Research Report

The Costs of Implementing Collaborative Care for Opioid and Alcohol Use Disorders in Primary Care

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Preface

The National Institutes of Health provided a grant to the RAND Corporation to identify the costs associated with implementation of a collaborative care treatment program for opioid and alcohol use disorders. Between 2012 and 2016, RAND studied the implementation of the substance use motivation and medication integrated treatment (SUMMIT) program in a multi-site large urban federally qualified health center (FQHC) in Los Angeles County (Ober et al., 2015). This report describes the costs of the program, separating the resources spent by the FQHC and the external facilitators of the SUMMIT program.

The findings of this study are based on a bottom-up, activity-based costing approach to determine the staff time spent (labor costs) on the program and any minor equipment expenses. Rather than simply log all the labor and equipment costs incurred for the study, we provide the costs that another facility of this size might expect to incur. We include costs that take into account the lessons learned about how many people with particular job roles should participate in meetings, trainings, and other activities. Therefore, although the focus of this study is one larger health center in Los Angeles County, we believe other large treatment facilities and health clinics may find the results of interest as well.

The research was conducted in RAND Health, a division of the RAND Corporation. A profile of RAND Health, abstracts of its publications, and ordering information can be found at www.rand.org/health.

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Summary

Motivation and Background

In 2013, nearly 90 percent of the 22.7 million people aged 12 or older who needed treatment for an illicit drug or alcohol use problem did not receive it (U.S. Department of Health and Human Services, 2014). Despite evidence that integrating substance use disorder (SUD) treatment and general health care could result in improved outcomes (e.g., less utilization of inpatient care, fewer emergency room visits [Parthasarathy et al., 2003]), primary care settings typically do not provide SUD screening and treatment for a variety of reasons, including lack of insurance reimbursement, perceived lack of time to fully assess and discuss substance use, lack of confidence by providers to treat SUDs, and lack of administrative buy-in for integrating SUD care into medical practices (Quest et al., 2012; Urada et al., 2014). Against this background, RAND researchers began (in 2012) studying the implementation and effectiveness of a collaborative care treatment program for opioid and alcohol use disorders entitled "substance use motivation and medication integrated treatment (SUMMIT)" at two sites within one large urban federally qualified health center (FQHC) in Los Angeles County (Ober et al., 2015).

Present Study

Because the cost of implementing new practices can influence whether they are ultimately adopted and sustained (Meyer, Davis, and Mays, 2012), this study evaluates the resources required first to create organizational readiness to integrate the continuum of care for opioid and alcohol use disorder (OAUD) into existing care practices—which can be considered a one-time, start-up cost—and then to support and deliver evidence-based OAUD treatment using a collaborative care service delivery model, which can be considered ongoing maintenance costs. Specifically, the main aim of this study is to provide an understanding of how much time and money a large FQHC might expect to spend on external facilitation and internal staff resources (e.g., physicians attending meetings) to create organizational readiness and deliver OAUD services using a collaborative care model.

We use an activity-based costing approach, in which activities necessary for implementing the key activities of the SUMMIT intervention were identified (after study completion) and assigned a cost based on resources used (labor and indirect expenses) (Kaplan and Anderson, 2007). Data on time spent were collected through interviews and recorded timesheets. Data on salaries, fringe benefits, and overhead rates were collected from the relevant organizations; in the case of any missing data, we used literature estimates for the region.

Findings

Over a 3.5-year period, the total one-time, start-up cost to prepare for organizational readiness and ongoing maintenance costs to deliver treatment using collaborative care was $185,491 for primary care resources and an estimated $178,821 for external facilitation. The primary care clinic used more resources for ongoing maintenance costs to deliver SUD treatment with collaborative care ($107,973) than for the start-up cost to create organizational readiness ($77,518). The opposite was the case for external facilitator resources in which the start-up costs of organizational readiness ($100,280) were greater than the ongoing maintenance costs to deliver treatment ($78,541). Additionally, the total spending of the primary care clinic on organizational readiness and collaborative care was approximately 1.0 percent of the total program operating expenses at the clinic. Using the rate of 114,000 patients seen per year for this primary care clinic, the estimated cost for primary care resources was $0.46 per patient seen.

In terms of time spent by primary care professionals, this study provides breakdowns of the number of meetings, length of time, and the attendees by job type. There were 69 organizational readiness and collaborative care implementation meetings, or an average of 1.4 meetings per month for months in which there was a meeting. Each meeting was 0.6 hours to 1.1 hours long, depending on the type. There were 27 training meetings total, with 3.3 meetings per month on average (for months in which there were training meetings). On average, the training meetings were 1.0 to 2.7 hours long, depending on the type attended. Physicians attend more meetings than the behavioral health therapists, but the meetings they attend are briefer than the meetings attended by the therapists.

We hope that this information will help policymakers with funding allocation decisions and primary care clinicians to plan how they can implement this program in their facilities.

Acknowledgments

This study would not have been possible without the time and effort of the primary care facility involved in this study. The willingness of staff to implement this program shows their passion for improving the health of underserved populations within Los Angeles County. The staff's fidelity to the program model facilitated this research and demonstrates their commitment to evidence-based policymaking.

We would also like to thank Tiffany Hruby and Praise Iyiewuare for their outstanding research support. We appreciate the valuable insights we received from our peer reviewers, Lisa Rubenstein (RAND Corporation, UCLA David Geffen School of Medicine, UCLA Fielding School of Public Health) and Martin Iguchi (RAND Corporation). We addressed their constructive critiques as part of RAND's rigorous quality assurance process to improve the quality of this report.

Abbreviations

EMR	electronic medical record
FQHC	federally qualified health center
OAUD	opioid and alcohol use disorder
PDSA	plan-do-study-act
SUD	substance use disorder
SUMMIT	substance use, motivation, and medication integrated treatment

Chapter One. Introduction

Background

Between 2012 and 2016, RAND conducted a study of a multicomponent intervention (SUMMIT—the substance use, motivation, and medication integrated treatment program) designed to increase the readiness and ability of primary care providers to identify and treat opioid and alcohol use disorders (OAUD) (Ober et al., 2015). The study was conducted at two sites within one large urban federally qualified health center (FQHC) in Los Angeles County that serves approximately 114,000 patients per year.

The SUMMIT intervention has two parts. First, external facilitators (in this case, researchers and substance use disorder and addiction medicine specialists) work with clinic staff (e.g., physicians, behavioral therapists, administrators, and support staff) to create organizational readiness for identifying and treating OAUD.

Organizational and behavioral change theories, such as Rogers' diffusion of innovation theory (Rogers, 1995) and Bandura's theory of behavior change (Bandura, 1977), posit that individuals' perceptions of the characteristics of new practices, their self-efficacy to implement the practices, and their perceptions of the capacity of their organization to implement the practices are critical precursors of behavior change that support implementation. These precursors are often referred to in the organizational change literature as elements of "organizational readiness" (Aarons, Hurlburt, and Horwitz, 2011; Aarons, Sommerfeld, and Walrath-Greene, 2009; Amatayakul, 2005; Cassidy, 1994; Damschroder et al., 2009; Greenhalgh et al., 2004; Hardison, 1998; O'Connor and Fiol, 2006; Weiner, Amick, and Lee, 2008). Although definitions of organizational readiness vary widely, they have in common several key constructs, such as whether an organization's culture and climate are ready to make general changes (for example, organizations with stronger staff morale, less staff turnover, and openness to new practices in general are more likely to support implementation of new practices) (Aarons, 2004; Glisson et al., 2008; Lehman, Greener, and Simpson, 2002), whether individual members view their organization as capable of change, or whether individual members are themselves prepared and willing to make a specific change or adopt a specific new practice (Lehman, Greener, and Simpson, 2002; Scaccia et al., 2015; Weiner, Amick, and Lee, 2008). Strategies for achieving organizational readiness include planning for change, educating staff, and restructuring service delivery systems (Ober et al., 2015). To enhance organizational readiness to provide evidence-based treatment for OAUDs, we employed multiple theory-based strategies hypothesized to increase adoption of evidence-based practices in community organizations (Aarons, Hurlburt, and Horwitz, 2011; Acosta et al., 2013; Berwick, 1998; Chinman et al., 2013; Chinman, Hunter, and Ebener, 2012; Damschroder et al., 2009; Deming, 1986; Fixsen et al.,

2005; Hunter et al., 2015; Leeman et al., 2015; Powell et al., 2012; Wandersman, Chien, and Katz, 2012; Weiner, Amick, and Lee, 2008). Our organizational readiness implementation intervention aimed to increase "behavioral and psychological willingness" to implement OAUD treatment in primary care among providers and staff (Weiner, Lewis, and Linnan, 2009); part of the intervention, therefore, was to develop clinic-specific protocols to deliver OAUD treatment. The organizational readiness intervention consisted of six implementation strategies. The strategies fall within three key implementation process categories outlined by Powell et al.: plan for change, educate at all levels, and restructure delivery systems (Powell et al., 2012). We further describe these below and in Ober et al. (2015). During this phase, we developed a collaborative care service delivery protocol in response to identified barriers to delivering OAUD treatment in the FQHC (Ober et al., 2017; Watkins et al., 2017).

Second, the clinic staff integrated the continuum of care for OAUD into existing care practices and provided OAUD treatment using a collaborative care service delivery model, while external facilitators continue to provide support. Collaborative care is based on principles of the chronic care model (Bodenheimer, Wagner, and Grumbach, 2002b; Bodenheimer, Wagner, and Grumbach, 2002a) and involves integrating behavioral health into primary care. Collaborative care in this demonstration consisted of a "warm hand-off" to a care coordinator, a brief motivational intervention with patients to assess willingness to attend an intake session with a behavioral therapist, care coordination, and regular check-in and monitoring calls. The continuum of care for OAUD consisted of screening provided by medical assistants and brief interventions for at-risk individuals provided by medical providers, with either a six-session motivational interviewing/cognitive behavioral therapy–based psychotherapy or medication-assisted treatment for individuals with alcohol or opioid dependence. The research literature supports the effectiveness of treatment for OAUD (Department of Veterans Affairs, Department of Defense, 2015; Jonas et al., 2014; Kaner et al., 2007; Schackman et al., 2012; Smedslund et al., 2011). Intervention activities, described in detail elsewhere, included implementation meetings, provider trainings, development of treatment and procedure manuals, a pilot test, care coordination, and support for population-based care.

Present Study

Because the cost of implementing new practices ultimately can influence whether they are adopted and sustained (Meyer, Davis, and Mays, 2012), we evaluated the resources required to create organizational readiness and to support and integrate evidence-based treatment for OAUD into existing care practices using a collaborative care service delivery model. Specifically, we sought to understand how much time and money a large FQHC might expect to spend on external facilitation and internal staff resources (e.g., physicians attending meetings) to create organizational readiness and to deliver OAUD services using collaborative care. There is some previous literature examining the cost of continuous quality improvement programs, including a

study on depressive care in primary care clinics within the Veterans Affairs system (Liu et al., 2009), diabetes care in diabetes clinics (Sathe et al., 2016), Network for the Improvement of Addiction Treatment interventions (Gustafson et al., 2013), and a range of quality improvement activities in substance abuse treatment centers (Hunt, Hunter, and Levan, 2017). This report builds off previous literature by documenting some of the costs of SUMMIT in a primary clinic setting.

While SUMMIT was conducted at only two clinic sites within one FQHC, limiting generalizability, we believe it is a useful starting point for primary care clinic directors and policymakers seeking to understand the potential costs of preparing for and then integrating OAUD into usual practice using a collaborative care service delivery model. In particular, we do not simply calculate the actual expenses incurred; that would be an accounting exercise, and the program funding information is freely available. Rather, we estimate the costs that another facility of this size might expect to incur. We include costs that take into account the lessons learned about how many people with particular job roles should participate in meetings, trainings, and other activities. For example, in some cases two external facilitators participated in implementation meetings, where in many cases only one facilitator was needed. Further, we excluded from our cost estimates development costs that would not be incurred by another facility (i.e., to develop protocols that are now freely accessible [Heinzerling et al., 2016; Ober et al., 2017; Osilla et al., 2016]).

Methodologically, **this study provides cost estimates based on an activity-based costing approach**, in which actions necessary for implementing the key activities of the SUMMIT intervention were identified after study completion and assigned a cost based on resources used (labor and indirect expenses) (Kaplan and Anderson, 2007).

Chapter Two. Method and Data

The scope of this study is to describe the costs to create organizational readiness for delivering substance use disorder (SUD) treatment in primary care and then to deliver the care using a collaborative care model. This means we do not include costs of any knock-on (i.e., indirect) effects that the program may have on care. For example, if the program leads to increased or decreased use of "usual clinical care," the costs of that are not included here. We cannot determine, therefore, whether the costs to implement and deliver the program change any medical costs that may occur in other parts of the system.

Method

This study applied a bottom-up, activity-based costing approach (Sabatier, 1986) in which we include labor (e.g., time spent by all involved), indirect costs (e.g., labor and capital to support those directly working on the program, such as information technology support or telephone expenses), and minor supplies or equipment (e.g., items purchased). In following this approach, we first identified each of the resources expended to implement the SUMMIT model. To do this, we started by organizing our cost data collection by each of the four components of SUMMIT shown in Figure 2.1—plan for change, educate at all levels, restructure delivery systems (which are part of achieving organizational readiness), and collaborate on care; for more, see Ober et al. (2015). Then we identified each of the theoretically grounded implementation activities achieved in order to deliver on the goals. Those are shown as the bullet points in the figure. The resources included for each of these activities are

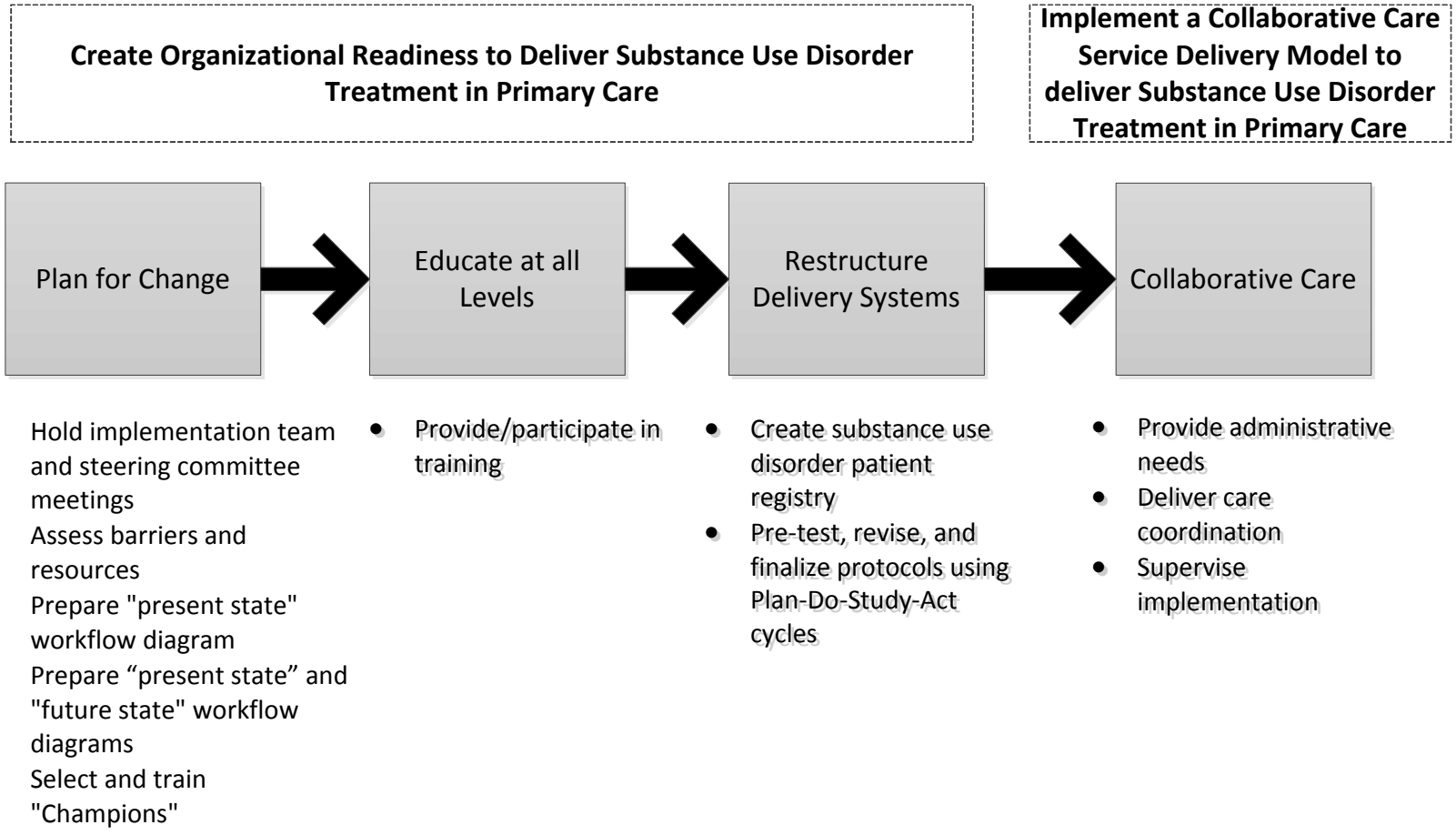
- *Hold implementation team and steering committee meetings* and *provide/attend training*: the resources for external facilitators to conduct meetings and for individuals at the primary care clinic to attend the meetings. We do not include the time spent scheduling meetings or any discussions about the meetings (i.e., on the telephone, email exchanges).
- *Assess barriers and resources*: the resources for external facilitators to conduct focus groups and interviews and to summarize findings, as well as the resources spent by primary care clinic staff to participate in the focus groups or interviews, and technical assistance. Again, we do not include time spent scheduling or discussing the focus groups or interviews.
- *Prepare workflow diagram*: the time spent for a project manager to adapt the diagram.
- *Select and train champions*: the time spent participating in training and delivering training; any time spent outside of the training to discuss the material was not included.
- *Create patient registry*: the time spent by an information technology programmer to develop the registry, including any time discussing, programming, and testing the registry.

- *Adapting protocol* under restructure delivery systems: the time spent to adapt a protocol to the specific systems of the primary care clinic studied, as well as the time for technical assistance and administrative assistance needed during the protocol adaptation. We note that there is one activity in Plan for Change that is not included in the cost estimates that involves protocol development. Specifically, the external facilitators developed treatment and program protocols and patient education materials. These protocols and materials are relevant to any large clinic preparing for and integrating SUMMIT and are currently available free online. Since the aim of this study is to provide costs that could be reasonably expected by another large FQHC or other type of community health center implementing SUMMIT, we did not include these costs. The protocol costs included here are for adaptation to a specific facility.
- *Collaborative care*: the time spent to (1) perform administrative tasks that occur with collaborative care, (2) deliver care coordination, and (3) supervise the implementation. These three elements do not include the cost of delivering the continuum of care for OAUD (i.e., screening, brief intervention, medication, and therapy) because that is part of clinical care.

After identifying the amount of resources used for each activity, we then applied a relevant monetary value (hourly pay, fringe benefits rate, and indirect rate). We describe the supplies and equipment needed in the results but do not include them in the costs because it is unlikely that other clinics using SUMMIT would need to buy these items.

Finally, we aggregated the values to generate the cost of the SUMMIT organizational readiness and collaborative care intervention. In part, we separate these because the organizational readiness costs can be considered one-time, start-up costs, whereas the collaborative care costs are ongoing maintenance costs. We provide results in terms of the costs to develop organizational readiness and the costs for using collaborative care to deliver OAUD treatment, broken down by the costs to the clinic and the costs for external facilitation. To standardize the costs, we provide the cost as a percentage of operating expenses for programs in the clinic and per patient seen.

Figure 2.1. SUMMIT Activities Included in Costs of This Study



For each objective achieved between August 2012 and January 2016, we collected the time spent and equipment purchased through administrative records or based on recall (we provide additional details regarding how data was collected in the Data section following). Fringe benefit rates were similarly applied as a percentage of labor. Indirect costs were applied as a percentage of the labor costs spent implementing tasks. The primary care facility and external facilitators provided their specific fringe benefit and indirect rates. Formally, we calculated the following:

$$Total\ cost\ = \left[\Sigma_j (CQIclinic_j * hourly\ wage_j) * (1 + R^C)\right] + \sum_j \left(CQIfac_j * hourly\ wage_j\right) * (1 + R^F), \quad (1)$$

where *CQIclinic* refers to the hours spent by job type *j*, the mean hourly pay for job types *j*, the fringe benefits and indirect rate R^C at the primary care facility; *CQIfac* refers to the hours spent by external facilitators for each job type *j*; and R^F represents the fringe benefits and indirect rate incurred by external facilitating agency *F*. For the hourly pay rates by job type, see Table A.1 in the appendix. To standardize the costs, we provide the cost as a percentage of total operating expenses for programs in the clinic and per patient seen. Furthermore, we also present the costs for the clinic and external facilitator separately to provide an understanding of how resources are split.

Additional details are provided below regarding all the data collection methods involved in calculating the equation shown, including interviews with participants and external facilitators and the abstraction of administrative data.

Data

Primary Care Facility Resources

The primary care facility incurred expenses for attending meetings, training sessions, and focus groups and interviews (to assess barriers and resources), as well as for time spent on implementing the pilot (to pretest, revise, and finalize protocols) and care coordination. We kept a record of attendees, their job types, and the duration of each implementation meeting and training session. There were 99 meetings in total, with an average of one meeting per type during the period of that type of meeting. Breaking down the meetings by type, organizational readiness involved meetings to plan (43 meetings over 23 months), adapt the intervention (eight meetings over nine months), and train (26 meetings over 37 months), and collaborative care implementation meetings (18 meetings) occurred over a 20-month period.

For the time spent adapting protocols[1] to fit the clinic (based on focus groups and interviews) and on care coordination, we did not have documented evidence, so we interviewed the relevant

[1] Not protocol development. We could expect this adaption of the protocol to the specific study site to occur for another facility adopting the program.

people about how much time was spent. Recall bias is a limitation of this approach, but the nature of the work meant that people appeared to remember specific time set aside for SUMMIT-related protocols and care coordination. Average pay rates for each job type were based on accounting records of the primary care facility (Table A.1 shows the rates used in this study). We did not include travel time or travel expenses because meetings were held at a time when staff was already at the facility.

Primary care facilities have accounting records for tax purposes, including the total operating expenses for programs of their facility and number of patients seen. We use these data to calculate SUMMIT costs as a percentage of operating expenses and per patient seen.

External Facilitator Resources

The external facilitator incurred expenses for conducting meetings, training sessions, focus groups, and interviews (to assess barriers and resources), as well as providing technical assistance. We used administrative records for the meetings and training sessions. For time spent on focus groups and interviews, providing technical assistance, and development of the SUD patient registry tool, we used the timesheets filled out by research organization staff.

Chapter Three. Results

Applying equation (1), we provide estimates separately for the start-up cost of developing organizational readiness in Table 3.1 and the ongoing maintenance cost of collaborative care in SUD treatment in Table 3.2. We include costs starting from when the program began (August 2012) until the research component of the program ended (January 2016). The clinic is currently continuing to deliver collaborative care.

Table 3.1. Start-up Cost to Create Organizational Readiness in Primary Care, August 2012–January 2016

	Primary Care Clinic	External Facilitators	Total
Plan for Change			
Hold implementation team meetings and steering committee meetings	$12,015	$34,236	$46,251
Assess barriers and resources through focus groups and interviews	$3,095	$9,360	$12,455
Prepare "present state" and "future state" workflow diagrams		$4,032	$4,032
Educate at All Levels			
Participate in/provide training	$55,371	$17,059	$72,429
Restructure Delivery Systems			
Create SUD patient registry		$11,724	$11,724
Pretest, revise, and finalize protocols using PDSA cycles	$2,838	$10,857	$13,695
Implement Collaborative Care			
Implementation Team Meetings	$4,200	$13,012	$17,212
Total	$77,519	$100,280	$177,798

NOTE: PDSA = plan-do-study-act.

Table 3.2. Ongoing Maintenance Costs to Deliver SUD Treatment Using Collaborative Care, August 2012–January 2016

	Primary Care Clinic	External Facilitator	Total
Administration		$20,466	$20,466
Care coordination	$107,973		$107,973
Supervision		$58,075	$58,075
Total	**$107,973**	**$78,541**	**$186,514**

We estimate the total one-time, start-up cost of achieving organizational readiness for SUMMIT to be $77,518 for the FQHC resources and $100,280 for external facilitation resources. The lowest-cost activity is to prepare “present state” and “future state” workflow diagrams ($4,032), and the greatest cost is to hold implementation team and steering committee meetings ($46,251). While one of the key cost drivers for the external facilitator is to hold the meetings

($34,236), the largest source of costs to the primary care clinic is to participate in training ($55,371).

To provide a better understanding of the time investment by primary care facilities to create organizational readiness over the 3.5 years studied, we provide a breakdown of the time spent in meetings and trainings by job type in Table 3.3. Generally speaking, the clinical director, physicians, and behavioral health providers (primarily licensed clinical social workers) attend the meetings. While physicians attend more meetings than behavioral health providers, the meetings they attend are briefer than the meetings attended by the therapists. Regarding training, the physicians, behavioral health providers, and Counselors/Coordinators attend the same number and duration of trainings. The other job types tend to attend one or two meetings of approximately one hour. There were two "all-staff trainings" of 30 minutes each that we did not include in our cost estimates because there were hundreds of attendees and official attendance was not taken, so we do not know how many people, and thus resources, were used. Yet, since we would recommend conducting these two meetings, we highlight this for readers planning to implement this program.

Table 3.3. Average Number of Hours in Meetings and Trainings, by Job Type, August 2012–January 2016

	Organizational Readiness and Collaborative Care Implementation Meetings		Trainings	
	Number of Meetings Attended by at Least One Person	Average Hours per Session Attended	Number of Trainings Attended by at Least One Person	Average Hours per Session Attended
Clinical director	22	1.0	4	1.0
Counselor/coordinator	0	n/a	13	2.7
Licensed Clinical Social Worker	40	1.1	12	2.5
Nurse practitioner	0	n/a	2	1.0
Pharmacist	0	n/a	2	1.3
Physician	49	0.6	12	2.6
Physician assistant	0	n/a	2	1.0
Registered nurse	0	n/a	1	1.0

We also identified ongoing maintenance costs to deliver and support delivery of OAUD treatment using collaborative care over the 3.5 years from when the program began and ended. Results show it cost an estimated $107,973 for labor and indirect resources at the primary care clinic and $78,541 for external facilitator support (Table 3.2).

Combined with the costs in Table 3.1, this brings the total cost of primary care clinic resources for organizational readiness and adding collaborative care to SUD treatment to $185,491. Given the size and scope of work at the clinic, the total cost of the SUMMIT organizational readiness and collaborative care intervention amounts to 1.0 percent of the

facility's total program operating expenditure. Using the rate of 114,000 patients seen per year for this primary care clinic, the estimated cost was $0.46 per patient seen. The total cost of external facilitation is an estimated $178,821, or $0.45 per patient seen.

Lastly, we identified the supplies and equipment needed to implement SUMMIT. Most clinics will already have many of the required items (e.g., computers, printers/paper/ink, telephone) and thus will not need to purchase them. Yet, we point out two items that are specific features of the treatment program that some programs may not have or would need to supplement: urinalysis cups and refrigerator(s).

Chapter Four. Discussion

The aim of the SUMMIT program was to increase an organization's readiness to implement the continuum of care for OAUD and then to deliver OAUD treatment through a collaborative care service delivery model. Over a 3.5-year period during which we measured the costs, the total cost to prepare for organizational readiness and to add collaborative care into the delivery of treatment was $185,491 for primary care resources (1.0 percent of total operating expenses at the clinic, $0.46 per patient seen) and an estimated $178,821 for external facilitation (1.0 percent of total operating expenses at the clinic, $0.45 per patient seen). Costs estimated in this study are distributed (although not uniformly) throughout the 3.5-year period.

These costs represent the labor and indirect expenses spent for the delivery of SUMMIT in one large FQHC. While these costs may not be directly transferable to other clinics, this may be a useful starting point for clinic directors and policymakers seeking to understand the potential costs of this program.

For other facilities considering adopting the program, there may be a question about how many resources are needed at the beginning to start up the program versus the average monthly cost of maintaining the program. We can equate the organizational readiness costs to start-up costs and collaborative care costs to ongoing program maintenance. That is, organizational readiness costs, with the exception of booster trainings or trainings for new staff, most likely can be considered one-time costs, whereas the cost of care coordination and other elements of collaborative care will be ongoing.

Given the aims of this study, resources were identified for the primary care clinic and external facilitator participating in the study; however, this leaves out one other important perspective. This study does not include the influence of the program on patients. For example, it may be that this program leads to increased waiting time or delays for patients, which could have tangible and intangible costs to patients. Future research could look into the influence of organizational readiness and collaborative care on economic costs to patients.

There are limitations to this cost analysis. First, the level of efficiency to complete organizational readiness and add collaborative care into SUD treatment depends on the clinic's readiness and expertise. Clinics should keep in mind that the period of organizational readiness and implementation could vary, with more or less time spent on each task. Time spent may be a function of how ready a clinic is to implement collaborative care for OAUD at the outset, how much external facilitation is desired or needed, and how quickly clinics are able to move forward with implementation. Similarly, while evidence suggests the intervention improved uptake of OAUD services in primary care (Watkins et al., forthcoming), time and level of support were not studied. Second, this study does not include the additional time spent on scheduling meetings or trainings or on discussing material (by telephone or email) because it was not possible to

determine with any accuracy how long it took to conduct these activities. This is perhaps a substantial amount of time, as seen in one study on the organizational cost of quality improvement for depression care (Liu et al., 2009). Third, this study does not include time spent by information technology professionals to add alerts into the electronic medical record (EMR) because this function was not fully operational during the study and because the registry used during the study could not be integrated with the clinic EMR. However, we do include the cost of creating the patient registry outside of the EMR and of any minor technology support (through indirect rates). Fourth, this study does not investigate the net benefit of tasks that individuals at the primary care clinic could have done instead (known as opportunity costs). That is, we do not know what activities physicians, therapists, and other staff would have been doing instead of attending organizational readiness meetings, for example, and therefore cannot take into account the net benefit of other activities that were not done or performed later. Last, the costs do not include the cost of providing clinical care to patients with OAUD, such as (potentially) additional time needed to spend with patients at medical or behavioral health visits, the cost of administering medication, or other clinical costs.

Appendix

Table A.1. Cost per Hour, by Job Type

	Fully Burdened Hourly Rate (Pay, Fringe Benefits, and Indirect Cost)	Source of Salary or Hourly Pay Data
Primary Care Facility		
CEO, COO	$111	Administrative records
Clinical Director	$64	Administrative records
Counselor/Coordinator	$37	Administrative records
Front desk/call center	$36	BLS (2017e)
Licensed Clinical Social Worker	$87	Administrative records
Nurse Practitioner, Registered Nurse	$77	BLS (2017c)
Pharmacist	$102	Administrative records
Physician	$197	Administrative records
Physician Assistant	$27	BLS (2017d)
External Facilitator		
Administrative Assistant	$36	BLS (2017e)
Computer Programmer	$70	BLS (2017b)
Full Policy Researcher	$196	Administrative records
Project Manager	$101	BLS (2017a)
Research Assistant	$153	Administrative records
Senior Physician/Psychologist Policy Researcher	$253	Administrative records
Senior Statistician/Survey Expert	$260	Administrative records

NOTE: CEO = chief executive officer; COO = chief operations officer.

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