

# Using Quality Improvement Methods to Implement an Early Childhood Oral Health Initiative: A Federally Qualified Health Center Pilot Study

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**Objectives:** To assess the use of quality improvement (QI) methods to implement an early childhood oral health program (Baby Oral Health Program- bOHP) in four federally qualified health center (FQHC) dental clinics. **Study Design:** Using a mixed-methods study design, survey responses, administrative data, QI project templates, and focus group measures were collected. Plan-Do-Study-Act (PDSA) cycles as mini-projects to improve the implementation of bOHP were examined. Data analysis included descriptive qualitative reviews and quantitative statistics at baseline, six, and 12 months following the intervention. **Results:** Twenty-three dental team providers in one urban and three rural clinics participated. Successful QI mini-projects included shortening time period between accepted referral and patient visits, improved documentation of caregiver interview, and efficiency of the infant oral health examination. Lack of change in provider confidence was observed, regardless of years of practice ( $p=0.93$ ), years of employment ( $p=0.39$ ), and dental team age ( $p=0.85$ ). Qualitative reviews highlighted mixed QI results related to training and limited resources invested on follow-up of QI implementation. **Conclusions:** A low cost, low resource pilot QI program as part of bOHP implementation showed mixed success, highlighting the critical role of training, staff commitment, and leadership support to assure sustainable oral health programs in high-risk populations.

**Key words:** quality improvement, infant oral health, safety-net dental clinics

## INTRODUCTION

With increasing emphasis on the Triple Aim to improve patient care, population health and reduce costs,<sup>1,3</sup> there is an amplified interest in facilitating implementation of quality improvement (QI) in clinical practice. QI, defined as “systematic and continuous actions that lead to measurable improvement in health care services and the health status of a targeted patient group”,<sup>4</sup> has been of particular interest in public health, given the focus on targeting high-risk populations. In 2005, North Carolina (NC) was the first state to legislate that health departments accreditation standards focus on QI as one of the key components to enhance standardization of services,<sup>5</sup> thus increasing its application in public health medical and dental clinics.

QI has been shown to improve delivery of care in various disciplines.<sup>6-9</sup> Its momentum in the field of medicine began in the mid-1990’s with the seminal Institute of Medicine (IOM) report on improving quality.<sup>10</sup> Successful implementation of QI initiatives in pediatrics have been shown in many areas, ranging from promoting increase of well child visits with home visiting programs, to improved adherence of inpatient sepsis identification pathways in surgical care units by physicians and nurses.<sup>11,12</sup> While efforts in dentistry have transcended to include federal agencies, large group practices, dental benefits industry and oral health safety-nets, they have lagged when compared to those initiatives in medical care.<sup>13</sup> A recent study by Ng et. al.,<sup>14</sup> demonstrated that the implementation

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of QI methods facilitated adoption of an oral health disease management approach in early childhood and resulted in improved care and health outcomes. While success in this project is documented, much work remains to further understand the influence of QI in implementing sustainable oral health promotion interventions, particularly when targeting high-risk pediatric populations.<sup>15</sup>

In 2011, an umbrella organization, Piedmont Health Services, with four FQHC satellite dental clinics located in rural and urban NC, obtained a grant to improve access to oral health care to underserved children. While the focus was on promoting oral health of children 12 years and younger, there was an emphasis on incorporating an infant and toddler oral health program in all four clinics. In collaboration with the University of North Carolina, the Baby Oral Health Program (BOHP) was implemented as a preventive model for early childhood oral health.<sup>16</sup> With evidence indicating the integration of QI as a critical component for sustainable public health initiatives, the sites simultaneously implemented QI as a component BOHP with the goal of pilot testing its influence in facilitating incremental, effective, and lasting improvements to delivering preventive oral health services to children under age three years.<sup>17</sup>

Thus, the purpose of this study is to share the QI implementation experience in dental clinics within a FQHC network in NC and examine provider attitudes and behaviors related to the QI implementation. We share lessons learned for consideration when using a QI approach to disseminate infant and toddler oral health initiatives to other FQHCs-based dental clinics.

## MATERIALS AND METHOD

This study was nested within a larger investigation assessing the influence of implementing BOHP on access to care in four FQHC dental clinics between December 2011 and November 2012. Using a mixed methods study design, quantitative data (survey responses, administrative information generated from dental records) and qualitative data (survey responses, quality improvement project templates, focus groups) were collected at baseline, six and 12 months following the BOHP implementation to describe and examine providers experience with the feasibility of using QI as a part of BOHP initiative.

All dentists, dental auxiliaries and administrative staff in four FQHC dental clinics within a network (Piedmont Health) were included. One of the clinics was in an urban setting (Carrboro) and three in rural areas (Prospect Hill, Siler City, Moncure); all primarily serving minorities and low-income families with public insurance or uninsured.

### Training and Ongoing QI support

Prior to QI staff training, a dental hygienist functioning as a case manager was trained to perform QI by the FQHC's QI Director and in consultation with a Public Health QI expert. A pediatric dentist from the University of North Carolina and the QI trained case manager provided a one day face-to-face workshop training to include BOHP and QI, respectively. Half a day was dedicated to QI and focused on describing its principles, introduction of Plan-Do-Study-Act (PDSA) cycles and proper identification and documentation of the QI process. Dental clinic workgroups were formed as part of the training session to identify barriers to caring for children that could result in QI "mini-projects" to help improve overall processes of the BOHP implementation. None of the staff

had previously received QI training, thus emphasizing the need for monthly individualized assistance by the case manager and at quarterly staff meetings where each clinic reported on their implementation experiences and projects. Limited funding and resources were available for QI training and implementation, making this a low-cost, low resources approach to QI implementation.

Institutional Review Board approval from UNC-CH (IRB#11-2046) was obtained prior to the BOHP intervention in December 2011, with an amendment in January 2013 to obtain additional administrative data from Piedmont Health Information Technology and the addition of focus group information for research purposes. The initial IRB submission determined that the study did not constitute human subject research. A combination of survey, administrative and qualitative data was obtained to answer our specific aims. All staff members, including those starting employment during the study period participated in the focus groups.

### Quantitative data

Two survey instruments were developed to assess attitudes related to the QI process while implementing BOHP and administered to all participants. The first survey assessed demographic data and their confidence in five QI related areas: leading a QI project, selecting an area for improvement, defining measurable goals, using QI tools, and testing/implementing system changes. Questions were asked at baseline (the week prior to the intervention), and at six and 12 months. These domains were quantified using a ten point Likert scale (1- not confident, 10- confident) and were based on measures previously used in similar QI training programs.<sup>17</sup>

A second survey measuring the "QI culture" of each dental clinic was completed by all participants at each site. The survey was originally developed by the manufacturing industry and has been adapted to health care and public health settings to help understand perception and values of individuals organizations in relation to health services. The culture survey used Likert scale responses from one to five with seven items such as communication, teams, problem solving and decision making. These data were intended to assess providers' attitudes regarding the QI process as part of the BOHP implementation. Given the stability of organization's culture, this was measured once (at 3 months) during the study period.

### Qualitative Data

Three qualitative data components were obtained. First, we used qualitative questions from the QI confidence survey addressing providers' attitudes, likes, and dislikes about QI at six and 12 months. Second, were two separate focus group sessions at months nine and 12 for dentists and auxiliary staff, respectively. The sessions were lead by a third party individual with facilitation expertise and approximated 45-60 minutes in duration. Questions included staff training, materials, perceptions of the influence of BOHP on providers and parents, barriers to implementing BOHP and QI. Specific to QI, the team's overall opinions about the QI implementation as part of BOHP were explored. Finally, the QI project logs for each clinic delineating their mini projects (generally consisting of one to two PDSA cycles) were examined and provided description of the types of projects conducted and their overall experiences during this one year process. The type of projects were grouped into the six IOM quality aims – safe, effective, patient centered, timely, efficient and equitable. The dental team was asked to indicate all domains that

applied for each project initiated. The selection of which domain to focus on, however, was left to each specific clinic based on their assessed needs to improve the bOHP initiative.

This study is primarily descriptive in nature. Constructs of interest included provider attitudes and behaviors related to using QI during the study period. A sample size of 22 providers was adequate to detect a moderate effect size of 0.5 for a single group repeated measures analysis of variance with a significance level of  $p=0.05$  at 99% power. This allowed detection of a moderate difference in the means across three levels (pre-intervention and two post-intervention assessment points) of the repeated measures factor, time, when examining quantitative differences in provider confidence. All analyses were performed using Stata/IC version 12.1.<sup>18</sup>

## RESULTS

All 23 providers and staff were trained to deliver bOHP and participated in the QI initiative. Most providers were female with an average age of 32 years and nearly three years of employment at the FQHC (Table 1). The staff comprised of six dentists, four dental hygienists, 11 dental assistants, an office manager and a case manager. Embedded in this group was an administrative group consisting of three staff members that directed and participated in dental care delivered in all four of FQHC clinic. This included one clinic director, one dental hygienist, and one case manager. The QI case manager, who was a hygienist, was hired through a grant to help support the implementation of bOHP and QI, with the goal to promote sustainability of the infant and toddler oral health program. During the study period, two dentists and two staff members transitioned out of the clinics and four new staff members were hired. All transitioning staff during the study period were trained in bOHP and introduced to QI by the trained QI hygienist as they joined the FQHC.

### Mini-Projects Description

The types of mini-projects undertaken by each group were examined using the six IOM quality aims (Table 2).<sup>19</sup> The number of projects per site ranged from four to five over a 12 month period and encompassed various domains in any given project. The majority of projects focused on patient centeredness, timeliness, effectiveness and efficiency. Topics less frequently selected included equity and safety. Projects were reported by each clinic team at quarterly staff meetings. During the first 6 months of the project, each clinic was encouraged to delineate their own mini projects based on their perceived clinic needs. Six months into the project, the clinic director decided to implement specific QI projects that would be universal to all clinics. By the end of the study period, eight mini-project changes were adopted and six were adapted. Successful QI mini-projects included improved electronic documentation of parent recommendations, timeliness of referral follow up for children ages three years and under, and efficiency of using four-handed approach during infant oral health examinations. Unfinished QI projects were mainly those larger in scope initiated in the first six months, which although highly desired, were difficult to complete in a short period of time. QI projects between clinics, led by the Dental Director beginning mid-way through the year, were more likely to be adopted than earlier mini-projects. Figure 1 is a sample of QI mini projects undertaken by the clinics.

### Quantitative Data

Only matched surveys at baseline, six and 12 months were included in the quantitative analysis. No statistical significant difference between overall confidence before and 12 months following the intervention was evident based on years of practice ( $p=0.93$ ), year employed ( $p=0.39$ ) or dental team age in years ( $p=0.85$ ). Overall confidence levels to performing QI prior to the intervention were high; ranging from 6.17 to 7.0 out of ten for QI related variables (Figure 2). Variability by clinic sites at baseline was evident, with the highest confidence scores reported by the Siler City team. Overall scores were stable, aggregated across sites for each variable following the intervention, but varied by site. Positive confidence score changes were reported at 12 months in the Carrboro dental clinic and the administrative group. No confidence score change was reported in the Siler clinic, and lower confidence score changes were evidenced in Moncure and Prospect Hill. The highest change in confidence scores at 12 months was by the administrative group (Figure 3). No statistical comparisons were made within centers because of the small sample sizes.

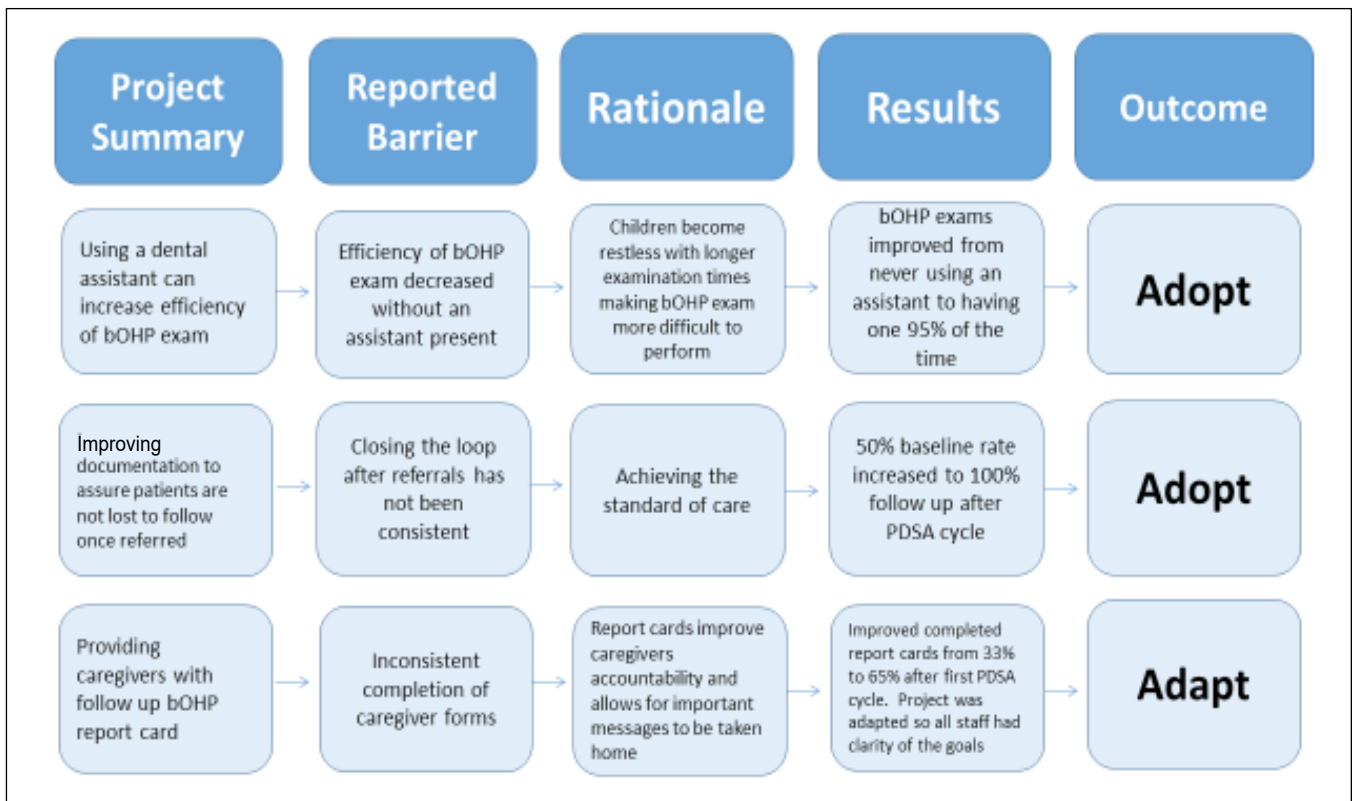
**Table 1: Characteristics of providers participating in four federally qualified community health center (FQHC) dental clinics.**

Variable	N (%) Total=23 providers
<b>Gender</b>	
Female	22 (95.7%)
Male	1 (4.3%)
Total	23 (100%)
<b>Position</b>	
Dentist	6 (26.1%)
Dental Hygienist	4 (17.40%)
Dental Assistant	11 (47.8%)
Office Staff	2 (8.7%)
Total	23 (100%)
<b>Location</b>	
Siler	4 (17.4%)
Moncure	4 (17.4%)
Prospect Hill	4 (17.4%)
Carrboro	6 (26.1%)
Administrative Leadership/Cooperate	5 (21.7%)
Total	23 (100%)
Variable	Mean, SD, Range
<b>Dental team age (years)</b>	Mean = 31.81 SD=9.82 (range of 20-59)
<b>Years in practice</b>	Mean =6.87 SD=6.90 (range of 1-24)
<b>Years at Piedmont FQHC</b>	Mean =2.97 SD=3.21 (range of 0.1-12)
Variable	Average Score: Range 0-5
<b>Culture</b>	
Siler	3.00
Moncure	3.47
Prospect Hill	3.60
Carrboro	3.17
Administrative Leadership/Cooperate	3.81

Table 2: Quality Improvement domains related to the bOHP projects (multiple domains per project)

		Sites			
		Siler City	Carrboro	Moncure	Prospect Hill
<b>Total # Projects in 12 Month Period</b>		6	4	4	4
<b>Definition</b>					
<b>QUALITY IMPROVEMENT DOMAINS</b>	Safe	Avoiding injuries to patients from the care that is intended to help them.			
	Effective	Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively).			
	Patient-Centered	Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.			
	Timely	Reducing waits and sometimes harmful delays for both those who receive and those who give care.			
	Efficient	Avoiding waste, including waste of equipment, supplies, ideas, and energy.			
	Equitable	Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.			
	<b>OUTCOME</b>	<b>Adopt</b>	2	1	3
<b>Adapt</b>		3	1	1	1
<b>Abandon</b>		1	2	1	1

Figure 1: Sampling of Quality Improvement (QI) Mini-Projects with Reported Outcomes



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Given the clinic level data and small number of clinic sites, there was insufficient power to perform a bivariate analysis of organizational culture differences. Overall culture scores, however, were similar in all four clinic sites, ranging from 3.0 to 3.6 out of 5 (Table 1). These baseline culture scores were similar to those seen in prior successful QI initiatives, based on the experiences of 64 local health departments supported by the Center for Public Health Quality through its QI training program.<sup>20</sup>

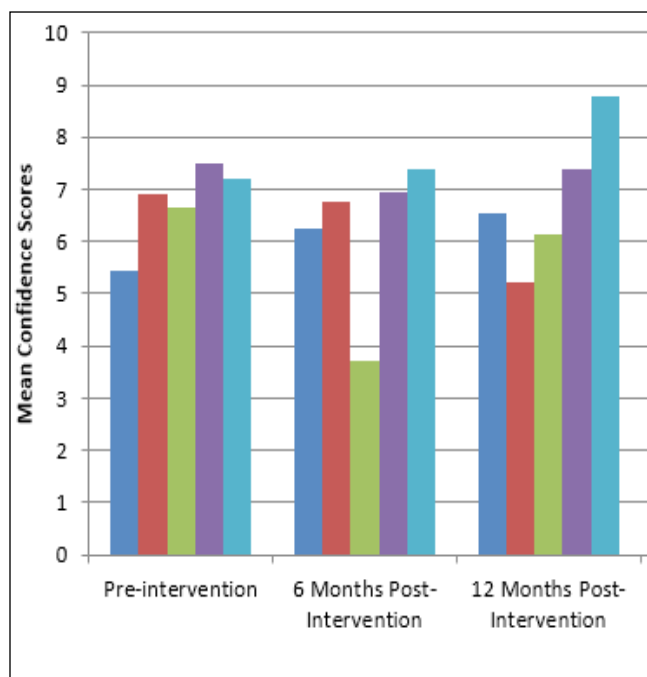
*Qualitative Data*

The dentists and staff were asked for qualitative written responses on their experiences with the QI process 12 months following the intervention. QI experiences reported by the dental team were divided into two emerging themes; patient/caregiver and provider related feedback. Most comments on the positive elements of the QI process were related to the improvement in patient care including better follow-up and increased confidence in caring for infants and toddlers. Reported benefits for the providers included the ability to facilitate objective and concrete changes to clinical practice. Comments related to barriers or negative elements in implementing QI reported by the dental team included time-consuming nature of some of the data collection for QI projects, staff time necessary to complete projects, and a lack of support from some dental team members regarding project execution.

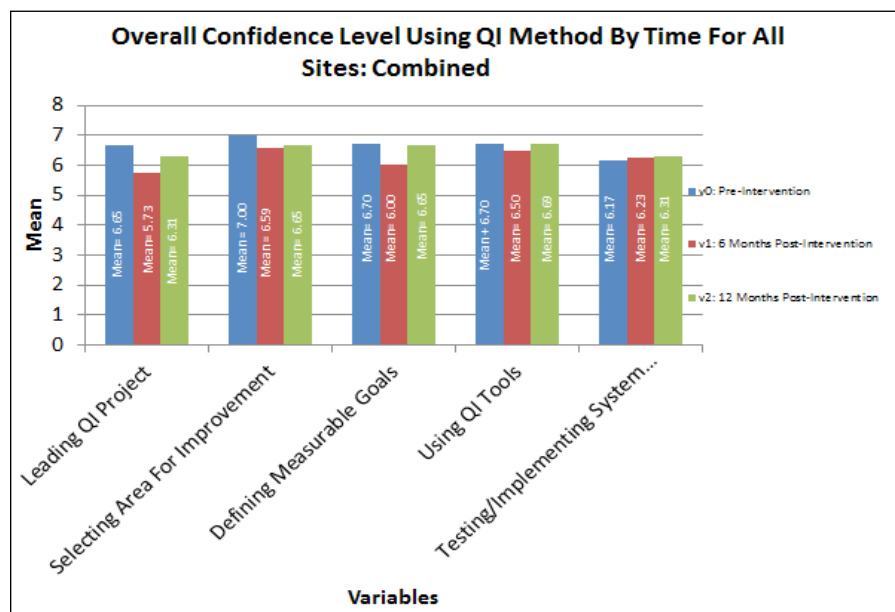
A summary focus group report provided by the third-party facilitator identified trends from the interview in relation to bOHP and QI implementation. The report supported the dental team's survey responses regarding QI with various themes emerging. Although positive feedback was evidenced by participants on the implementation of bOHP through the training, materials used, and parent and provider influences, divergent opinions regarding QI were reported. Participants indicated QI to be an onerous process and generally were not always convinced that it was worth the effort. Collaborative projects between sites were viewed as more successful than independent projects. Providers reported that if they were to leave the FQHC, they would continue to perform bOHP and preventive oral health services to young children, but would be less likely to

implement QI processes in clinical practice. However, a number of recommendations were offered to improve the QI component of this initiative. First, was the need for re-training on QI fundamentals during the process. The lack of substantial initial training delayed full understanding of the process and decreased enthusiasm. Second, the staff suggested their greater involvement in the projects, improved integration of QI as part of the clinical schedule, and better feedback on their progress during each project. Finally, staff requested implementing QI into multiple aspects of their clinic, particularly since the focus on QI was specific to the implementation of bOHP.

**Figure 3: Overall Confidence Level Using QI Method By Time and Site: All Questions Combined**



**Figure 2: Overall Confidence Level Using QI Method by Time for all Sites: Combined**



- Carrboro
- Moncure
- Prospect Hill
- Siler City
- Corporate

## DISCUSSION

The goal of this pilot project was to examine QI methods as a way to enhance implementation of an evidence based infant and toddler oral health preventive program (bOHP) at four rural and urban FQHC dental clinics and to describe the experience of its implementation. Culture scores indicated QI could be successfully implemented with adequate support. Over a 12 month period, PDSA cycles were successfully implemented in each clinic as mini-projects. Many were adapted or adopted, but some were abandoned. Overall, no change was evidenced in provider confidence regarding implementation of QI, however only one of four sites showed full engagement of these activities. Qualitative data supported mixed success of this low cost, low resource QI program. Addressing the issue of promoting provider confidence has been delineated as a critical aspect to guideline adherence and subsequent behavior change.<sup>21</sup> Efforts to ensure provider confidence in the QI process is key, with self-efficacy having a greater influence when coupled with other systems based interventions.<sup>22</sup>

A number of themes emerged with the implementation of QI as part of bOHP. First was the importance of training. The limited intensity of the initial QI training by a relatively inexperienced trainer via a half day introductory workshop in hindsight likely left the staff uncertain of how best to proceed, as evidenced in the decrease in confidence expressed at the six month period in most sites and the overall lack of staff ownership of the QI process. Adequate training stands as the foundation of QI implementation when organizations lack significant QI experience.<sup>23-24</sup> Successful QI programs led by experienced facilitators/trainers that include ongoing coaching and training is critical, and can further enhance staff buy-in, another element of successful QI implementation.<sup>17, 25-26</sup> In the context of FQHC's, the relatively high staff turnover experienced in these organizations also highlights the need for systems to train new staff.

Despite the training issues, a number of mini-projects did result in positive outcomes that improved bOHP and the delivery of care. The PDSA cycles allowed for a systematic approach to assess presenting clinical issues during the implementation of bOHP. Collaborative projects between sites were deemed to be more successful than those independently initiated at each site. Similar to Ng *et al*,<sup>27</sup> who investigated the implementation of QI in two hospital-based dental clinics to improve early childhood oral health, the most likely adopted projects were those that were small and

focused in scope. Nevertheless, addressing issues that are broader in scope and influence are crucial to successful improvement efforts. For instance, improving availability of care provided in Spanish throughout the visit was a desire in many sites. Issues like these need to be addressed for FQHC dental teams to provide a safety net for families of multiple ethnic backgrounds.<sup>28</sup> The mini-project approach in the present study proved inadequate to address these important issues.

A final lesson learned from this pilot study was the importance of greater involvement and guidance provided by the Dental Director of the FQHC at the six month period. This appeared to increase participants' understanding of QI as evidenced by their project development, quality, and higher project adoption rates. Indeed, upper-level leadership has been documented as the key component in the success of QI and as a barrier when not present.<sup>7, 24</sup>

This pilot study should be considered in the context of its limitations. First, the small site sample size precluded statistical power for more in depth analyses and limits generalizability. Second, this project was 12 months in length and should be considered in the context of implementing QI in FQHC dental clinics. The long-term impact of QI requires further investigation.

## CONCLUSIONS

In an era of health care reform, strategies to smoothly implement programmatic changes while addressing quality oral health care are paramount. FQHCs will continue to serve an important role for underserved populations with dental needs and should be targeted to systematically include QI as part of their processes and culture. Although this project was limited in scope, it is a case study of four dental clinics and can help inform larger initiatives, particularly those focusing on improving the quality of care and program sustainability for high-risk populations. The literature suggests that when implemented, QI must be fully incorporated in the operations of the organizations to effectively improve quality of care.<sup>29</sup> The authors believe that QI will become an integral part of community dentistry; thus, more examples of its challenges and successes should be documented to improve oral health programming. Our study suggests that substantial initial and ongoing training will be critical to QI implementation in oral health settings that lack substantial prior QI experience.

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