

Costs of Maintaining a High-Volume Telemedicine Program in Community Health Centers

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Preface

From 2017 to 2020, the California Health Care Foundation funded the Sustainable Models of Telehealth in the Safety Net initiative to expand the use of telemedicine in nine participating community health centers in California. To evaluate the experiences of participating health centers in growing their telemedicine programs, we conducted a mixed methods formative and summative evaluation. Quantitative data sources included health center telemedicine volume and progress report data, while qualitative data sources included interviews with telemedicine coordinators and health center clinicians conducted by telephone and at site visits, along with focus groups with chief financial officers. The overall results of this evaluation are described elsewhere (see Lori Uscher-Pines, Jessica Sousa, Alina I. Palimaru, Mark Zocchi, Kandice A. Kapinos, and Allison J. Ober, *Experiences of Community Health Centers in Expanding Telemedicine*, Santa Monica, Calif.: RAND Corporation, RR-A100-1, 2020). In this report, we share more-detailed findings from an analysis of telemedicine-related costs at participating health centers.

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Costs of Maintaining a High-Volume Telemedicine Practice

In the past five years, the use of telemedicine has grown considerably as a way to address access-to-care challenges for individuals in remote or rural locations and to potentially reduce costs (Kruse et al., 2017; Kvedar, Coye, and Everett, 2014; Speyer et al., 2018). However, the evidence on whether telemedicine results in cost savings is mixed and varies by type of telemedicine and delivery setting (Totten et al., 2016). Only a handful of studies have explored the costs and potential savings associated with telemedicine implementation in community health centers. These studies have found that telemedicine programs are not self-sustaining and typically require grants and other resources to operate (Center for Connected Health Policy, 2015; Chelius, Hook, and Rodriguez, 2010). However, these studies are few and outdated, given the significant changes to state telemedicine policies that have occurred in the past few years.

To address this gap in the literature, we examined setup and ongoing annual costs associated with telemedicine implementation among nine community health centers in California that participated in the Sustainable Models of Telehealth in the Safety Net (SMTSN) initiative (Uscher-Pines et al., 2020) from 2017 to 2020, prior to the coronavirus disease 2019 (COVID-19) epidemic. Health centers that participated in the initiative offered different specialty telemedicine services (e.g., tele-mental health, diabetic retinopathy screening) and used different approaches to providing telemedicine. One approach was for health centers to use their own specialty provider staff to provide telemedicine visits. A second approach was for (1) the health center to contract directly with a telemedicine provider or (2) a health plan to contract with a telemedicine provider on behalf of the health center. When the health center contracts directly, it bills on behalf of the telemedicine provider and incurs the contracting costs. When a health plan contracts with the telemedicine provider, the health center does not incur contracting costs but receives reimbursement only when a primary care provider is able to attend a portion of the visit. A third, hybrid approach was for health centers to contract with telemedicine vendors for certain services and use their own staff for other services.

This report uses cost data collected from participating health centers to answer the following questions:

- What are the main setup costs and ongoing annual costs among community health centers for providing telemedicine?
- How do these costs vary by funding structure (i.e., the three approaches described earlier), type of care being delivered, and telemedicine volume?

Although the study did not collect revenue data from centers, we present possible scenarios assuming different reimbursement rates.

Approach

Cost data. We developed a cost questionnaire to be completed by each health center's chief financial officer (CFO). We emailed the cost questionnaire to health centers in June 2019, approximately 18 months after the start of the initiative, and instructed the CFO to complete it prior to a site visit we were conducting as part of the larger evaluation. During the site visits, we reviewed the questionnaire with each health center's telemedicine coordinator and CFO, clarifying responses and adding details where appropriate.

The questionnaire included questions about the fixed costs of delivering telemedicine visits (e.g., labor, equipment, system development, and research costs related to implementation) and variable operating costs. It also asked about how health centers obtained their current (in-use) telemedicine equipment and software (e.g., purchased directly or through a grant), what the dates of acquisition were, what costs were associated with setting up the equipment (e.g., information technology staff time), and what physical space was repurposed for the new equipment and for telemedicine visits. Furthermore, health centers provided detailed information on full-time or part-time staff who were dedicated to supporting the telemedicine program, time spent supporting the telemedicine program, salary information, and costs of vendors (if used). Finally, health centers answered open-ended qualitative questions related to the perceived efficiency of telemedicine (compared with in-person visits).

Measures

From these questionnaires, we aggregated costs into setup and ongoing annual costs across the following dimensions (see Table 1):

- equipment, including carts, software, licenses, and furniture or office supplies
- labor, including professional or clinical, administrative, and contractual.

In instances in which health centers provided an estimate of hours worked but not a specific wage or salary, we used the average wage as reported for California in the U.S. Bureau of Labor Statistics (BLS) State Occupational Employment and Wage Estimates (BLS, 2020). Fringe benefits were estimated at 25 percent of staff costs unless otherwise specified by the health center. In some cases, costs were not reported and we imputed values using average costs reported by other centers (e.g., costs of telehealth carts). Imputed values are denoted in all reporting.

Table 1. Key Cost Measures

Type	Setup	Ongoing
Equipment	Direct costs of equipment and software acquisition	Annual costs of subscriptions, licenses, telemedicine software or services
Labor	Staff time needed to set up equipment, establish contracts, and other start-up activities	Personnel dedicated to the provision of telemedicine, including clinicians, administrative, billing, etc.

NOTE: Setup costs were incurred at the time health centers acquired their current telemedicine capabilities, which varied by health center.

We broke labor costs out into the categories of telemedicine personnel, clinicians, and other support staff.

Volume data. As part of the overall evaluation of the initiative, the nine participating health centers were required to submit data on the number of telemedicine visits that occurred in the 24 months they participated in the initiative. For this cost analysis, we used total counts of telemedicine visits in 2019 to calculate costs per telemedicine visit.

Revenue data. Federally qualified health centers in California receive a single, bundled rate for each qualifying patient visit among Medicaid patients. This single prospective payment system (PPS) rate (between \$130 and \$445 for SMTSN initiative health centers) covers all services and supplies provided during the visit.¹ Reimbursement for telemedicine services outside Medicaid varies depending on the payer, service, specialty, and clinic location. However, most reimbursement outside Medicaid is less than the PPS rate. For example, when we collected cost data, health centers did not receive any reimbursement for telemedicine visits with Medicare patients presenting to an urban or suburban clinic location. They also did not get any reimbursement for certain telemedicine visits for which health plans contracted with vendors on behalf of the health center. For self-pay patients, health centers typically received \$25 per encounter. Notably, between 47 percent and 86 percent of patients have Medicaid at these health centers. It should also be noted that health centers also might receive funding for telemedicine from a variety of other sources (e.g., government grants, incentive payments from health plans) that are not directly related to reimbursement. We did not include those additional revenue sources in our analysis; however, in some health centers, these revenue sources are significant and can offset both start-up and operating costs.

We estimated revenue amounts assuming that the clinic-specific PPS rate was received for different percentages of each health center’s telemedicine volume. We compared these approximate revenues with the total annual costs of administering the telemedicine program as an exploratory examination of profitability.

¹ PPS rates for each health center are published by the California Department of Health Care Services (2019). We applied one PPS rate for each (multisite) health center. This rate was an average of the rates of all the physical locations that provided telehealth within the health center’s network of clinics.

Statistical analysis. Because we collected data from only nine health centers, we chose to report ranges of cost estimates. Our analysis should be considered descriptive and exploratory. Where possible, we have calculated center means and made statistical comparisons using two-sided statistical tests comparing means.

Results

Health centers' telemedicine programs varied widely in the volume of telemedicine visits and in start-up and ongoing costs.

In Table 2, we show reported setup costs. Values are as they were reported by health centers in nominal dollars, but we have included the earliest year reported for incurring these costs. We did not convert amounts to real dollars because not all centers provided dates for all costs initially incurred. It should be noted that multiple health centers incurred start-up costs over several years.

Although equipment costs made up the majority of health centers' start-up costs (see Figure 1), the actual cost of equipment also varied significantly. For example, two health centers spent approximately \$250,000 to procure equipment, while less than \$3,000 was spent at another. More research is needed to determine whether certain types of services or settings necessitate more-expensive equipment for telemedicine (e.g., diabetic retinopathy screening). Only two health centers estimated any costs associated with repurposing space to support the telemedicine program. Estimates of staff (e.g., information technology) time needed to install or set up the telemedicine infrastructure also ranged from \$0 to \$31,200. There was no correlation between total setup costs (equipment, staff, and space) and 2019 telemedicine volume ($\rho = 0.27$, $p = 0.49$). There also were no significant differences in whether the health center was contracting with telemedicine providers ($p = 0.11$) after adjusting for volume, and there was no association between years of experience with telemedicine and setup costs ($p = 0.69$).

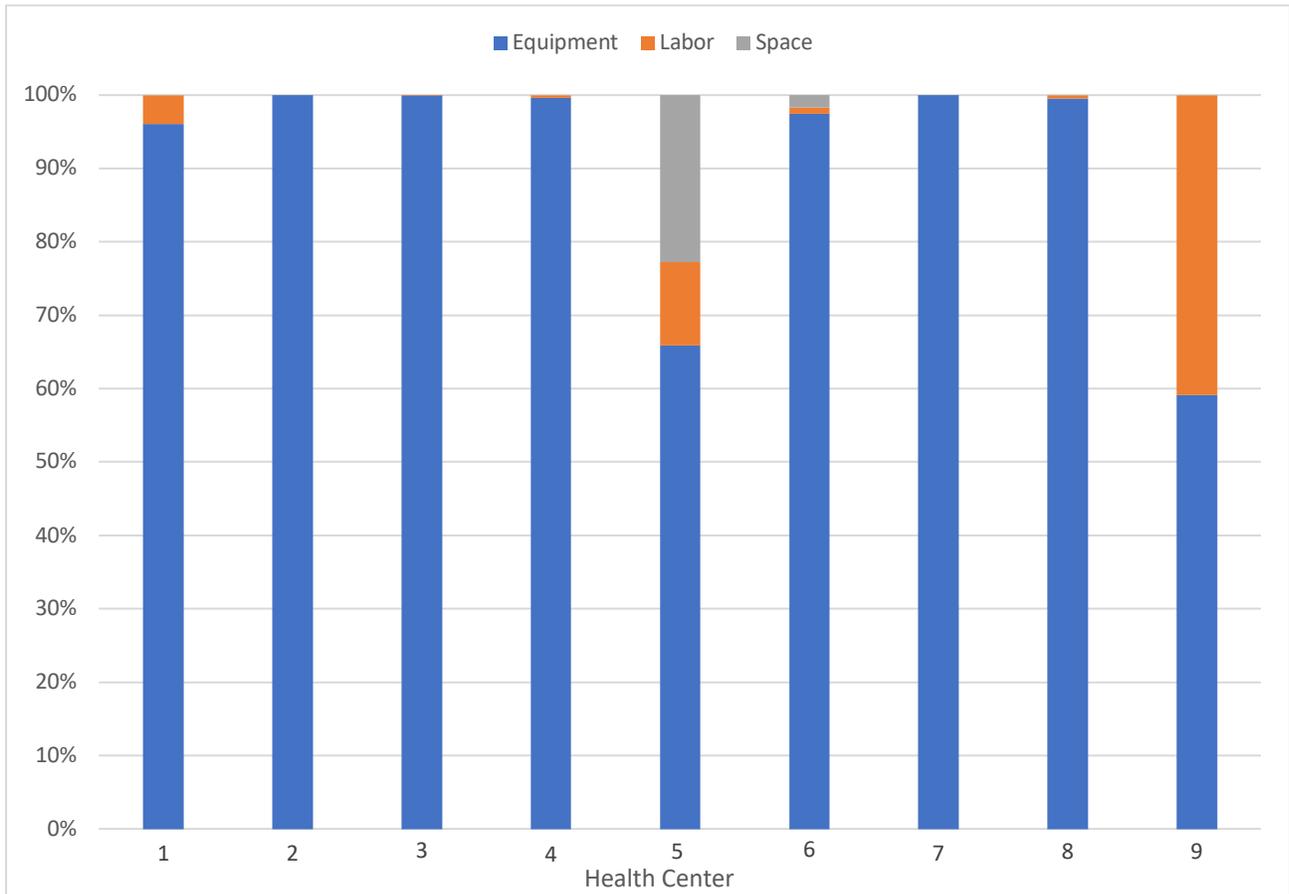
Table 2. Setup Costs, by Center

Center ID	Equipment	Staff	Space	Total Setup Costs	First Year Setup Costs Were Incurred^a
1	\$50,846	\$2,060	\$0	\$52,906	2016
2	<i>\$89,967</i>	\$0	\$0	\$89,967	2011
3	\$156,523	\$112	\$0	\$156,635	2017
4	<i>\$81,800</i>	\$280	\$0	\$82,080	2019
5	<i>\$2,900</i>	\$500	\$1,000	\$4,400	Not provided
6	<i>\$249,920</i>	\$2,240	\$4,300	\$256,460	2017
7	\$250,500	\$0	\$0	\$250,500	2018
8	\$52,160	\$224	\$0	\$52,384	2011
9	\$45,156	\$31,200	\$0	\$76,356	2016
Minimum	\$2,900	\$0	\$0	\$4,400	
Maximum	\$250,500	\$31,200	\$4,300	\$256,460	

NOTE: Values in italics include imputed amounts.

^a Among setup costs reported in the cost worksheet.

Figure 1. Allocation of Setup Costs, by Center



In Table 3, we present annual operating costs for each center, which is what we use in our profitability analyses because setup costs are treated as sunk costs. Volume data are for the 2019 calendar year only.

Notably, there is significant variation in the volume of telemedicine visits across health centers, ranging from fewer than 500 to more than 7,000 per year. Health centers also varied in the number of clinic sites, number of annual patient visits, types of telemedicine services, and years of experience with telemedicine.

Total annual operating costs ranged from around \$137,000 to just over \$1.2 million. There was no correlation between telemedicine volumes and annual operating costs ($\rho = 0.56, p = 0.13$). Vendor costs, which were used in seven of the nine centers, was the largest cost category. Most health centers (eight of nine) provided estimates of time that other staff (e.g., billing or administrative staff) who were not dedicated to the telemedicine program spent on the program. These costs ranged from \$3,000 to \$169,308 per year.

Total annual operating costs were not significantly different for health centers that were contracting out telemedicine visits ($n = 2$). There also was no association between years of telemedicine experience and annual operating costs ($p = 0.20$).

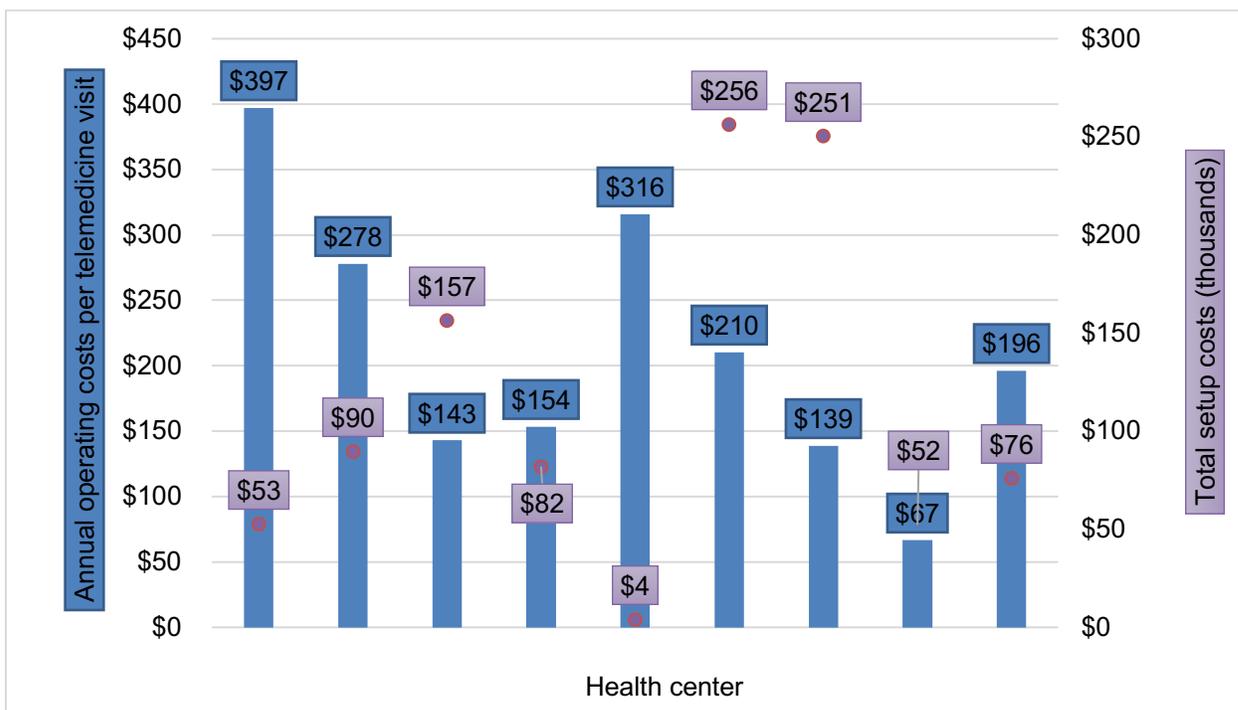
Table 3. Annual Telemedicine Operating Costs, by Center

Center ID	Annual Telemedicine Volume	Annual Costs					Misc. (Including Licenses)	Total	Annual Cost per Visit
		Telemedicine Staff	Vendors	Other Staff	Clinicians				
1	2,814	\$310,902	\$365,000	\$169,308	\$267,138	\$5,153	\$1,117,501	\$397	
2	3,279	\$145,817	\$726,000	\$38,358	\$0	\$1,840	\$912,015	\$278	
3	4,120	\$129,085	\$72,964	\$3,000	\$384,384	\$0	\$589,433	\$143	
4	1,485	\$131,931	\$9,600	\$50,796	\$35,712	\$0	\$228,039	\$154	
5	433	\$96,956	\$9,080	N/A	\$0	\$30,804	\$136,840	\$316	
6	5,784	\$335,349	\$852,240	\$25,595	\$0	\$0	\$1,217,184	\$210	
7	1,793	\$73,641	\$0	\$156,244	\$12,096	\$7,120	\$249,101	\$139	
8	7,254	\$141,328	\$186,430	\$154,776	\$1,824	\$0	\$484,358	\$67	
9	1,063	\$75,107	\$63,320	\$54,846	\$8,424	\$6,990	\$208,687	\$196	
Minimum	433	\$73,641	\$0	\$3,000	\$0	\$0	\$136,840	\$67	
Maximum	7,254	\$335,349	\$852,240	\$169,308	\$384,384	\$30,804	\$1,217,184	\$397	

NOTE: N/A = not applicable.

In Figure 2, we present the total annual operating costs per visit by health center (see the left y-axis, blue bars, and boxes) and the total setup costs by health center (see the right y-axis and the purple boxes). The annual costs per visit ranged from \$67 to \$397. There was no correlation between setup costs and annual costs per visit ($\rho = -0.31, p = 0.42$).

Figure 2. Annual Operating Costs per Visit and Total Setup Costs



NOTE: Health centers are shown left to right from 1 to 9.

In Table 4, we present results on the telemedicine coordinator costs. All health centers provided specific salary information for this position. Most health centers (seven of the nine) had one full-time equivalent (FTE) staff member dedicated to this position, one had three FTEs, and another had two FTEs. Average annual salaries per FTE ranged from \$37,554 to \$66,518 (inclusive of fringe benefits). On a cost-per-visit basis for this position, health centers ranged from \$6 to \$139. Most health centers reported other telemedicine staff costs than clinical providers. Like the setup and annual costs described earlier, these annual costs are not correlated with volume ($\rho = -0.04, p = 0.91$).

Table 4. Telemedicine Coordinator Costs, by Center

Health Center ID	FTE	Average Annual Salary plus Fringe	Total Annual Cost	Telemedicine Visits	Cost per Visit
1	3	\$49,021	\$147,063	2,814	\$52
2	1	\$42,925	\$42,925	3,279	\$13
3	1	\$54,868	\$54,868	4,120	\$13
4	1	\$65,520	\$65,520	1,228	\$53
5	1	\$60,000	\$60,000	433	\$139
6	1	\$66,518	\$66,518	5,784	\$12
7	1	\$45,000	\$45,000	1,793	\$25
8	1	\$42,000	\$42,000	7,254	\$6
9	2	\$37,554	\$75,108	1,063	\$71
Min	1	\$37,554	\$42,000	433	\$6
Max	3	\$66,518	\$147,063	7,254	\$139

Implications for Profitability

We used health center–specific PPS rates provided and each health center’s patient payer mix according to Health Resources and Services Administration Uniform Data System data to impute an approximate annual revenue amount from reimbursements under three scenarios. In this analysis, we ignore setup costs, treating them as sunk costs.

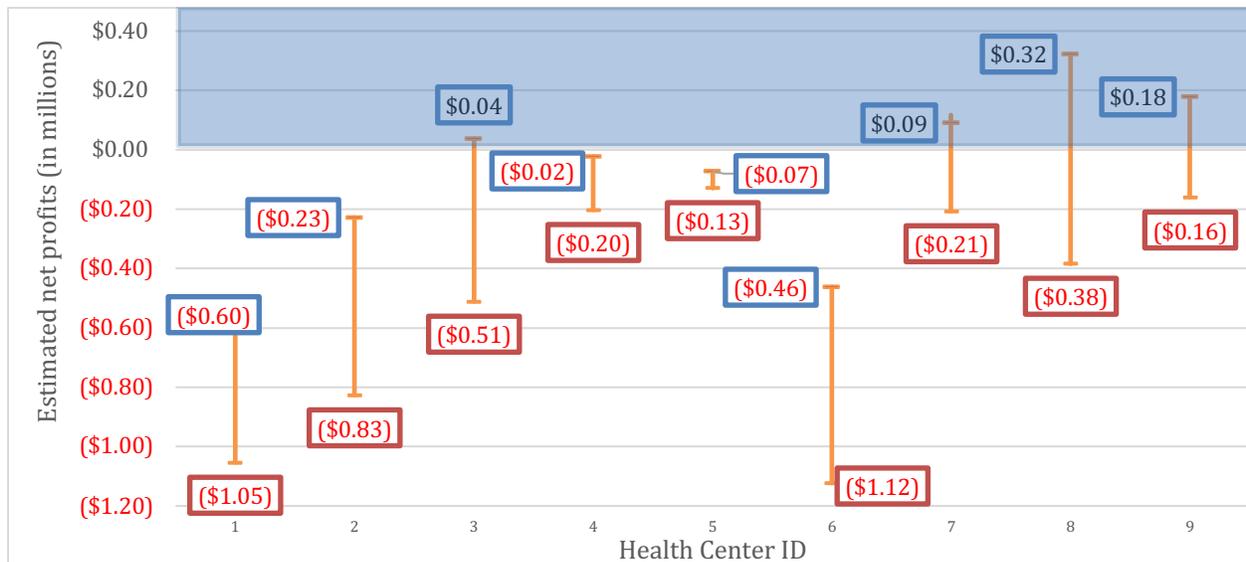
In Scenario 1, we assumed that the federally qualified health center would get reimbursed at the PPS rate for 50 percent of its visits and receive \$0 for the remaining 50 percent of visits. In this case, all but two of the health centers in our study would not be able to cover telemedicine operating costs each year (see the net profits column under Scenario 1 in Table 5). In Scenario 2, we used the percentage of the center’s patients who were covered by Medicaid as reported by the Health Resources and Services Administration (see column 1 in Table 5) as an approximation of the percentage of telemedicine visits that would be reimbursed at the PPS rate. As before, we assumed that visits with patients who were covered by other payers would receive no reimbursement. In this case, three centers would be able to cover annual operating costs. Two of these three centers contract with external telemedicine providers for all or some of their services. Finally, in Scenario 3, we used Scenario 2 but allowed for \$25 reimbursement for all other (non-Medicaid) visits for each health center. For example, for the first center listed, we assumed that about 52 percent of the visits would be reimbursed at the PPS rate and 48 percent would be reimbursed at \$25.

Table 5. Profitability Scenarios, by Center

Percentage Medicaid or Children’s Health Insurance Program	Revenue Estimate			Annual Operating Costs	Net Profits		
	Scenario 1	Scenario 2	Scenario 3		Scenario 1	Scenario 2	Scenario 3
51.46	\$320,374	\$329,753	\$363,898	\$1,117,501	(\$797,127)	(\$787,748)	(\$753,603)
65.46	\$427,401	\$559,582	\$587,894	\$912,015	(\$484,614)	(\$352,433)	(\$324,121)
72.79	\$391,585	\$570,103	\$598,125	\$589,433	(\$197,848)	(\$19,330)	\$8,692
69.98	\$128,178	\$179,388	\$190,534	\$228,039	(\$122,044)	(\$79,697)	(\$70,480)
47.51	\$39,925	\$37,936	\$43,618	\$136,840	(\$96,915)	(\$98,904)	(\$93,222)
65.30	\$471,656	\$615,993	\$666,167	\$1,217,184	(\$745,528)	(\$601,192)	(\$551,017)
86.34	\$212,255	\$366,536	\$372,657	\$249,101	(\$36,846)	\$117,435	\$123,556
52.72	\$504,226	\$531,643	\$617,387	\$484,358	\$19,868	\$47,285	\$133,029
47.00	\$241,833	\$227,323	\$241,407	\$208,687	\$33,146	\$18,636	\$32,720

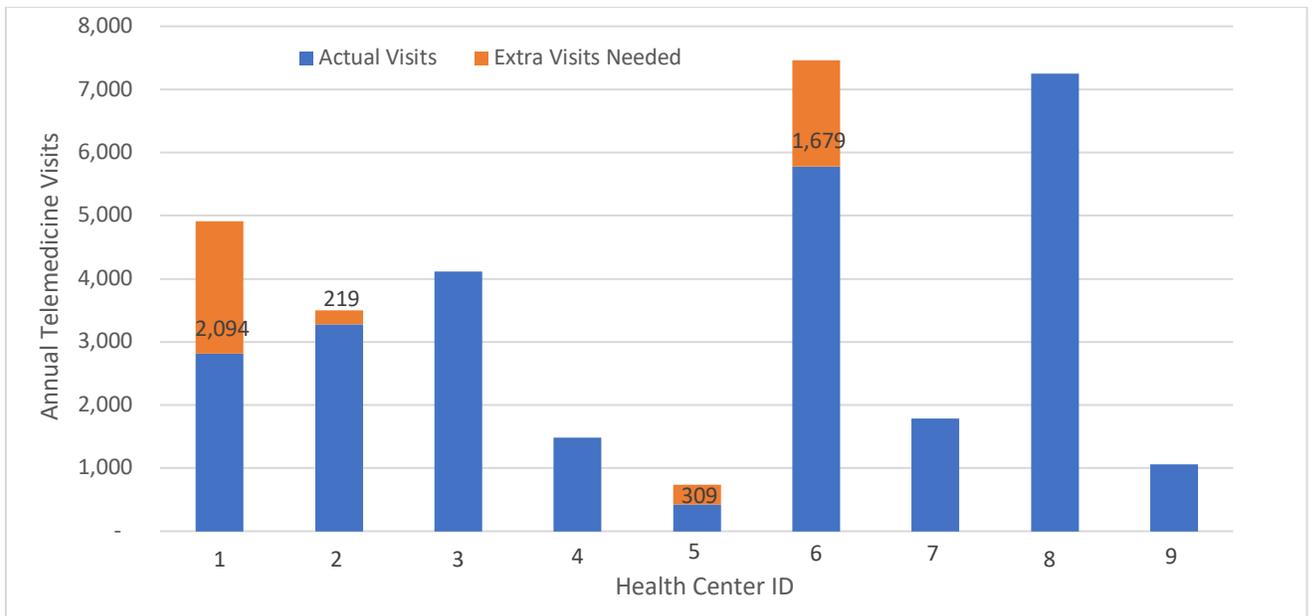
To show the range of net profits, assuming that clinics receive their PPS reimbursement for 10 percent to 80 percent of all their telehealth visits, we plotted these values in Figure 4 for each center. Our estimates suggest that if 80 percent of the current volume of telemedicine visits were reimbursed at the health center’s current PPS rate, five centers still would not be able to cover their annual telemedicine operating costs. Five centers would not break even if 100 percent of visits were reimbursed at the PPS rate (specifically, centers 1, 2, 4, 5, and 6).

Figure 4. Range of Net Profits Assuming That from 10 Percent to 80 Percent of Visits Are Reimbursed at PPS Rate, by Center



Another way to think about profitability is to determine how many visits would be necessary to cover operating costs; that is, total annual operating costs divided by the PPS rate. This calculation assumes a PPS reimbursement for all visits, so this should be considered a lower bound of the minimum number of visits needed to cover operating costs. Assuming that there are no additional variable costs, we calculated the minimum number of telemedicine visits per year that would be necessary to cover the current annual operating costs, as shown in Figure 5. Five health centers already have enough telemedicine visits to cover the operating costs if all of their visits are reimbursed at their PPS rates, whereas the remaining centers would need to increase volume by the amounts shown in the orange bars.

Figure 5. Annual Telemedicine Visits: Additional Billable Visits Needed to Break Even (Assuming That All Visits Are Reimbursed at PPS Rate)



Conclusions

Our study has several limitations. Our summation of each health center's total setup costs and annual costs is based on what they reported on the cost questionnaires and in discussions with our team to clarify details in their responses. We did not review any formal center cost or reimbursement reports at either the aggregated or claim level. We did allow health center representatives to review this report and clarify any costs they felt were inaccurate.

We also note significant heterogeneity in responses from health centers. Although all nine centers responded and completed our cost questionnaires, the level of detail provided varied. This may be because of the length of time that has elapsed since the initial setup of telemedicine for some centers (i.e., more than ten years) or because of differences in tracking costs across centers. Because of inconsistency in reporting, we had to impute some costs where, for example, the number of hours was provided but wages were not. We used average costs for imputation. However, given how varied these costs were across health centers, using "average" costs to impute this missing cost data might not reflect actual costs at that site. The BLS data used to estimate wages is based on the average hourly wage across the state of California and might be different than the hourly wage at any given site. Furthermore, health centers frequently estimated the cost of equipment, especially for equipment that was acquired from grants or was donated. Information technology staff time to set up telemedicine equipment and provide ongoing support or maintenance was estimated in hindsight but not collected in real time. Also, any setup costs covered by a grant (and not the health center) are included only if centers reported the amounts. In some cases, centers would note that grants covered certain costs but did not have amounts readily available. Finally, costs from sites that provided more-detailed estimates of staff and equipment might appear to be higher simply because they included more resources in their estimates. We did not impute cost categories missing from cost questionnaires entirely (e.g., staff time for setup, costs of room repurposing, hours for billing or administrative staff if left off the cost worksheet).

As noted earlier, we did not collect revenue data, which means that the profitability analyses we conducted should not be considered definitive. We made assumptions regarding reimbursement. However, some health centers in the initiative reported that the majority of their telemedicine visits were not reimbursed, either because they were not eligible for reimbursement or because the health center had not pursued reimbursement. For example, in some cases, extra resources would be required to convert the visit into a billable visit, and the service was too low-volume to justify the extra resources.

Finally, there were factors that we were unable to address that might affect all of our estimates. In particular, although we collected details on setup costs, we were unable to estimate a precise magnitude of setup costs for a few reasons. Some health centers began offering

telemedicine more than ten years ago. We did not convert setup costs into real dollars (i.e., adjust for inflation) because of inconsistency in reporting when items were acquired. However, even if we had that information, the technology used in offering telemedicine has changed dramatically in the past ten years. Thus, comparisons of setup costs across these centers is not straightforward, and we do not draw statistical inferences in those differences except to note that there is variation. We also did not factor any depreciation into the cost analysis. Buying new equipment to replace outdated or broken equipment is not factored into any of the annual operating costs.

With these caveats in mind, we offer two key themes based on our analyses: (1) there is significant variation in the structuring and financing of telemedicine in health centers, and (2) depending on which assumptions are made about reimbursement, many health centers would need to add additional (billable) telemedicine visits to cover operating costs and/or reduce operating costs.

First, as noted in the introduction, the nine health centers we studied used different approaches to telemedicine implementation. Some centers started offering telemedicine shortly before the SMTSN initiative, whereas others had been offering it since the late 1990s. Some health centers used their own staff to provide telemedicine visits, whereas others contracted with third parties. As a result, we found significant variation in both the setup and ongoing costs of providing telemedicine. The one exception to this is that we found that the majority of setup costs were related to equipment and infrastructure (and less were related to personnel or staffing costs).

With so few clinics in our study, we cannot determine drivers of profitability, but we did conduct exploratory analyses of what revenues from the telemedicine visits might be across each of the centers. In most cases, the annual operating costs exceeded the expected revenues unless we make generous assumptions about reimbursement. Analysis of claims data to ascertain billing and reimbursement amounts is needed to provide more-conclusive evidence. However, based on our assessment, even if all centers received the full amount of the PPS reimbursement for 80 percent of their telemedicine visits, fewer than half would be able to cover the annual operating costs from reimbursement alone. However, discussions with the centers in our study revealed that many received no reimbursement for a significant percentage of these visits. Several noted differences in reimbursement rules by payers. Taken together, these findings highlight an urgent need for consistent payer policy for telemedicine visits. Our study included several clinics that have been navigating the provision of telemedicine for some time, optimizing strategies to minimize losses on these visits; yet, the challenge remains.

Health centers looking to reduce costs or increase revenue from telemedicine visits have several options. Fortunately, equipment costs have fallen in recent years, and many programs can operate with very basic equipment (i.e., without peripherals or dedicated telemedicine carts). Before purchasing expensive equipment, health centers should seek advice and technical assistance about what features are needed. In addition, some key strategies to increase reimbursement revenue are to convert nonbillable visits into billable ones (i.e., by navigating

complex reimbursement rules regarding location and provider type and finding an acceptable care model). Once visits are billable, health centers can increase the percentage of scheduled telemedicine visits that are completed. Among health centers that contracted with external telemedicine providers, no-show rates were more problematic for telemedicine than for scheduled in-person visits. This was the case because health centers typically had to pay the telemedicine vendor regardless of whether a visit was completed. In contrast, with in-person visits delivered by salaried clinic staff, a clinician with an unexpected opening could use that time productively on other tasks, including, in some cases, completing a visit with another patient in the waiting room. In other words, the opportunity cost for no-show visits in particular is that no other patients can be scheduled, precluding reimbursement for that visit despite the fact that operating costs already have been incurred for that visit. Additional practical strategies to reduce costs and increase revenue can be found in Palimaru et al., 2020.

More broadly, research is needed to determine the optimal financing structure of telemedicine. In most of the centers we studied, the setup costs were approximately 27 percent of the ongoing operating costs. Finding ways to reduce those operating costs requires centers to examine where the marginal costs are the highest. In our analysis, professional labor represented the highest cost. From our analysis of nine health centers, there was no clear evidence that using internal staff relative to outsourcing those services would yield lower costs. However, for some health centers, there might be obvious indications of how to allocate these costs. For example, in cases in which a primary care clinic does not have in-house specialists, outsourcing the delivery of those services through telemedicine might be more efficient. In other cases in which a center already has specialty clinics (e.g., psychiatry), outsourcing might make less sense financially.

Most community health centers involved in the SMTSN initiative were committed to sustaining telemedicine programs, regardless of profitability, to meet the needs of patients who would not otherwise have access to many of the specialty services provided through telemedicine. Nevertheless, during and after the COVID-19 pandemic, new reimbursement policies could allow for greater flexibility in the type of visits that qualify for reimbursement, which could increase revenue for these visits. Telemedicine clearly provides a needed service to health center patients: Ensuring that health centers at least break even will help ensure the sustainability of these services in safety-net clinics where they are needed most.

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