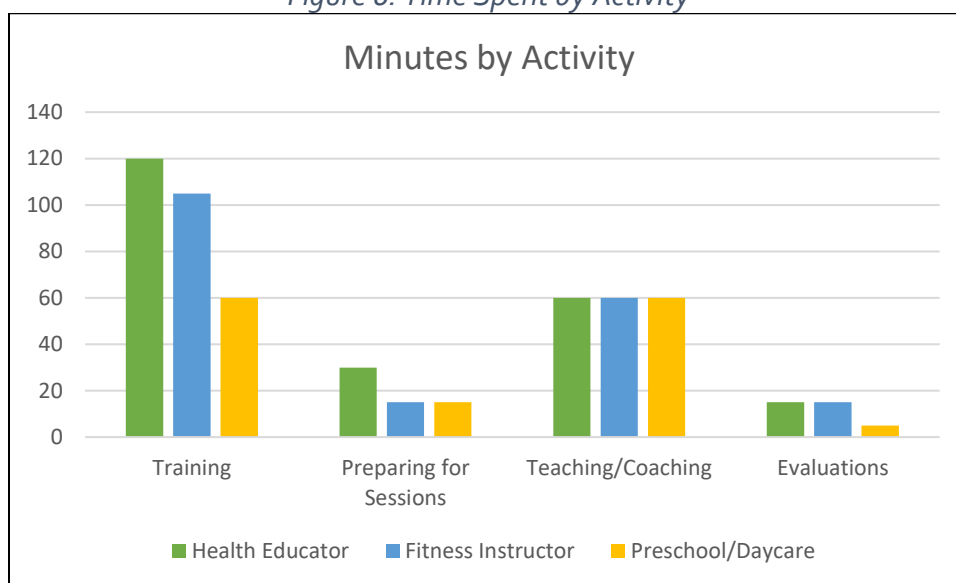


Table 11: Costs by Activity			
	Health Educator	Fitness Instructor	Preschool/Daycare
Training	\$81.79	\$50.56	\$27.12
Preparing for Sessions	\$20.45	\$7.22	\$6.78
Teaching/Coaching	\$40.89	\$28.89	\$27.12
Evaluations	\$10.22	\$7.22	\$2.26

Let's recap!

- ✓ Determine from which source you wish to pull salaries.
- ✓ For each phase of implementation, calculate personnel costs, resource costs, and costs of implementation strategies to determine total cost.
- ✓ Total cost of implementation is, within implementation science, the same as incremental cost: Costs After minus Costs Before.
- ✓ When reporting results, follow reporting guidelines, specify assumptions, and consider adding sensitivity and other secondary analyses.

Key References

Cidav et al. (2020). A pragmatic method for costing implementation strategies using time-driven activity-based costing. *Implementation Sci* 15, 28 (2020). <https://doi.org/10.1186/s13012-020-00993-1>

This article presents a new method for economic evaluation, combining time-driven activity-based costing and Proctor implementation framework. It contains examples of summary visual displays for use for providing feedback to decision makers.

Husereau D, Drummond M, Augustovski F, de Bekker-Grob E, Briggs AH, Carswell C, Caulley L, Chaiyakunapruk N, Greenberg D, Loder E, Mauskopf J, Mullins CD, Petrou S, Pwu RF, Staniszweska S; CHEERS 2022 ISPOR Good Research Practices Task Force. Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations. *BMC Med.* 2022 Jan 12;20(1):23. doi: 10.1186/s12916-021-02204-0. PMID: 35022047; PMCID: PMC8753858.

This article presents reporting guidance for health economic evaluations.

Kaplan, R. S., & Porter, M. E. (2011). How to solve the cost crisis in health care: The biggest problem with health care isn't with insurance or politics. It's that we're measuring the wrong things the wrong way. *Harvard Business Review*, 89(9), 46–64.

This article presents the steps for conducting TDABC and estimating the cost of each individual resource. It goes beyond the scope of ABC in regards to capacity cost rates, but it is a helpful source for a more rigorous assessment.

Ritzwoller et al. (2009). Costing behavioral interventions: a practical guide to enhance translation. *Ann Behav Med.* 2009 Apr;37(2):218-27. doi: 10.1007/s12160-009-9088-5.

<https://pubmed.ncbi.nlm.nih.gov/19291342/>

This paper recommends steps to evaluate the cost and cost effectiveness interventions. The authors emphasize distinguishing intervention costs from R&D/recruitment costs and also including sensitivity analyses, principles which can be used to identify which costs to include and exclude when outlining your workflows.

CHAPTER 6: WHAT WILL IT COST TO REPLICATE THIS PROGRAM IN DIFFERENT SETTINGS?

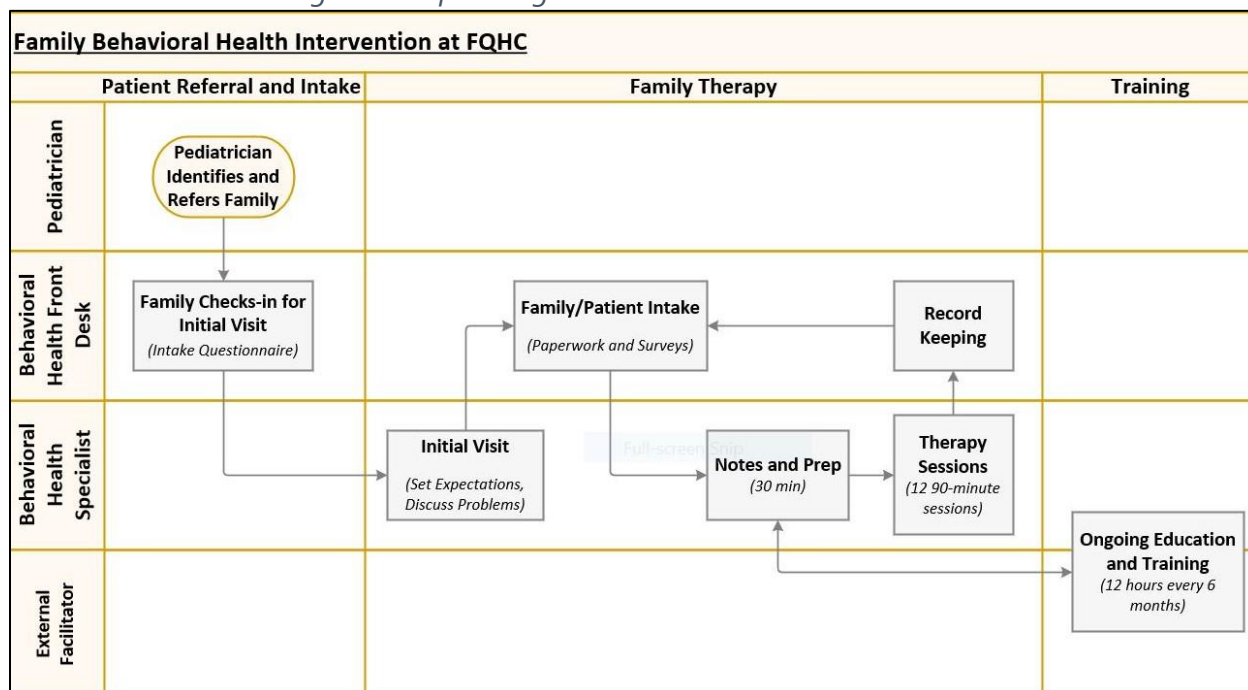
The previous chapters have covered key issues in planning for, conducting and reporting cost assessments relevant for implementation science. In this chapter, we discuss issues in generalizing results from your current project to other settings – scaling up (to similar organizations or systems) and scaling out (to different types of settings and locations). Your project's collected costs are informative and useful for estimating costs, but they are conducted in a specific research context. They have a certain set of organizations, staff, and participants that may vary from new settings potentially interested in your program. As such, the costs under these specific conditions will likely be different from those incurred in other settings and circumstances. What potential adopters and decision-makers want to know is the 'replication cost': what will it cost them in their setting?

Why consider replication costs? While what it cost your sites to implement your intervention is helpful, readers will want to know what it will cost them in their settings.

Replication Costs in Action

To illustrate how replication costs can be estimated, consider the following example about a family behavioral health intervention in a federally qualified healthcare setting (FQHC). Depicted below in the workflow diagram, the program consists of 12 90-minute therapy sessions with a behavioral health specialist, who also expends 30 minutes of preparation time per session and ongoing training and education once every six months.

Figure 7: Replicating a Behavioral Health Intervention



After the successful implementation of this behavioral health intervention at a large FQHC, a Veterans Affairs Mental Health facility is interested in adopting this program. Key differences between these two applications include the VA lowering the number of therapy sessions from 12 to 8, a robust EHR system for record keeping (as opposed to the bookkeeping at the FQHC), and billing fees and costs that will be incurred by the national VA system (as opposed to the local healthcare center). To visualize how this program's costs will be replicated in the new setting, please consider the following table.

Table 12: Replicating a Behavioral Health Intervention					
Original Setting (FQHC)			Replication Setting (VA)		
Activity 1: Patient Intake	Time (hrs)	Cost	Activity 1: Patient Intake	Time (hrs)	Cost
Front Desk	1.00	\$19.08	Front Desk	0.67	\$12.78
Activity 2: Notes and Prep	Time (hrs)	Cost	Activity 2: Notes and Prep	Time (hrs)	Cost
Behavioral Health Specialist	6.00	\$139.98	Behavioral Health Specialist	4.00	\$93.79
Activity 3: Therapy Sessions	Time (hrs)	Cost	Activity 3: Therapy Sessions	Time (hrs)	Cost
Behavioral Health Specialist	18.00	\$419.94	Behavioral Health Specialist	12.00	\$281.36
Activity 4: Bookkeeping	Time (hrs)	Cost	Activity 4: Update EHR	Time (hrs)	Cost
Front Desk	3.00	\$57.24	Medical Assistant	0.67	\$11.98
Activity 5: Ongoing Training	Time (hrs)	Cost	Activity 5: Ongoing Training	Time (hrs)	Cost
Behavioral Health Specialist	24.00	\$559.92	Behavioral Health Specialist	24.00	\$559.92
External Facilitator	24.00	\$735.36			
Other Costs:	Time (hrs)	Cost	Other Costs:	Time (hrs)	Cost
Bookkeeping	0.00	\$500.00	EHR Fees	0.00	\$950.00
Materials	0.00	\$575.00			
Training Materials					
Total Cost Estimate:	Time (hrs)	Cost	Estimated Replication Costs	Time (hrs)	Cost
	52.00	\$3,006.52		41.33	\$2,409.83

In summary, for a site or other research group deciding whether to implement your program in their setting and context, they will need to know the following about your intervention: staff makeup, workflow, volume of recipients, and the resources and capital needed for delivery (e.g., virtual health platform, materials for a community health class). Anticipating those needs will help inform other decision-makers. The best way to give prospective readers that information is by providing full transparency in your results so they can determine if their replication would cost more or less.

Replication Cost Calculator

To further assist your replication cost estimates, we developed a Replication Cost Calculator, previewed below in Table 13. Click the download icon to obtain this table in Excel, review the instructions, and revise it as necessary to fit the contexts of your implementation project.

Table 13: Replication Cost Calculator 

	Example				Intervention				Replication Scenario 1			
Activity	Weekly Time (Minutes)	Personnel	Per-Minute Wage	Cost (\$)	Weekly Time (Minutes)	Personnel	Per-Minute Wage	Cost (\$)	Weekly Time (Minutes)	Personnel	Per-Minute Wage	Cost (\$)
Activity 1	5	EX	\$0.69	\$3.46								
Activity 2	10	EX	\$0.69	\$6.93								
Activity 3	17	EX	\$0.69	\$11.78								
Activity 4	25	EX	\$0.69	\$17.32								
Activity 5	3	EX	\$0.69	\$2.08								
Activity 6	8	EX	\$0.69	\$5.54								
Activity 7	15	EX	\$0.69	\$10.39								
Activity 8	5	EX	\$0.69	\$3.46								
Activity 9	5	EX	\$0.69	\$3.46								
Activity 10	3	EX	\$0.69	\$2.08								
Personnel Costs	96	-	-	\$ 66.50	0	-	-	\$ -	0	-	-	\$ -
Other Costs	-	-	-	\$ 35.00				\$ -				\$ -
Materials	-	-	-	\$ 25.00								
Equipment	-	-	-	\$ 5.00								
Resources	-	-	-	\$ 5.00								
Total Weekly Costs	-	-	-	\$ 71.50				\$ -				\$ -

What do readers need to know?

- Your staff makeup: which occupations are involved?
- Your workflow: what activities were involved?
- Volume of recipients: how many patients, students, or families benefitted from your program? Hint: Report costs per 100 patients or per 30 students.
- The resources and capital needed for delivery: Did you need a virtual health platform? Were new classroom materials necessary?

A Note on Sustainment Phase Costs:

Sustainment is an important and growing focus of implementation science. Most of the concepts and recommendations above regarding replication costs also apply to “sustainment costs.” The reasons for sustainment costing are twofold: 1) there are some initial costs such as equipment purchases or initial training that are one time only (though re-training may be required); and 2) most importantly, ***seldom will settings continue a program exactly as it was implemented in your research evaluation.*** Sustainment phase costs typically include time-dependent and variable costs. When meeting with decision makers about whether they will continue a program, there will very likely need to be some adaptations made in the details of how a program is implemented to make it become a routine part of the workflow and processes of the organization. Costing these changes will provide a better estimate of what it will cost the site than what it cost during the recently completed implementation.

The sustainment of your intervention hinges on the following. How will it be adapted?

- How many participants will be identified?
- What type of staff will deliver the program?
- Will you change the timing or number of sessions (e.g., will there be one 45-minute session instead of two 30-minute sessions)?
- How many participants will be seen in each cohort?

Let's recap!

- ✓ Not all settings are created equal. Due to differences in resources, it may cost more to replicate a program in a different setting.
- ✓ Help inform your readers' decision-making with transparency concerning staff makeup, workflow, volume of recipients, and the resources or capital necessary to implement.
- ✓ Sustainment costs refer to those resources necessary to continue your program, and they frequently involve some adaptation or changes that need to be captured.

Key References

Ritzwoller, D. P., Sukhanova, A., Gaglio, B., & Glasgow, R. E. (2009). Costing behavioral interventions: A practical guide to enhance translation. *Annals of Behavioral Medicine*, 37(2), 218–227.

<https://doi.org/10.1007/s12160-009-9088-5>

This practical guide includes a discussion of sensitivity analyses as a way to inform decision-making regarding the future adoption of considered implementation projects. Like the replication costing methods described in this chapter, sensitivity analyses can "estimate the range of intervention costs in a variety of settings and circumstances."

Rhodes et al. (2018). Stakeholder perspectives on costs and resource expenditures: Tools for addressing economic issues most relevant to patients, providers and clinics. *Transl Behav Med*. 8(5): 675–682,

<https://doi.org/10.1093/>

Provides an easy to read summary of key issues in costing implementation and behavior change studies. Provides example templates and discusses issues of different perspectives and replication costs.

CHAPTER 7: WHAT'S NEXT – GETTING GOING OR GETTING HELP

Getting Going

With the principles and methods described in this guidebook, you now have everything you need to conduct cost assessments for most implementation projects. The appendix provides several helpful tools and resources that you can use on projects of your own, including fillable process maps, cost collection templates, and weblinks to other resources.

However, the methods described in this guidebook may not be sufficient for all implementation projects. For those who require additional guidance or wish to explore other economic evaluations, please continue to read along.

Getting Help – When Implementation Costing Isn't Enough

So far, we have discussed what it takes to conduct your own cost assessment, but sometimes costing alone is not enough. Other types of economic evaluations can aid in asking the next logical questions- "Are the implementation strategies affordable within our budget constraints?" and "What is the return on investment for our implementation efforts?"

Additionally, you may find that your cost assessment is not quite capturing everything you intended. In these and other situations, [consultations with economists](#) are recommended (Barnett et al., 2020). Economists can be very helpful in choosing the right economic evaluation for your study, identifying and valuing costs, and interpreting outcomes. If you do consult with an economist, come prepared with a few things in mind:

- What are you trying to determine – the cost of a program, its impact on a budget, or the tradeoff between its costs and benefits?
- What kind of data and information can your team feasibly collect?
- Do you have the resources to pay an economist to lead your economic evaluation?

Budget Impact Analysis (BIA)

This guidebook instructs you how to calculate the total costs to the site and/or team implementing your program, and cost-effectiveness analyses (discussed below) inform decision-makers about the value of an intervention's costs relative to its effects. However, often decision-makers require more information to determine how a new program would fit into their budget. In other words, they want to know how it will impact their budget in their setting. How does the implementation of a new intervention effect the reach of your target population, the staffing and resources required to meet the new demand for services, and ultimately the budget going forward? Figure 8 below illustrates this concept.

Figure 8: Budget Impact of an Implementation Project, adapted from Mauskopf et al. (2007) and Brosa et al. (2005)



1. Overview of Budget Impact Analyses

Budget impact analysis (BIA) focuses on the financial impact of a program on the budget of a specific organization or payer, such as a State Medicaid program (Eisman et al., 2020). While the costing methods described in this guidebook allow you to determine the total cost of implementation, they fall short of anticipating or measuring the downstream consequences on the organization's budget (e.g., implementation of a lung cancer screening program might be costly in the present but ultimately cost-saving if it prevents more costly procedures in the long-term). A BIA compares these two elements – costs of implementation and downstream budgetary changes.

BIA answers the key question: are the intervention and implementation strategies affordable?

BIA goes beyond just determining costs, to evaluating the financial impact of intervention and implementation strategies (Wagner et al., 2020; Mauskopf et al., 2007).

BIA aids in addressing key issues for an organization or system, including a) whether the intervention is feasible within budgetary realities and b) whether the intervention will pay for itself; that is, if the downstream effects are cost-saving or neutral (Wagner et al., 2020; Smith & Levy, 2024).

BIAs can serve two functions: 1) Estimate the budget impacts for replication in a new setting. This may involve taking the original cost analysis and estimating who (i.e., personnel) will perform specific activities in new settings, and how labor and non-labor costs may change. 2) considering downstream costs and savings and timeline. Generally, in economic terms, upstream costs refer to costs that occur prior to 'production' of goods or services, whereas downstream costs occur after 'production.' In implementation settings, upstream efforts might entail the investment in implementation strategies to enhance uptake of preventive care for cardiovascular risk. The implementation and delivery of an

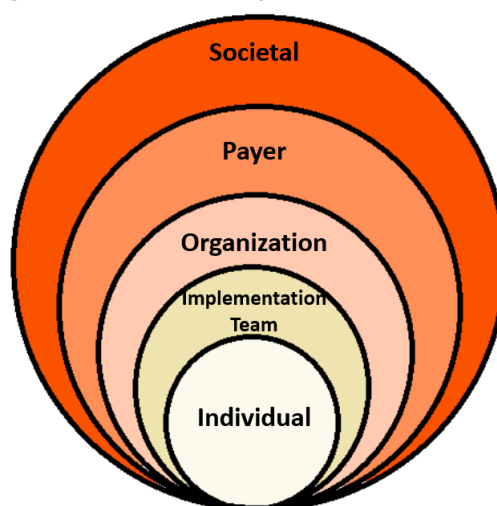
intervention or program might then cause downstream consequences.. For example, the increased volume of patients served might result in increased labor from screening, prescription management, and/or billing. While downstream costs often consider a wider time horizon, they often do not require any projection as they may be measured and estimated in real time.

An example with the opposite BIA conclusion might be implementation of a lung cancer screening program that might well be costly in the present but ultimately cost-saving by preventing more costly procedures in the long-term.

2. Perspectives adopted in BIA

A key difference between BIA's and the implementation costing methods described in this guidebook is often the perspective adopted. While we assume the perspective of the implementation site for implementation costing, BIA's traditionally broaden their scope to include the entire healthcare organization as beneficiaries to downstream budget impacts: costs saved via preventive care (Eisman et al., 2023). Ryan et al. (2023) created and published a budget impact tool with which users can select resources and change inputs to visualize budget impacts. They use the example of delivery of a medication for opioid disorder intervention. Other perspectives, such as the employer perspective, may be adopted in BIA's, as discussed in Wagner et al. (2020).

Figure 9: Perspectives of Economic Evaluation



Cost-Effectiveness Analysis (CEA)

Sometimes it is not enough to know how much time and resources it takes to implement a program. Given limited resources, healthcare (and other) organizations need to make choices among programs, all of which may be effective and beneficial. In such cases, decisions must be based on value – the benefits of a program divided by its costs. One important approach to help make such decisions is cost-effectiveness analysis (CEA). For more complex applications of CEA, you may want to collaborate with a health economist. The information below should help you prepare for such meetings or consultation.

This section summarizes key points about CEA. It will not cover all the complex issues or allow you to conduct sophisticated CEA, but rather to summarize important issues in conducting and interpreting such analyses.

1. What is a Cost-Effectiveness Analysis (CEA)?

Economic evaluations generally consist of a few key features: costs, effects, and choices. The costing methods described throughout this guidebook will provide a helpful foundation to estimate the costs of an implementation project and inform decision-making when comparing costs of alternatives.

A CEA takes the next step to determine the cost-effectiveness of an intervention, program, or implementation project and compare it **to its relative alternatives**. Cost-effectiveness is assessed by dividing the incremental or additional costs associated with implementing the intervention or program, by the incremental or additional benefits or effects. Findings and comparisons with alternatives answer whether the consequences of an intervention are worth the costs: is it cost-effective?

NOTE: As with budget impact analyses, the perspective adopted in cost-effectiveness analyses dictates which costs and effects you include and exclude in your evaluation: e.g., the individual (or patient) perspective includes only costs and effects relevant to the patient.

Figure 10: Cost-Effectiveness Plane

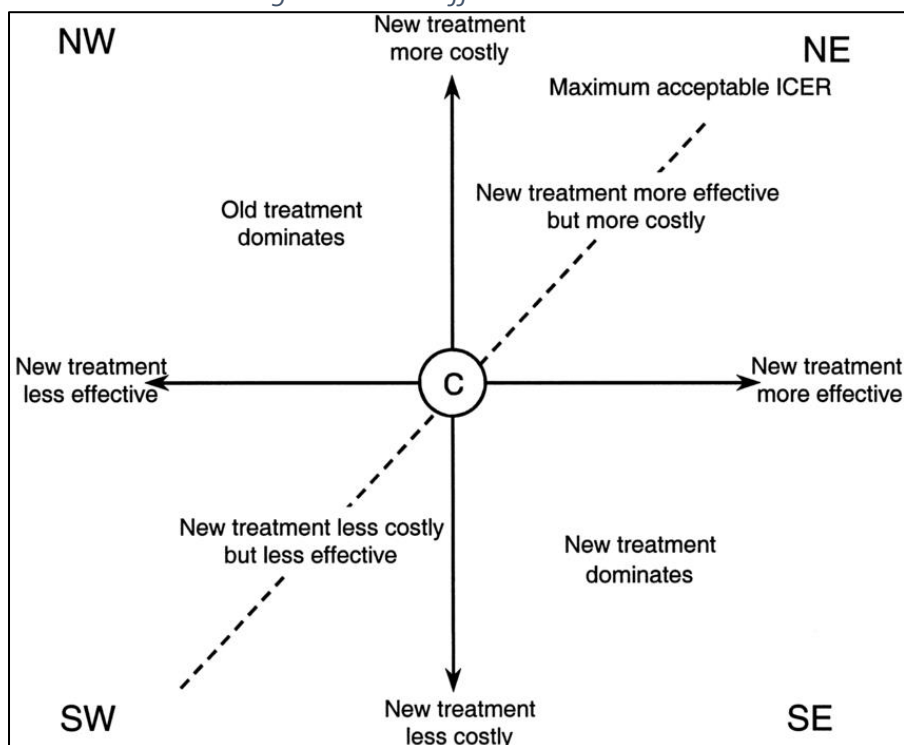


Figure 8 above shows the “cost-effectiveness plane,” which informs the interpretation of your CEA. The research questions and interpretations of a CEA differ from that of a simple cost assessment. Cost-effectiveness ratios reflect the cost per unit of effect (e.g., cost of the resources used relative to pounds lost, vaccines administered, etc.). Comparing two or more alternatives produces an *incremental cost-effectiveness ratio (ICER)* which shows the incremental value (added cost compared to added benefit). The figure above summarizes results on both cost and effectiveness outcomes of a new treatment compared to an old or existing treatment (or ‘usual care’) – which is the most common CEA comparison made. ICER’s are also used to compare two or more new interventions or programs and are especially useful in comparing programs that differ substantially in costs – e.g., virtual, largely automated programs versus repeated in-person meetings.

NOTE: In Figure 8 above, ICER’s in the bottom right quadrant are said to “dominate” their alternatives in that they offer greater benefits at a reduced cost. The dashed line in Figure 8 represents the cost-effectiveness threshold, an essential feature to interpreting findings. Researchers select cost-effectiveness thresholds based on the literature and country-specific recommendations. ICER’s that fall below the threshold are more cost-effective than their alternatives.

While this economic evaluation informs decision-makers whether an intervention is cost-effective, the results might not capture the full scope of costs to implementers and its associated opportunity cost (i.e., other purposes for which the funds could have been spent). If not done correctly, cost-effectiveness may also fail to include assess all costs, including activities such as implementation strategies and adaptations.

2. In what situations should cost-effectiveness analysis be conducted?

The purpose of a report you are preparing, and your audience – journals, policymakers, or implementation sites – informs your priorities and whether you might want to report cost-effectiveness. An implementation science journal or an implementation or replication site might only need to know what program delivery costs to determine whether the program is feasible in their setting.

On the other hand, some settings such as health systems and journals such as health services research journals, may strongly prefer or require cost-effectiveness data to determine value or help them decide if a program is worth the outcomes produced.

3. Fundamentals of Cost-Effectiveness Analyses

A cost-effectiveness analysis involves the comparison of two or more alternatives (interventions or programs; implementation strategies), costs, and effects. A CEA uses monetary units for costs and a single (primary) outcome. Natural units and key outcome variables, such as points of blood pressure, are often preferred, but the outcome chosen should be the same each alternative you compare. If costs and effects extend beyond your study period, you may estimate or project their impact using evidence-based assumptions. This is because decision makers sometimes want to know the long-term cost-

effectiveness and consequences of a new intervention. However, any future costs and effects must be 'discounted' to present value as costs and effects might not always accrue within the same timeframe.

Once you have costs (C) and effects (E) estimated for each alternative (e.g., C_0 and E_0 respectively represent usual care, 'control condition', or minimal intervention costs and effects), you compare them with the new or more intensive program (C_1 , E_1) to produce an ICER:

Equation 3: Incremental Cost – Effectiveness Ratio

$$ICER = \frac{(C_1 - C_0)}{(E_1 - E_0)}$$

NOTE: Due to the inherent variability in measuring and estimating costs and effects, ICER's may not always produce precise, exact results. Economists address this uncertainty head-on by conducting sensitivity analyses to determine how outcomes might change in other implementation contexts or replication settings as discussed in earlier sections.

Other Economic Evaluations

BIA and CEA are just two of the more complex economic analyses. The table below summarizes these two approaches as well as other fairly common methods for which you will likely need to consult an economist. Table 14 summarizes a few of these evaluations and provides resources for additional information. Although evaluations like cost-benefit analysis are unlikely to be conducted by implementation scientists, they may be suitable to other research questions, healthcare decision-makers, or especially policy related issues. For summary information on various methods and key methodological issues, the single best resource is probably the Neuman et al (2017) reference in the top right of Table 14 (pg. 42).

Let's recap!

- ✓ This guidebook provides you with the basics of implementation costing, primarily using micro-costing methods such as Activity-Based Costing.
- ✓ When interested parties need to know more than what it will cost implementation teams and/or sites, other economic evaluations may be considered.
- ✓ A budget impact analysis (BIA) assesses a project's impacts on the long-term budget relative to the costs of implementation, informing decision-makers if the intervention pays for itself or is affordable.
- ✓ Cost-effectiveness analysis (CEA) determines the value of an intervention or program by estimating the costs per unit of effect, answering whether that effort is 'worth it.'
- ✓ We consider these evaluations most relevant to implementation projects, but other economic evaluations exist to answer other questions and/or decision-maker concerns.
- ✓ When conducting these more complex economic evaluations, we highly recommend working with an economist.

Table 14: Other Economic Evaluations

Other Economic Evaluations	Description	Resources to get you started
Budget Impact Analysis (BIA)	BIA assesses the effect that a program may have on your budget as a decision-maker. In addition to direct costs, it also includes related indirect costs (e.g., if heart attacks are reduced by your program, then there would be a reduced cost of treating those heart attacks). Results are expressed as a dollar value per each budget term (or fiscal year).	Estimating Downstream Budget Impacts in Implementation Research. Wagner TH, Dopp AR, Gold HT. <i>Med Decis Making</i> . 2020 Nov; 40(8):968-977. doi: 10.1177/0272989X20954387. Epub 2020 Sep 19. PMID: 32951506
Cost-Effectiveness Analysis (CEA)	This method compares relevant alternatives in terms of health outcomes (e.g., cases averted) and costs. It answers the question, "are the added costs of option B worth the added benefit of option B compared to option A?"	Neumann, P. J., Ganiats, T. G., Russell, L. B., Sanders, G. D., & Siegel, J. E. (2017). <i>Cost effectiveness in health and medicine</i> . Oxford University Press.
Return on Investment Analysis (ROI)	An ROI is an analysis that compares the gains from a program with its costs. "Gains" can quite literally mean profits, or it could be the net benefits of your program. Results are expressed as a percentage ratio.	Grazier, K. L., Trochim, W. M., Dilts, D. M., & Kirk, R. (2013). Estimating return on investment in translational research: methods and protocols. <i>Evaluation & the health professions, 36(4)</i> , 478–491. https://doi.org/10.1177/0163278713499587
Cost-Benefit Analysis (CBA)	This method assigns monetary values to all costs and benefits (including health outcomes and indirect consequences) associated with each alternative and sum them to get net present value (NPV). After getting a NPV for each treatment or program, you can compare the NPV's for evaluation: which option has the most positive effect?	Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L., & Torrance, G. W. (2015). <i>Methods for the economic evaluation of Health Care Programmes</i> . Oxford University Press.

Parting Words

You should now be prepared to begin costing with your implementation partners or consult with an economist. You will likely want to return to different chapters and to use some of the resources provided to help focus and report your work. This guidebook is not intended as a definitive text on economic analysis or to answer all questions about the complex issues in economic evaluation. It should however *equip you to understand the key issues and conduct appropriate costing activities for many implementation science projects.*

Finally, you may want to **review the various tools and templates in the appendix** to help you apply what you have learned. Happy costing!

Before You Go:

Your feedback is important to us!
Please click this icon to complete a
 short survey about our Guidebook:



Key References

Mauskopf JA, Sullivan SD, Annemans L, Caro J, Mullins CD, Nuijten M, et al. Principles of Good Practice for Budget Impact Analysis: Report of the ISPOR Task Force on Good Research Practices—Budget Impact Analysis. *Value in Health*. 2007;10(5):336–47.

This report from the ISPOR Task Force provides an overview of BIA's, best practices for conducting them, and recommendations on reporting findings and results.

Ryan DA, Montoya ID, Koutoujian PJ, Siddiqi K, Hayes E, Jeng PJ, et al. Budget impact tool for the incorporation of medications for opioid use disorder into jail/prison facilities. *J Subst Use Addict Treat*. 2023 Mar;146:208943.

Ryan et al. created a budget impact tool to assess the downstream costs of medical treatment for opioid use disorder in incarceration facilities. Available via the CHERISH website, this tool can help users visualize how fixed-startup, time-dependent, and variable costs might impact budgets downstream.

Smith NR, Levy DE. Budget impact analysis for implementation decision making, planning, and financing. *Transl Behav Med*. 2024 Jan 11;14(1):54–9.

Smith et al. discuss the importance of BIA's in implementation science. Namely, they indicate how this evaluation informs decision-makers of the affordability and

potential financing of implementation programs, such as the tobacco use treatment described.

Wagner TH, Dopp AR, Gold HT. Estimating Downstream Budget Impacts in Implementation Research. *Med Decis Making*. 2020 Nov;40(8):968–77.

Wagner et al. consider the measurement and assessment of downstream costs in implementation contexts, such as the applicability of costs (i.e., which costs to include) and the time horizon of cost evaluations. Additionally, they discuss methodologies for BIA's – including Activity-Based Costing – types of costs, costing implementation strategies, and other perspectives that you might adopt.

Boggs, Jennifer M et al. "Cost-Effectiveness of a Web-Based Program for Residual Depressive Symptoms: Mindful Mood Balance." *Psychiatric services (Washington, D.C.)* 73.2 (2022): 158–164. Web.

Boggs et al. conducted a cost-effectiveness analysis of a web-based mindfulness program. This example both illustrates how CEA's can be conducted in implementation settings and offers insight into how ICER's can be chosen, compared, and calculated.

Michaud, T. L., Hill, J. L., Heelan, K. A., Bartee, R. T., Abbey, B. M., Malmkar, A., Masker, J., Golden, C., Porter, G., Glasgow, R. E., & Estabrooks, P. A. (2022). Understanding implementation costs of a Pediatric Weight Management Intervention: An economic evaluation protocol. *Implementation Science Communications*, 3(1). <https://doi.org/10.1186/s43058-022-00287-1>

This implementation science protocol lays out the study design of a cost-effectiveness analysis of a pediatric weight management program. The authors correspond costs and effects to the RE-AIM framework and describe their plan for measuring the costs of implementation strategies. Putting this article together with the foundational texts of Neumann et al. (2017) and Drummond et al. (2015) will be a great jumping-off point for CEA efforts in implementation science.

Neumann, P. J., Ganiats, T. G., Russell, L. B., Sanders, G. D., & Siegel, J. E. (2017). *Cost effectiveness in health and medicine*. Oxford University Press.

Commonly referred to as the "gold book," this prominent contribution describes in great detail the purpose, rationale, methods, and considerations in conduct cost-effectiveness analyses in healthcare and medicine.

APPENDIX

Appendix Table of Contents

- A. Planning and Decision-Making
- B. Collecting Cost Data
- C. Reporting Cost Data
- D. Other Resources

The contents of this appendix, detailed above, include various resources, templates, guides, and links that you may use on your implementation projects. Many of these resources are downloadable. Any time you see the following icon, simply click to download.



Simply click icon to download

A. Planning and Decision-Making

1. "Get To Know Your Project" Questionnaire:



This questionnaire asks specific questions to consider how a cost assessment fits into your project. In combination with the other materials in this Guidebook, these questions can help you think about the factors that can determine your chosen cost collection methods.

1. Why do you want to add cost analyses to your projects?
2. What is your delivery setting?
3. Do you have staffing to help collect cost information? How many of each role?
4. If considering using observation to collect your cost data, do you have a travel budget?
5. How many research sites are included in your study?
6. Are each of your research sites more-or-less the same (e.g., primary care practices) or do they vary significantly (e.g., in-person care vs. virtual service)?
7. If considering using observation to collect your cost data, roughly how close are your research sites to each other and your place of work?
8. At what stage in the project are you currently?
9. Keeping in mind the time burden you would be placing on your research staff, how frequently would your staff be able to collect cost information (either via interview, email, surveys, observations, etc.)?
10. Keeping in mind the time burden you would be placing on your implementing staff, how frequently would you be able to collect cost information from your implementation sites (e.g., clinical staff at a practice; educators at a community health center)? Please consider the burden that your project is placing on this population in your answer.

2. Fillable Workflow Outline: 

Table A2: Fillable Workflow Outline			
When does this occur?	What is the activity?	Who does it?	With what materials or resources?
I.	A.		
	B.		
II.	C.		
	D.		
	E.		
III.	F.		
	G.		
IV.	H.		
	I.		
	J.		
	K.		

3. Alternative Costing Template, Adapted from Saldana et al. (2014): 

Table A3: Cost of Implementing New Strategies (COINS) Outline					
Phase	Stage	Activities (What?)	Who?	How long? (Hourly Rate)	Total Cost
I. Pre-Implementation					
II. Implementation					
III. Sustainability					

4. Fillable Process Map:

[Downloadable PDF:](#)  [Downloadable Microsoft Visio File:](#) 

Fillable Process Map				
	Phase 1	Phase 2	Phase 3	Phase 4
Person 1				
Person 2				
Person 3				

5. Cost Collection Methods Table:

Table A5: Choosing What Method Is Right For You				
Method	Definition	Strengths	Drawbacks	Resources Needed
Direct Observation	A member of your research team watches and records the time and resources needed to complete each activity.	"Gold standard" for the measurement of time data.	Places a high burden on research team.	Staffed observers, a travel budget, and time dedicated to observation. Alternatively, equipment and staff to arrange for audio or video recording.
Time Diaries / Activity Logs	Implementing staff record the time and resources necessary to deliver the program or intervention.	Self-report time can be precisely attributed to each discrete activity.	Burden is placed on respondents, and self-report measures may result in accuracy and data quality issues.	A way of distributing time-diaries, surveys, or questionnaires (e.g., REDCap); implementers willing and able to complete diaries on recurring basis; and research staff to create and distribute time diaries.
Targeted Questionnaires	Delivery staff indicate resources necessary to implement the program in a standardized questionnaire.	Responses can provide additional insight into implementation process.	Results may be less generalizable and precise.	A way to distribute questionnaires (e.g., REDCap); implementers willing and able complete questionnaires periodically; and research staff to create and distribute questionnaires.
Key Informant Interviews	Trained research staff interview knowledgeable informants regarding time and resources necessary for the intervention.	Like targeted questionnaires, you can learn more about implementation process through interviews.	Depending on their scope and depth, interviews may be less precise and generalizable.	Research staff trained to complete interviews; and implementers willing to be interviewed who are knowledgeable of the whole program.
Onsite Database (or EHR-based) approaches	Delivery staff uses their internal database to capture time spent on intervention activities.	In theory, an onsite database can provide real-time data; it can potentially provide automated collection of time stamps; and it can also alleviate burden on research team.	In addition to programming issues, EHR-based approaches are largely unproven and have wide margin for error.	Pre-existing, internal database infrastructure that is adaptable to your project.
<p>For more information various cost collection methods, see:</p> <p>Chapel, J. M., & Wang, G. (2019). Understanding cost data collection tools to improve economic evaluations of health interventions. <i>Stroke and Vascular Neurology</i>, 4(4), 214–222. https://doi.org/10.1136/svn-2019-000301</p> <p>Keel, G., Savage, C., Rafiq, M., & Mazzocato, P. (2017). Time-driven activity-based costing in Health Care: A systematic review of the literature. <i>Health Policy</i>, 121(7), 755–763. https://doi.org/10.1016/j.healthpol.2017.04.013</p> <p>Huebschmann, A. G., Trinkley, K. E., Gritz, M., & Glasgow, R. E. (2022). Pragmatic considerations and approaches for measuring staff time as an implementation cost in health systems and clinics: Key issues and applied examples. <i>Implementation Science Communications</i>, 3(1). https://doi.org/10.1186/s43058-022-00292-4</p>				

6. Other Economic Evaluations:

Table A6: Other Economic Evaluations		
Evaluations	Description	Resources to get you started
Cost-Effectiveness Analysis	This method compares relevant alternatives in terms of health outcomes (e.g., cases averted) and costs. It answers the question, “are the added costs of option B worth the added benefit of option B compared to option A?”	Neumann, P. J., Ganiats, T. G., Russell, L. B., Sanders, G. D., & Siegel, J. E. (2017). <i>Cost effectiveness in health and medicine</i> . Oxford University Press.
Cost-Benefit Analysis	This method assigns monetary values to all costs and benefits (including health outcomes and indirect consequences) associated with each alternative and sums them to get net present value (NPV). After getting a NPV for each treatment or program, you can compare the NPV’s for evaluation: which option has the most positive effect?	Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L., & Torrance, G. W. (2015). <i>Methods for the economic evaluation of Health Care Programmes</i> . Oxford University Press.
Return on Investment Analysis (ROI)	An ROI is an analysis that compares the gains from a program with its costs. “Gains” can quite literally mean profits, or it could be the net benefits of your program. Results are expressed as a percentage ratio.	Grazier, K. L., Trochim, W. M., Dilts, D. M., & Kirk, R. (2013). Estimating return on investment in translational research: methods and protocols. <i>Evaluation & the health professions</i> , 36(4), 478–491. https://doi.org/10.1177/0163278713499587
Budget Impact Analysis (BIA)	BIA assesses the effect that a program may have on your budget as a decision-maker. In addition to direct costs, it also includes related indirect costs (e.g., if heart attacks are reduced by your program, then there would be a reduced cost of treating those heart attacks). Results are expressed as a dollar value per each budget term (or fiscal year).	Estimating Downstream Budget Impacts in Implementation Research. Wagner TH, Dopp AR, Gold HT. <i>Med Decis Making</i> . 2020 Nov; 40(8):968-977. doi: 10.1177/0272989X20954387. Epub 2020 Sep 19. PMID: 32951506

B. Collecting Cost-Data

1. **Auto-Calculating Cost Collection Spreadsheet:** 

Table B1: Personnel Costs

Personnel Resources: For each staff member involved in the delivery of your program, indicate their name, credentials and salary. Then, note the amount of time in minutes that they spend on each activity in your process map on a typical patient encounter. Your best estimate is sufficient.

	Staff Member	Credentials	Annual Salary	Fringe Benefits	Per-Minute Wage	New Hire?	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7	Activity 8	Activity 9	Activity 10	Additional Notes	Total Time	Total Cost
Ex:	Sally Smith	RN	\$82,750.00	31%	\$0.87	No	0	10	5	3	0	0	0	5	5	0	-	28	\$24.32
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

2. **Downloadable Cost Collection Questionnaire:** 

Table B2: Cost-Collection Questionnaire

Section A: Direct Staff
Please list ALL staff directly involved in the delivery of your project and indicate the time (in minutes) spent on the following delivery activities:

member's initials	Role/Title	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Other	Notes
Example EX	CDCES	-	10.00	5.00	5.00	5.00	15.00	-	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

3. **Downloadable Interview Guide:** 

4. How to use data from Bureau of Labor Statistics (BLS):

The [Bureau of Labor Statistics](#) (BLS) makes publicly available compensation data, collected via 12 of their surveys and programs. While the national averages reported in their databases might not accurately reflect the salaries in your particular region, and the positions involved in your program might not fit perfectly within their categories, using these national averages can help inform replication efforts.

The two key elements that you will be pulling for your cost assessments are [salaries](#) and [fringe rates](#) – each respectively linked. When filtering through the myriad occupations and categories, we recommend filtering by industry or category (e.g., healthcare vs. education) to find the positions that most aptly align with the roles in your study. You can also run a simple search of each document by using “Ctrl + F” or “Command + F” for relevant keywords. Once you have pulled each, calculate the total compensation for each position with the following formula:

Equation 4: Total Compensation Formula

$$\text{Total Compensation} = \text{Annual Salary} \times (1 + \text{Fringe Rate}\%)$$

Then convert it into a per-minute or per-hour wage and multiply it by the time reported and collected for your implementation project to determine the cost of each individual’s time.

C. Reporting Cost Data

1. CHEERS – Reporting Guidelines:

Husereau, D., Drummond, M., Augustovski, F., de Bekker-Grob, E., Briggs, A. H., Carswell, C., Caulley, L., Chaiyakunapruk, N., Greenberg, D., Loder, E., Mauskopf, J., Mullins, C. D., Petrou, S., Pwu, R.-F., & Stanisiewska, S. (2022). Consolidated Health Economic Evaluation Reporting Standards 2022 (cheers 2022) statement: Updated reporting guidance for health economic evaluations. *BMJ*, 20. <https://doi.org/10.1136/bmj-2021-067975>

The Consolidated Health Economic Evaluation Reporting Standards (CHEERS) are reporting guidelines intended to make publications more reader-friendly to reviewers and readers by explicitly describing the evaluation, its findings, and interpretations. In the latest version, the authors provide a 28-item checklist for you to use.

2. Cidav et al., 2020: Sample Reporting Figures:

Cidav, Z., Mandell, D., Pyne, J., Beidas, R., Curran, G., & Marcus, S. (2020). A pragmatic method for costing implementation strategies using time-driven activity-based costing. *Implementation Science*, 15(1). <https://doi.org/10.1186/s13012-020-00993-1>

Cidav et al. (2020) used TDABC to assess the costs of different implementation strategies. This prominent paper additionally features some interesting reporting figures, such as displaying percentage of costs by implementation phase, implementation strategy, personnel, and non-personnel costs.

3. Sample Time by Activity Histogram, Costs by Activity Table, and Cost Results Table:

Figure C3: Minutes by Activity Histogram

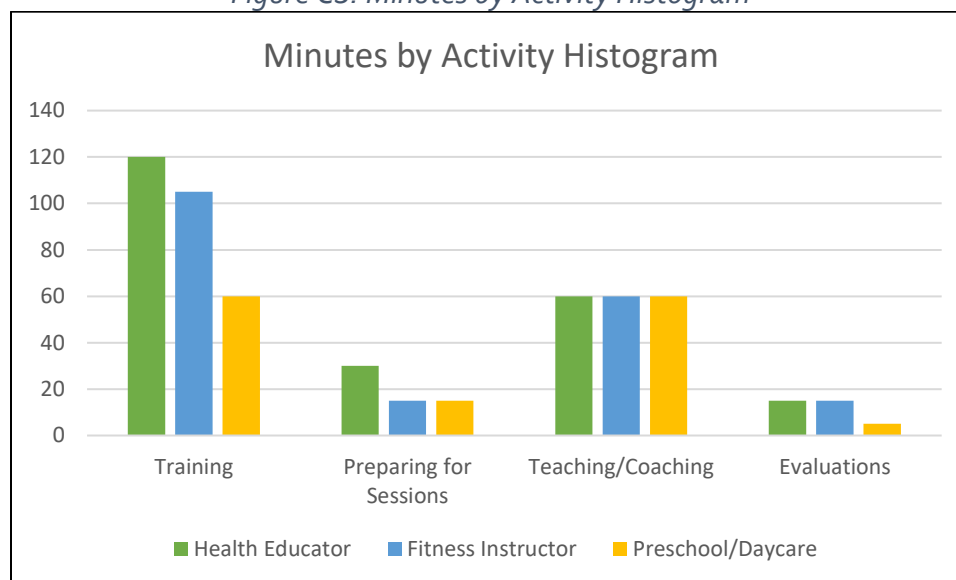


Table C3a: Costs by Activity			
	Health Educator	Fitness Instructor	Preschool/Daycare
Training	\$81.79	\$50.56	\$27.12
Preparing for Sessions	\$20.45	\$7.22	\$6.78
Teaching/Coaching	\$40.89	\$28.89	\$27.12
Evaluations	\$10.22	\$7.22	\$2.26

Table C3b: Total Costs			
	Planning	Implementation	Sustainment
Personnel Time (minutes)	115.0	516.0	350.0
Personnel Cost (\$)	\$ 178.25	\$ 801.33	\$ 542.50
Training Costs (\$)*	\$ 447.00	\$ 78.00	\$ 0.00
Space and Overhead Costs (\$)*	\$ 396.00	\$ 396.00	\$ 396.00
Equipment and Materials Costs (\$)*	\$ 12.00	\$ 42.00	\$ 38.00
Total Cost (\$)	\$ 586.25	\$ 1,239.33	\$ 976.50

***Note:** Your equipment, training, and overhead costs may very well be recurrent. They may also be fixed or time-dependent costs. Make sure to adjust calculations accordingly before determining Total Cost.

4. Auto-Calculating Cost Collection Spreadsheet: 

Table C4: Personnel Costs

Stage/Phase	Personnel Time	Personnel Cost	Equipment-Materials	Sum Cost
1	-	\$ -	\$ -	\$ -
2	-	\$ -	\$ -	\$ -
3	-	\$ -	\$ -	\$ -
Total Cost	-	\$ -	\$ -	\$ -
Incremental Cost	-	\$ -	\$ -	\$ -

5. Fillable Replication Costs Table: 

Table C5: Fillable Replication Costs						
	This Study Setting			Potential New Setting		
Pre-Implementation	Activity 1	Time (hrs)	Cost	Activity 1:	Time (hrs)	Cost
	Front Desk	1.00	\$19.08	Who?		
Implementation	Activity 2	Time (hrs)	Cost	Activity 2:	Time (hrs)	Cost
	Behavioral Health Specialist	6.00	\$139.98	Who?		
	Activity 3	Time (hrs)	Cost	Activity 3:	Time (hrs)	Cost
	Behavioral Health Specialist	18.00	\$419.94	Who?		
Sustainment	Activity 4	Time (hrs)	Cost	Activity 4:	Time (hrs)	Cost
	Front Desk	3.00	\$57.24	Who?		
	Activity 5	Time (hrs)	Cost	Activity 5:	Time (hrs)	Cost
	Behavioral Health Specialist	24.00	\$559.92	Who?		
	External Facilitator	24.00	\$735.36			
	Other Costs:	Time (hrs)	Cost	Other Costs:	Time (hrs)	Cost
	Bookkeeping	0.00	\$500.00	What?		
	Materials	0.00	\$575.00			
	Training Materials	0.00	\$0.00			
	Total Cost Estimate:	Time (hrs)	Cost	Estimated Replication Costs	Time (hrs)	Cost
		52.00	\$3,006.52			

6. Replication Cost Calculator: 

	Example				Intervention				Replication Scenario 1			
Activity	Weekly Time (Minutes)	Personnel	Per-Minute Wage	Cost (\$)	Weekly Time (Minutes)	Personnel	Per-Minute Wage	Cost (\$)	Weekly Time (Minutes)	Personnel	Per-Minute Wage	Cost (\$)
Activity 1	5	EX	\$0.69	\$3.46								
Activity 2	10	EX	\$0.69	\$6.93								
Activity 3	17	EX	\$0.69	\$11.78								
Activity 4	25	EX	\$0.69	\$17.32								
Activity 5	3	EX	\$0.69	\$2.08								
Activity 6	8	EX	\$0.69	\$5.54								
Activity 7	15	EX	\$0.69	\$10.39								
Activity 8	5	EX	\$0.69	\$3.46								
Activity 9	5	EX	\$0.69	\$3.46								
Activity 10	3	EX	\$0.69	\$2.08								
Personnel Costs	96	-	-	\$ 66.50	0	-	-	\$ -	0	-	-	\$ -
Other Costs	-	-	-	\$ 35.00				\$ -				\$ -
Materials	-	-	-	\$ 25.00								
Equipment	-	-	-	\$ 5.00								
Resources	-	-	-	\$ 5.00								
Total Weekly Costs	-	-	-	\$ 71.50				\$ -				\$ -

D. Other Resources

1. D2V Costing Resource Hub at ACCORDS – CU Anschutz:

D2V Costing Resource Hub - Costing and Data Collection

<https://medschool.cuanschutz.edu/accords/cores-and-programs/economic-analysis/psv-resource-hub>

Online resource that details the reasons for measuring cost, different methods that can be used to evaluate economic issues associated with health interventions, and the steps needed to complete them.

2. Costing Annotated Bibliography for Implementation Science:

[Costing Annotated Bibliography of Economic Analysis Resources Relevant for Implementation Science](#)

This tool was created by UC San Diego DISC and the ACCORDS D&I Program to compile resources, tools, and studies about cost/cost-effectiveness research in implementation science.

3. Rhodes et al. (2018):

Rhodes et al. (2018). Stakeholder perspectives on costs and resource expenditures: Tools for addressing economic issues most relevant to patients, providers and clinics. *Transl Behav Med.* 8(5): 675–682, <https://doi.org/10.1093/>

Provides an easy to read summary of key issues in costing implementation and behavior change studies. Provides example templates and discusses issues of different perspectives and replication costs.

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