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Dissertation

THE ROLE OF ELECTRONIC RECORDS IN THE INTEGRATION OF PRIMARY CARE AND DENTAL SERVICES AT COMMUNITY HEALTH CENTERS

by

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Dedication

To my husband Juan, and children Juanita and Nicolas

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AT COMMUNITY HEALTH CENTERS

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ABSTRACT

Background: Medical-Dental integration involves the provision of fluoride varnish application, caries risk assessment, anticipatory guidance, and provision of dental referrals by pediatricians during well-child visits. Integration has been recommended as a means to increase access to quality dental care for patients from racial and ethnic minority groups who are at an increased risk of developing oral health problems.

Methods: Guided by the RE-AIM framework (Reach, Efficacy/Effectiveness, Adoption, Implementation, Maintenance), this case study explored the barriers and facilitators for the incorporation of a medical-dental integration program at two community health centers in Massachusetts. Specifically, this study explored the degree to which electronic records were instrumental in the provision and documentation of oral health preventive services during pediatric primary care at the study sites.

Data sources included analysis of records from 2014–2015 (before integration) to those from 2016-2018 (post integration), interviews with staff, clinicians, and administrators and direct observations of the workflow at dental and pediatric medicine departments in the study sites. A General Estimating Equation Analysis was conducted to estimate the odds of application of oral health preventive measures before and after electronic dental and medical electronic records were integrated at one of the sites.

Findings: During the years post-record integration, children were 40.3 times more likely to receive dental screenings, 2.7 times more likely to receive fluoride varnish during well child visits and 1.6 times more likely to receive fluoride in the dental department within six months of their well child visits compared to the period prior to integration. Respondents identified the complexity, ease of use and accessibility of tools within the electronic medical records as significant factors in success of integration efforts.

Conclusions: Community health centers interested in successfully implementing a medical-dental integration model should invest in sufficient workflow and training resources for the transition to the new records system, develop a simplified protocol for the application of dental preventive services, design accessible electronic tools for documentation of services, and establish accurate reporting systems for both internal program monitoring and external surveillance purposes.

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List of Abbreviations

AAP – American Academy of Pediatrics

BNHC – Brockton Neighborhood Health Center

CDC – Center for Disease Control and Prevention

CHC – Community Health Centers

ECC – Early Childhood Caries

EDR – Electronic Dental Record

EHR – Electronic Health Record (Includes Medical and Dental records and records from other health services)

EMR – Electronic Medical Record

FPL – Federal Poverty Level

GEE – General Estimating Equation

HIT – Health Information Technology

HRSA – Health Resources and Services Administration

MSIS – Medicaid Statistical Information System

NACHC – National Association of Community Health Centers

NOHI – Networks for Oral Health Integration within the Maternal and Child Health Safety Net Program

RE-AIM – Reach, Effectiveness, Adoption, Implementation, Maintenance

UDS – Uniform Data System

Part 1: Introduction

Chapter 1 – Introduction

1. Problem statement

Disparities in the prevalence of Early Childhood Caries (ECC), as well as dental caries' negative impact on systemic health, nutrition, speech development and self-esteem, as well as poor performance and elevated dental treatment costs for children and adults have been widely documented.[1, 2, 3, 4] The American Academy of Pediatrics (AAP) has recommended the establishment of a dental home for every child starting at 1 year of age, and *medical-dental integration*. That is, for pediatricians to provide caries risk assessment and anticipatory guidance including dietary guidance, fluoride applications, and oral hygiene instruction, at well-child and other pediatric primary care appointments.[5] A framework for Oral Health Delivery for the incorporation of dental preventive services into pediatric primary care was developed by the Qualis Foundation in 2014 and was piloted nationwide at 19 sites between 2014 and 2016, including five Community Health Centers (CHCs) in Massachusetts.[6] The framework has since been endorsed by several professional organizations including the AAP.

Other than the results of the original pilot case studies, no sources were found that describe maintenance of these practices in the pilot sites, or implementation of the framework in additional sites. A Qualis Foundation White Paper[6] describes ways in which Health Information Technology (HIT) resources

can be leveraged in the application of the framework, highlighting the use of custom data entry fields to document findings during screenings, or questions to ask when addressing oral health with patients during pediatric visits. The sites received guidance to incorporate these electronic fields in their EMR as part of the pilot. The Qualis paper also provides a listing of ICD 10 diagnostic codes that can be utilized to document oral health conditions, and the creation of patient education materials or summaries that can be generated directly from the EMR and given to patients after appointments. However, the paper does not specify if such features were incorporated in the EMR records during the pilot, and/or if they were, whether the tools were successfully used. Further, only a paper by Hummel and colleagues has described best practices for utilizing HIT resources as tools for advancing Medical Dental Integration[6] and more research is needed exploring or documenting the successful use of the integrated health record or tools built within the system to effectively promote medical dental integration.

The purpose of this study is two- fold: First, to provide insight on the level of current application of the framework and integration of services two years after the pilot was conducted. Second, to explore how are electronic records being used for the purpose of medical-dental integration. Most importantly, through the perspective of key program managers and practitioners, this study provides important insights into whether incorporating integrated dental and health record systems has enhanced or can further enhance the integration of those services, as well as how HIT resources can be implemented and utilized to further the

goals of medical-dental integration.

2. Study Methodology

Focusing on the implementation and maintenance (IM) domains of the RE-AIM Framework (Reach, Efficacy/Effectiveness, Adoption, Implementation, Maintenance), this cross-sectional study used two sites as case studies. It combined multiple methods to explore the reactions and opinions of care teams (Managers, Clinical Providers, Clinical Support Staff, and Non-Clinical Support Staff), health center administrators and IT support personnel in pediatric and dental clinics at CHCs in the Greater Boston area, with special attention to integrated electronic records. Specifically, this study examined their use of electronic records to promote, support and/or document identification of high-risk patients, and provision of preventive dental services or dental referrals for those patients, as well as the continued application of the oral health delivery framework in their workflow and their current level of medical-dental integration.

The analysis drew on the study of documents and data from the sites as well as information gathered through key informant interviews and with direct observations conducted at their pediatric and dental departments.

3. Research Questions

The study was guided by a central question, eight sub-questions and 2 translation questions outlined below.

A. Central question

Does the establishment of integrated electronic dental and medical records promote the incorporation of dental preventive services into pediatric primary care at community health centers?

B. Sub-questions

1. What implementation or maintenance actions have been taken by the sites after completion of the Qualis Foundation's Oral Health Delivery Framework pilot in 2014, to document and/or enhance their level of medical-dental integration?

2. How are electronic records being used currently to promote, inform and/or document the application of the integrated framework and/or the provision of oral health services during pediatric visits at community health centers?

3. How are electronic records being used currently for dental providers to adopt a more active role in connecting their patients with primary care and other health services?

4. How are dental providers using electronic medical records to assess their patients' health conditions to make decisions regarding their dental treatment?

5. Are there ways in which electronic health record systems could be more efficient? Are there tools that could be incorporated using HIT that would further promote integration?

6. What information would providers like included in existing EHR tools that they would find helpful in addressing their patients' oral health needs?

7. What would make providers more likely to use EHR tools if available?

8. What would be the suitability of their current electronic records systems to incorporate those tools?

C. Translation questions

1. How can other institutions use the findings from these case studies to enhance their utilization of HIT to improve their level of medical-dental integration?

2. How can findings from this study aid in the utilization of HIT resources as part of the design and implementation of initiatives to integrate multiple services at community health centers and/or similar healthcare institutions?

4. Research Translation: Significance to improving the health of the public

Findings from this study are instrumental to explain the role of electronic records in community health centers' integration of oral health preventive services into pediatric care. Based on the implementation and maintenance components of the RE-AIM Framework (Reach, Effectiveness, Adoption, Implementation and Maintenance), the study also explored areas in which the technology currently facilitates or hinders the incorporation of these services into the health centers' workflow. Lastly, and most importantly, this study will help identify areas in which the existing technology can be improved and changes that can be implemented to make the technology easier to use by providers, facilitating their application of oral health preventive measures and documentation of those services.

Information gathered regarding the implementation and maintenance of the Oral Health Delivery Framework, can be used for disseminating this model to community health centers that did not participate in the pilot. It can be used for designing similar approaches to increase medical-dental integration and the provision of preventive services during primary care appointments for children younger than 6 years old (pre-school age). This information may facilitate the

process of referring patients for dental care, improving access to dental services and reducing the impact of ECC and caries in the community health center patient population.

Recently HRSA published the availability of grant funding under the Networks for Oral Health Integration within the Maternal and Child Health Safety Net Program (NOHI)[7] with the goal of improving access to quality oral care for children 0-17 years of age, enhancing integration of oral health and primary care, increasing knowledge and skills among healthcare providers for delivering optimal dental services and increasing awareness and knowledge of preventive oral practices among parents and caregivers. Outcomes from this study fit clearly in the definition of these goals, and can support future applications for funding to expand this project into a larger study to explore how electronic health records can be instrumental in the creation and maintenance of replicable models of care to integrate oral health into MCH safety net services.

Furthermore, HRSA also offers funding and technical support for enhancing the use of health information technology to increase access to care, thus improving the centers' infrastructure to facilitate the provision of oral health services by pediatric providers. Findings from this study can help identify areas in which that infrastructure can be improved. Information about tools that can be built within electronic health records and their utilization by providers, can be helpful for software developers for EMR, telemedicine and other media.

5. Overview of the chapters

Part 1 reviews the literature regarding early childhood caries definition and extent of the problem, barriers and facilitators to medical-dental integration, the role of community health centers in improving access to quality dental care for people who are underserved, (have reduced or no access to oral health care) and those that belong to a racial/ethnic minority group. The oral health delivery framework, the current evidence of the role electronic records play in two settings that have sought medical-dental integration, and current research gaps related to the topics of this dissertation.

Part 2 begins with a detailed description of the study methodology, conceptual and analytical framework and continues with the presentation of the findings from the two case studies.

Part 3 brings together the results from the two case studies into the public health implications and transferability and discussion chapters, ending in lessons learned and study strengths and limitations.

Chapter 2: Literature Review

1. Introduction

According to NCHS data from 2015-2016, there are significant disparities in prevalence of caries in children between two and nineteen years of age. Specifically, the prevalence in children is higher for racial minority groups, those who live under the Federal Poverty Level (FPL), or are uninsured.[8] The literature suggests a potential national mean increase of approximately 1.2 billion dollars in dental treatment costs for children enrolled in Medicaid alone, for each year their first dental appointment is delayed.[9]

According to the US Health Resources & Services Administration (HRSA),[10,11] community health centers (CHC) are defined as "community-based institutions that are patient-directed and deliver comprehensive, culturally competent, high quality primary care services to under-served populations".

In the United States, Community Health Centers (CHCs) serve one of every three people living in poverty, one in six Medicaid beneficiaries, one in eight from racial or ethnic minority groups and one in nine children.[12,13] 1% of patients seen at CHCs are children under 18 years of age. 91% of health center patients are in or near poverty, 49% are covered by Medicaid and 23% are uninsured.[13] Furthermore, between 2006 and 2017, the proportion of patients in poverty seeking health care at CHCs grew by 64%, increasing faster than the proportion of people in poverty nationally (9% growth). The same is true for the

proportion of Medicaid covered patients that seek care at CHCs (118%growth) as compared to the national 66% growth of Medicaid covered patients during the same period. Health center patients are disproportionally members of racial/ethnic minority groups (67.9%) as compared to the US Population (41.1%).[13] Health centers also provide more preventive services than other primary care providers in areas like asthma education, tobacco cessation, health education, immunizations for people 65 and older, pap smears, mammograms, hypertension management, and behavioral health among others.[13]

In 2016 health centers reported 74.4 million medical visits as compared to 15.7 million dental visits.[12] Between the years 2010 and 2017, 30% of community health centers expanded services to provide dental care.[13] 81% of Community Health Centers in the United States provide some dental services on-site, and over 95% use electronic records.[14] This gives CHCs the unique opportunity of integrating these services through integrated electronic health records (EHR) - that include electronic medical records (EMR) and other records such as electronic dental records (EDR).[15] While the Health Resources and Centers Administration (HRSA) Uniform Data System (UDS)[16] collects information on the vendors for electronic records used by its CHCs, no information is available specifically for how many of the CHC sites have integrated medical and dental electronic records.

According to earlier findings, about 44% of health centers in the United States utilize telehealth to expand accessibility to health care.[13] “Telehealth is the

provision of healthcare remotely by means of a variety of telecommunication tools such as telephones, smart phones and other mobile wireless devices". The technology is utilized to expand specialty services into rural or underserved areas, increasing accessibility of behavioral health interventions, specialty care, management of chronic conditions and the provision of oral health services.[17]

The data summarized above suggests that patients who seek care at Health Centers are likely at a disproportionately higher risk for developing caries. It also suggests that CHCs are the ideal sites to explore ways to improve access to dental services in order to reduce disparities in the prevalence of caries for this population.

2. Early Childhood Caries (ECC)

The American Academy of Pediatrics defines ECC as "the presence of one or more decayed (cavitated or not cavitated lesions), missing teeth (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger."[18] ECC is a type of caries that is chronic, multi-factorial, very aggressive, rapidly progressing and specifically affects infants and children of pre-school age.[18]

In his 2000 report, the Surgeon General described caries as the "silent epidemic" and the "most common chronic childhood condition".[19] Furthermore, the Institute of Medicine in its 2011 Advancing Oral Health in America report, described factors involved in the development of caries as including frequent intake of carbohydrates. Particularly for ECC, risk factors include frequent and

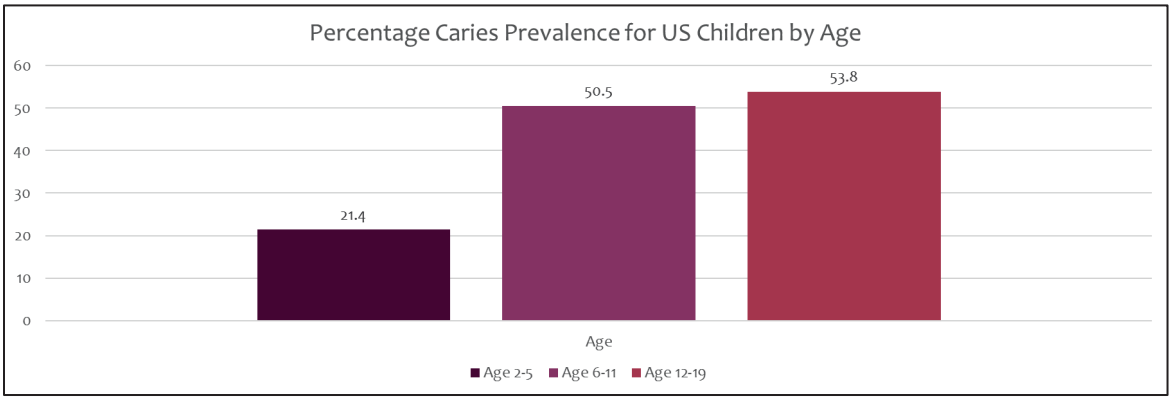
prolonged exposure to sugar containing beverages such as infant formula and juice often through inappropriate use of infant bottles or sippy cups.[18-20] This cariogenic diet, combined with improper or infrequent oral hygiene, provides the substrate necessary for bacteria to cause tissue demineralization ultimately destroying the enamel of teeth.[5] Caries can be prevented by applying simple measures such as limiting sugar intake and exposure to home and professionally applied fluoride. When identified early, prior to tissue destruction, the effects of ECC can be stopped, and often reversed, by increasing exposure to professionally applied fluoride that promotes tissue re-mineralization.[18]

ECC has higher incidence among children of low income and from racial and ethnic minority groups.[21-23] According to the US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, data from the National Health and Nutrition Survey from 2015 and 2016, prevalence of caries in children between two and five years of age was approximately 21.4%. Disparities in the prevalence of ECC, as well as its impact on systemic health, have been widely documented in the literature.[1-4,24] As illustrated on figures 1-3, for children six to eleven years old prevalence was 50.5%, and for youth aged 12-19 prevalence was 53.8%. Caries prevalence was higher for Hispanic (57.1%), non-Hispanic black (48.1%) and non-Hispanic Asian children (44.6%), compared with non-Hispanic white children (40.4%)".[8]

Caries is also more prevalent for children living under the Federal Poverty Level (51.8%) when compared with children from families with income levels

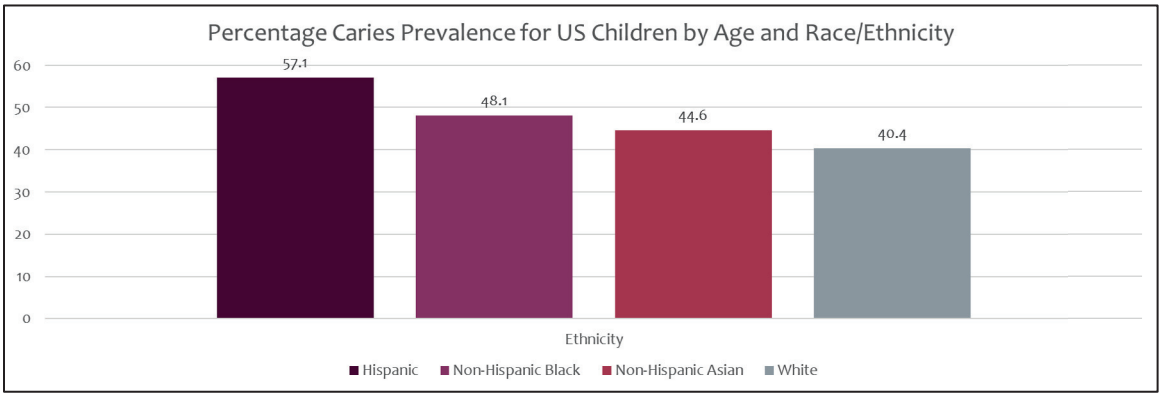
greater than 300% of the Federal Poverty Level (34.2% prevalence). The same is true for untreated caries that decreased from 18.6% for children from families living under 100% Federal Poverty level as compared to those living over 300% of the Federal Poverty Level (7% Prevalence).[8]

Figure 1 Percentage Caries Prevalence for US Children by Age



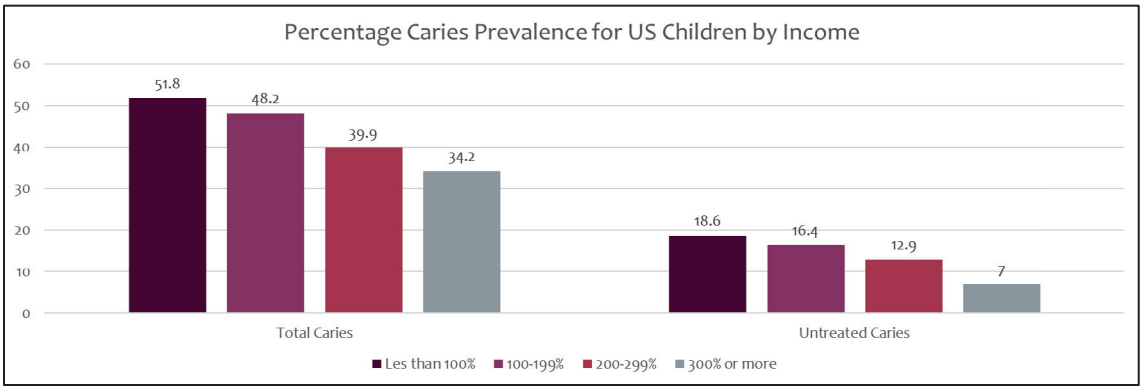
Source: Fleming E, Afful J.[8]

Figure 2 Percentage Caries Prevalence for US Children by Race/Ethnicity



Source: Fleming E, Afful J.[8]

Figure 3 Percentage Caries Prevalence for US Children by Income



Source: Fleming E, Afful J.[8]

Nowak et al. Found that after following 42,532 children for 8 years, those who started seeing a dentist before the age of four, needed fewer dental procedures (avg 3.58) and the cost for their dental treatment was significantly (P<.0001) lower ($360) when compared with children who started receiving care later (between four and eight years of age).[25]

Similarly, Doykos' findings indicate that dental costs for children increase by mean increments of $34.75 per year for each year that the child's first appointment was delayed.[9] With FY2013 Medicaid Enrollment data from the Medicaid Statistical Information System (MSIS), the Kaiser Foundation estimates that 48% of 72,332,467 Medicaid enrollees in the United States, are between 0 and 18 years of age.[26] This would suggest a potential national mean increase of approximately 1.2 billion dollars (48% X 72,332,467 X $34.75) in dental treatment costs for each year delay of initiating treatment for children enrolled in Medicaid alone.

Children who are more likely to develop ECC are also less likely to have

access to dental treatment, due to socio-economic status and insurance coverage, as well as cultural barriers.[27,28] Such children often receive pediatric primary care at community health centers and other safety net institutions.[10,29] These children are not likely to seek preventive dental care or treatment until they reach pre-school age.[18,28,30] In many cases, by this time ECC has developed to a stage where children require complex dental treatment that may be beyond the scope of services that can be provided by community health centers and may need to be referred for costly in-hospital or specialty care.

3. Medical-Dental Integration

Pediatricians currently screen patients for risk factors for chronic conditions such as asthma, diabetes, cardiovascular disease, obesity, behavioral and mental health conditions. It's been suggested that pediatric practices can use a similar approach to incorporate oral health activities in the provision of primary care that would help prevent, identify and appropriately address oral health conditions including ECC.[5] The American Academy of Pediatrics has recommended *medical-dental integration*, that is, for pediatricians to provide caries risk assessment and anticipatory guidance including dietary guidance, fluoride applications, and oral hygiene instruction, at well-child and other pediatric appointments as well the establishment of a dental home for every child starting at 1 year of age.[31]

Even when medical and dental education continue to be "siloed,"[32] efforts

to integrate medical and dental care have been explored with the goals of reducing the impact of ECC, and managing the effects of systemic conditions in the oral health of patients in different age groups. Some approaches as described by the National Association of Community Health Centers,[33] have been physician led, others administration driven, some have relied in inter professional integration while others have incorporated outreach workers or care coordinators.

The Institute of Medicine's 2011 report suggests the need for multidisciplinary teams across the healthcare system in order to improve access to preventive oral health for minorities and the underserved.[34] In response to this report, HRSA published the Integration of Oral Health and Primary Care report [10] that calls for the expansion of physicians' oral health clinical competency, development of infrastructure that supports the application of the oral health core competencies, and allow for decision making based on the application of such competencies. The report also calls for changes in payment policies to reimburse and incentivize practitioners to apply oral health competencies, and lastly to "*develop and evaluate implementation strategies of the oral health core clinical competencies into primary care practice.*"[34]

4. Barriers and Facilitators to Medical Dental Integration

The literature has identified barriers and facilitators for integrating primary and dental care in the United States. These barriers and facilitators are classified as provider/individual (micro), institutional (messo), and political/population (macro) level characteristics that promote or hinder the integration of dental and medical services.[35] Some of the most commonly found barriers are the absence of appropriate policies and/or insurance coverage as well as a lack of professional regulations that support the coordinated delivery of preventive oral health by non-dental professionals.[36] Other barriers include a lack of training and expertise among pediatric clinicians to provide oral health services, and lack of shared electronic records.[2] According to the Health Policy Institute of the American Dental Association, the top reason reported by Affordable Care Organizations for excluding dental care from their contracts, is the lack of integrated information technology.[6]

When it comes to the use of electronic health records, or health information technology for medical dental integration, there seems to be no consensus. Bernstein et al.[2] report that clinicians identified EHR systems as posing significant barriers for integration, describing “tedious separate login procedures to gain access to patient records”. They also noted the “lack of an oral health template, a referral system for dental services, and the capacity to track outcomes”, while Maxey et al.,[33] describe 5 innovative models of Medical Dental Integration, where EHR resources were instrumental in the incorporation

of dental services in primary care. They highlight the use of electronic records to "flag" patients in need of dental care, identifying and producing referrals, use of codes to identify dental conditions, facilitate comprehensive medical/dental care delivery on-site, and by out-of-network dentists.

While some studies have described barriers to medical dental integration such as lack of communication between dental and medical providers, incompatibility of dental and health electronic records, separation of health and dental insurance systems and unstructured care coordination,[36] electronic health records have been reported as facilitators of medical dental integration in telehealth approaches that have been used to extend dental care to underserved populations in community-based settings. Using these systems, dental teams delivered oral health education and services, and issued and monitored referral outcomes. They were connected virtually with dental offices to provide case management, treatment and other oral health services under remote supervision. Electronic Health systems have also been used to include prompts for effective dental referrals, or questionnaires to improve patient flow that can be completed by patients, or by the dental team.[17,37,38]

Other studies have looked at the applicability of integrated electronic records in the integration of behavioral health, and assessment of social determinants of health into primary care,[39-43] describing improvements in processes of care, and increases in the application of the Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder -7 Scores. The studies

highlight the need for development of EHR capabilities for data documentation, reporting and tracking of patients, and describe the need for careful design of EHR tools with the goal of avoiding over-burdening providers with excessive data collection. For example, developing tools that can populate data from multiple sources through EMR integration with other services.

Similarly, some studies have described the use of telehealth to improve access to health services for patients in remote areas.[17] Currently 44% of health centers in the United States utilize telehealth to expand accessibility to health care,[13] with 52% of these sites utilizing the technology for behavioral health interventions, 27% for specialty care services and 25% for management of chronic conditions. Only 6% of the sites use telehealth for oral health services.[15]

As noted above, HRSA collects data regarding the use of Electronic Health Records in the UDS HRSA Health Center Program Database.[16] However, no information is available regarding which centers have integrated dental and health electronic records. Table 1 summarizes indicators collected in the HRSA Health Centers Database regarding the use of electronic records.

This study hypothesizes that while there may be barriers for the reimbursement of dental telehealth services, if electronic medical and dental records were better integrated, centers that have already incorporated the telehealth technology for management of other health conditions – and have dental providers that can provide the services – could take advantage of these resources to increase access to oral health care. Likewise, with the use of this

technology, dental professionals could be trained to take a more active role in in the management of chronic health conditions.

Table 1 Health information Technology Capabilities and Quality Recognition for Community Health Centers (2017)

Measures		Number of CHCs (N=1,373)	% of Total
1.	Health Centers that have an EHR installed and in use		
1a.	Yes, installed at all sites and used by all providers	1,326	96.6%
1b.	Yes, but only installed at some sites or used by some providers	34	2.5%
	Total Health centers with EHR installed (Sum 1a + 1b)	**1,360**	**99.0%**
1c.	Health centers who will install the EHR system in 3 months	3	0.2%
1d.	Health centers who will install the EHR system in 6 months	2	0.2%
1e.	Health centers who will install the EHR system in 1 year or more	6	0.4%
1f.	Health centers who have Not Planned on installing the EHR system	2	0.2%
	Total Health centers with No EHR installed (sum 1c + 1d + 1e + 1f)	13	1.0%
	Total Health centers reported	1,373	100.00%
EHR Functionalities			
2	**Does your center send prescriptions to the pharmacy electronically? (Do not include faxing)**		
	Yes	1,345	98.0%
3	**Does your center use computerized, clinical decision support such as alerts for drug allergies, checks for drug-drug interactions, reminders for preventive screening tests, or other similar functions?**		
	Yes	1,349	98.3%
4	**Does your center exchange clinical information electronically with other key providers/health care settings such as hospitals, emergency rooms, or subspecialty clinicians?**		
	Yes	1,096	79.8%
5	**Does your center engage patients through health IT such as patient portals, kiosks, secure messaging (i.e., secure email) either through the EHR or through other technologies?**		
	Yes	1,238	90.2%
6	**Does your center use the EHR or other health IT system to provide patients with electronic summaries of office visits or other clinical information when requested?**		
	Yes	1,316	95.9%
7	**How do you collect data for UDS clinical reporting (Tables 6B and 7)?**		
	We use the EHR to extract automated reports	617	44.9%
	We use the EHR but only to access individual patient charts	26	1.9%
	We use the EHR in combination with another data analytic system	716	52.2%
	We do not use the EHR	14	1.0%
8	**Are your eligible providers participating in the Centers for Medicare and Medicaid Services (CMS) EHR Incentive Program commonly known as "Meaningful Use"?**		
	Yes	1,158	84.3%
9	**Does your center use health IT to coordinate or to provide enabling services such as outreach, language translation, transportation, case management, or other similar services?**		
	Yes	1,090	79.4%
10	**Has your center received or retained patient centered medical home recognition or certification for one or more sites during the measurement year?**		
	Yes	1,059	77.1%
11	**Has your center received accreditation?**		
[16]	Yes	368	26.8%
Source: UDS System Database 2017[16]			

5. The role of dental professionals in improving patients' access to primary care and other health services

Dental professionals must also consider patients' medical conditions for the provision of dental treatment. They play an important role in connecting patients with primary care and can play a role in the diagnosis and management of underlying medical conditions.

When exploring ways to identify and address systemic health conditions during the provision of routine dental care for patients in different age ranges, Berman et al. found that dentists effectively identified high blood pressure during the provision of routine dental care and referred patients for medical evaluation. They reported that 87% of the participants who received referrals as part of their study, were later diagnosed with, and treated for hypertension.[44] Lalla et al. found that dentists effectively detected undiagnosed diabetes during routine dental care, by testing glycemic levels on patients with high risk for developing the condition.[45] Pollack et al. conducted a nationally representative survey to explore dentists' willingness to administer HIV rapid testing in their offices. They concluded that provided with CDC's recommendations for annual HIV testing for high risk patients, dentists were favorable to administering the tests, making rapid testing suitable for the dental settings.[46] Multiple sources have found that both dental practitioners and caregivers were favorable to addressing childhood overweight and obesity in the dental setting.[47-49] Stark et al. found that dentists

effectively identify and provide referrals for the diagnosis and treatment of pediatric obstructive sleep apnea.[50]

West et al. describe a model of collaborative care that involves practitioners from various clinical and non-clinical services such as dental, medical and public health providers, to improve efficiencies and provide high quality of care across settings. They suggest taking advantage of technological advances such as electronic records, telemedicine, communications and social media, as means to "connect the information and make it readily available for clinical decision-making".[51]

Dental professionals must also take into account patients' existing medical conditions and medications in order to properly assess their impact on the patients' oral health, and formulate dental treatment that will not interact with those conditions and/or treatment, possibly having a negative effect on the dental treatment outcomes and prognosis for the patient's oral or systemic health.

This study hypothesizes that by having access to integrated dental and medical electronic records, dental and medical providers may be able to access the patients' medical information directly, reducing the need to request consultations and/or relying solely on the patients' description of their medical conditions, management or pharmacologic regime. At the same time, integrated records may enable dental and medical providers to actively contribute important information regarding the patients' management of their systemic conditions.

6. The role of Community Health Centers (CHCs)

According to the National Association of Community Health Centers (NACHC) 2019 *Chartbook*, CHCs serve one in 12 people in the United States, at 1373 organizations with more than 11,000 delivery sites located throughout all 50 states and U.S. territories.[13,52] CHCs' patient population account for 18% of the national Medicaid population and 22% of the uninsured nationwide.[13] In order to qualify for Federal Funding under current regulations, CHCs are required to deliver "primary care services" which are defined in the statue to include "Preventive Dental Services". These services are defined by regulation (42 C.F.R. §51c.102 (h) (6)) and include (i) "oral hygiene instruction; (ii) oral prophylaxis, as necessary; and (iii) topical application of fluorides, and the prescription of fluorides for systemic use when not available in the community water supply."[11]

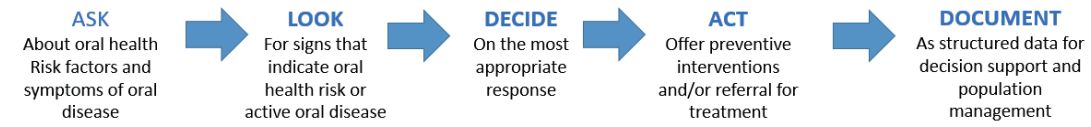
"Nationally, 81% of community health centers provide dental services on-site", and over 95% use electronic records.[14] This gives CHCs the unique opportunity of integrating these services through integrated EHR.[15] No information is available regarding how many of the sites have integrated medical and dental electronic records.

This study hypothesizes that if medical and dental services were better integrated, then this may increase access to and use of preventive dental care for children served by CHCs, thus potentially reducing socioeconomic and racial/ethnic disparities in ECC.

7. Oral Health Delivery Framework

Phillips et Al. developed a framework for Oral Health Delivery (Figure 4) in 2014 through participation of a Technical Expert Panel, and presented it in 2015.[53] The framework is based on the 2014 HRSA recommendations “Integration of Health and Primary Care Practice", and provides a structure to define the operational components of oral health integration to facilitate its incorporation into primary care practice. It is modeled to fit within the Subjective, Objective, Assessment and Plan (SOAP) system that clinicians use to organize their clinical documentation.[54]

Figure 4. Oral Health Delivery Framework



Adapted from Phillips et Al.[39]

The framework guides the process for clinicians to evaluate their patients’ oral health status and risks beginning with asking questions regarding their oral hygiene habits, diet, medical conditions, tooth pain or disease experience and symptoms. The process is followed by a screening and visual examination for signs of oral disease. Once the information gathering stage is completed, the framework moves to the DECIDE stage, where clinicians recognize whether the findings are normal or abnormal. They share with the patients the appropriate actions nurses and pediatricians can take, utilizing an algorithm that guides the

process of correlating the clinical findings with specific conditions and actions such as application of fluoride varnish, necessary medical therapy, diet or hygiene education and referral for dental care. The last recommendation of the framework is to document findings and actions in a systematic way that will allow practices to evaluate the outcomes of the dental integration program and put in place quality improvement measures.

Between 2014 and 2016, the implementation of the framework was piloted nationwide at 19 sites, including CHCs as well as private clinics located in five different states and utilizing five different electronic health records systems. The sites included urban, suburban and rural practices, and targeted four unique target populations. Five of these sites are CHCs in Massachusetts.[6] Physicians and staff at the pilot sites received extensive training in the various components of the framework. The Qualis Foundation published a White Paper and Supplement, summarizing their pilot findings in a case study and guide for the implementation of the framework.[6,55] The framework has since been endorsed by several professional academies and organizations including The American Academy of Family Physicians, The American Academy of Nursing, and the American Academy of Pediatrics, among 18 others.[6]

According to the executive summary published by the Qualis Foundation in October, 2016, among the 19 sites that participated on the pilot over 20 months, 13,771 patients were screened, 4,518 received fluoride varnish and 1,255 patients who did not have a dental home were referred for care. The program

spread from 27 provider teams across the 19 sites, to 80 clinician teams over the span of the pilot.[52] The summary describes success in the implementation of the framework. "All 19 sites were able to implement at least three components of the framework, and many implemented all five". The summary also describes limitations in reporting fluoride applications and dental referral outcomes at the sites, as well as difficulties accurately tracking referrals within the sites EHR systems. One of the most important findings of the pilot was the fact that all sites encountered challenges in modifying their EMR to document oral health data, describing the alternative documenting solutions that various sites implemented.[55]

8. Research Gaps

Per the Qualis pilot report, "health information technology (HIT) is a useful tool for managing information, creating efficiencies in workflow, and facilitating care coordination activities". While it is a barrier for implementation, lack of HIT resources should not prevent providers from addressing oral health in the primary care setting.[56]

Other past studies that have looked at the structure of CHCs to identify barriers and facilitators for medical-dental integration,[2,11,28,33,36,57-59] have found that providers and administrators perceive the absence of integrated electronic medical/dental records and/or integrated referral systems as potential institutional barriers for incorporating programs into the health centers workflow.[36,59-62]

No subsequent publications were found that explore the post pilot maintenance and continued application of this framework, nor its application in the development of oral health and primary care integration initiatives at other CHCs. Only one other source was found in the literature that describes best practices for utilizing HIT resources as tools for advancing Medical Dental Integration[56] and no current research was found exploring or documenting successful use of the integrated health record or tools built within the system to effectively promote medical dental integration.

9. Case Study specific aims

The public health significance of this research study is to describe the implementation and maintenance of the oral health delivery framework for medical-dental integration and the role of electronic health records in community health centers' integration of oral health preventive services into pediatric health care. Study questions outlined above included questions about "how" and "why" the dental delivery framework was implemented and "how" electronic records are used to facilitate its incorporation into the workflow of pediatric clinics at the study sites. The following summary outlines the study specific aims that are based on those questions as well as the study objectives:

> **Specific Aim 1:** To examine the result of implementation or maintenance actions taken by the sites after the Qualis Foundation's Oral Health Delivery Framework pilot in 2014 to maintain, enhance and/or document their level of medical-dental integration

Specific Aim 2: To identify how records are being used currently to promote, inform and document the application of the integrated framework and/or the provision of oral health services during pediatric visits at community health centers

Specific Aim 2a: To identify how providers are using electronic records to assess and/or document their patient's oral health condition and make decisions regarding their dental treatment.

Specific Aim 2b: To identify ways in which dental providers are using medical electronic records to adopt a more active role in connecting their patients with primary care and making decisions regarding dental treatment

Specific Aim 2c: To describe how can electronic records systems be more efficient for the purpose of medical-dental integration, what tools could be built within the systems to further promote integration, and what information would providers like included in those tools that would make them more likely to use them and address their patients' oral health needs.

Specific Aim 2d: To identify what would make providers more likely to use EHR tools if available, and what would be the suitability of their current electronic records systems to incorporate those tools or changes to the existing ones.

Topics studied to address these aims included the following:

- Participants' recollection of training and materials related to the implementation of the Qualis Foundation Oral Health Delivery Framework Pilot in 2014. Copies of these materials were sought for documentary analysis

- Participants' views on the application of the different components of the oral health delivery framework
- Levels of medical-dental integration both in the participants' perception and through analysis of quantitative data provided by the sites
- Participants' views on current usability and adaptability of EMR tools and data, and EMR suitability to capture various components of patients' oral health and access to care
- Sites workflow and the application of oral health services during pediatric appointments by participants in various care roles

Part 2. Case Studies

Chapter 3. Research Design and Methods

1. The Case Study Research Method Description and Rationale

Case study research is a qualitative approach to investigate or analyze single or collective real-life, contemporary bounded systems (cases).[63] Case studies involve in depth data collection through observations or interactions that occur in the physical space[64] to understand the case, provide in-depth detailed descriptions and answer specific research questions.

The purpose of this study is to explore the current application and potential future applicability of Electronic Health Records to enhance integration of services in the provision of comprehensive patient-centered care. It fits clearly within the general characteristics of case studies proposed by Yin (1994):[65]

- The purpose of the study is to answer the "how" or "why" (or why not) electronic records may have been, or could potentially be, instrumental in promoting medical dental integration at the sites in the study[65]
- The investigator has little/no possibility to control behavioral events involved in the utilization of records or integration of oral health services into pediatric care[65]
- The project intends to study a contemporary phenomenon in a real-life context.[65] .

Collective instrumental case studies analyze and compare multiple cases, and consist of observations of more than one case simultaneously seeking what is common and what is particular to each individual case.[63] By comparing

multiple cases, researchers can arrive to conclusions that otherwise would not be accessible. According to Patton, “instrumental use multiple-case studies select multiple cases of a phenomenon for the purpose of generating generalizable findings that can be used to inform changes in practices, programs and policies”.[66] Since this study aims to explore the impact of integrated EMR and dental records in dental integration, the study focuses on gaining in-depth understanding of how providers and support staff at the study sites are utilizing electronic records for the integration of dental services into primary care, specifically in the presence and absence of integrated electronic records.

For this study, both quantitative and qualitative approaches were used, utilizing naturalistic inquiry (observation and description of the clinics’ context) and quantitative data examined by statistical analysis.[66]

In 2014 the Qualis Foundation conducted a pilot to introduce the Oral Health Delivery Framework to increase the provision of dental preventive services by pediatricians during medical visits (medical-dental integration). In 2016 Dimock Community Health Center integrated their EMR and dental electronic records. The purpose of this study is to compare the changes over time in levels of medical-dental integration at Dimock CHC with those at Brockton Neighborhood Health Center that also participated in the pilot but continues to have separate electronic records for their dental and pediatrics clinics. By comparing the levels of medical-dental integration at both sites longitudinally, this study aims to explore the relationship between the adoption of electronic records and medical-

dental integration. This study also aims to describe the opinions and reactions of personnel at both sites about medical-dental integration and their use of electronic records for this purpose.

According to Patton,[67] "while quantitative data often appears in case studies, qualitative data usually predominates". As described in the data collection and analysis section, this study includes quantitative data to describe the different changes in the level of integration at the sites after one of them incorporated integrated electronic records. However, the main purpose of the study is to utilize qualitative data collected at the sites during observations and interviews, in order to understand potential reasons for those differences from the providers' perspectives. Specifically, this study aims to explore what role participants think that having integrated electronic records may have on those differences.

Yin proposes the careful development of case study protocols that take potential bias and validity into consideration, involving a pilot phase where "all elements of the case are measured and adequately described",[63] careful descriptions of the methodology used as well as the rationale for their use and/or changes during the course of the study are necessary in order to make the cases understood by the reader, ensure study rigor and enhance credibility of the field.[63,68] In addition to keeping a detailed study protocol as well as any changes made to study instruments during the study, in order to increase the credibility and generalizability of the study, a second coder reviewed a sample of the interview transcripts and preliminary coding outcomes were reviewed for inter-

coder reliability.

A panel of experts was also convened for a peer debriefing session[69] where they were presented and asked for their opinion on the preliminary coding outcomes. Their input was used to revise the initial code book and incorporate additional codes, delete or combine codes as they deemed appropriate. The panel was comprised of two experts in qualitative research, one dentist who has knowledge of the Oral Health Delivery Framework and one pediatrician expert in electronic health records research.

The purpose of this study was to produce theoretical propositions (analytic generalization), rather than enumerating frequencies that are generalizable to the population (statistical generalization).[65] While quantitative data was analyzed to observe the different trends in dental integration at one of the sites for the periods before and after electronic records were integrated, the outcomes of this study are presented as a detailed description of the themes emerging from interviewing key informants at both sites regarding their use of electronic records to integrate dental services into pediatric primary care.

2. Conceptual Framework

There is an increasing need for pragmatic research approaches to document the translation of research findings into clinical practice.[70,71] Glasgow highlights the importance of pragmatic research, and explains: “By focusing on the perspective of stakeholders and the context for application of scientific findings,

pragmatic approaches can accelerate the integration of research, policy, and practice".[72]

The RE-AIM Framework was first introduced in 1999,[71] and it has been used in the design, implementation, dissemination and evaluation of policies or public health interventions intended to promote health behavior change and/or reduce health disparities. This pragmatic approach focuses research activities in understanding the different dimensions of an intervention (Reach, Effectiveness, Adoption, Implementation, Maintenance) from the point of views of the different stakeholders, taking into account any contextual factors or institutional characteristics that influence the intervention's success in achieving the desired outcomes.

In 2009 Bakken et al., proposed the use of the RE-AIM framework to evaluate the translation of clinical informatics interventions into routine clinical care.[73] As outlined in their article, and summarized on table 2, they defined the different components of the RE-AIM framework as it applies in evaluating the application of medical informatics, and proposed additional assessment questions that can be relevant in explaining predisposing or influencing factors in the translation of those interventions into clinical practice.

The pilot case study published by the Qualis foundation in 2014[6] documented the Reach, Effectiveness and Adoption of the Oral Health Delivery Framework to promote medical-dental integration, as well as best practices for incorporating this framework in the pilot sites workflow. The purpose of this study,

is to focus on the (“I”) Implementation and (“M”) Maintenance dimensions of this intervention, and more specifically on how instrumental can electronic records be in promoting, supporting and documenting the successful maintenance of oral health integration into pediatric services at community health centers

Table 2 RE-AIM Framework and Informatics Interventions

RE-AIM DIMENSION	DEFINITION	QUESTIONS TO ASK TO ASSESS THE APPLICABILITY OF FINDINGS WITH THE GOAL OF TRANSLATING FINDINGS INTO PRACTICE	ADDITIONAL QUESTIONS TO ASSESS APPLIC-ABILITY OF CLINICAL INFORMATICS INTERVENTION STUDY FINDINGS
REACH	Absolute number, proportion and representativeness of participants	• What percentage of the target population came into contact or began the program? • Did program reach those most in need? • Were participants represent-tative of the practice setting?	
EFFICACY EFFECTIVE-NESS	Impact on key outcomes, quality of life and unanticipated outcomes	• Did program achieve key targeted outcomes? • Did it produce unintended consequences? • How did it affect quality of life? • What did the program cost as implemented and what would it cost in your setting?	• Did the informatics intervention produce unintended positive consequences? • How did the informatics intervention affect quality of care?
ADOPTION	Absolute number, proportion or representativeness of settings and intervention agents (people who deliver the program)	• Did low-resource organizations serving high-risk populations use it? • Did program help address the organization's primary mission? • Is program consistent with the organizations' values and priorities?	
IMPLEMEN-TATION	Intervention agents' fidelity to the various elements of an intervention's protocol, including consistency of delivery as intended and the time and cost of the intervention	• How many staff members delivered the program? • Did different levels of staff deliver the program successfully? • Were different program components delivered as intended?	• What barriers to implementation were identified and how were they addressed? • What enabling factors were required to support the infor-matics intervention?
MAINTEN-ANCE	Extent to which a program or policy becomes institutionalized or part of the routine organizational practices and policies. Long term effects of a program on outcomes for 6 or more months after the most recent intervention contact	• Did program produce lasting effects at the individual level? • Did organizations sustain the program over time? • How did the program evolve? • Did those persons and settings that showed maintenance include those most in need?	• What reinforcing factors were required to maintain the informatics intervention?
Adapted from Bakken et al.[73]			

3. Case Study Propositions

Theoretical propositions are grounded in previous research findings and provide direction for the inquiry, outlining issues or factors of significance to be explored during the study.[68] Table 3 summarizes this study's preliminary propositions and the sources used to formulate them.

Themes and propositions generated during the study design, data collection and analysis are outlined below and have been applied in the case study sections (Chapters 4 and 5). They have been used to identify relationships among the different contextual components studied at each of the Health Centers:

- Providers
- Existing workflow
- Approaches to medical-dental integration
- Use of the electronic system to promote and/or document integration of pediatric and dental services

When differences were identified, comparisons were made developing ***theories*** of causality that may explain those differences.

Proposition 1: To examine the extent to which integrated medical and dental records facilitate access to the necessary information to apply the oral health delivery framework

Proposition 2: To explore how the lack of integrated medical and dental records hinders access to the necessary information to apply the oral health delivery framework, and thus, the incorporation of medical-dental integration in the sites' workflow

Proposition 3: To describe how integrated medical and dental electronic records facilitate access to the necessary information to provide dental services in primary care

Proposition 4: To explore whether integrated medical and dental electronic records increase access and use of preventive dental care for children during pediatric primary care

Proposition 5: To examine if, by having access to integrated electronic records, dental professionals can take a more active role in management of chronic conditions, increasing their patients' access to primary care and input health information directly into the medical record

Proposition 6: To explore the current level of medical-dental integration at the sites as well as barriers and facilitators to medical-dental integration other than the EMR and/or record integration.

Table 3. Preliminary Propositions

Preliminary Proposition	Sources
Integrated medical and dental records facilitate access to the necessary information to apply the oral health delivery framework	Braun[38] , Maxey[33], Silk[37], Harnagea[11,36]
Lack of integrated medical and dental records hinder access to the necessary information to apply the oral health delivery framework	Bernstein [2], Harnagea[11,36]
Integrated medical and dental records facilitate access to the necessary information to dental services in primary care	Harnagea[11,36]
Integrated medical and dental records increase access to and use of preventive dental care for children during pediatric primary care, thus potentially reducing socioeconomic and racial/ethnic disparities in ECC.	Silk[74], Hummel[56]
By having access to integrated electronic records, dental providers be able to access, or potentially input, health information directly in the medical record	Berman[45] , Lalla[46] , Curran[47] , Curran[47] , Caplan[48]
The use of integrated health records, dental professionals can be trained to take a more active role in in the management of chronic health conditions.	Berman[45] , Lalla[46] , Curran[47] , Curran[47] , Caplan[48]
If electronic medical and dental records were better integrated, centers that have already incorporated the telehealth technology for management of other health conditions, can take advantage of these resources to increase access to oral health care.	Valentijn[35] , Dorsey[17]
With the use of telehealth technology, dental professionals can be trained to take a more active role in in the management of chronic health conditions.	Dorsey[17]

4. Site Selection, sample and date range

I. Case identification

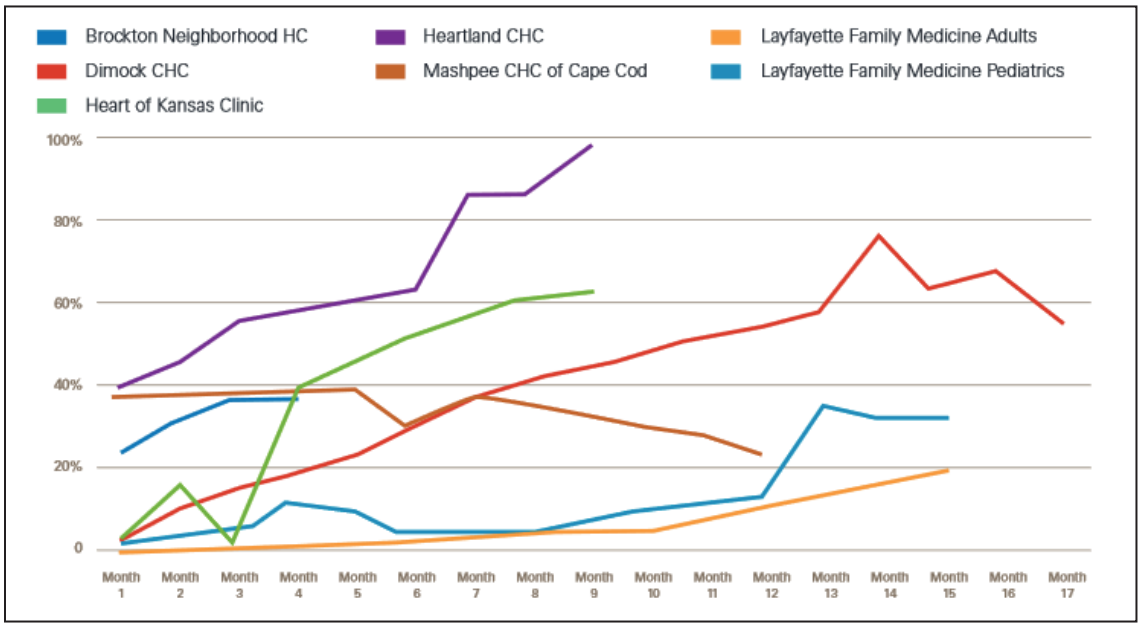
A purposeful selection method[75] was used to compare the five sites in Massachusetts that participated in the Quails pilot, and to determine which of

those sites would provide good cases to compare incorporation of dental services into primary care, in the presence or absence of integrated electronic health records. Providers and support staff in pediatric clinics at all five sites who participated in the pilot, received extensive training in the implementation of the oral health delivery framework, and successfully incorporated this framework into their workflow, demonstrating improvement in their level of medical-dental integration.

Dimock CHC and Brockton CHC had similar increasing trends in the number of target patients receiving oral health assessments during their early participation on the pilot (Figure 5).[6] Both sites offer dental and pediatric services on-site and did not have fully integrated records during the pilot.

In 2016 Dimock CHC incorporated the eCW electronic record system that allows for fully integrated electronic dental and health records, while Brockton Neighborhood Health Center has not integrated their medical and dental records. In addition to these characteristics, at both sites, roughly 80% of pediatric patients have Mass Health (i.e. Medicaid) coverage for dental services, and income-based financial assistance for those patients that do not qualify for Mass Health.[14]

Figure 5. Percentage of target population receiving oral health assessments by month in Qualis Pilot



Adapted from Phillips et al.[55]

Both sites received reimbursement per procedure for dental services and collected data for oral health integration indicators (Number/Percent of patients that received oral health assessment, fluoride varnish and/or dental referrals during pediatric visits) during the Pilot. Table 4 summarizes demographic and insurance coverage information at both sites.

The investigator interviewed two representatives of each care-team category in the dental and pediatric services as well as health center administrators and health information and technology personnel at both sites. Table 5 summarizes the initial participant recruitment goals, as well as their roles within care teams and their level of training.

Table 4. Health Centers Demographics by Site

Demographics	Dimock	Brockton
Total Patients	15,016	32,896
Total Patients with known ethnicity (Denominator)	6,693	32,265
Percentage of Racial and/or Ethnic Minority Patients	91.3	80.4
% Non-Hispanic White	9.7	19.7
% Hispanic	45.0	11.7
% Black / African American	73.4	67.9
% Asian	0.6	1.4
% AIAN	0.2	0.2
% Native Hawaiian / Pacific Islander	8.5	0.17
	137	101.7
% Patients with more than one race	5.7	3.6
% Best served in language other than English	28.1	53.8
% Homeless	4.6	3.0
Insurance	**Dimock**	**Brockton**
Total Insurance Source Patients (Denominator)	15,016	7,008
% Medicaid /CHIP	61.0	46.5
% Medicare	10.4	8.6
% Uninsured (All)	9.7	32.9
% Other Third Party Payer	18.9	12.0
	100.0	100.0
% Uninsured (Children)	4.6	11.2

Source: HRSA Health Centers database 2017[16]
Race and ethnicity percentages do not add to 100% as they were reported separately and they may overlap

Administrators at both sites helped in identifying participants that had been in their role for at least 6 months and ideally those that were working at the centers during 2014, the year when the pilot and related trainings were conducted. Quantitative data for the provision of dental services during pediatric primary care appointments were collected for the years 2014 through 2018 the periods 2 years before, and 2 years after records were integrated at Dimock, to observe any differences in the application of those services pre and post record integration. The study recruitment goals are summarized on Table 5.

Table 5. Participant Roles

Site	Clinic	Roles	Pediatric Clinic	Participants
Intervention Site	Pediatric	Clinical Providers	Physician Nurse Practitioner	2
		Clinical Support Staff	Medical Assistant	2
		Non-Clinical Support Staff	Practice Manager Front Desk Staff	2
		Administrator		1
	Dental	Clinical Providers	Dentist Dental Hygienist	2
		Clinical Support Staff	Dental Assistant	2
		Non-Clinical Support Staff	Practice Manager Front Desk Staff	2
		Administrator		1
	Health Center	Administrator		1
		IT Personnel		1
Comparison Site	Pediatric	Clinical Providers	Physician Nurse Practitioner	2
		Clinical Support Staff	Medical Assistant	2
		Non-Clinical Support Staff	Practice Manager Front Desk Staff	2
		Administrator		1
	Dental	Clinical Providers	Dentist Dental Hygienist	2
		Clinical Support Staff	Dental Assistant	2
		Non-Clinical Support Staff	Practice Manager Front Desk Staff	2
		Administrator		1
	Health Center	Administrator		1
		IT Personnel		1

II. Case Boundaries

One of the features of Case Studies is that cases, that involve individuals, communities, processes or institutions, are bound within specific parameters.[76] This means specific characteristics such as location, or the timing when the situation to be researched occurred. Participants in the event, and thus the case study, can also be defined as parameters.[76]

The sites where this study took place were selected based on their previous participation in the Qualis pilot, receiving training on medical-dental integration and documenting the application of preventive oral health services during pediatric medicine visits. Semi-structured interviews were conducted with providers, support staff, IT personnel and administrators at both sites to assess the measures they have taken over time to maintain or enhance their level of medical-dental integration. Quantitative data was also provided by both sites for the periods before and after records integration, to assess changes in the level of application of dental services during pediatric visits during those periods. By triangulating findings from the qualitative and the quantitative outcomes of the study, the goal was to understand the relationship between record integration and medical-dental integration.

The cases selected were also bound by the timing of the Qualis Pilot in 2014, and the integration of electronic records by Dimock CHC in 2016. The quantitative data for this study was collected from 2014 when the pilot was conducted until 2018, two years after Dimock integrated their electronic records.

5. Definitions

For the purpose of this analysis, the independent variable is the implementation of the eCW record system that allows for integrated medical and dental records at the intervention site (Dimock CHC). The comparison site (Brockton NHC) continues to use separate medical and dental records.

Oral Health Integration, the dependent variable, is defined as the application of the Oral Health Delivery Framework by pediatricians. This was measured by looking at three specific indicators:

- Provision of an oral health assessment, and/or
- Fluoride varnish application and/or
- Dental referral during pediatric visits.

According to the framework, one or more of these preventive measures could be applied at any given visit. Therefore, the measure of integration is the proportion of pediatric visits in which at least one of these 3 procedures are reported during the period of two years before and two years after eCW implementation at the intervention site. Dimock CHC provided the following data in the form of a de-identified report:

- Age of the child in months as well as standard general demographic and insurance status
- For each child, visits at 6, 9, 12, 24, 36, 48 and 60 months and whether each appointment included codes associated with dental screening performed, fluoride varnish application provided, and dental referrals issued
- For each child, dental appointments associated with dental referrals provided in pediatrics (as listed above)

6. Data Collection and Management

Data for this case study was collected primarily during site visits and semi-structured interviews that were scheduled at both sites after obtaining approval from the BUMC Institutional Review Board, reciprocal IRB approval from the sites, as well as consent from participants. The different data collection activities and aims of this study are summarized on (Table 6).

In order to understand what role, the integration of medical and dental records has played in the implementation and maintenance of incorporating the oral health delivery framework into pediatric practices at the sites, this study collected and triangulated the following information:

- Participants contributions as part of semi-structured key informant interviews

- Reports from direct observations of the facilities and workflow in the dental and pediatric primary care clinics at both sites
- Detailed descriptions of electronic and paper tools that the sites currently utilize to document patients' oral health status, identify high-risk patients, document findings from oral health screenings, track and/or report the provision of oral health services and/or referrals during pediatric visits.
- Quantitative analysis (Described in section 7a.)

6a. Qualitative Data Collection

A study protocol, interview and observation guides, were developed based on the study aims and preliminary propositions, in order to outline major themes and topics to be included during semi-structured interviews and direct observation sessions at the sites. The instruments were revised along the data collection process, to incorporate additional themes or areas of probing arising from the interviews, using a continuing coding approach.[68,77] Drafts of these instruments are presented on APPENDIX A.

Data for this study was stored in a database and kept in an electronic password protected server at BUMC.

The PI obtained a listing of providers representative of each role within care teams (Clinical Providers, Clinical Support Staff, Non-Clinical Support Staff), Administrators and IT support personnel in the pediatric and dental clinics at both sites. Whenever possible, participants who had been in their roles for at least 6

months were randomly selected and recruited to the program via phone and/or email.

If an individual declined to participate, a replacement was randomly selected from the list and recruited. Some participants were unique in their roles and were purposefully selected. In addition to the original recruitment goal of 32 participants, a snowball approach was used, including additional participants that the key informants identified during the interviews, and who could make significant contributions to answering the study questions.

Enrollment continued until the investigators reached saturation, that is, the researchers found that new participants interviewed were contributing the same information and no new themes or topics were emerging from the interviews and researchers assessed that a comprehensive case study was completed.[66]

Site visits and direct observation: During site visits, the PI took detailed notes to describe the Health Center's physical layout, (for example the dental and pediatric waiting areas), signage, oral health related materials posted in the waiting and clinical areas and location of the dental clinic in relation to the pediatric clinic. The investigator observed check-in and check-out processes at both clinics, taking note of details such as number and role(s) of staff involved, paperwork completed with or given to the patients, average length of the processes, languages spoken and/or use of interpretive services, hand-outs or instructions given to the patients.

Table 6. Study specific aims and data collection activities

Aim 1. To examine the result of implementation or maintenance actions taken by the sites after the Qualis Foundation's Oral Health Delivery Framework pilot in 2014 to maintain, enhance and/or document their level of medical-dental integration	
Data Collection	**Research Activity**
Direct Observation	1. Observe the workflow at both sites, including the processes for patient intake and referral
Key Informant Interviews	1. From each informant perspective, how was the medical-integration model incorporated in the practice and what measures are taken to maintain the program 2. From each informant perspective, what are barriers and facilitators for the incorporation of dental preventive services into pediatric primary care
Review of existing data:	If available from the sites, review of current data on integration indicators that were originally reported in the pilot case study: 1. Number of patients that received oral health assessment 2. Number of patients that received fluoride 3. Number of patients that received dental referrals This data will be triangulated with the qualitative data collected as described above, to establish the current level of medical-dental integration at the sites.
Aim 2: To identify how are records being used currently to promote, inform and document the application of the integrated framework and/or the provision of oral health services during pediatric visits at community health centers	
Direct Observation	1 Review electronic or paper tools that are being utilized to collect information from patients in order to inform the application of the framework 2. Review electronic or paper tools that are being utilized to order the provision of preventive oral health services and patient referrals 3. Review electronic or paper tools that are being utilized to document, track and/or report the provision of those services
Key Informant Interviews	1. From each informant perspective, are electronic records being used currently to promote, inform and/or document the application of the framework and/or the provision of oral health services 2. If yes, are there ways in which those systems could be more efficient. Are there tools that could be incorporated using HIT that would further promote integration? 3. What information would providers like included in EHR tools that they would find helpful in addressing their patient's oral health needs? 4. What would make providers more likely to use EHR tools if available? From interviewing with administrators and IT support staff at each of the sites: What would be the suitability of their current electronic records systems to incorporate those tools?
Review of existing data:	1. Review reports currently being produced by the site for the evaluation and maintenance of the medical-dental integration program 2. Review the suitability of the data collected at the site for the production of medical-dental integration reports

Whenever possible, the PI also requested samples of any paper or electronic tools utilized at the sites to collect patient's oral health status or information regarding recent dental visits including:

- A description of whether they are used prior, during or after the appointments
- Whether they were completed for each and every appointment or only during well-child visits
- Which providers or support personnel have access to the tools or information
- Whether or not there is a protocol or written guidelines to follow up on that information during or after the appointment

Lastly, the investigator explored and described any existing electronic prompts, warnings, flags, templates or other tools within the electronic records that may remind providers of addressing oral health and/or applying oral health preventive measures during appointments, as well as whether they appeared for every patient at every appointment, or if not, what triggered them to appear.

Key Informant Interviews: After obtaining participants' consent, the interviews were completed in person, and each interview lasted between 45 and 60 minutes. The interviews were audio-recorded and transcribed, and an initial search for themes and sub-themes was conducted using an inductive constant comparative method.[68]

A second coder reviewed a sample of the interviews using the code-book and both coders met to refine the code book in search for inter-coder reliability, or agreement in the way the codes were defined and applied to the interviews.

An expert panel was also convened to enhance the credibility of the findings. The panel was comprised of two experts in qualitative research, one dentist with experience in the Oral Health Delivery Framework and one pediatrician expert on health electronic records research. The panel was presented with the code-book and samples of passages from the interviews that exemplified each code. They provided input to refine the code-book, adding combining and removing codes as they deemed appropriate. Once the code-book was refined, the inter-coder process was repeated once again. The interview data was then imported and coded using the N-Vivo qualitative data management software, and an iterative process was followed for the analysis of the transcripts to draw conclusions in relation to the research questions. More information about qualitative analysis is provided in section 7b.

The information collected during the project is related to the departments' workflow and regular application of medical-dental integration, and for that reason the information is not sensitive, personal or identifiable, and posed minimal risk to participants. In order to protect participants' identity and privacy and reduce the risk for their responses to be linked to them personally, no identifiable information from the participants was be included in the audio-recordings or transcripts, and the interviews were identified by numerical codes. The semi-structured interview guides addressed the following topics:

1. If providers/staff participated on the original pilot, describe their experience in applying the training received as part of the Qualis project,

and ways in which they have maintained or increased that knowledge in the subsequent years

2. If providers/staff did not participate in the original pilot, describe the training they have received to apply the oral health delivery framework in their clinical work
3. For all providers, describe any barriers or facilitators they have encountered in the application of the oral health delivery framework in their clinical work and description of their level of confidence in addressing oral health issues, conducting oral health screenings, applying fluoride varnish during pediatric visits and/or issuing dental referrals.
4. Describe the major topics of discussion around oral health that they routinely encounter in their interactions with patients
5. Describe their approach, the criteria they use and their decision-making process for the application of oral health preventive services during pediatric visits.
6. From each informant's perspective, describe how are electronic records being used currently to promote, inform and/or document the application of the oral health delivery framework and/or the provision of oral health services
7. From each informant's perspective, describe how are electronic records being used currently, if at all, to integrate pediatric care and services other than dental within or outside the health center

8. From each participant perspective, explore the existence of any tools within the electronic record that they find helpful in connecting their patients with services outside primary care, specifically dental, and other services as it may apply. If such tools exist, the interviewer probed further to understand the frequency and ease of use of those tools, from the participants' perspective, as well as what makes the participants more or less likely to utilize them. The interviewer also probed to gain insight from the participants on changes they would make to the existing tools in order to make them more efficient or easier to use. The interviewer asked for samples of existing tools to include a detailed description as part of the observation findings.
9. From each informant perspective, describe new tools, or changes to the existing tools, that could be incorporated as part of the electronic record system and that they think would further promote integration of dental services into pediatric primary care. The interviewer further probed ways in which the participants thought that those systems could be more efficient and easier to use, as well as what would make it more likely for them to use the tools routinely.
10. From interviews with administrators and IT support staff at each of the sites, what is the technical suitability of their current electronic records systems to incorporate the proposed new tools, or changes to existing tools. What are barriers and facilitators that they found for implementing

the integration of medical and dental electronic records?

11. At Dimock Community Health Center specifically, what are the benefits they have found from having integrated records and what considerations did they have in adopting the selected system? What institutional measures did they have to implement in order to incorporate the system into their operations and workflow, and how is the management of the new system different from the previously separate record systems.

6b. Quantitative data collection

A de-identified database was extracted from the EMR and provided by Dimock Community Health Center. The database consisted of five listings of services provided to children between 0 and 72 months between the years 2014 and 2018:

- 6949 well child visits
- 2581 dental screenings
- 3301 fluoride varnish applications by pediatricians
- 2099 dental appointments and
- 1775 fluoride applications by dentists.

A total of 16,705 contacts were included in the database. Each listing included the date of services, and the child's date of birth, an identifier labeled account number, and the child's ethnicity, race and insurance status.

Given that dental referrals are not captured by the site's EMR system in a

way that can be extracted from the EMR, the dental appointment information was used for the analysis instead of dental referrals. A limitation about this approach is that the analysis cannot separate whether there was a referral for dental treatment, and if there was one, if it was issued in the Pediatrics Department at Dimock. The data for dental appointments was matched with that for well-child visits using a unique identifier in order to ascertain whether the children were patients in both the Pediatric and Dental departments, and had dental appointments and/or fluoride varnish applied by the dental department within +/- 6 months of their well child visits.

The child's date of birth was used to calculate the child's age at the date of services for children 0 to 72 months seen for well child visits at Dimock CHC from 2014 through 2018. A total of 633 records were excluded from the analysis because they were missing the child's date of birth and the child's age could not be calculated. A total of 1,456 children (Unique IDs) were included in the analysis. The children were seen for well child visits as shown in table 7.

Table 7. Number of children (Unique IDs) 0-72 months old seen for well child visits at Dimock CHC between 2014 and 2018

Category	Count
Children seen only during the period 2014-2016	397
Children seen only during the period 2016-2018	587
Children seen during both periods	472

With the children ID as clustering variable, the well child visits were organized and categorized using the following criteria: Dental screenings and fluoride varnish applied by pediatricians were categorized as yes if the date of services matched that of well child visits. The dental appointments and fluoride applied by dentists were categorized as yes if the date of services was within +/- 6 months of well child visits. A Chi-Square test was used to explore the distribution of patient characteristics.

Due to the Brockton Neighborhood Health Center's current electronic record design and limited capability to capture information regarding oral health indicators and oral health services provided during pediatric primary care, as well as current capacity within the site's IT department, the site was not able to produce a report of medical-dental integration services provided in pediatrics. The site did provide a report of services provided in the dental department. This information is provided descriptively on the results section, but given the low number of appointments reported as well as the limitation of not having patient identifiers to properly match the data, a statistical analysis of this data could not be conducted.

7. Data Analysis - Analytical Framework

This section describes the framework used to organize and analyze the quantitative data provided by Dimock CHC as well as the qualitative data collected during site visits and key informant interviews at both Dimock CHC and

Brockton NHC.

7a. Quantitative Analysis

Given that the original Qualis Pilot was conducted between 2014 and 2016, and the integrated record system was implemented at Dimock CHC on 2016, the data described in the data collection section was provided by the sites for the years 2014 through 2018: this includes a pre (2014-2015) and post (2016-2018) record integration periods.

For the data provided by Dimock CHC, a General Estimating Equation (GEE) logistic analysis was applied to estimate the crude and adjusted odds ratios of application of dental preventive procedures pre and post record integration, using the pre-record integration period as the reference. The odds ratios are presented with 95% Confidence intervals adjusted by age, ethnicity and insurance status for the following outcomes:

- Application of fluoride varnish by pediatricians during well child visits: Matched with well child visits by date of service and patient ID
- Dental screenings by pediatricians during well child visits: Matched with well child visit by date of service and patient ID
- Children having an appointment in Dimock Dental Department within +/-6 months of having a well-child visit matched by date of services and patient ID

- Children receiving fluoride varnish in Dimock Dental Department within +/- 6 months of having a well-child visit matched by date of services and patient ID

The PROC GENMOD (SAS Software Version 7.1) with logit link was used to generate the odds ratios with 95% confidence intervals. Two models were used. The crude model did not include any terms for covariates such as age. The second model was a multi-variable model which included terms for each of the covariates: child's age (0-11 months, 12-23 months, 24-35 months, 36-47 months, 48-59 months and 60-71 months), race (Black or African American, Declined to Specify and Other), ethnicity (Hispanic or Latino, Not Hispanic Or Latino and Declined to Specify/Refused to Report), insurance status(MassHealth, No Insurance and Private/Other) and gender (Male or Female).

7b. Qualitative Analysis

The investigator utilized an inductive approach to review the initial interview transcripts, searching for words or phrases used by participants throughout the interviews and identifying topics that were present across interviews (codes). Once the coding scheme was identified, the investigator created a code book with definitions for each of the codes and sub-codes. The codebook is presented in APPENDIX B.

A second coder was trained by the researcher with the code-book and code definitions, and asked to review a sample of the interview transcripts,

applying the same code book. Both investigators met in person to review the material together with the aim to reach inter-coder reliability[78], that is, agreement in the codes identified as well as the way those codes are applied to the interview materials.

A panel of four experts (two experts in qualitative analysis, one dentist with experience in the Oral Health Delivery Framework and one pediatrician expert in electronic health records research) was convened for a peer debriefing meeting where the current version of the codebook was presented, with sample passages of the interviews where each code was applied. The goal of the peer debriefing session was to enhance the credibility of the analysis process, by opening up the coding process to a sample of experts and refining and deleting codes in the process and to reach consensus on the application of the codes.[69]

Once this process was completed, the interview transcripts were uploaded and the NVivo software was used to code all interview materials once again using the finalized code book. The investigator reviewed the information, identified sections of data that share common codes, belonging to a specific domain, and grouped assigned codes into meaningful units called themes.[79]

If a segment of the interviews addressed multiple topics, all applicable codes were assigned in order for this to be captured during the analysis.[80]As part of the analysis, the codes and themes were organized based on the study specific aims, and the codes pertaining to each domain:

Aim 1: : To examine the result of implementation or maintenance actions taken by the sites after the Qualis Foundation's Oral Health Delivery Framework pilot in 2014 to enhance and/or document their level of medical-dental integration

In order to identify actions taken at Dimock Community Health Center as part of the implementation of the medical-dental integration program during the Qualis pilot, and what actions the site has taken to maintain the program after the pilot was completed, researchers reviewed the data within the codes listed on Table 8 to search for themes. When these themes were identified, they were grouped into three major domains:

1) Level of Dental Integration,
2) Maintenance and Implementation Measures, and
3) Barriers and Facilitators for the medical-dental integration program.

Each domain is presented in the results section, with a description of themes and passages from the interviews that illustrate the findings. Some of the participants' contributions helped explain or describe the phenomenon of medical-dental integration, but they were not part of a repetitive theme. These segments were identified during the analysis, and some of this content and passages are provided due to their contextual value.

Aim 2: To identify how electronic records are being used currently to promote, inform and document the application of the oral health delivery framework and/or the provision of oral health services during pediatric visits at community health centers.

To ascertain how participants at Dimock Community Health Center are currently using their electronic records to inform, promote and/or document the

provision of oral health services during pediatric primary care, researchers looked through the content of the interviews that were assigned the codes listed on table 9. All of these codes were grouped under the domain “Electronic Records”. The descriptions below include the themes that emerged from this analysis as well as contextual descriptions that illustrate the phenomenon.

Table 8. Domains and Codes for Aim 1	
DOMAIN: LEVEL OF DENTAL INTEGRATION	
Code	Description
2	Integrated or Comprehensive Care
5	Training
5a	Identification of the content of trainings
5b	Perceptions of what and who was included in trainings
7b	Qualis Framework Components (Ask, Look, Decide, Act, Document)
8	Criteria/Application of Dental Services
8a	Criteria or procedure for Fluoride Varnish Application
8b	Criteria or procedure for Dental Referrals
8b1	Dental Emergencies
8c	Criteria or procedure for Dental Screenings
9	Referrals
9a	Referral Processing
9b	Referral Type (Electronic, Paper, Other, Internal, External)
9c	Referral content or information
9d	Follow up on referrals
9e	Referral Department or Referral Coordinator
10	Dental Appointments
10a	Timing, wait time, scheduling or availability of dental appointments
10b	Emergency Dental Care
10c	Patient volume in the Dental Department
11	Participants' role
12	Communication
12a	Communication within department
12b	Communication with other departments
12c	Communication with other institutions/offices
12d	Type of communication (Via EMR, paper, text, internet, fax, phone)
13	Pediatric Visit Type (Physical, Well Child, Sick, Emergency)
17	Patient knowledge or patient education
Domain: Maintenance and Implementation Measures	
Code	Description
7	Qualis Project
7a	Qualis Project adoption and implementation
7b	Qualis Framework Components (Ask, Look, Decide, Act, Document)
20	Co-location of Dental and Pediatric services on-site
21	Workflow
Domain: Barriers and facilitators for Medical-Dental Integration	
Code	Description
3	Barriers associated with: _____(Fill in description of topic)
3a	Barriers associated with Time
3b	Barriers associated with Language/Cultural Beliefs
3c	Barriers associated with workflow
4	Facilitators associated with: _____(Fill in description of topic)
4a	Facilitators associated with Time
4b	Facilitators associated with Language/Cultural Beliefs)
4c	Facilitators associated with workflow

Table 9. Domain and Codes for aim 2	
Domain: Electronic Records	
Code	Description
1	Record Integration
1a	Level of record integration
6	General comments related to EMR
6a	EMR Structure (Components, templates or screens)
6a1	Capturing Dental Home
6a2	Capturing appointment information or referral outcomes or information
6b	EMR Easiness of use
6c	EMR Access (Limited or role-based access)
6d	EMR Technology (desired or recent changes, comparison among vendors)
6e	Use of EMR to update or confirm patient information
6f	Provider notes within EMR
6g	Information scanned into EMR
6f	Usability and adaptability of EMR data / Reporting

8. Interpretation and Reporting

Findings of the study are reported in the case study chapters 4 and 5. The outcomes from the quantitative analysis of dental integration indicators are reported descriptively as crude and adjusted odd ratios for the application of oral health activities into primary care with 95% confidence intervals after implementation of integrated electronic records, using the years before record integration as the reference. This information is triangulated with the qualitative data to make comparisons and develop theories of causality between contextual factors and any differences found in the quantitative outcomes between the two periods, before and after record integration.

The qualitative outcomes are reported as described by Bradley[79] , by developing a ***taxonomy*** based on the conceptual codes and sub-codes utilized during data analysis as described by Yin (2003) and later by Baxter.[68] This

study's purpose was to describe contrasting results in the integration of dental services at the two sites, predicting that having integrated electronic records would play a role in the differences of those outcomes.

Chapter 4. Dimock Community Health Center

1. Abstract

Medical-Dental integration involves the provision of fluoride varnish application, caries risk assessment, anticipatory guidance and provision of dental referrals by pediatricians during primary care appointments.[33] It has been recommended by the American Academy of Pediatrics as a way for increasing access to quality dental care for patients who are from racial and ethnic minority groups and those who live under the federal poverty level.[5] These patients largely seek care at community health centers and are at a disproportionally increased risk of developing oral health problems.

In 2014 the Qualis Foundation developed and piloted the implementation of the Oral Health Delivery Framework to guide the implementation of medical-dental integration programs at 19 sites nationwide including five community health centers in Massachusetts.[6] As part of the pilot, the sites received guidance in modifying their record systems to capture oral health indicators and services information, and assistance to incorporate the medical-dental integration programs into their pediatric primary care workflow.[52]

To date, few research efforts have been specifically designed to examine ways in which electronic health records may influence the successful implementation of medical-dental integration programs. Guided by the RE-

AIM framework (Reach, Efficacy/Effectiveness, Adoption, Implementation, Maintenance), this case study explored the barriers and facilitators encountered by a community health center for the incorporation of a medical-dental integration program. Specifically, this study explored the degree to which electronic records were instrumental in the provision and documentation of oral health preventive services during pediatric primary care at the study site.

Data sources included interviews and direct observations at the site's dental and pediatric medicine departments, as well as review of the current paper and electronic forms that the site currently use for documenting the provision of oral health services in pediatric primary care. The qualitative data was analyzed to identify perceived barriers and facilitators for the implementation of the program. The site also provided a report of all well child visits, visits where fluoride varnish was applied, and dental screenings were conducted by pediatricians as well as dental visits and visits where fluoride varnish was applied by dentists. Quantitative data was analyzed utilizing a general estimating equation logistic model to calculate the odds of application of oral health preventive measures before and after electronic dental and medical records were integrated at the site.

2. Introduction

Dimock Community Health Center is located in the urban area of Boston, in Roxbury, Massachusetts. According to HRSA UDS Health Center Database in 2017, the Center served a total of 13,946 patients from the neighborhoods of Jamaica Plain, West Roxbury, Roslindale, Mattapan and Hyde Park. Of Dimock's patients, 86.9% live below 200% of poverty level, and 59.5% live below 100% poverty level. A total of 91.3% of Dimock's patient population belong to racial and ethnic minority groups, and 24.8% of Dimock's patients are below 18 years of age.

Dimock offers the following services on-site: Primary care for adults and pediatric patients, Woman's and Maternity care, Eye Care, Dental Care, Specialty Clinic, Pharmacy. They also offer Behavioral Health Services such as Counseling and Addiction Services, Inpatient Detox Center, an Emergency Shelter Program and Residential Services programs, as well as child and family services: Early Intervention, Early Head Start and Foundations for Learning.

Dimock's pediatric clinic is located on the second floor of the facilities, it shares a suite with the OB/Gyn department. In the waiting area of the Pediatrics Department there are two secretaries who assist patients during the check-in and check-out processes before and after appointments. There is an area dedicated for children in the waiting area consisting on age appropriate chairs and tables where there are several books available that include some regarding oral health and visiting the dentist. There is signage in English and in Spanish that refers to

the various services offered at the center, none of the signs are related to oral health.

The check-in process in the Pediatrics Department involves the completion of an intake packet by the patients that will be described more in detail in the results section of this case study. Once the patients have completed the intake forms, these are given to the secretaries and Medical Assistants that update their responses in the patients' electronic health record. The patients then are called into an exam room, where the medical assistants record their vital signs, height and weights and proceed to call-in the physician or nurse practitioner to complete the clinical portion of the encounters. This describes the normal procedure for well-child and sick visits at the Pediatric Department.

By all participants' accounts, at Dimock Community Health Center the provision of oral health preventive services, fluoride varnish application, dental screenings and provision of dental referrals is fully integrated into the practices' workflow. The medical assistants apply fluoride varnish to all patients 6 months to 6 years of age, and all providers record a caries risk assessment at all well child visits. The patients also receive a bag that contains an age appropriate toothbrush, toothpaste, floss and educational materials related to water fluoridation and oral hygiene at the end of all well-child visits.

In order to account for the overall increase of Health Center visits as a result of the Affordable Care Act investment in 2015 and the increases in Medicaid coverage, as well as the effects that these may have had in the

outcomes of this study, Table 10 illustrates the changes in overall number of medical and dental patients at Dimock CHC as reported in the HRSA UDS data center for the years post-record integration (2016-2018).[15]

Table 10. Percentage of Medical and Dental Patients at Dimock CHC 2016-2018					
	2014	2015	2016	2017	2018
Total Number of Patients (Denominator)	14,984	14,370	14,776	15,016	13,946
Percentage of Children (< 18 years old)	26.1%	25.4%	26.2%	24.8%	25.3%
Percentage of Medical Patients	N/A	N/A	50.8%	53.2%	60.4%
Percentage of Dental Patients	N/A	N/A	26.5%	25.7%	24.9%
Source: HRSA UDS Data Center 2018.[16]					

3. Methods

I. Quantitative Data Collection and analysis:. A de-identified listing of 6949 well-child visits for children aged 0 to 72 months from 2014 through 2018 was extracted from the EMR and provided by Dimock CHC including the patients' age, date of services, ethnicity and insurance status, and an identifier labeled account number. For children in the same age range, the site also provided a listing of all appointments where fluoride varnish applications and dental screenings were reported by pediatricians, as well as all dental appointments and dental appointments where fluoride was applied by the dentists at the Dimock Community Health Center Dental Department. All told there are 16,705 contacts reported in the database.

Given that dental referrals are not captured by the site's EMR system in a way that can be extracted from the EMR, the dental appointment information was used for the analysis instead of dental referrals. However, the analysis cannot

separate whether there was a referral for dental treatment, and if there was one, if it was issued in the Pediatrics Department at Dimock.

The data for dental appointments was matched with that for well-child visits using a unique identifier in order to ascertain whether the children were patients in both the Pediatric and Dental departments, and had dental appointments and/or fluoride varnish applied by the dental department within +/- 6 months of their well child visits.

The data was organized with the child as clustering variable. 633 children for whom age could not be calculated were excluded from the analysis. A Chi Square test was used to explore the distribution of patient characteristics as illustrated on table 11. A General Estimating Equation logistic analysis was conducted to estimate the crude and adjusted odds ratios of application of dental preventive procedures pre (between 2014 and 2016) and post (between 2016 and 2018) record integration.

Using the years before record integration (2014-2016) as reference, the outcomes show the changes the likelihood of providing dental preventive services during the years post record integration (2016-2018) compared to prior to integration. The odds ratios are presented with 95% confidence intervals, both crude and adjusted by age, ethnicity and insurance status. The outcomes measured were:

- Application of fluoride varnish during well child visits by pediatricians

- Dental screenings by pediatricians during well child visits
- Children having dental appointments within +/- 6 months of a well child visit
- Children receiving fluoride during dental visits within +/- 6 months of a well child visit

The PROC GENMOD (SAS Software Version 7.1) with logit link was used to generate the odds ratios (OR) with 95% confidence intervals (95%CI). Two models were used. The crude model did not include any terms for covariates such as age. The second model was a multi-variable model which included terms for each of the covariates: child's age (0-11 months, 12-23 months (Reference), 24-35 months, 36-47 months, 48-59 months and 60-71 months), race (Black or African American (Reference), Declined to Specify and Other), ethnicity (Hispanic or Latino (Reference), Not Hispanic Or Latino and Declined to Specify/Refused to Report), insurance status(MassHealth, No Insurance and Private/Other(Reference)) and gender (Male (reference) or Female).

II. Qualitative Data Collection and analysis: A Semi-Structured interview guide, a site observation checklist and a guide for assessment of existing paper and electronic tools (included in APPENDIX A) were developed, based on the study propositions, aims and questions outlined on Chapter 3 sections 3-5.

Semi-structured interviews were conducted in person with providers and staff

from the Pediatric and Dental Departments at Dimock Community Health Center:

- Clinical Providers
- Clinical Support Staff
- Non-Clinical Support Staff
- Department Administrators
- Health Center Administrators

Participants were selected based on them having been in their roles for at least 6 months, and when possible having worked at the center since 2014 when the Qualis Foundation implemented their pilot for the use of the Oral Health Delivery Framework for the incorporation of dental preventive services (Fluoride varnish application, dental screenings and provision of dental referrals) into pediatric well child visits.

During the interview visits, the layout of the Health Center and both departments were observed, with the observer taking notes of the physical description of the departments, intake, check-in and check-out processes. Notes of the workflow and encounters at both departments were extracted from the content of the interviews.

The interviews were recorded and transcribed, and an initial search for themes was conducted. A code book (APPENDIX B) was developed based on the study's preliminary propositions and questions, the systematic review of the interview transcripts, input from a second coder to ensure inter-coder reliability, and outcomes from a Peer Debriefing convened to review the code book and samples of material illustrating each code. The experts provided feedback on

additional codes that were added to answer the study questions and address the study propositions. The expert panel was comprised of two experts on qualitative research, one pediatric dentist with experience on the Oral Health Delivery Framework, and one Pediatrician who is an expert on electronic records research. Once the codebook was finalized, all interview materials were uploaded and the NVivo software was used to code and analyze the totality of the interview data.

Results of the qualitative analysis are presented based on the study aims that summarize the study propositions and questions, and codes associated with each of them. The findings are organized based on the study aims including excerpts of the participant responses that illustrate each finding as presented.

4. Results

I. Quantitative Results:

Table 11 summarizes the distribution of patient characteristics and oral health preventive services provided at Dimock CHC between 2014 and 2018. and Table 12 summarizes the outcomes of the GEE analysis.

Table 11 Oral Health preventive Services at Dimock CHC 2014-2016 by subgroups

Appointment Category	Column %	Analytical Sample (Has Age) N=6949	Fluoride varnish by Pediatrician on Well Child visit date (yes)		Dental screening by Pediatrician on Well Child visit date (yes		Dental appointment within +/- 6 months of well child visit (yes)		Fluoride varnish by dentist within +/- 6 months of well child visit (yes)	
			Row %	(N)	Row %	(N)	Row %	(N)	Row %	(N)
2014-2015	38.7%	2686	37.2%	1000	9.3%	250	12.6%	338	3.9%	104
2016-2018	61.3%	4263	54%	2301	54.7%	2331	12.4%	528	11.1%	473
Age group		N=6316								
0	47.2%	2983	16.5%	492*	14.9%	445*	3%	92*	2.4%	70*
12	27.6%	1691	82.3%	1392*	62.5%	1057*	22.7%	384*	15.6%	264*
24	9.4%	591	85.5%	505*	62.4%	369*	24.4%	144*	16.2%	96*
36	8.7%	552	84.6%	467*	65.6%	362*	22.6%	125*	13%	72*
48	7.9%	499	89.2%	445*	69.7%	348*	24.3%	121*	15%	75*
Race		N=6949								
AA	35.6%	2473	49%	1212	32.8%	810*	11.9%	295	6.4%	158*
Non AA / Declined	64.4%	4476	46.7%	2089	39.6%	1771*	12.8%	571	9.4%	419*
Ethnicity		N=6949								
Hispanic	37.5%	2605	47.8%	1246	37.5%	976*	14%	367	10%	260*
Non-Hispanic	32%	2217	48.7%	1079	33.8%	749*	12.5%	278	6.5%	143*
Declined	30.6%	2127	45.9%	976	40.2%	856*	10.4%	221	8.2%	174*
Gender		N=6949								
Male	50%	3485	47%	1637	35.9%	1251	12.3%	429	8.1%	284
Female	49.9%	3464	48%	1664	38.4%	1330	12.6%	437	8.4%	293
Insurance		N=6949								
Mass Health	74.1%	5151	49%	2501	38%	1971	12.9%	662	8.9%	459
No Insurance	1.6%	111	34%	38	31.5%	35	12.6%	14	8.1%	9
Private	24.3%	1687	45.1%	762	34%	575	11.2%	190	6.4%	109

* Statistically Significant (P<.0001)

Table 12. GEE Results – Absolute Rate and Adjusted Odds Ratios* with 95% Confidence Interval for OH Outcomes**

	Fluoride varnish by Pediatrician on Well Child visit date			Dental screening by Pediatrician on Well Child visit date			Dental appointment within +/- 6 months of well child visit			Fluoride varnish by dentist within +/- 6 months of well child visit		
Appointment Category	Absolute Rate	Crude OR	Adjusted OR with 95%CI	Absolute Rate	Crude OR	Adjusted OR with 95%CI	Absolute Rate	Crude OR	Adjusted OR with 95%CI	Absolute Rate	Crude OR	Adjusted OR with 95%CI
2014-2015	54%		Reference	9.3%		Reference	13%		Reference	24%**		Reference
2016-2018	37%	1.98	**3.65 (3.13-4.27)***	54.7%	11.76	**41.34 (32.95-51.87)***	12.4%	0.98	0.86 (0.70-1.04)	6.2%	3.1	**2.64 (2.02-3.46)***
Age group	OR with 95%CI			OR with 95%CI			OR with 95%CI			OR with 95%CI		
0-11 Months			**0.03 (0.03-0.04)***			**0.03 (0.03-0.04)***			**0.11 (0.09-0.14)***			**0.11 (0.08-0.16)***
12-23 Months			Reference			Reference			Reference			Reference
24-35 Months			1.28 (0.98-1.67)			0.91 (0.70-1.18)			1.13 (0.94-1.35)			1.06 (0.84-1.35)
36-47 Months			1.23 (0.94-1.60)			1.38 (1.02-1.85)			1.01 (0.80-1.28)			0.90 (0.66-1.23)
48-59 Months			1.74 (1.27-2.39)			1.39 (1.01-1.92)			1.13 (0.88-1.44)			1.09 (0.79-1.50)
Race	OR with 95%CI			OR with 95%CI			OR with 95%CI			OR with 95%CI		
Black or AA			Reference			Reference			Reference			Reference
Non/Declined			1.04 (0.89-1.23)			**1.40 (1.19-1.66)***			0.84 (0.58-1.22)			1.27 (0.89-1.81)
Ethnicity	OR with 95%CI			OR with 95%CI			OR with 95%CI			OR with 95%CI		
Hispanic			Reference			Reference			Reference			Reference
Non-Hispanic			0.87 (0.73-1.04)			1.04 (0.87-1.24)			0.91 (0.58-1.22)			0.72 (0.49-1.07)
Declined			1.30 (1.08-1.55)			**1.65 (1.38-1.96)***			0.84 (0.58-1.22)			0.95 (0.63-1.42)
Gender	OR with 95%CI			OR with 95%CI			OR with 95%CI			OR with 95%CI		
Male			Reference			Reference			Reference			Reference
Female			0.93 (0.82-1.05)			0.91 (0.80-1.03)			1.02 (0.80-1.32)			0.89 (0.66-1.20)
Insurance	OR with 95%CI			OR with 95%CI			OR with 95%CI			OR with 95%CI		
Mass Health			1.10 (0.94-1.28)			0.99 (0.84-2.16)			1.17 (0.86-1.58)			1.23 (0.85-1.78)
No Insurance			0.88 (0.48-1.60)			1.57 (0.74-3.29)			1.47 (0.62-3.50)			1.66 (0.62-4.43)
Private			Reference			Reference			Reference			Reference

* Statistically Significant (P<.0001)
** Excluding children who received varnish from the pediatrician
*** Adjusted for age, race, ethnicity, gender and insurance

Using the years pre-record integration as reference, there were statistically significant increases in the likelihood of children receiving fluoride varnish and dental screenings during well child visits. Children were 41.34 times more likely to receive dental screenings and 3.65 times more likely to receive fluoride varnish during well child visits during the years after record integration. They were 14% less likely to have dental appointments within six months of their well child visits and 2.64 times more likely to receive fluoride in the dental department within six months of their well child visits.

Fluoride varnish application during well child visits by age: When compared to children aged 12 to 23 months, there was an increasing trend in the odds for children receiving fluoride varnish and dental screenings during well child visits as children grew older. Two year old children were 28% more likely to receive fluoride, 3 year old children were 23% more likely and 4 year old children were 74% more likely to receive fluoride.

Dental Screenings by pediatricians by age: Similarly, 2 year old children were 9% less likely to receive dental screenings than children who were 1 year old. The odds increased for 3 year old children (38%) and 4 year old children (39%). These differences were not statistically significant.

Oral Health Outcomes by Race: When compared to Black/African American Children, children who did not report their race were 4% more likely to receive fluoride varnish and 40% more likely to receive dental screenings during well child visits, they were 27% more likely to receive fluoride varnish during

dental visits and they were 16% less likely to have a dental appointment within 6 months of their well child visits. These differences were not statistically significant.

Oral Health Outcomes by ethnicity: When compared to children who reported their ethnicity as Hispanic, Non-Hispanic children and children who declined to report ethnicity were 4% and 65% respectively more likely to receive dental screenings during well child visits. Non-Hispanic children were 13% less likely to receive fluoride varnish during well child visits and 9% less likely to have dental appointments within 6 months of their well child visits than Hispanic Children. They were also 28% less likely to receive fluoride varnish by dentists within 6 months of their dental visits. Children who declined to report ethnicity were 30% more likely to receive fluoride varnish and 65% more likely to have a dental screening during well child visits than Hispanic children. They were 16% less likely to have a dental appointment and 5% less likely to receive fluoride varnish by the dentist within 6 months of their well child visits.

Oral Health Outcomes by Insurance Status: Children with MassHealth were 10% more likely to receive fluoride varnish and as likely to receive dental screenings when compared to children with private insurance. They were 17% more likely to have dental appointments and 23% more likely to have fluoride applied by dentists within 6 months of their well child visits. Children with no insurance were 57% more likely to have dental screenings during well child visits, 47% more likely to have dental appointments and 66% more likely to

receive fluoride by the dentist within 6 months of their dental appointments when compared to children with private insurance. They were 12% less likely to receive fluoride varnish during well child visits. These differences were not statistically significant.

There were minimal and no statistically significant differences in the application of oral preventive services for children based on their gender.

II. Qualitative Results:

Aim 1: : To examine the result of implementation or maintenance actions taken by the sites after the Qualis Foundation's Oral Health Delivery Framework pilot in 2014 to enhance and/or document their level of medical-dental integration

Level of Dental Integration: ***Successful Medical-Dental Integration:*** When asked about their level of medical integration, a theme that emerged from the majority of respondents at Dimock Community Health Center, is that they all agree that they have successfully integrated the provision of dental preventive services, fluoride applications, dental screenings and provision of dental referrals into their pediatric medicine practice workflow. For example, when asked about their level of medical-dental integration, the Medical Director of Pediatrics described:

> *"I think It's become a core part of our pediatric services, and this way our children that we see here we get them into dental care very, very early, we can fast track them in, we can track that they made it in,*

and that is a little bit hybrid electronic and manual, so it's a little bit difficult but it can be done."

Criteria for Fluoride Application: Multiple participants described the criteria for fluoride application is age dependent, all children 6 months to 6 years of age receive fluoride varnish application at all well child visits, regardless of their caries risk status. Some participants explained that sometimes parents decline fluoride applications, and the most common reason for declining the procedure is having recently received it at a dental appointment. The varnish is applied by medical assistants in the practice, and they are also in charge of documenting the application in the patients' record. For example, one of the medical assistants at the practice described:

"*Yes. Usually we do it 6 months and up, 6 months to 6 years old 6 years old is the cut down like after 6 you don't get fluoride. You know you get fluoride from the dentist. But every visit here from 6 months on we do fluoride. So usually I already know if I have a 6 month old, I already know that I have to do the fluoride. I'll grab my bag. After I do my part of the visit, I'll grab the bag. As we have a little bag with the fluoride with a toothbrush toothpaste and some pamphlets with information about when to take your kids to the dentist, about what is fluoride was for and what it looks like. Where can you get fluoride besides from varnish or going to the dentist, like water and food and stuff like that. So, you know I put that outside the door just for me to remember, or if I'm not in my station whoever goes past by that door knows that this patient needs fluoride."*

Criteria for Dental Screenings: The criteria for the provision of dental screenings was another theme that emerged during the interviews. Providers

described that in addition to receiving fluoride varnish, all patients in this age range also receive dental screenings and caries risk assessments from their primary care physician or nurse practitioner as part of the well child visit. The outcomes from the screening and risk assessment is documented in the patients' electronic record. The Medical Director of the Pediatric Department describes the criteria for dental screenings and caries risk assessments:

> *"so we kept it very simple, it's a little bit age dependent, if for example basically, if for the little ones, if they are drinking a lot of juice, going to bed with a bottle, or the mother or primary caregiver has active caries or if they haven't seen a dentist within 6 months if they're you know age 1 and more, then they are high risk.*
>
> *Any one yes for any of those make them high risk so we're keeping it simple and may be pulling in a lot of people who may not be that high risk, we are not discriminating between very high risk and moderate risk and mildly high risk, but we are just you are high risk, go get your teeth seen."*

Patient Oral Health Intake Form and Template: Multiple participants described that all patients in the practice complete an intake form prior to each well child visit where the parents indicate whether or not the child has a dental home, whether that dental home is the Dental Department at Dimock, whether the parent or primary care giver has had caries in the past 12 months, and feeding practices for the child. Based on these answers, the providers categorize the child into low risk or high risk, provide anticipatory guidance and refer for dental exams based on risk. The providers explained that they classify children into the high risk category if they do not have a dental home, if there is caries

present on the child or the caregiver, or if the parents report feeding milk or juice while the child sleeps. The questionnaire is administered in a paper form that is available in English and in Spanish. There are fields within the well child visit electronic template to record the patients' answers to these questions, and for the providers to indicate the patients' risk based on the parents' answers. During the site visit, the researcher received a copy of the intake questionnaire, and was allowed to view the screen for the well child visit template. The oral health questionnaire is outlined as shown in figure 4.

The well child visit form and electronic template also include fields for weight and height, vital signs, chief complaint, a symptoms checklist, a field to list details about any recent injuries and where they were treated, medications and updates to pharmacy information.

Figure 6. Dimock CHC – Oral Health Intake Questionnaire

1. If your child is 1 or older, when did your child last see a dentist?
   - ☐ Within the past 6 months
   - ☐ It has been longer than 6 months
   - ☐ Never
2. If the patient has seen a dentist before, what dentist did they see?
   - ☐ Dimock Dentist
   - ☐ Other Dentist: _____
3. Has the parent or caregiver for the child all day had any cavities in the last 12 months?
   Yes ____ No____
4. Does your child fall asleep or take naps with a bottle containing juice or milk?
   Yes____ No ____

For Provider to complete:
Low Risk _____ High Risk_____

Maintenance and implementation measures after the Qualis Foundation Pilot: ***Qualis Project Implementation:*** The Health Center Administrator described the process of adopting the Oral Health Delivery Framework and participating in the pilot from the Qualis Foundation. The Administration was introduced to the project by the Mass League of Community Health Centers and found it doable to incorporate into their workflow, given that the Center offers both Pediatric and Dental services on-site.

As described by the Medical Director in Pediatrics, as part of the implementation phase of the project, the site received some funding, and participated in meetings with all other sites that were included in the pilot. They received technical assistance on how to modify their templates to capture the necessary information, educational materials, and information about fluoride varnish application and related trainings.

> *"I think the Qualis funding and technical assistance helped us to set up the program, and it was very sustainable [it was already incorporated in the site's budget and workflow] so we've been able to continue it even after the funding dried up."*

Resources that the Health Center continues to invest in order to maintain the program include time for related trainings, funding for oral health supplies, fluoride varnish, toothbrushes and toothpaste. Information Technology (IT) support for modifying and maintaining the electronic records and the addition of a referral coordinator to follow up on the dental referrals issued in pediatrics.

"A few different things. They [The Health Center Administration] allowed us to budget the cost [include the cost in the Department's budget] of the fluoride, and the toothpaste, and all of that stuff. The toothbrushes and stuff that we give out. They factored in billing for the fluoride applications, they allowed us to use staff time to get trainings on fluoride applications as well as oral health education for families, and they just encouraged it overall, this is part of our strategic plan to have as many integrated services as possible, and this was part of those areas of integration"

Need for Training: Another theme that emerged during the interviews was around the topic of training. The Center maintains the providers' level of training by requiring that all medical assistants complete the "Smiles for Life" Online training on Fluoride application. The researcher was able to review this training online for documentary purposes. It was also described by the Medical Assistant and the Medical Director in Pediatrics during their interviews. The training includes a module on oral health, how to conduct dental screenings and provide fluoride varnish applications in the pediatric medicine office. The training is offered free of charge, and it includes multiple cases that trainees must review and questions they must answer at the end to become certified for fluoride varnish applications. Participants described the training taking about one hour to complete and being part of Mass Health requirements for billing fluoride applications by pediatric medicine practices.

Providers (Nurse Practitioner, Pediatrician and Dental Providers) also mentioned they maintain their knowledge by participating in Continued Education

Courses and Grand Rounds sessions organized internally at the center. A Nurse Practitioner in the Pediatric Department Described:

> *"I've learned through my nursing training and in addition, actually recently I came back from the AAP, the American Academy of Pediatrics, yeah a conference and actually went to a talk about oral Health in specific topics related to primary care in oral health"*

Quality Improvement Reports: The Center also has a quality improvement department that produces reports monthly on the application of dental preventive services in pediatrics, and those reports are regularly shared with providers in the pediatric department.

Oral Health Delivery Framework: While some participants are not familiar with the graphic of the Oral Health Delivery Framework, all participants in the Pediatric Department agreed that all five components of the framework (ask, look, decide, act, document) are currently being applied for patients as part of their well child visits in pediatrics. For example, when asked what areas of the framework are applied at the site, one of the pediatric providers responded:

> *"Not all of the information [goes in the computer], but yes we say low risk high risk. Look for signs that indicate oral health risk, I do this when I am doing my physical exam. We always ask the parents and also look at the physical. I ask the parents about whether they go, and also about flossing and brushing at least twice a day, and (…) I think I do all five yes all five."*

The Medical Director for Pediatrics describes advantages for offering this model of integrated care as follows:

"We are all very comfortable now talking about oral health with our patients, which I think that makes them very comfortable when they show up at the dentist office, rather than being a scary experience and them only going when they have a problem, so these are all of the benefits that our patients have had."

Dental Appointments Availability: The site has also invested in hiring a Pediatric Dentist that is able to see patients from the youngest ages and this facilitates the process of fast-tracking their appointments in the Dental Department. The Pediatric Dentist estimates that roughly 40% of the patients she sees in the practice are referred from the Pediatrics Department. According to the Health Center Administrator, recently, with funding from a HRSA grant, the Center has also upgraded their equipment to be able to produce digital x-rays.

Barriers and Facilitators to Medical-Dental Integration: ***Need for Training:*** One of the barriers to Medical-Dental Integration listed by providers in the Dental and Pediatrics Departments at Dimock Community Health Center, included the need for training. For example, the Dental Director, the pediatric dentist and both pediatric providers mentioned in their interviews the need for training pediatric providers in the identification of abnormal dental findings and what constitutes a dental emergency.

Capability to treat younger children: The Health Center Administrator also mentioned that while the Center has Dental services on-site, and a pediatric dentist as part of the dental team, the Center also lacks the ability to offer nitrous

sedation which hinders their ability to treat the more complex cases, resulting in the need to refer out these cases for full mouth restoration.

Tracking Referral Outcomes: Another theme that emerged when participants were discussing barriers to medical dental integration was the limited ability to track the outcomes of dental referrals, patient knowledge and their perceptions about oral health, as well as their ability to follow-through, schedule and keep dental appointments when referrals are issued.

Perceptions about barriers and facilitators (program prioritization, language, insurance coverage/financial): When asked about barriers for maintaining the medical-dental integration program, the Medical Director in Pediatrics described:

> *"we don't think of this as a separate program, we look at it as part of our primary care, so it's incorporated just like we provide care for asthma, or weight issues or anything else that comes up during the primary care visit, we consider this a core part of our preventive primary care visit similar to immunizations, and so I don't see any barriers."*

When asked about barriers, the Dental Operations Manager described:

> *"I would say you know no I can't think of any barriers because we're a Community Health Center. We have every kind of resource available to the patient so if the patient comes in and they don't speak English, we have interpreters. If they say we can't afford any of this, we have financial counselors on the ground level that they meet with the patient to see if they qualify for a discount or free service or payment plan, or they sign him up for insurance that they may not have. So, in terms of barriers we go above and beyond to make sure that that we can service whatever the patient's needs are"*

Co-location of Dental and Pediatric Services: Participants at Dimock CHC identified multiple facilitators to the medical-integration Program. For example, several participants highlighted the co-location of services and prioritization of Dimock's patients for dental appointments, the availability of appointments for emergency dental care and the availability of a Pediatric Dentist on site as facilitators for the provision of integrated dental and medical services. For example, the Dental Department Practice Manager described:

> *"If they need to refer, in dental for example anyone referred from Pediatrics or Adult Medicine, they get the appointment right away. Say the doctor calls me and says the patient has rampant caries can you see them today, I say send them right away so our pediatric dentist, we have eleven providers, if they have any problems they come right away. They get the appointment at the same time, so at least if they can't do the procedure that's fine. But at least they are seen in dental so that way if the child needs to be referred to pediatric dentist…"*

One of the providers in the Pediatrics Department highlights:

> *"Fortunately for us we also have dental clinic upstairs and I if I needed something urgent and had a question I would either call, get advice or actually I can actually send my kids right then and there for like an urgent care"*

Other barriers that participants mentioned though they were not part of a repetitive theme are worth mentioning. For example, difficulties giving instructions to the parents for after fluoride is applied, the taste of the fluoride varnish, and parents declining fluoride varnish. Lack of experience and lack of exposure to less common dental findings, and obtaining honest answers from the

parents in the intake questionnaire.

In general, medical-dental integration is seen by providers and the Health Center Administrators as a core component of their strategic plan. This has enabled the Pediatric and Dental Departments to allocate the necessary resources to prioritize the maintenance of the program, and resolve institutional barriers they have encountered for the maintenance of the program.

Aim 2: To identify how electronic records are being used currently to promote, inform and document the application of the oral health delivery framework and/or the provision of oral health services during pediatric visits at community health centers.

Electronic Records System: At Dimock Community Health Center, they use the E-Clinical Works (ECW) platform for electronic records. They first acquired the system for medical services around 2011, and in 2016 they converted from their paper dental records to the ECW platform for dental records. The Health Center Administrator explained that the implementation of electronic dental records took about one year of planning. While the Qualis Pilot and the availability of the electronic dental record platform came at around the same time, she clarified that one project did not lead to the other, and most changes that were made associated with the pilot were incorporated into the electronic health record for pediatric patients, not in the dental record. The Health Center Administrator described:

> *"In 2015 we went to electronic [dental] records, after a year of planning. E Clinical works, I want to say 2011. That was for the rest of the Health Center, the medical side. In 2015 E Clinical Works developed a dental module and we had been waiting for that dental*

module to come because we didn't want a separate free standing electronic dental record such as Dentrix, or Eaglesoft or one of those, so we were waiting for this."

EMR Accessibility and Usability: A theme that emerged from the interviews with participants from Dimock Community Health Center, was the capability of the system to integrate Medical and Dental records where providers in both departments can access the patients' information without the need for a separate log-in process. When asked to rank the system on a scale of 1 to 10 where 1 is very difficult and 10 is very easy to use, all participants ranked the system as very easy. Multiple participants also highlighted the accessibility of information as one of the biggest advantages of the system. For example, the Dental Practice Manager described:

"Basically it increases the communication between the two departments. Pediatrics and Dental. For instance if say they apply fluoride they can mention for example that the kid was not cooperative or whatever, they'll have in the note. So when the pediatric dentist gets this upstairs she at least has access before the patient comes. She'll know what to expect."

Having access to behavioral and social information within the electronic record is another feature that participants (Dental Director, Dentist, Pediatric Dentist and Dental Practice Manager) highlighted as helpful. A provider in the Dental Department described:

"Yeah I think it's a good thing to have integrated records specially that I can view like… Sometimes I don't know nothing about the patient and then they come and then they don't tell you anything, even if you ask

them. Like where do you live, how is it like, anything. I go to the records, I see the parents are divorced the kid is living with one parent visiting with another parent or for example they live in a shelter, they are homeless they don't tell you this stuff but then if you if you drop it like pediatricians record they have those"

Inter-Departmental Communication: Another feature that participants in both the Dental and Pediatrics Departments highlighted as helpful, is the ability to communicate between departments directly within the records using what they referred to as "phone encounters." Through this feature the initiating provider writes a note within the record, for example a consultation. The note is delivered directly to the receiving provider and "flagged" as a task within the record. This feature is commonly used for referrals or questions between the dental department providers and primary care physicians. When discussing this feature, a provider in the Pediatrics department described:

"Yes, and also, another tool that we could use, and I have used maybe a few times, if they have a concern, there is a way that they can do a telephone encounter and send to me, like we do with ophthalmology, and maybe dental, if they have a concern, they can consult with primary care. From within the medical record they open the telephone encounter that goes directly to me as the PCP, and it can say I saw your patient, and I am very concerned about having bottles in the middle of the night"

A provider in the Dental Department described:

"So there's an area when you look when you log in and you open your own schedule when I have logged in there is actually you know just highlighted areas where if there is a telephonic message for me or a document waiting for me is highlighted so it'll show me the number of documents if there's anything that was sent over"

While the system lacks the capability of tracking the provision of dental referrals in a way that can be systematically reported, participants agreed that the ability to consult appointment history in order to determine whether the patients scheduled and kept their dental appointments as referred, is very helpful. One provider at the Pediatrics Department highlighted:

> *"I think it is super helpful because in my experience a lot of times parents or even patients themselves are poor historians. So it's nice to have the records on hand when I do need to look them up because there's plenty of times patients will say Oh yeah I think I went to that appointment or like I don't remember and then you know it's just going to have the records on hand so you can look them up and says make sure that they actually went to appointments and also find out what happens during that visit too so we're all on the same page"*

Quality Improvement Reports and Oral Health Template: At Dimock Community Health Center, as part of every well child visit, providers assess whether the child has a dental home, when was the last time they had a dental visit, whether the primary caregivers have had caries in the past year and based on these findings providers categorize the patients on low or high caries risk. Patients in the high-risk category are referred for dental appointments. All patients aged 6 months to 6 years old receive fluoride varnish application during their well child visits. The well child visit template within the electronic records contains fields to record these indicators and the information captured is used for the production of quality improvement reports that are generated monthly and shared with providers in the pediatrics department. The Medical Director in Pediatrics describes:

"So in our EMR we are able to track how many children have a dental home, how many are at high risk for caries and you've seen the form and how many were referred. Who was referred. We are able to if they made their appointment but that part is a little bit more manual. Those are the reports that we produce. How many kids were seen and out of those how many got fluoride varnish in a given month. How many were seen and out of them how many had a dental home every month, and how many were referred in a given month out of those who don't have a dental home."

The oral health fields within the well child visit template were included as part of the Qualis Pilot. The following describes the process for the incorporation of those fields:

"It wasn't a standard part of the record but we asked them, this is what we want to track, we started doing the Qualis project, we started on paper because we wanted to make sure that it worked for everybody before we put it directly into the medical record, but that was a time when everybody was able to give their opinion, oh this is how we want this to look like, we were able to say these are the things that the American Dental association considers high risk for caries, so how do we want to word these questions, and we piloted the paper forms a few different times, we piloted it with our medical assistants so that they felt more ownership"

The intake questionnaires were first designed in English and translated into Spanish. They were both piloted prior to implementation, and input was sought from providers to finalize the tools as illustrated in the following quotation:

"We then had someone translate them into Spanish and we piloted the Spanish, we had a lot of input into designing not necessarily the record but the whole system and the operation, how would we deliver the information and how would we retrieve the information."

Providers agreed that the presence of the oral health fields within the well child visit template serve as a reminder for them to address oral health with their

patients:

> *"It's like right there. When I am doing for example for the screening, it is part of the template. It's like right there, you know, low risk or high risk, so it's like a flag for being more persistent or telling the patient that it is very important and to also remind me to look and talk about oral health."*

Desired changes to EMR: One of the desired changes in the way EMR tracks dental services provided, is the ability to better document the completion of dental appointments resulting from referrals issued in Pediatrics. At this time, the process of obtaining that information is described as a "manual process" and it would be helpful for quality improvement reporting to have a streamlined way of tracking that information within the system. Providers, however, described easily finding appointment information for individual patients if they want to check if dental appointments were scheduled and kept after referrals were issued.

Providers who have experience working with other electronic record systems such as Epic, highlighted features from the other systems that they would like included in their current records, such as easier access to review notes from the emergency room or hospital discharge notes within the record.

When asked about the suitability of the system to incorporate changes to tools and templates, participants agreed that it is a fairly simple process that often can be done internally within the Center's IT department, they also highlighted the availability of technical support from ECW whenever needed.

In general, the integrated electronic systems are perceived by participants as an important facilitator for the integration of services between the Dental and Pediatric Departments at Dimock Community Health Center. For example, the operations manager described:

> *"It's everything. It is everything. The fact that we have the ability to see where the patient was, when was the last visit in dental even over here pediatric it's everything and I can't imagine being without when it wasn't like this when I started many years ago so the fact that we're able to do it now I don't know if we can live without it if we didn't have it so it is everything."*

The Dental Department Practice Manager described:

> *"So it's a very good system and also us putting our notes up there can help the pediatricians down here to know that okay what is the patients concern, or what history they have dental history or caries so basically on both sides we can help the patient with good dental hygiene, or the parent on dental hygiene so it's very important to be integrated so we both are clear on what's happened to that particular patient so we can treat them as a whole, not just pediatrics not just dental so that's very good having integrated software."*

The qualitative research findings suggest actions that the site has taken for successfully incorporating the medical-dental integration program into their pediatric department workflow, resources that the site continues to invest for the maintenance of the program and outcomes for the application of oral health preventive services into pediatric primary care. They include prioritization of the program within the site's strategic plan, increasing the capability of the dental department to treat young children by incorporating a pediatric dentist, and

streamlining the referral process between pediatric and dental departments, among others.

The findings also suggest that the availability of integrated dental and medical electronic records has been instrumental in the maintenance of the medical-dental integration model at the site.

Factors that the participants identified as facilitators for the incorporation of medical-dental integration into their workflow are the inclusion of integration of services across the Health Center as part of the Centers' strategic plan, continued training and easy coordination of services via their electronic record that integrates dental and medical information. Barriers that the participants listed for medical-dental integration, include the patients' knowledge or perception of the importance of Oral Health as well as the difficulty on capturing the patients' successful follow up on referrals, and particularly capturing information on the patients' dental home when it is outside of the Health Centers' Dental Department.

Advantages that the participants listed for having integrated dental and health records include their ability to easily find information relevant to oral health both in the medical and dental records, the ability for providers in both practices to communicate directly through the electronic record through electronic encounters that get documented as part of the patients' chart. Dental providers find particularly helpful the availability of information regarding the patients' behavioral and social information that they take into account when providing

treatment.

Features that participants would like included in the record include a more streamlined system for referrals to directly translate into dental appointments, as well as better documentation of the patients' dental home if services are not received on-site.

When it comes to connecting patients with dental services, participants emphasized the importance of co-location of dental and pediatric services on-site as well as the dental appointment availability and prioritization of Dimock's pediatric patients for dental appointments.

While participants don't routinely consult historical data on patients' caries risk or referrals from previous appointments, the presence of oral health indicators and risk assessments in the well child visit electronic record template serves as a reminder to address oral health during appointments. It is also instrumental in the production of quality improvement reports that are produced routinely and shared with providers.

All participants considered that not having integrated records would negatively impact their ability to provide dental services during pediatric well child visits as well as connecting patients with dental services as needed. All participants ranked their current electronic record systems as easy to use and listed minimal differences in the ease of use of their current system compared with other electronic record platforms whenever the participants had experience

in using other systems.

All participants agree that all 5 areas of the Oral Health Delivery Framework (Ask, look, decide, act, document) are applied routinely at the site, however only few of them identified the framework as a tool they use routinely and only some recalled trainings associated with the Qualis Foundation pilot in 2014.

5. Discussion

There was a statistically significant increase in the application of fluoride varnish and dental screenings by pediatricians during the period after electronic medical and dental records were integrated at Dimock CHC. There were also statistically significant improvements in the likelihood of children having dental appointments and fluoride applied during dental visits.

There was a large number of patients that declined to specify their race/ethnicity. While several analyses were performed to try and better understand these differences, having better tools to validate race/ethnicity in this data would enable a better understanding of the overall differences found in the application of oral health preventive services during pediatric primary care when adjusting by race/ethnicity.

The qualitative findings illustrated reasons for the successful model of medical-dental integration for the provision of preventive oral health services in

pediatric primary care in which electronic health records have proven instrumental for the implementation and maintenance of the program.

One feature within the records system that enabled the program to succeed, was the presence of simplified oral health fields within the well child visit templates that are visible to providers in the pediatric and dental departments, and serve as a reminder to address oral health during pediatric appointments. The records are also integrated for the medical and dental departments, and this facilitates the process for providers in both departments to consult medical and behavioral information pertinent to the provision of dental care, reducing the need for inter-departmental consultations. When those consultations are needed, the record facilitates this communication via the phone encounter feature included in the record. Lastly, referrals for dental treatment are easily issued within the electronic record system and received directly in the dental department which facilitates the scheduling of dental appointments for patients referred from Pediatrics.

A number of factors other than the electronic record systems have contributed to the success of medical-dental integration at the site. First, the CHC prioritized the project within the site's pediatric and dental departments' strategic plans. Integrating services within departments at Dimock Health Center is seen across the health center as one of their core priorities. This has allowed the site to allocate significant resources to maintain the program in both the Dental and Pediatric Departments. Given that one of the goals of the program was to

establish a dental home for children at one year of age, the presence of the program has enabled the center to justify the need for a pediatric dentist on-site that prioritizes care for the younger children when referred for dental treatment. An area that the site would like to improve, is adding the availability of nitrous sedation to enable the pediatric dentist to treat the more complex cases on-site and reduce the need for referrals outside of the center for full mouth restoration.

The design of the program has also contributed to its successful implementation. The fact that the caries risk assessment has been simplified and is now based on three main indicators (presence of a dental home, feeding practices and the presence of caries for the child and caregiver) has facilitated the application of risk assessments by providers for issuing dental referrals. These indicators are easily collected at intake and recorded in the electronic record. Making the annual fluoride varnish application age dependent and universal for ages 6 months to 6 years, not based on risk, has eliminated the need for providers to order the procedure separately and enabled medical assistants to easily incorporate fluoride varnish applications into their routine workflow for well child visits. The varnish is not applied when parents report having had a recent fluoride varnish application at a dental appointment.

The accessibility and adaptability of oral health data captured within the electronic records has also enabled the site to utilize the information for the production of quality improvement reports that are shared with providers,

increasing their motivation to maintain the program, and identifying areas in which the program can be improved.

While co-location of dental and pediatric services within the center is a major facilitator to increase access to dental care for Dimock's patients, a barrier that remains for maintenance and reporting of the medical-dental integration program at this site is the capability of the system to better capture the outcomes of dental referrals. Improving this capability would enable providers to easily follow up with patients and increase the likelihood that the patients will schedule and attend dental appointments when referred. This is particularly true when patients report having scheduled their appointments outside of Dimock Health Center's dental department.

Our analysis has found electronic health records were a key factor in the successful implementation and maintenance of medical-dental integration at Dimock Community Health Center, increasing the likelihood that oral health is addressed during pediatric care encounters and facilitating the accessibility of dental care for pediatric patients at the site.

Chapter 5. Brockton Neighborhood Health Center

1. Introduction

Brockton Neighborhood Health Center (BNHC) is located in the sub-urban area 23 miles south from Boston, Massachusetts. According to the HRSA UDS Health Center Database in 2017, the Center served a total of 34,222 patients from the neighborhoods of Brockton, Stoughton, Randolph, Abington and Taunton. 97% of patients at BNHC live below 200% of the Federal Poverty Guideline and 83.3% live below 100% of poverty, while 80.4% of patients belong to ethnic and racial minority groups and 21.3% are children below 18 years of age.

BNHC offers the following services on site: Pediatric and Adult Primary Care, Dental Care, OB & Specialty Gynecological Care, Specialty Care, Behavioral Health Care, Addiction Services, Nutritional Education and WIC as well as Management of Acute and Chronic Conditions.

The Pediatric Medicine Department at BNHC is located on the same floor as the OB/GYN Department on the third floor of the facilities, and it is a separate suite. At different times of the day there are 2 or 3 secretaries at the front desk of the Pediatric Medicine Department who assist the patients during their check-in and check-out processes. There is a TV screen, and there are no posters other than directional signage in the waiting area.

The check-in process in the Pediatrics Department involves the

completion of several intake forms that are available for patients in four languages: English, Spanish, Portuguese and Haitian Creole. The questionnaires include updates regarding recent medical problems within the past year, hospitalizations, medications and/or vitamins and medical conditions (Diabetes, Hypertension, Learning Problems, Heart Disease, Cancer, ADHD and Other). Another questionnaire pertains to a screening for depression symptoms or behavioral problems, and a CRAFT Questionnaire regarding substance abuse and additional behavioral questions. There are no questions related to Oral Health in the intake forms. These questionnaires are completed by parents or guardians annually, at well child visits.

At BNHC, oral health preventive services are incorporated into pediatric primary care in a way that is described by participants as “inconsistent”. Fluoride is applied at annual well child visits to children over six months old, or at the presence of the first tooth. Participants did not specify the top age limit for fluoride applications, but the nurse in pediatrics described applying fluoride to teenagers.

There are two areas of the record where oral health related information is documented. During the intake section of well child visits, the medical assistants record whether the patient has a dental home and/or whether they have seen a dentist in the past six months. A referral for dental services is issued if the patients indicate they don’t have a dental home. This information does not populate in the well child visit template where clinicians (pediatricians or nurse

practitioners) document the presence of caries and request the application of fluoride varnish by nurses. Nurses only apply fluoride varnish when ordered by the clinicians and usually at the same time they apply immunizations. Dental referrals are issued in a separate template.

BNHC uses the NextGen platforms for their Electronic Medical Records (EMR) and Electronic Dental Records (EDR). The systems are somewhat integrated and the providers with appropriate access have the capability of viewing appointment and referral histories, diagnostic codes and prescriptions from both records. Participants described that in order to consult the shared sections, they need to log in separately for both systems, and fields don't update from within both systems. For example, the information in the EMR medical history does not populate into the EDR Medical History, and vice versa. Providers can also write internal referrals within the electronic records systems, but instead of going directly to the receiving departments, these referrals go to referral coordinators that prioritize scheduling of appointments based on the urgency of the patients' medical conditions. For that reason, the departments have developed a back-up system for dental referrals that relies on paper forms that are completed by providers and processed by secretaries in both departments, or given to the patients to schedule their own appointments.

When presented with the graphic for the Oral Health Delivery Framework, participants did not recall its application at the center, however, many of them described that they apply one or more of its components (ask, look, decide, act,

document) dependent upon their roles within the Dental and Pediatric Departments.

Participants agreed that having better integrated records would be a helpful tool to incorporate dental services into pediatric care and mentioned improvements they would like in their current system. Some of these changes include simplifying or consolidating their current oral health templates and/or including fields that populate from both templates. Other features they would like included are a better system to track referrals and referral outcomes, and better fields to capture the patients' dental home particularly if they see a dentist outside of BNHC.

2. Methods

I. Qualitative Data Collection and analysis: A Semi-Structured interview guide, a site observation checklist and a guide for assessment of existing paper and electronic tools (see APPENDIX A) were developed based on the study propositions, aims and questions outlined on Chapter 3 sections 3-5.

Semi-structured interviews were conducted in person with providers and staff from the Pediatric and Dental Departments at BNHC. Participants were selected based on their having been in their roles for at least 6 months, and when possible having worked at the center since 2014 when the Qualis Foundation implemented their pilot for the use of the Oral Health Delivery Framework for the incorporation of dental preventive services (Fluoride varnish

application, dental screenings and provision of dental referrals) into pediatric well child visits. Participants were also selected that were representatives of the different roles within the healthcare teams in the Pediatric and Dental departments (Clinical providers, clinical support staff, non-clinical support staff and administrators). Representatives of the Health Center Management, Information and Technology and the WIC office were also interviewed.

During the interview visits, the layout of the Health Center and both departments were observed, taking notes of the physical description of the departments, intake, check-in and check-out processes. Notes of the workflow and encounters at both departments were extracted from the content of the interviews.

The interviews were recorded and transcribed, and an initial search for themes was conducted. A code book (APPENDIX B) was developed based on the study's preliminary propositions and questions, the systematic review of the interview transcripts, input from a second coder to ensure inter-coder reliability, and outcomes from a Peer Debriefing convened to review the code book and samples of material illustrating each code. The experts provided feedback on additional codes that were added to answer the study questions and address the study propositions. The expert panel was comprised of two experts on qualitative research, one pediatric dentist with experience on the Oral Health Delivery Framework, and one Pediatrician who is an expert on electronic records research. Once the codebook was finalized, all interview materials were

uploaded and the NVivo software was used to code and analyze all of the interview data.

Results of the qualitative analysis are presented based on the study aims that summarize the study propositions and questions, and codes associated with each of them. The findings are organized based on the study aims including excerpts of the participant responses that illustrate each finding as presented.

II. Quantitative Data Collection and analysis:

Due to the sites' current electronic record design and limited capability to capture information regarding oral health indicators and oral health services provided during pediatric primary care, as well as current capacity within the site's IT department, the site was not able to produce a report of medical-dental integration services provided in pediatrics. The site did provide a report of services provided in the dental department. Given the small sample size (12 Patients), and the limitation of not having patient identifiers to properly match the data, a statistical analysis of this data could not be conducted.

3. Results

Aim 1: : To examine the result of implementation or maintenance actions taken by the sites after the Qualis Foundation's Oral Health Delivery Framework pilot in 2014 to enhance and/or document their level of medical-dental integration

Level of Dental Integration: ***Medical-Dental Integration is important:*** A theme that emerged at BNHC was the fact that participants recognized the importance of medical-dental integration, particularly due to the poor oral health status of the immigrant communities that seek care at the Center, and the fact that Brockton water is not fluoridated. Multiple respondents also explained that oral health preventive services are incorporated into the provision of pediatric primary care in a way that they described as "inconsistent".

When discussing with the Health Center Administrator the need for integrating medical and dental preventive services, she explained:

> *"Our patients live in poverty. The percentage is outstanding. About 90% of our patients live under 200% poverty and about 70% living in poverty so when our children present at dental many of them have very significant oral health problems"*

However, when elaborating about the reasons why the program may not be fully integrated into the pediatric department's workflow, she described:

> *"I think it's just that the challenge of competing priorities… Again, survey a population that has so many social determinants of health as well as other factors in a particular visit. Even though it's a well child visit, they are trying to attend to many different things. They're trying to attend to where is the child in their development, or is there need for food, is this a homeless family… So there's so many things that I think that can be a challenge, because the pediatricians and the medical staff are really trying to address everything that they can during that time."*

Criteria for Fluoride Varnish Application/Workflow: Another theme that emerged during the interviews, was the criteria for the application of oral health

services during pediatric primary care. The application of fluoride varnish during annual well child visits is age dependent. Multiple participants described that children receive fluoride varnish during annual well-child visits when they are over six months of age or when the first tooth erupts. The medical director in pediatrics explained that at BNHC all patients are considered to be at high risk due to the fact that water in Brockton is not fluoridated. Another theme was the fact that the procedure must be ordered by the pediatricians or nurse practitioners, who usually document the order in the record at the same time they order immunizations. When the procedures are ordered, nurses apply the fluoride and vaccines.

WIC Hygienists: The presence of hygienists at the WIC office as well as the services they provide was another theme that emerged during the interviews. In order to decide whether or not fluoride should be applied, providers must rely on the patients' recollection of when was the last time fluoride was applied by the dentist, or by the "WIC Hygienists". The WIC program provides nutritional assistance for low income pregnant women and their children up to the age of 5. In the Brockton main WIC Office that is in a different location than BNHC, there is a private (Limited Liability Company) organization that offers dental screenings, fluoride varnish applications, dental sealants and dental referrals to patients when they come for their WIC appointments. Providers from the oral health preventive program recruit patients that come for their WIC appointments, but they are not affiliated with WIC or BNHC. The WIC nutritionist describes:

"They just come in when they have their WIC appointments. They go out and they have one person that goes out and says, Oh are you interested in seeing the dental hygienist after your WIC appointment, and if they say yes then they fill out a paper, they give him the Mass Health number, their name and every other information sheet and then they'll come and see the nutritionist to do their WIC stuff and then afterwards will go and see the dentists."

Oral Health Intake / Documentation of Oral Health Indicators and Services: Another theme that was identified during the interviews was the intake of patients by medical assistants, as well as the documentation of oral health indicators as part of the intake. During the intake portion of the well child visits, medical assistants ask patients a series of questions related to past medical history including whether they have a dental home, and whether they have seen a dentist in the past year. There is a field within their intake template in the EMR to document this information. However, the information does not populate in the pediatrician's template for the well child visit. The pediatricians then conduct the physical exam, including a dental screening, and they have their own template where they document the presence of caries and order the application of fluoride varnish. The Medical Director of Pediatrics described:

"So we don't have a [paper] form for that. What we have is, what they [the medical assistants] are supposed to do and it's not consistent, it's a medical assistant has to do a little intake. And in our electronic record there is an intake section for the well child exam. And they are supposed to ask key questions like any concerns, anything happened, since the last visit, and do they have a dental home That's not as consistent as it is supposed to be… [These fields are included in the EMR template but are currently not recorded consistently]. "

Once the pediatricians order the fluoride varnish application, the nurses apply the fluoride and document the application in the office procedures section of the record. Based on the dental screening findings, providers issue dental referrals using a separate template within the EMR. A paper referral form is also sent out to the secretaries who assist the patients in scheduling dental appointments as needed. The Medical Director in Pediatrics described:

> *"The nurses usually do the varnish, the medical assistants know how to do it but the nurses tend to do it because they usually give them vaccines, they give the vaccines, they are crying, the mouth is open, it's easier to do the varnish and the vaccines at the same time. So it tends to be nursing"*

Implementation and maintenance measures after the Qualis Foundation Pilot: ***Qualis Pilot:*** When asked to describe the process for adopting the Oral Health Delivery Framework at BNHC, and participate in the Qualis Foundation Pilot, the Health Center Administrator indicated that they were introduced to the project by the Mass League of Community Health Centers, and it seemed a project that would benefit BNHC's patient population as exemplified in the following quotation:

> *"I think we were interested because we… So I think this was a Mass League project and if I remember correctly we wanted to participate because we're really looking to provide the best care for children that we serve. Brockton historically has had a very high rate of caries for children and certainly we see it in our own practice"*

The center continues to invest resources for the maintenance of the program such as involvement of both the Pediatric and Dental Departments and

the revision of workflows in both departments, the training for both medical assistants and providers, and initiatives to increase the availability of dental appointments for patients referred from Pediatrics. The center also allocates IT resources for the maintenance of both the dental and medical electronic records.

Qualis Pilot-related Trainings: As part of the Qualis project, trainings were conducted for clinical providers and staff at BNHC. Participants described that the trainings were delivered in person and included a hands-on component where providers applied fluoride on each-other. Participants also recalled training content pertaining to the indications and contra-indications of fluoride. The trainings have been repeated over the years. When talking about the trainings received related to oral health, the nurse in the pediatrics department described:

> *"Yes so it happened at least 3 times already. I believe so. It was a very first time which didn't really know what we were doing, we were very new, and they had us do it on each other which I thought was great because we got the idea how it feels like in our mouths, you know, knowing at least what people are going to experience or the children when we are doing this to them."*

Dental Appointments Availability: In order to increase the availability of dental appointments for patients referred from Pediatrics, the Center has allocated resources and revised workflows in the Dental Department that consists of 22 chairs and 10 staff dentists. They have created a visit type called special populations and tried setting aside "open access" appointments to expedite the process of scheduling appointments for patients referred from within

the Health Center departments and programs including pediatrics. The dental director described:

> *"Not only for pediatrics. We have other departments at the health center. Adult medicine that manages chronic illness, as well as the HIV Clinic, they all needed to have greater access to dental, so I created appointment slots that we offer to these groups, we call it special populations throughout the health center, and we only put patients from these referrals. So, we have a certain amount of appointments that are reserved for pedi, and we have a certain amount that are reserved for the other groups."*

Medical-Dental Integration Program Priority / Competing Priorities:

When discussing with the Center's Chief Operating Officer what other programs or priorities interfere with the maintenance of the medical-dental integration program at BNHC, she explained that given the number of social and behavioral needs in the population served by the center, the program at this time is in the medium to low priority level. She explained there are more recent initiatives, mostly related with behavioral health and social services that are grant funded and require reporting. Furthermore, she explained that while there is a high risk for oral health problems, and providers continue to see poor oral health conditions in their patients, the patients themselves have more pressing concerns that must be addressed. She described:

> *"Talking about a hierarchy of needs you're probably going to go with do you have food tonight, do you have shelter, is there violence in your home, and then let's talk about fluoride varnish, which is also important but in none of the others had medical. Right here our patients have daily challenges of survival so that always probably is going to come before looking at a medical issue. Honestly, this isn't from our dental*

prospective but from the parents' perspective this is probably seen as important but not the highest."

Barriers and Facilitators to Medical-Dental Integration: ***Time and Competing Priorities:*** As described in the previous section, the biggest barrier to Medical-Dental Integration identified by participants was the number of other social and behavioral concerns that must be addressed during pediatric appointments. They also highlighted the patients' cultural beliefs and perceptions about oral health, and their compliance and ability to schedule and keep dental appointments when referred. For example, when discussing this topic, the secretary in Pediatrics described:

"Well, they think that kids, like some of our Hispanic and Cape Verdean population, they see when the kids have a lot of cavities and they don't believe on curing the cavity and want to pull out the tooth! Especially the Hispanic."

The nurse in Pediatrics described:

"One of the things especially with this population that I find, is… So you would give them referrals, you would try your best, you send and send them so many times, they just don't go. Sometimes they forget that oral health is part of overall health."

Another barrier described by participants is time during appointments. While providers are trying to address multiple issues, time is limited for addressing oral health or provide anticipatory guidance. When asked about barriers that pediatricians may find for incorporating oral health preventive

services during well child visits, a provider in the Dental Department explained:

> *"Time. We are very double booked in the health center. So we see a lot of patients and then we have to go quickly and quickly. And it's not their fault if they are running behind with like 5 or 6 patients waiting outside that will be waiting for an hour, so they are like, OK just book the appointment. If they have done their part, and maybe they don't have the time to educate the patient about the dental part. So I think we all struggle as providers working on our health centers with time."*

Availability of Dental Appointments as a barrier: BNHC has also tried in multiple ways to increase availability of dental appointments for patients when referred from the Pediatric Department as previously described. However, meeting demands for the volume of patients in need for appointments, particularly those that are only covered by Medicaid in private offices for emergency dental care, continues to be a barrier for integrated dental care. When discussing this issue, the secretary in the pediatrics department described:

> *"Sometimes I believe the hardest part because I have said we have Medicaid insurance some people some patients have limited insurance and maybe basically a lot of like private dental offices they don't take their insurance unless it is an emergency. So it's in here they have to be seen, and the volume of patients that we have here sometimes they have to get based on the waiting list, so my barrier is like sometimes you don't get appointment time, within a month."*
>
> *"But most of the time the patients they want to keep everything in one place they want to be seen by vision, dental, and their primary care in here. So it's just that just the wait list, list wait time is too long. Sometimes it goes up to 2 months*."

On the other hand, a barrier for keeping open appointments in the dental department for pediatric patients is the high no-show rates from these patients

when their appointments are scheduled. The Dental Director explained:

> *"I would say the biggest problem we have is the no show rate from the pediatric patients, because their parents don't bring them to the appointments. Even if they received reminders and they confirmed the day before. So that is our biggest problem now. But no access. Access is fine. Is the no show rate for that population is high."*

The Health Center Administrator explained that in order to reduce the high no-show rates the schedules in the Dental Department are only open six weeks to two months in advance, but due to the high demand, once they open the schedules, these appointments often are filled within one day.

Need for Training: Another barrier to medical-dental integration that was described by the Medical Director in Pediatrics is maintaining the level of training, given recent staff turn-over. She explained that while most providers that received the original trainings are still at the site, they have several new staff (medical assistants and secretaries) that have not been trained in the provision and proper documentation of oral health services in pediatrics.

EMR Templates as a barrier: Lastly, the structure of templates within the EMR for documentation of oral health indicators and services was identified as time consuming and complex, making it another important barrier that will be further described in the next section.

Aim 2: To identify how electronic records are being used currently to promote, inform and document the application of the oral health delivery framework and/or the provision of oral health services during pediatric visits at community health centers.

EMR System: BNHC acquired their Electronic Medical Record system from NextGen as part of a Blue Cross Blue Shield grant that aimed to implement city-wide record integration. That is, for the two hospitals, the Health Center and some private practices in the city to have access to integrated medical records. The Center designated a taskforce that evaluated 7 different vendors and selected NextGen. Years later, about 8 years ago, the Center acquired the Electronic Dental Record developed by NextGen with the goal of having the highest possible level of integration between the EMR and the EDR systems. Through the system, providers with appropriate access can look up information in both records such as prescriptions, diagnostic codes and appointment history. However, they require separate log-in for each system, and information such as the Medical History collected in the Dental Department does not populate in the Medical History recorded in Pediatrics and vice-versa.

EMR Accessibility and Usability: Some participants rated the individual areas of the record that they access as part of their roles as easy to use, however, in general participants agreed that they don't consult other areas of the record frequently, some because they don't have access, and others because of the difficulties posed by the separate log-in procedures and the limited information that is available for them to view.

Capturing Referral information and outcomes: Referrals that are issued within the system, don't get delivered directly to the receiving department but rather become part of a referral queue that is processed by referral

coordinators who prioritize the scheduling of appointments for specialties, tests and management of acute and chronic conditions, resulting in a back-log of dental appointments to be scheduled. This has created the need for the Pediatric and Dental Departments to implement alternative systems such as paper referral orders that are given to patients, or listings of pending referrals that are shared by secretaries in both departments to coordinate for scheduling dental appointments. Sometimes the referral orders are given to the patients who are asked to schedule their appointments in the Dental Department themselves.

Inter-Departmental Consultations / Communication: Due to the lack of shared information between the Dental and Medical Electronic records, providers at the Center rely on paper forms for inter-departmental consultations such as medical clearances for dental procedures. The Director of the Pediatric Department describes:

> *"And they also fill out a form and they make it part of their packet so the pregnant women get a whole packet of stuff with the WIC form and everything and they do a dental clearance. Because otherwise they get upstairs and they don't see them."*

EMR Oral Health Templates: As mentioned in previous sections, at BNHC Pediatric Department, oral health indicators such as dental home, presence of caries, fluoride applications and dental referrals, are documented within four separate templates within the EMR. One that is completed by medical assistants during intake, one that is completed by Pediatricians during the physical exams, the in-office procedures template completed by nurses, and the

referral template completed by providers. One of the difficulties about having separate templates, is that they don't populate on each-other, so in order to look up the information providers have to close one screen to access the other templates. Another limitation is that the process for ordering Fluoride Varnish and Dental Referrals from within the templates is complex and requires several "clicks", this makes it difficult for providers to complete the orders on time for nurses to be able to see them and provide the application of fluoride, or for secretaries to see the referrals before the patients finish their check-out processes. The Medical Director in Pediatrics describes:

> *"It's in a different section and it is a process. So you know the vaccines are part of a routine so after you do all this, we'll scroll down and do all of our immunizations, and then you have to go all the way to the very end to get to office procedure. And it is several clicks. So it is kind of in a different section, at the end and all that. So sometimes you mean to do it and you might forget to do the seven extra clicks in a different template."*

EMR Capturing Dental Home Information: Another difficulty with the oral health related templates completed by pediatricians, is that it only captures whether or not the patient has a dental home but it does not capture information about where the patient is receiving services, within or outside BNHC, or when was the last time they saw the dentists. This prompts for lengthy discussions with caregivers to ascertain whether they are providing accurate information regarding their last dental visits. If providers wish to document this information, they must do so on their free text notes within the physical exam template. In

addition to being time consuming, this poses limitations for reporting of medical-dental integration indicators.

Providers in pediatrics agreed that the NextGen templates they currently use are not user friendly. When asked about the suitability of the system to incorporate changes, they described a lengthy process coordinated between the Centers' internal IT department and NextGen. For example, the Medical Director in Pediatrics described:

> *"So we have one person in charge of IT through NextGen Clinical. One person in the whole place. He works with NextGen remotely. So little changes like trying to get a little box in, he can do that working with NextGen. We can't do some customization. That can take weeks or months."*

The representative from the IT department explained:

> *"This depends on the scale of the issue so if it's something like remapping all a bunch of like codes or changing the prices of stuff that can be a longer process. But if it's something as simple as just changing remapping a button in their palette it could take like a couple of clicks"*

In general, participants find that having access to information, however limited, through integration of electronic records is helpful. When asked about the benefits from record integration, a provider in pediatrics described:

> *"Before it was like a black hole. Because we couldn't see anything. At least we can see diagnosis, appointments, if it's hygienist or dentist we can see that, there's a little we can see it but we can't read the note, So it helps a little bit, having them having electronic records at least you can see what's going on a little bit. So it helps a little bit, I think more information does help."*

Another provider explained:

> *"So, I mean, if we don't have that information we don't know what was done. We don't know how best we can help them. And sometimes it's just time wasted right like on the Phone Calling these people OK can you send me this, the faxes are great, but the truth is sometimes we don't get them right away. The patient sitting there waiting, we don't know what to do, and we want to prevent that."*

Reporting: As described above, BNHC could not provide a report of the oral health preventive services provided during well child visits due to the way data is collected in their electronic system and capacity within their IT Department. The Chief Operating Officer described that in order to produce this report, the one IT specialist that is dedicated to managing the EMR in Pediatrics would need to dedicate time to write the report and given that this program is not a current priority for the center, she could not prioritize the production of this report. She explained:

> *"This report would require our IT Department to write the report, and they are really really busy. And overwhelmed with the amount of stuff they have to take care off, so this wouldn't have been a priority. Had we been doing a quality initiative and working on this particular topic, then yes I would have pushed and asked them to develop it".*
>
> *"I know the way we run reports is not from our billing side. It is from our EMR, and I cannot create or write a report from scratch myself but I can modify reports that are in the system".*

As exemplified in the following quotation, she described that this report has not been previously created for monitoring the dental-integration program, and in order to produce it at this time it would need to be built from scratch.

"Our IT Department, we don't have a programmer, we have somebody that works exclusively with our EMR and we do have a data analysis, but our data analysis has been working on a number of things including our reports to the Federal Government which is due the end of this week. We started working on that in December. So, and that is just one of the initiatives. We are submitting our Health Center Medical Application which requires data. We are working with our ACL which requires data. So Community Health Centers like us we have IT support, but we don't have it to the level that other places might have"

In order for BNHC to prioritize the creation of this report, it would require for the medical-integration program to be prioritized over several other programs, as explained in the following quotation:

"We have behavioral health, which is a whole project on the third floor with pedi and OB. That is a big project. We have a very big foundation grant for that project, and on the other hand we also are required by the State to start collecting social determinants of health, so that element we rolled out the tablets for the patients to enter the information about social determinants of health, so that is another project.

But there is my problem. I feel bad that we always have to balance where is our top focus."

In summary, participants at BNHC have encountered multiple barriers for integrating dental preventive services into pediatric primary care. The complexity of templates used to document oral health related outcomes is one of these barriers, as is the limited ability of the system to document information regarding dental home and referral outcomes. While records are partially integrated at the site, the accessibility and usability of the information poses an additional barrier to evaluate the outcomes for the program.

4. Discussion

This case study illustrates ways in which electronic health records may hinder and become a barrier for the successful implementation and maintenance of a medical-dental integration program at a community health center. Given the complexity of social and behavioral conditions experienced by patients served at Community Health Centers, in order for the program to be successful any and all measures must be taken into consideration to simplify and facilitate the process for providers to apply oral health preventive services into pediatric primary care.

Even in the presence of partially integrated dental and medical electronic records, the structure, accessibility and usability of templates to document oral health indicators and services, pose a barrier for the providers to utilize the tools and apply oral health preventive measures during pediatric encounters. The difficulties in properly documenting oral health indicators and services, results in lack of ability of the site for producing reports to track the provision of those services, and thus, identifying areas in which processes may be streamlined and improved in order to make the medical-dental integration program successful.

Other areas of the program can also be revised and simplified to increase the likelihood of provision of oral health preventive services during pediatric primary care appointments. For example, the collection of oral health indicators could be done as part of the intake questionnaires that patients complete at the beginning of their well child appointments, and this would serve as a reminder for medical assistants to properly document the presence and location of a dental

home as well as the last time the patients were seen by a dentist. If the electronic templates were modified and consolidated, this would make that information available for providers during the clinical portion of the encounter and they would be more likely to remind parents of the importance of scheduling dental appointments for their children when they are one year of age and older.

The criteria for the provision of oral health preventive services can also be revised. For example, having fluoride applied on all children over the age of 1, regardless of their caries risk status, would eliminate the need for providers to order the procedure before fluoride is applied. This would streamline the incorporation of fluoride varnish application into the primary care appointments workflow. Similarly, if the medical assistants recorded the information regarding the patients' dental home directly into the visit template, instead of having a separate intake template, the information may be readily available for providers when conducting the physical exam, eliminating the need for pediatricians to discuss dental home and previous dental services with the patients during their interview.

The dental department at the site has tried in multiple ways to prioritize and increase the availability of dental appointments for patients referred from the pediatric department but continues to be limited in their ability to meet the demand for dental appointments at the center in general. In order to overcome this barrier, the Director in the Pediatric department would like to incorporate a dentist or dental hygienist dedicated exclusively to seeing the patients referred

from the practice. Proper documentation of the patients' oral health status and caries risk would be instrumental in justifying the need for the site to invest in the space and necessary resources to incorporate an additional dentist or dental hygienist within the pediatrics and OB/GYN departments. If implemented, the presence of a dental provider in pediatrics would address the difficulties described regarding follow up on dental referrals and availability of dental appointments for patients when referred.

In summary, several barriers were identified at this site for the incorporation of oral health preventive services into pediatric primary care. The tools related to oral health currently available within the electronic record systems have been identified as an additional barrier to medical-dental integration. Furthermore, the revision of these tools could potentially aid in the solution to some of the other barriers identified.

Factors that participants identified as facilitators for the incorporation of medical-dental integration include motivation on the part of primary care providers who recognize the patients served at BNHC are at higher risk of caries given that the community has no fluoridated water. Participants also mentioned the fact that the Brockton Public Schools require documentation of physical and dental examinations during enrollment each academic year. Another facilitator they identified was patient compliance with physician's recommendations and the fact that patients usually do not decline any procedures when ordered by their PCPs.

Barriers that participants identified included patients' knowledge and their cultural perceptions about the importance of oral health, and thus, their compliance in scheduling and keeping dental appointments when referred. Participants also identified barriers related with time and competing priorities during the appointments. They described difficulties documenting the provision of oral health services due to the structure of the templates within the EMR. Other barriers identified by participants included difficulties with the referral processes, patient volume and the ability of the Dental Department to meet the increasing demand for dental appointments at the Center. Workflow and staff turn-over were also identified as barriers, as well as the need for medical-dental integration related trainings for newly hired staff.

The lack of availability of documentation of oral health preventive services received by patients at the WIC office was also identified as a barrier for the provision of oral health preventive services at BNHC both in the dental and pediatrics departments. Patients from BNHC who are also eligible for services under the WIC program, have access to seeing Public Health Hygienists from a private organization that offers their services at the WIC Main Office (outside of BNHC at a different location). The hygienists recruit patients from the WIC office, and provide oral health screenings, fluoride varnish applications, dental sealants and dental referrals. Given that these services are provided by an independent organization, they are not documented directly by the hygienists within BNHC records. Providers in both the Dental and Pediatric Departments rely on the

patients' recollection of services they received at the WIC office in order to document those services.

Part 3: Conclusions

Chapter 6 – Public Health Practice Implications and Transferability

Based on the available evidence in this study, as well as previously described in the literature,[2,11,27,33,36-38,74] there are several factors that influence the successful integration of oral health preventive measures into routine pediatric primary care. [6,55,56]

This study found that the likelihood of pediatricians applying fluoride varnish and conducting dental screenings during well-child visits significantly increased in the presence of integrated medical and dental electronic records. Furthermore, integrated records were found to be instrumental in promoting the medical-dental integration model.

While it is true that in 2015 the overall number of visits at CHCs increased nationwide due to the Affordable Care Act (ACA) investment and increased Medicaid Coverage, the available data suggest that this increase, while statistically significant for Mental Health, Substance Use and Family Planning Services, was not seen for Dental Services.[81]

According to the qualitative and quantitative findings of this study, the design of tools within the electronic records systems to document oral health findings and services must be seriously considered as components that can help address organizational barriers and promote the provision of oral health preventive services during pediatric primary care. On the contrary, if those

electronic tools are partially integrated, complex and/or time consuming, or if they don't capture the information in a way that is accessible and reportable, they themselves become a barrier to medical-dental integration.

This study found that the factors involved in the successful implementation of a medical-dental integration model in community health centers are closely inter-related and can be summarized in the following areas: 1) Institutional supportive environment, workflow and training resources, 2) Development of a simplified and streamlined protocol for the application of services during pediatric primary care, 3) Careful design of electronic tools that facilitate the documentation of findings and services, and 4) Reporting both internally for quality improvement and externally for surveillance.

The study findings and recommendations are outlined below and summarized on table 20.

A. Institutional supportive environment, workflow and training resources: According to the findings in this study, as well as the evidence available from previous studies, the medical-dental integration model is more successful when the administrators of the health center as well as the dental and pediatric departments consider the need for dental services a priority for the community served at the health center. However, given the need for addressing multiple competing priorities during pediatric primary care appointments, the processes for incorporating dental preventive services must be simplified.

This study found that a way to elevate the level of priority centers give to medical-dental integration, as described later in the reporting section, would be to include more indicators of integration in the HRSA UDS survey.[16] Sites also prioritize the collection of data to complete state mandated reports, such as indicators of behavioral health. If the sites are required to report on medical-dental integration, this may incentivize the creation of the necessary fields within their record systems for tracking medical-dental indicators, and address oral health with their patients as part of routine pediatric care.

Another finding of this study is the fact that while co-location of dental and pediatric services within the health center was described by participants as an important factor for medical-dental integration, pediatric medicine providers are less likely to issue referrals if they find that they won't be fulfilled promptly by the dental department.

Having an effective referral process internally or outside of the health center is more important than offering dental services on-site. Therefore, while sites must consider increasing the capability of the dental department to meet the increasing demand of services produced by the referrals issued through the program, it is also important to consider developing partnerships and streamline referral systems with local dentists or institutions. If this is the case, sites must consider improving the capability of their record system to easily track referral outcomes. Furthermore, given that the program involves increasing access to dental care for children as early as six months of age, centers must consider

increasing the capability of the dental department to treat younger children by providing training for general dentists and/or considering the addition of a pediatric dentist in the dental team. If the center does not have this capability on-site, developing a listing of local dentists that can provide those services may be necessary.

Motivation on the part of pediatricians to incorporate dental screenings into their routine physical examinations was also found to be important. However, in order to achieve this, providers must maintain their level of training regarding oral health conditions as well as what constitutes a dental emergency. Increasing providers' level of confidence while conducting dental screenings, also reduces the time they need to dedicate to this during their appointments. Providers find helpful the availability of continued education trainings related to oral health as well as grand rounds sessions offered internally at the sites. Some of these trainings are offered by the American Academy of Pediatrics online and free of charge, however the site must allocate time for the providers to take these trainings.

Support staff in the pediatric department must also maintain their training for the application of fluoride varnish. This is a requirement from MassHealth for reimbursement of fluoride applications in Pediatrics. The "Smiles for Life" online training is approved by MassHealth for this purpose and it is an important resource offered free of charge to participants. The training takes about one hour to complete and includes sections on the importance of oral health,

common findings during an oral examination, proper procedures to conduct dental screenings and fluoride applications in the pediatrics office. This is an important resource specially to train newly hired staff. In addition to this training, Mass Health offers in-person trainings at the sites. Information about these training requirements can be found within the MassHealth website: https://www.mass.gov/how-to/fluoride-varnish-training-for-health-care-professionals .

Lastly, an effective referral process within the pediatric and dental departments was found to be an important component of the program. The ability of patients to schedule and attend dental appointments when referred, was identified as a barrier for improving access to care. Therefore, the sites must consider ways in which to facilitate the referral process and direct scheduling of appointments when needed. Integrated electronic medical records were found to facilitate this process. Having a referral feature within the electronic health records that directly is delivered to the receiving department may help increasing the likelihood that appointments are scheduled. Furthermore, if the system has the capability of tracking referral outcomes in a way that is easily accessible to pediatricians, this enables providers to follow up with their patients and educate them in the importance of keeping those appointments.

B. Development of a simplified and streamlined protocol for the application of dental services during pediatric primary care: Given the fact that the majority of patients who seek care at community health centers belong to

ethnic and racial minority groups and live below the federal poverty level, they are at a disproportionate risk not only to develop oral health problems, but also to experience a significant number of other challenges associated with social determinants of health that must be addressed during their medical encounters.[82]

Similar to previous studies,[2,36] given these competing demands during pediatric well-child visits, this study found that processes associated with the incorporation of dental services must be streamlined in order for providers to be able to incorporate dental services during the limited time available for pediatric medicine appointments.

First, this study found that the incorporation of fluoride varnish applications into the pediatric medicine department workflow is easier done independent from a caries risk assessment, contrary to what was previously recommended.[6,53] The criteria for applying fluoride varnish can be simplified according to the guidelines provided by the American Academy of Pediatrics and the American Dental Association.[5] [83] All children between the ages of six months to six years of age should receive fluoride application every three to six months regardless of their caries risk status.[5] Applying this criterion for the application of fluoride, makes it non-dependent on pediatricians conducting a dental screening and documenting caries risk prior to ordering the procedure. It also eliminates the need for an additional step to order the procedure separately before fluoride is applied. This enables sites to incorporate the fluoride applications within the pediatric encounters workflow and establish a standing order for fluoride to be applied to

all children that meet the age criteria at the same time they are receiving immunizations within their well-child visits.

Data collection for risk assessment can also be simplified and completed by parents during their intake for well child visit appointments. Based on this study findings, the recommendation is to include the following questions on the intake for all children over 6 months of age:

- When was the last time your child saw a dentist?
- When was the last time your child received fluoride?
- What dentist did your child see?
- Is this dentist at the Health Center's Dental Department?
- Did your child have cavities in the last year?
- Have you, or your child's caregiver had cavities in the last year?
- Does your child drink milk or juice between meals or while sleeping?

The answers to these questions can be entered in the record by medical assistants at the same time they are recording all other intake data, and can be made available to pediatricians by incorporating fields within the well child visit electronic record that mirrors the questions listed above. This eliminates the need for pediatricians to ask these questions and document these answers during their interview with the patients, making the data readily available for them to make the caries risk assessment during the exam.

The caries risk assessment criteria can also be simplified as follows: If the child hasn't seen a dentist or had caries within the past year, the primary caregiver for the child had caries in the past year, or the child drinks milk or juice

between meals or while sleeping, the patient can be categorized into the high risk.

The criteria for issuing dental referrals can be simplified by following the guideline that all children at the age of one must establish a dental home.[5] Following this criterion, all children who do not have a dental home should receive a dental referral. This would increase the number of referrals to the dental department. If capacity to fulfill those referrals in the dental department is limited, then referring all children categorized in the high risk should be prioritized.[5]

C. Careful design of electronic tools that facilitate the documentation of findings and services: This study found that providers are less likely to address oral health and document their findings if the electronic templates require them to visit multiple screens for doing so and/or the information doesn't automatically populate relevant screens.

Documentation of oral health indicators and services provided during pediatric primary care appointments should be simplified ideally into one template, that is accessible to all members of the healthcare team. Also ideally, if those fields can be included within the primary screen where providers record their findings during physical examinations, the presence of these fields can serve as a reminder for providers to address oral health during their appointments.

It is also important that these fields can be completed with the fewest

possible number of “clicks” and that they do not require for providers to visit multiple screens in order to record their findings. Fields in the electronic record can mirror those listed for the patient intake above and entered by support staff during the initial portion of the appointments at the same time they record height and weight and vital signs. This leaves only two additional fields to document the presence of caries, if found during the physical examinations, and a determination of high and low risk that can be completed by providers at the time they document their physical exams findings.

This study found that providers do not routinely review historical data from previous exams unless they find oral health problems during the examination that required follow up. Providers do frequently visit appointment history at the dental department to ascertain whether patients scheduled and attended dental appointments when referred. The presence of a dental home field within the oral health section of the well-child visit that populates from year to year would allow pediatricians to have this information readily available and address with their patients the importance of keeping their dental appointments, and follow up with the patients if they didn’t keep their dental appointments.

A desired feature among providers at both sites in this study, is the capability of the electronic records system to easily document the translation of dental referrals into appointments on site, as well as the ability of the system to capture information for dental home when patients visit dentists outside of the health center. Ideally, when patients see a dentist outside of the health center,

this information should populate within the well-child visit from one year to the next, making the information readily available for providers and eliminating the need for questioning the patient and entering the information again. Both systems in this study lacked this capability, but administrators at both sites described a simple process for the addition of the field within the well child visit template.

One of the outcomes of medical-dental integration is for dental providers to have more accessibility to the patients' medical and behavioral information that they take into account for providing dental treatment. If, ideally, medical and dental records are integrated, this gives dental providers the capability of accessing this information directly reducing the need for inter-departmental consultations. If records are not integrated, in order to establish a successful medical-dental integration model, the site must consider a way to streamline the process for consultations.

A feature that was found to be helpful, is the capability of the integrated electronic system to facilitate communication between departments by allowing providers to send these consultations directly from within the record. The feature delivers the message and flags it for the receiving provider to respond. The advantages of this feature include the fact that these consultations automatically become part of the patient's record. It also reduces the wait time for providers to receive a response, and it eliminates the need for the patients to schedule additional appointments for procedures such as medical clearance for dental

treatment.

Participants at both sites with experience in using multiple EMR platforms, mentioned EPIC as the EMR platform they found easiest to use and highlighted its capability to access outcomes from hospital and emergency room visits. When discussing the incorporation of EPIC as an EMR system, they both referred to cost as the limitation for selecting this platform or converting from their current platform to EPIC.

D. Reporting: This study found that the production of quality improvement reports has been instrumental in motivating providers to incorporate the medical-dental integration model. It also has enabled the sites to identify areas where the program can be improved. In order for the sites to be able to produce these reports, the data collection tools within the electronic record systems must be carefully designed as described in the previous section in order for providers to be able to effectively document the data.

The data must also be collected and documented in a way that is easily extracted from the records in order to produce the reports. In addition to producing internal reports for quality improvements, community health centers also report annually to HRSA through their uniform data system report. The sites give priority to documenting the fields that must be reported as part of this survey. They also give priority to State requirements for reporting information such as behavioral health and access to social services.

Given that one of HRSA's goals is to promote networks for oral health

integration within the maternal and child health safety net program, the inclusion of additional medical-dental integration indicators in the UDS survey may elevate the priority for community health centers to improve medical dental-integration and better document oral health outcomes and services.

Questions that the system currently collects, include the number of dental patients, and the percentage of Children 6 through 9 years of age at moderate to high risk of caries who received a sealant on a first permanent molar. Both of these indicators are collected in the dental department. No data is collected for oral health services provided during routine primary care. The system also does not collect any data on dental services or fluoride application provided to children between one and six years of age that are the subjects of this study. The UDS system collects data on whether the sites utilize their electronic record systems for integration of services, including telehealth, but it does not collect data on whether the sites have integrated dental and medical records.

The recommendation would be to collect the following indicators as part of the UDS Survey: Number of children between 1 and 6 years of age that have received fluoride application during well child visits in the past year, and number of children 1 year old or older that report having an established dental home.

Another way to increase Medical-Dental integration at the sites and elevate the level of priority of the program would be the establishment of a grant-funded initiative to support the necessary changes in EMR and workflow, requiring that the sites report on the outcomes of the program.

Table 13. Recommendations	
Recommendations regarding workflow and training	Implications
1. Include oral health indicators into patient intake. Suggested questions are: • When was the last time your child saw a dentist? • What dentist did your child see? • Is this dentist at the Health Center's Dental Department? • When was the last time your child received fluoride? • Did your child have cavities in the last year? • Have you, or your child's caregiver had cavities in the last year? • Does your child drink milk or juice between meals or while sleeping?	• Increases the amount of paperwork that parents complete at intake • Reduces time dedicated during appointments to interview the parents regarding oral health • Requires coordination with support staff to document answers in the electronic record
2. Medical Assistants can document the above information at intake	• Requires access to well-child visit template for medical assistants • Frees up physicians and nurses time during appointment
3. Promote oral health training for pediatric providers via continued education, free online AAP resources and internal trainings	• Cost and time • Providers are more confident and efficient conducting oral health screenings
4. Training for pediatric team members can be done online. Providers and assistants can complete the Smiles for Life training online. More training information can be found at: https://www.mass.gov/how-to/fluoride-varnish-training-for-health-care-professionals	
Recommendations regarding protocols for provision of oral health services in pediatrics	Implications
1. Simplified criteria for Fluoride Varnish Applications: Fluoride can be applied every 3-6 months for all children 6 months or older	• Increased number of fluoride applied, cost and time • Cost is offset by reimbursement of fluoride application • More efficient workflow
2. Simplified caries risk assessment: Children are considered at high risk if: • They haven't seen a dentist in the past year • The child, parent or caregiver had caries in the past year • The child drinks juice or milk between meals or while sleeping	• Reduces time dedicated to risk assessment during encounter • Increases the number of referrals
3. Simplified criteria for dental referrals:	• Increases the number of appointments needed in dental department

• All children over age one must be referred to establish a dental home. • If there is reduced capacity to fulfill the increased number of dental referrals, All children in the high risk category need a referral for dental services	• Requires increased capacity to treat younger children in the dental department
4. Increase the ability to treat younger children in dental department by adding a pediatric dentist or training general dentists	• Personnel and space costs and/or time for training
Recommendations for the selection of electronic records and design of record tools	Implications
1. Ideally, medical and dental records should be integrated	• May require new EMR system, since some systems do not have this capability. This is a considerable expense to the CHC
2. System should have the capability for inter-department communication within the electronic record	
3. If records are not integrated, pediatric providers at minimum should have access to viewing dental appointment history	
4. Fields for documenting oral health should be consolidated within one screen available to all members of the healthcare team in pediatrics. Consider including the following fields: • Dental home -with a field to specify dentist • Caries found at exam or reported by parent Y/N • Feeding milk/juice between meals or while sleeping Y/N • Risk High/Low • Fluoride applied Y/N • Referral provided Y/N	• Requires involvement of IT Department, and possibly EMR vendor. There will be costs associated with the technical support • Increases usability of the data collected • May serve as reminder to address Oral Health
5. Consider including the above fields within the well-child visit template	
6. If the system has the capability, consider having the dental home field populate from one year to the next	
Recommendations for reporting	
1. The above fields should be built in a way that it can be extracted for quality improvement reports, or reports required by HRSA or State.	• Requires involvement of IT Department, and possibly EMR vendor. There will be costs associated with technical support • Increases usability of the data collected • May serve as reminder to address Oral Health

	• Outcomes from the reports may serve to justify funding to make program improvements
Recommendations for elevating the level of priority of a Medical-Dental Integration Program	
1. Incorporation of Medical-Dental integration indicators in the HRSA UDS Survey, and/or state reporting requirements. The indicators that should be collected are: • Number of children 6 Months to 6 years of age that received fluoride varnish during pediatric primary care visits in the past year • Number of children 1 year of age or older that have an established dental home 2. Establishment of a grant-funded medical-dental integration program	• Cost for data collection for CHCs • Cost for data analysis and reporting HRSA and/or state • Funding and administration of grant program

Study Strengths and Limitations

This study is the first in-depth examination of how community health centers use their electronic record systems in the integration of pediatric primary care and dental services. The findings regarding barriers and facilitators for medical-dental integration are consistent with previously available evidence on the topic.[2,36] Contrary to what was previously described, this study found that integrated electronic records had a statistically significant impact on the integration of dental and pediatric services.

The ***generalizability and validity*** of this study's findings rely on in depth descriptions of the context observed in the pediatric and dental clinics at the Community Health Centers, to construct theories of "how" and "why" providers may or may not apply the oral health delivery framework in their clinical work, or utilize tools within the electronic health records to document these practices.

This study describes what would make providers more likely to utilize *both* the framework and the electronic records as tools to increase the provision of oral health services during pediatric care, and, in their opinion, how does having integrated electronic records contribute to their utilization of those tools. By utilizing "good descriptive language by means of which you can truly grasp the interactions between various parts of a system, the possibilities to generalize from very few cases, or even one single case, may be reasonably good".[67]

One of the strengths of this study is the provision of in-depth description of

the context within the pediatric and dental departments in the study sites, resulting in a series of concrete recommendations for sites when considering the implementation of a medical-dental integration program.

The availability of two sites, one where electronic dental and medical records are fully integrated and one where records are partially integrated is both a strength and limitation. On one hand, this selection criteria allowed the researchers to establish differences in the way records are utilized in the different settings for the purpose of medical-dental integration. On the other hand, the inclusion of a limited number of sites poses a limitation in regards to the generalizability of the findings.

The fact that both sites in this study participated in the pilot from the Qualis Foundation in 2014, and as part of the project received similar assistance in implementing the medical-dental integration model as well as modifying their electronic record systems to document outcomes, makes it easier to identify differences in the way the program was implemented and has been maintained in both sites. This inclusion criteria also poses limitations in the replicability of the study findings on sites that have not received such assistance.

Another limitation is the lack of statistical data from Brockton Neighborhood Health Center. This made it impossible to empirically compare the levels of medical-dental integration at both sites. The data that the site was able to provide for services provided in the dental department did not include enough identifiers to match the data and make the comparisons between the sites. The

accuracy of administrative data for surveillance research is a weakness that has been described by previous studies.[84,85]

Another weakness associated with the use of administrative data is the fact that the data provided by Dimock CHC was collected for clinical decision making, billing and program evaluation purposes, and no attempt was made to validate this data for the outcomes of this study.[85] For example, there is no way to ascertain if the site may have under-reported services that were not reimbursed by insurance, or validate the accuracy of the patients' self-reported race and ethnicity. Also, the site was able to provide information on dental appointments and fluoride applied during those visits, but it was not possible to ascertain whether those appointments were the outcome of referrals issued in the pediatric department.

For the qualitative data collection, the researchers aimed to interview at least two representatives of each level of care in the pediatric and dental departments at both sites. Ideally, participants were sought that had been in their roles during the year the pilot was conducted. Availability of participants meeting this inclusion criteria was limited, and for this reason some participants could not contribute information regarding the adoption and implementation of the medical-dental integration program when it started on 2014.

At one site the researcher was able to interview a representative from the IT department that specializes in the management of the electronic dental record system. At the other site a representative from the IT department was not

available for interview. The assessment of processes for modification of record systems was obtained primarily from accounts of such processes from health center and department administrators at both sites. This limited the ability for the researches to explore further the technical suitability of the different electronic records systems to incorporate the changes desired by participants.

Another limitation of the qualitative analysis is that a member-check was not conducted. This is, to present participants with a summary of the findings to see if they resonate with them. This tool could have been used to enhance the credibility of the findings.[86]

APPENDIX A - DATA COLLECTION TOOLS

Site Observation Checklist

Site Observation Checklist

This checklist is intended as a tool to systematically review the areas below at both sites. General descriptions of the areas listed below will be documented.

Site:_____ Date:_____ Time:_____

Site Main Entrance
- ☐ Assess and provide a General Description
- ☐ Assess and provide a general description of waiting area
- ☐ Describe signage and/or patient information
  - Languages
  - Specific materials related to oral health
- ☐ Staffing
- ☐ Number of Patients
- ☐ Staffing level changes over different times in the day

Site Layout
- ☐ Location of Dental Clinic and Pediatric clinic in relation to main entrance and to each-other

Pediatric Clinic waiting area
- ☐ Assess and provide a general description of waiting area
- ☐ Describe signage and/or patient information
  - Languages
  - Specific materials related to oral health
- ☐ Staffing (Roles)
- ☐ Number of Patients
- ☐ Staffing level changes over different times in the day

Pediatric Clinic patient intake (Check-In)
- ☐ Staff involved (Roles)
- ☐ Duration
  - Intake completed with or given to patients (Verbal/Written, Electronic/Paper, Language, Interpretive Service)
- ☐ Intake questions specific to oral health

☐ Management of intake information:
  - Which staff have access?
  - How is it entered in EMR?

☐ Same for all appointments, or different for Well Child Vs. Treatment Vs. emergency?
  If existing, ask for copy of templates of intake forms

Pediatric Clinic encounter (If allowed observed directly, if not, include on provider interviews)

☐ Type of appointment
☐ Staff Involved (Roles)
☐ Duration
☐ Language/Interpretive Service
☐ Is Oral Health Addressed (Describe as applicable)
☐ How is intake information used and who uses the information
☐ Is caries risk assessment completed; describe electronic or paper tools used
☐ Describe how is an oral health screening completed (Describe)
☐ How are screening findings documented
☐ Is fluoride varnish considered, discussed or applied.
  - Staff member that applies the fluoride
  - Electronic or paper tools used for fluoride varnish application

☐ Is dental referral considered, discussed or applied. (Describe electronic or paper tools used)
☐ Is an Oral Health protocol available (Describe as applicable)
☐ Describe how are findings and/or procedures documented

Pediatric Clinic Patient Check-Out

☐ Staff Involved (Roles)
☐ Duration
☐ Language/Interpretive service
☐ Describe paperwork given to patient (Personalized/Generated by EMR)
☐ Describe how are oral health services billed
☐ Describe follow up on dental referral (Given to patient and/or sent directly to dental)
☐ Describe if any assistance is provided for scheduling

Dental Clinic waiting area

☐ General Description
☐ Signage and/or patient information (Languages)
☐ Waiting Area
☐ Staffing (Roles)
☐ Number of Patients
☐ Staffing level changes over different times in the day

Dental Clinic patient intake (Check-In)

- ☐ Staff involved (Roles)
- ☐ Duration
- ☐ Intake completed with or given to patients (Verbal/Written, Electronic/Paper, Language, Interpretive Service)
- ☐ Intake specifics (Systemic health, is patient also a patient in pediatrics)
- ☐ Management of intake information (Which staff have access, how is it entered in EMR, same for all patients, or different if patient is patient at Pediatrics, new patient or emergency)
- ☐ If existing, ask for copy of templates of intake forms

Dental Clinic encounter (If allowed observed directly, if not, include on provider interviews)

- ☐ Type of appointment (Staff Involved – Roles, Duration, Language/Interpretive Service)
- ☐ Describe how is systemic health addressed
- ☐ Describe how is intake information used and by who uses it
- ☐ Describe if dental screening or risk assessment are completed: electronic/paper tools used
- ☐ Is fluoride varnish considered, discussed or applied.
    - Staff member that applies the fluoride
    - How is fluoride varnish application documented
- ☐ Describe how are findings and/or procedures documented
- ☐ If the patient was referred from pediatrics, describe:
    - What information was included in referral?
    - How was the referral received?
    - How was the referral processed?
    - If pediatrics risk assessment was available, how accurate was risk assessment
    - How are findings from this appointment shared with pediatrics?

Dental Clinic Patient Check-Out

- ☐ Staff Involved (Roles)
- ☐ Duration
- ☐ Language/Interpretive service
- ☐ Paperwork given to patient (Personalized and/or Generated by EMR)

Assessment of existing paper and/or electronic tools

Assessment of Paper and Electronic Tools

This checklist is provided to systematically review each tool and provide detailed descriptions of any items that apply from the list below. If information is to be entered in the EMR, describe who enters the information, and who has access/uses the information

Site:_____ Date:_____ Time:_____

Sample/template available for study
☐ Paper and/or electronic
☐ Describe what information is included

Type of form
☐ Questionnaire
☐ Template
☐ Instructions/Protocol

Who completes information
☐ Patients
☐ Staff
☐ Providers
☐ Describe if multiple providers complete the form, or sections of the form

Timing of completion
☐ Prior to arrival
☐ During Check-In
☐ During Appointment
☐ During Check-out
☐ After patient leaves\
☐ For all patients and/or for all appointments?
☐ Prompts/Flags/Reminders?
☐ Describe if it is different for different patients or appointments

Information included/entered in EMR
☐ Who enters the information
☐ Who accesses the information
☐ Forced completion?
☐ Describe Process and who is involved
☐ Number of questions, Time it takes to complete (Adaptive? Individualized?)
☐ Uses (Reviewed by staff/providers, given to patients/staff, shared within CHC)

Key Informant Interview Guide
Providers, Staff and Department Administrators

Site: **Clinic:**_____
_____
Date: **Start Time:**_____ **End Time:**_____
_____
Provider Code:_____ **Role:**
_____

Interviews General Description:

A minimum of 16 interviews will be conducted at each site. Enrollment of participants will remain open to include any additional key informants that participants identify during the interviews and that may contribute significant information to answer the study questions.

The intent of these interviews is to understand what role the integration of medical and dental records has played in the implementation and maintenance of incorporating the oral health delivery framework into pediatric practices at the sites.

We aim to interview at least 2 representatives of each role within care teams in the pediatric and dental clinics at each site:

- Clinical Providers (Physician, Nurse Practicioner, Dentist, Dental Hygienist), Clinical Support Staff (Medical Assistants, Dental Assistants)
- Non-clinical support staff (Practice Manager, Front Desk Staff)
- Administrator (Department/Clinic Director)
- IT personnel
- Health Center Administrator

This guide is intended to ensure that the interviewer covers the same general content areas in all of the interviews. However, this document is not intended as a script that must be followed verbatim. The interviewer has flexibility to adapt the conversation to include any emergent themes that arise during the conversation, and to probe as needed to elaborate in depth into the proposed and/or emergent themes.

Section 1 – Welcome, Program Description and Informational Sheet

1. Welcome participant and introduce interviewer. Describe the project. Explain: The purpose of this project is to understand from your perspective, how are electronic medical and dental records being utilized, or could potentially be used to promote, enhance or document the integration of dental preventive services into pediatric primary care.

2. Provide informational sheet to participant, and explain or answer questions as needed:

- You are being asked to voluntarily participate in a research study. We are conducting this study to understand how electronic records can be used to help you incorporate oral health preventive services into primary care.
- The information you provide will help other providers and health care centers understand how they can better use their electronic record systems to promote oral health care for pediatric patients, and integrate the provision of pediatric and dental services.
- This interview is intended to last about 60 minutes, and will be audio-recorded and later transcribed, and the interviewer will take notes during the interview.
- This recording and notes will be identified with a number, and your name, role or other identifiable information will not be included.
- We will make our best effort to protect your privacy, however we cannot guarantee confidentiality. Your information will be protected by not sharing the recording, transcript and/or notes of this interview with anyone outside of the research team at any time. Any information you share during the interview will be kept anonymous.
- At the end of the research study, results will be reported as an aggregate and your personal information will not be included.
- You will not receive any direct benefit from participating this study. However, findings from this study may be beneficial to healthcare institutions and providers committed to improving access to oral health services for pediatric patients, and the use of electronic medical records to facilitate the provision of those services.
- Your honesty will be greatly appreciated. There are no right or wrong answers, and you can choose not to answer any question during the interview. You can discontinue your participation in this study at any time. Should you wish to discontinue your participation, please inform the interviewer.
- If you have any questions, please contact Ana Zea at azea@bu.edu and/or (617)358-6415.

3. Give the participant a copy of the informational sheet with PI contact information on it.

Section 2 – Clinic workflow and participant role

4. Thank you for agreeing to talk with me. I am interested in learning about you and your role at the clinic.
   a. For example, can you please tell me how old are you?
   b. What is your gender?
   c. Can you please describe your education (for example, High School, College -what program)?

5. Please describe your role at the clinic,
   a. Let's start with how long have you worked at the center, and how long in your current role? If you worked previously in different roles, what were those roles?
   b. Please describe your intervention in a regular appointment at the clinic
   c. Is the description above representative of all visits, or does your role change if the visit is different (For example, well child visit vs. emergency visit)? If your role changes, please describe how is your role different
   d. Please describe how you use electronic records in your role during your intervention in a typical appointment at the clinic, for example:
      - What information from the record do you use, how do you use that information, and who enters that information
      - What information do you enter in the record, who uses the information you enter, and how do they use that information

Section 3 – Application of the Oral Health Delivery Framework

6. A few years ago -around 2014, the Qualis foundation conducted a pilot on Medical Dental Integration at this site. Were you working in this department during those years? Have you ever seen or are you familiar with the Oral Health Delivery Framework? (show framework graphic).

7. Did you participate in the original pilot when the oral health delivery framework was initially implemented at your site?

8. If yes, please describe the training you received during the pilot, any additional training you have received after the completion of the pilot, and ways in which you have maintained or increased your knowledge about oral health over the years

SHOW THE GRAPHIC OF THE ORAL HEALTH FRAMEWORK:

9. Medical-dental integration is the application of oral health screenings, fluoride varnish or provision of dental referrals during pediatric visits. Please describe any training you have received about oral health, medical-dental integration or the oral health delivery framework as part of your work in this clinic, or outside of your work in this clinic.

10. Which areas of this framework do you typically apply? Please describe.
    - ASK (about oral health risk factors and symptoms of oral disease)
    - LOOK (for signs that indicate oral health risk or active oral disease)
    - DECIDE (on the most appropriate response)
    - ACT (offer preventive interventions and/or referral for treatment)
    - DOCUMENT (as structured data for decision support and population management)

11. Please describe any barriers you find for applying the framework in your typical work. For example, use of electronic tools, lack of information within the electronic record, timing of appointments and/or other priorities, your knowledge of oral health, the patients' knowledge of oral health, accessibility of dental services.

12. Please describe any facilitators you find for applying the framework in your typical work. For example, use of tools or information available within the electronic record, or other educational materials. Your previous training in oral health. The availability of dental services at the site. Access to the patients' dental records.

13. Please describe (and provide samples as applicable) any tools available to you for the application of the oral health delivery framework. For example, questionnaires completed by the patient, educational materials, information within the record, access to the patients' dental records.

14. Are these tools included within the electronic record, or are they paper documents such as manuals and/or forms? Can you let me see samples of these tools?

15. Please describe how often you use these forms/tools, and how easy to use do you find these tools are?

16. Please describe your level of confidence in utilizing the tools and applying the oral health delivery framework

Section 4 – Medical Dental Integration

17. Please describe oral health preventive services provided routinely during pediatric primary care appointments at your site

    a. What oral health services are typically provided and which member(s) of your team usually apply them? (Screenings? Fluoride? Referrals? Any other?)

    b. Are these services offered/provided during all appointments, only during well child visits?

    c. Are these services offered to all patients, or is there specific criteria to choose what patients receive these services? Are you familiar with the criteria and the decision-making process for the application of the services you described above? If so, please describe

    d. Do you in your role typically address oral health with patients?
        - Please describe how you typically approach oral health with patients
        - Please describe major topics of discussion around oral health you typically find in your interaction with patients

    e. Are these oral health services usually recorded, billed for and/or reported?
        - Please describe what systems or methods are used
        - Please describe which team members are responsible
        - Please describe if these outcomes are shared with the team, how, why and how often

Section 5 – Integration of Medical and Dental Records

18. Please describe if for the provision of oral health services, you use any information already in the medical or dental records and/or if after addressing oral health with your patients, you enter that information in the record

19. Please describe which other members of your team use that record information and how

20. Please describe if other users in the health center use that record information and how

21. Earlier in the interview, you described tools that you use for the application of the Oral Health Delivery Framework. Please describe if there are any changes you would make to those tools to make them easier to use for you, or to make you use those tools more frequently

    a. On a scale of 1 to 10, where one is never and ten is almost all the time, how frequently would you say you use these tools?

    b. If the participant is high on the scale, what makes you use the tools this frequently? To your knowledge do other providers in the practice use the tools as frequently as you do?

    c. If the participant is low on the scale, what would it take to move you and, or other providers higher on this scale?

    d. What changes would you make to existing tools?

    e. Would you incorporate any additional tools? Please describe the tools you would like added.

    f. Is there any information that could be extracted from areas of the record you currently can't access, that you would find helpful? Please describe

22. Are there tools you use for incorporating services (other than dental) into pediatric care? Please describe

    g. Do you find those tools easy to use?

    h. Do you use those tools more or less frequently than those for oral health? Why?

    i. Is there information you collect/input regarding other services that would be helpful in the application of oral health services? Please describe

j. Are there tools that could be adapted that could serve multiple purposes, including the provision of oral health?

23. In your opinion, how does having (at Dimock) or not having (at Brockton) integrated electronic records facilitate or make more difficult for you to access the information you need to apply the oral health delivery framework and/or provide oral health services to your patients?

Key Informant Interview Guide Health Center Administration

Site: _____ **Clinic:_____**
Date:_____ **Start Time:_____** **End Time:_____**
Provider Code:_____ **Role:** **_____**

Interviews General Description: A minimum of 16 interviews will be conducted at each site. Enrollment of participants will remain open to include any additional key informants that participants identify during the interviews and that may contribute significant information to answer the study questions.

The intent of these interviews is to understand what role the integration of medical and dental records has played in the implementation and maintenance of incorporating the oral health delivery framework into pediatric practices at the sites.

We aim to interview at least 2 representatives of each role within care teams in the pediatric and dental clinics at each site:

- Clinical Providers (Physician, Nurse Practitioner, Dentist, Dental Hygienist), Clinical Support Staff (Medical Assistants, Dental Assistants)
- Non-clinical support staff (Practice Manager, Front Desk Staff)
- Administrator (Department/Clinic Director)
- IT personnel
- Health Center Administrator

This guide is intended to ensure that the interviewer covers the same general content areas in all of the interviews. However, this document is not intended as a script that must be followed verbatim. The interviewer has flexibility to adapt the conversation to include any emergent themes that arise during the conversation, and to probe as needed to elaborate in depth into the proposed and/or emergent themes.

Section 1 – Welcome, Program Description and Informational Shee

1. Welcome participant and introduce interviewer. Describe the project. Explain: The purpose of this project is to understand from your perspective, how are electronic medical and dental records being utilized, or could potentially be used to promote, enhance or document the integration of dental preventive services into pediatric primary care.
2. Provide informational sheet to participant, and explain or answer questions as needed:
   - You are being asked to voluntarily participate in a research study. We are conducting this study to understand how electronic records can be used to help you incorporate oral health preventive services into primary care.
   - The information you provide will help other providers and health care centers understand how they can better use their electronic record systems to promote oral health care for pediatric patients, and integrate the provision of pediatric and dental services.
   - This interview is intended to last about 60 minutes, and will be audio-recorded and later transcribed, and the interviewer will take notes during the interview.
   - This recording and notes will be identified with a number, and your name, role or other identifiable information will not be included.
   - We will make our best effort to protect your privacy, however we cannot guarantee confidentiality. Your information will be protected by not sharing the recording, transcript and/or notes of this interview with anyone outside of the research team at any time. Any information you share during the interview will be kept anonymous.
   - At the end of the research study, results will be reported as an aggregate and your personal information will not be included.
   - You will not receive any direct benefit from participating this study. However, findings from this study may be beneficial to healthcare institutions and providers committed to improving access to oral health services for pediatric patients, and the use of electronic medical records to facilitate the provision of those services.
   - Your honesty will be greatly appreciated. There are no right or wrong answers, and you can choose not to answer any question during the interview. You can discontinue your participation in this study at any time. Should you wish to discontinue your participation, please inform the interviewer.
   - If you have any questions, please contact Ana Zea at azea@bu.edu and/or (617)358-6415.

3. Give the participant a copy of the informational sheet with PI contact information on it.

Section 2 – Participant role

1. Please describe your role at the clinic
   a. How long have you worked in your current role?

Section 3 – Application of the Oral Health Delivery Framework and medical-dental integration

2. Are you familiar with the Oral Health Delivery Framework?

3. Did you participate in the original pilot when the oral health delivery framework was initially implemented at your site?

4. If yes, please describe your role in deciding that your site would participate in the project, the training you received during the pilot, any additional training you have received after the completion of the pilot, and ways in which you have maintained or increased your knowledge about oral health over the years

5. If not, please describe the training about the oral health delivery framework you received when you started working at your clinic

6. Whether you were present for the implementation of the original pilot, or in your current role, please describe:

   a. What resources did the center allocate then, and what resources are currently allocated for the maintenance of the program?
   b. In your opinion, what are benefits for maintaining this program?
   c. What other internal or external stakeholders are involved in deciding to maintain and/or enhance this program? Please describe their involvement
   d. Please describe any barriers you have found for maintaining this program in the Health Center
   e. Please describe any facilitators you have found for maintaining this program in the Health Center
   f. Please describe (and provide samples as applicable) any reports that you include in deciding and/or justifying the allocation of resources for maintaining this program in the Health Center

g. Please describe any health center programs and/or priorities that would justify and/or compete with the allocation of resources for the maintenance of this program

Section 4 – Integration of Medical and Dental Records

7. Please describe your involvement in the decision-making process for incorporating (or not incorporating) integrated electronic medical and dental records

8. Whether you were present for the implementation of the integrated record system, or in your current role, please describe:

   a. What resources does the center allocate for maintenance of their current electronic records system?
   b. In your opinion, what are benefits for maintaining your current record system?
      - For the comparison site, has the site considered implementing integrated records? Please describe why or why not
   c. What other internal or external stakeholders are involved in deciding to maintain and/or enhance your electronic records system? Please describe their involvement
   d. Please describe any barriers you have found for maintaining your current system; At the comparison site, for implementing integrated records.
   e. Please describe any facilitators you have found for maintaining your current system. At the comparison site, for implementing integrated records.
   f. Please describe (and provide samples as applicable) any reports that you include in deciding and/or justifying the allocation of resources for maintaining or enhancing your electronic record systems
   g. Please describe any health center programs and/or priorities that would justify and/or compete with the allocation of resources for the maintenance or enhancement of your electronic record systems

Key Informant Interview Guide – Health Center Information Technology

Site: **Clinic:**_____

Date:_____ **Start Time:**_____ **End Time:**_____

Provider Code:_____ **Role:** _____

Interviews General Description: A minimum of 16 interviews will be conducted at each site. Enrollment of participants will remain open to include any additional key informants that participants identify during the interviews and that may contribute significant information to answer the study questions.

The intent of these interviews is to understand what role the integration of medical and dental records has played in the implementation and maintenance of incorporating the oral health delivery framework into pediatric practices at the sites.

We aim to interview at least 2 representatives of each role within care teams in the pediatric and dental clinics at each site:

- Clinical Providers (Physician, Nurse Practitioner, Dentist, Dental Hygienist), Clinical Support Staff (Medical Assistants, Dental Assistants)
- Non-clinical support staff (Practice Manager, Front Desk Staff)
- Administrator (Department/Clinic Director)
- IT personnel
- Health Center Administrator

This guide is intended to ensure that the interviewer covers the same general content areas in all of the interviews. However, this document is not intended as a script that must be followed verbatim. The interviewer has flexibility to adapt the conversation to include any emergent themes that arise during the conversation, and to probe as needed to elaborate in depth into the proposed and/or emergent themes.

Section 1 – Welcome, Program Description and Informational Sheet

1. Welcome participant and introduce interviewer. Describe the project. Explain: The purpose of this project is to understand from your perspective, how are electronic medical and dental records being utilized, or could potentially be used to promote, enhance or document the integration of dental preventive services into pediatric primary care.
2. Provide informational sheet to participant, and explain or answer questions as needed:

- You are being asked to voluntarily participate in a research study. We are conducting this study to understand how electronic records can be used to help you incorporate oral health preventive services into primary care.
- The information you provide will help other providers and health care centers understand how they can better use their electronic record systems to promote oral health care for pediatric patients, and integrate the provision of pediatric and dental services.
- This interview is intended to last about 60 minutes, and will be audio-recorded and later transcribed, and the interviewer will take notes during the interview.
- This recording and notes will be identified with a number, and your name, role or other identifiable information will not be included.
- We will make our best effort to protect your privacy, however we cannot guarantee confidentiality. Your information will be protected by not sharing the recording, transcript and/or notes of this interview with anyone outside of the research team at any time. Any information you share during the interview will be kept anonymous.
- At the end of the research study, results will be reported as an aggregate and your personal information will not be included.
- You will not receive any direct benefit from participating this study. However, findings from this study may be beneficial to healthcare institutions and providers committed to improving access to oral health services for pediatric patients, and the use of electronic medical records to facilitate the provision of those services.
- Your honesty will be greatly appreciated. There are no right or wrong answers, and you can choose not to answer any question during the interview. You can discontinue your participation in this study at any time. Should you wish to discontinue your participation, please inform the interviewer.
- If you have any questions, please contact Ana Zea at azea@bu.edu and/or (617)358-6415.

3. Give the participant a copy of the informational sheet with PI contact information on it.

Section 2 – Participant role

1. I am interested on learning about your role at the clinic. To start, could you please tell me what is your role? Can you briefly describe what are your responsibilities?

    a. How long have you worked in your current role?

Section 3 – Application of the Oral Health Delivery Framework and medical-dental integration

2. A few years ago -around 2014, the Qualis foundation conducted a pilot on Medical Dental Integration at this site. Were you working in this department during those years? Have you ever seen or are you familiar with the Oral Health Delivery Framework? (show framework graphic).

3. Did you participate in the original pilot when the oral health delivery framework was initially implemented at your site?

4. If you participated in the original pilot, could you please describe your role in designing tools within the electronic record system, billing system, creation of databases and/or any other electronic tools for the implementation of the pilot? Can you please describe the training you received during the pilot, any additional training you have received after the completion of the pilot? Can you please describe ways in which you have maintained or increased your knowledge about oral health over the years?

5. If did not participate in the original pilot, can you please describe any training you may have received about oral health and/or the oral health delivery framework? When did you receive that training? Who provided that training? Are there any manuals you utilize when working on reports or systems related to oral health? Have you been involved in designing or maintaining tools within the electronic record system, billing system, databases and/or any other electronic tools for the application of the dental delivery framework? For oral health? For any other medical-dental integration initiatives in the health center? Can you please describe how long have you been involved, and what has been your involvement?

6. Medical-dental integration is the provision of oral health screenings, fluoride varnish application and/or dental referrals during pediatric visits. Whether you were present for the implementation of the original pilot, or in your current role, please describe:

    a. As far as you know, what resources did the center (and specifically your department) allocate then, and what resources are currently allocated for the maintenance of the electronic tools for tracking or documenting oral health or medical-dental integration? For example, how many employees are dedicated to this? How many hours per employee would you say are dedicated to this? Is there a specific amount of funding that is dedicated to this?

    b. Do you know of other internal or external stakeholders that are involved in deciding to maintain and/or enhance electronic tools for documenting or reporting oral health or medical-dental integration? Could you please describe how they are involved?

    c. Have you found any barriers you for maintaining, modifying or incorporating new electronic tools for this program in the Health Center, for example technical specifications of the electronic records, time constraints, training constraints, financial limitations? Have you found any other barriers that I didn't include on this list?

    d. Please describe any facilitators for maintaining, modifying or incorporating new electronic tools for this program in the Health Center? For example technical specifications of the electronic records, performance or financial incentives, trainings? Are there any other facilitators that I didn't include on this list?

    e. Can you show me or describe any tools you have created or modified for documenting or reporting oral health services or medical dental integration? As we look through the tools, can you please describe the process for their creation, testing and implementation and what other personnel from the center was involved?

    f. Please describe any health center programs and/or priorities that would justify, support and/or compete with your assistance in creating and maintaining electronic tools for this program.

Section 4 – Integration of Medical and Dental Records

7. Please describe if you were involved in the decision making process for incorporating (or not incorporating) integrated electronic medical and dental records at the health center. If you were involved, could you please describe your involvement? If you were not involved, do you know of other personnel that was involved? Were you working at the center when the current record system was implemented?

8. Whether you were present for the implementation of the integrated record system, or in your current role, please describe:

    a. What resources does the center allocate for maintenance of their current electronic records system?

    b. In your opinion, what are benefits for maintaining your current record system?

    c. For the comparison site, has the site considered implementing integrated records? Please describe why or why not

    d. To your knowledge, what other internal or external stakeholders are involved in deciding to maintain and/or enhance your electronic records system? Please describe their involvement

    e. Please describe any barriers you have found for maintaining your current system. At the comparison site, for implementing integrated records.

    f. Please describe any facilitators you have found for maintaining your current system. At the comparison site, for implementing integrated records.

    g. Please describe (and provide samples as applicable) any reports that you include in deciding and/or justifying the allocation of resources for maintaining or enhancing your electronic record systems

    h. Please describe any health center programs and/or priorities that would justify and/or compete with the allocation of resources for the maintenance or enhancement of your electronic record systems

Section 4 – Integration of Medical and Dental Records

9. During our observation of the site's workflow and/or interviews with providers and staff, they described the following changes to the existing tools that would make them easier to use and/or would make them more likely to use the tools routinely. In your opinion, please describe:

    a. What would be the suitability of your current system to incorporate the proposed changes?

    b. Please describe what would be the process for incorporating these changes into the system?

    c. Please describe what resources would need to be allocated to incorporate these changes

    d. Please describe what would be a tentative timeline for the completion of these changes

    e. Please describe what are barriers that you anticipate you would encounter in the implementation of these changes

APPENDIX B – Code Book

Code		Definition
1	**Comments related to Record Integration**	Text that refers to the use, advantages or disadvantages of integrated records
	1a. Level of integration	For example records are integrated but cannot access certain information, or, completely integrated, or, not integrated at all
2	**Comments related to Comprehensive Care**	Text that refers to provision of comprehensive or integrated care
3	**Comments related to Barriers associated with _____**	Text that refers to or describes barriers to xxx (Fill in the blank)
	3a. Time	For example limited appointment time as a barrier for integrated care. Patient long wait times as a barrier. Long time spent on record as a barrier to care
	3b. Language	For example language as a barrier to patient care
	3c. Workflow	
4	**Comments related to Facilitators associated with _____**	Text that refers to or describes facilitators to xxx (Fill in the blank)
	4a. Time	For example time saving due to workflow or records
	4b. Language	For example having interpreters or speaking other languages as facilitators for care
	4c. Workflow	
5	**Comments related to Training**	Assign 5, or one of the sub-codes below
	5a. Identification/Content of training	Text that refers to content from previous trainings related to oral health or oral health integration
	5b. Remembers being included/not included in training	Text that refers to their perceptions of remembering what or who was/was not included in the training
6	**Comments related to EMR**	Assign 6, or one of the sub-codes below
	6a. EMR Structure	Text that refers to or describes the EMR structure, components, templates or changes

	6a1 Capturing Dental Home	
	6a2 Capturing Referral or Dental Appointment Information	
	6b. Easiness of use	Text that refers to easiness or difficulty of use of tools within EMR
	6c. EMR Role-based access; limited access; full access	Text that refers to participant's access to EMR or others access to EMR based on their role
	6d. EMR Technology	Text that refers to Glitches, desired changes to EMR, recent changes to EMR, processing changes to EMR, comparison between EMR vendors
	6e. EMR Update Patient Information/Patient ID	Text that refers to information enterd in the Electronic record in regards to patient identifiers or other updates
	6f. EMR Provider Note	Text that refers to information entered in the Electronic Record as a note
	6g. Scan information into EMR	Text that refers to documents scanned into the electronic record
	6h. Usability and adaptability of EMR Data	Text that refers to information that participants gather from EMR such as scheduling information, Patient ID, Providers Notes, production of reports for productivity or quality. Granularity of the data captured within EMR.
7	**Comments related to Qualis Project**	Assign 7, if refers to qualis project in general, or one of the sub-codes below
	7a. Qualis project adoption/implementation	Text that refers to Qualis project implementation, or inclusion into workflow
	7b. Qualis Framework Components: Ask, Look, Decide, Act, Document	Text that refers to areas of the framework that are incorporated into practice's workflow or applied by participant, or in the participant's opinion applied by others in the clinic
8	**Comments related to criteria/application for dental services**	Assign 8, or one of the sub-codes below
	8a. Criteria/application for fluoride application	Text that refers to fluoride, fluoride application process, fluoride application criteria or fluoride application protocol
	8b. Criteria/application for dental referrals	Text that refers to criteria or protocol for issuing dental referrals. For all other referral themes, see code 9 below
	8b1. Dental Emergencies	Text that refers to referrals for dental emergencies
	8c. Criteria/application for dental screening	Text that refers to dental screenings, dental screening process, protocol or outcomes

9	**Comments related to referrals**	Assign 9, or one of the sub-codes below
	9a. Referral Processing	Text that refers to processing of referrals, communication of dental referrals
	9b. Referral Type: Electronic, Paper, Other, Internal, External	Text that refers to the manner in which referrals are provided, or classifies referrals into categories
	9c. Referral content or information	Text that refers to specific information included in referrals
	9d. Follow up on Referrals	Text that refers to patients, providers or departments following up on referrals
	9e. Referral Department	Text that refers to intervention from referral department
10	**Comments related to Dental Appointments**	Assign 10 for general information on dental appointments, or one of the sub-codes below
	10a. Timing, wait time, scheduling, availability	Text that refers to scheduling of dental appointments, timing of dental appointments, wait time for dental appointments, availability of dental appointments
	10b. Emergency dental care	Text that refers to emergency dental care or dental walk-in
	10c. Patient Volume	Text that refers to patient volume or number of dental appointments
11	**Comments related to Participant's role**	Text that refers to participant's role, or role description such as direct clinical care, administrative, communication with other departments, etc as part of the participant's role
12	**Comments related to Communication**	Assign 12 for communication in general, or one of the sub-codes below
	12 a. Communication within department	Text that refers to communication via the EMR or in other forms within the department
	12 b. Communication with other departments	Text that refers to communication with other departments within the health center
	12 c. Communication with other institutions	Text that refers to communication or information received from external institutions
	12 d. Type of Communication	Text that specifies type of communication: Electronic, paper, text, internet, fax/phone
13	**Comments related to Visit Type**	Text that refers to visit types, for example physical, well child, sick, emergency.

14	**Comments related to Paperwork from patient**	Text that refers to forms or documents received from patients, for example patient intake, patient release
15	**Comments related to paperwork given to patient**	Text that refers to information given to patients, for example forms or patient hand outs
16	**Comments related to information from other departments or institutions**	Text that refers to information received from or sent to other departments or institutions
17	**Comments related to patient knowledge, or patient education**	Text that refers to oral health questions from patients or themes from patients regarding Oral Health or themes for patient education
18	**Comments related to reporting**	Comments related to reporting or producing reports
19	**Does not match any code**	

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Curriculum Vitae

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ACADEMIC TRAINING:

Present	Candidate - DrPH Boston University School of Public Health
1996	DDS Pontificia Universidad Javeriana Bogotá, Colombia

ACADEMIC APPOINTMENTS:

2011- Present	Clinical Assistant Professor Boston University Henry M. Goldman School of Dental Medicine Department of Health Policy & Health Services Research Department of General Dentistry
2007-2011	Teaching Associate Boston University Henry M. Goldman School of Dental Medicine Department of Health Policy & Health Services Research Department of General Dentistry

CLINICAL APPOINTMENTS:

2007-Present	Dentist, Chelsea School Dental Center Boston University Henry M. Goldman School of Dental Medicine Department of Health Policy & Health Services Research
2007-2010	Dentist, Program Coordinator Boston Center for Refugee Health and Human Rights Boston University Henry M. Goldman School of Dental Medicine Department of Health Policy & Health Services Research Boston Medical Center
2007-2011	Dentist, Program Coordinator Smart Smiles school based prevention program Boston University Henry M. Goldman School of Dental Medicine Department of Health Policy & Health Services Research

LICENSES AND CERTIFICATION:

2007 - Present Massachusetts License DF11280

TEACHING EXPERIENCE AND RESPONSIBILITIES:

Boston University Henry M. Goldman School of Dental Medicine

2013 – Present Director, Community Based Education
APEX (Applied Professional Experience)
Externship Program
Academic Elective Externship
Service Learning

2011 – Present Course Co-Director
Comprehensive Preclinical Dentistry Course

2011 – Present Field Supervisor
Comprehensive Preclinical Dentistry Course (Service Learning Component)

2011 – Present Pre-Clinical Instructor
Comprehensive Preclinical Dentistry Course
Operative Course

2011 – Present Mentor
Externship (Public Health Projects)

2011 – Present Ethical Fitness Trainer
Boston University Henry M. Goldman School of Dental Medicine

2009 – 2013 Course Director
APEX (Applied Professional Experience)

2009 – 2011 Course Co-Director
IDP (Introduction to Dental Practice)
Boston University Henry M. Goldman School of Dental Medicine

2008-2010 Field Supervisor, IDP (Service Learning Component)
Boston University Henry M. Goldman School of Dental Medicine

Boston University School of Public Health

2007 Preceptor (Practicum)

DEPARTMENTAL AND UNIVERSITY COMMITTEES:

October 2015 Appointed Member, Dean's Advisory Search Committee for the Position of GSDM Director of Oral and Maxillofacial Radiology
Boston University Henry M. Goldman School of Dental Medicine

June 2015 Appointed Member, Dean's Advisory Search Committee for the Position of GSDM Chair, Department of General Dentistry
Boston University Henry M. Goldman School of Dental Medicine

2013 – Present Appointed Member, Admissions Committee
Boston University Henry M. Goldman School of Dental Medicine

2013 – Present Appointed Member, DMD 1 Promotions Committee
Boston University Henry M. Goldman School of Dental Medicine

2013 – Present Faculty advisor, HSDA (Hispanic Student Dental Association) GSDM Chapter
Boston University, Henry M. Goldman School of Dental Medicine

2011 Appointed Member, Dean's Council of Ethics and Professionalism Ethical Fitness Trainer
Boston University Henry M. Goldman School of Dental Medicine

2011 Appointed Member, Infection Control Policies, Procedures and Practices review Working Group
Boston University Henry M. Goldman School of Dental Medicine

PROFESSIONAL SOCIETIES: MEMBERSHIPS, OFFICES, AND COMMITTEE ASSIGNMENTS:

2018 – Present International College of Dentists
Fellow

2018 - Present Hispanic Dental Association
Member of the Board of Trustees
Community Outreach Committee
Membership Committee
2019 Community Service Award

2009 – Present	American Dental Education Association
2012 – Present	Massachusetts Hispanic Dental Association
2010-2011	Massachusetts Dental Society
2010-2011	American Dental Association

INVITED LECTURES AND PRESENTATIONS:

October 16, 2014	The Science Behind Art: Teaching Critical Thinking Through Art Observation Fleisher, N. McManama, J. Zea, A. Boston University Center for Excellence in teaching
March 18, 2013	"GLOBAL" What's in it for the School, Students and Communities American Dental Education Association (ADEA) Conference
July 17, 2012	"GLOBAL" What's in it for the School, Students and Communities BU-Harvard DPH Journal Club Boston University Henry M. Goldman School of Dental Medicine
January 29, 2012	"Caries and Perio Risk Assessment" Yankee Dental Congress Boston, MA
October 15, 2010	"Oral Health among African Refugees" African Refugee Health: Best Practices -A clinical and public health perspective *Bates College - Lewiston, ME*
June 19, 2009	"Caries Risk Assessment: BU's Four Year Approach" Updates in General Dentistry Boston University Henry M. Goldman School of Dental Medicine

ABSTRACTS AND CONTRIBUTED PAPERS:

March 17, 2014	Fleisher, N. Zea, A. "The Science Behind Art: Teaching Critical Thinking Through Art Observation," American Dental Education Association (ADEA) Conference

May 21, 2013	Fleisher, N. Zea A. McManama, C. Loadholt, M. “Enhancing Clinical Observation through the arts” McCahan Education Day Boston University Medical Campus
May 1-3, 2006	Culler C, Henshaw M, Tabares M, Becker M, Zea A, and Garcia C. “An Oral Health Program for Recently Settled Somali Bantu Refugee Children” (poster) 2006 National Oral Health Conference, Little Rock, AR, May 1-3, 2006.
October 28, 2009	“Oral Health Program offers screening, education and referrals for follow up care, enhancing access to culturally sensitive dental care for Refugees and Asylum Seekers”, Health Care Innovations Exchange – Best Practices Website Agency for Health Care Research and Quality, US Department of Health & Human Services