Medical-Dental Integration: Barriers to Implementing Silver Diamine Fluoride into Primary Care Well-Child Visits

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ABSTRACT

Purpose Dental caries is the most common chronic disease in children and the US Preventive Services Task Force recommends integration of oral health assessments and minimally invasive services into primary care for early oral health prevention. The purpose of the study was to identify barriers to integrating silver diamine fluoride (SDF) into well-child visits with primary care physicians (PCPs) and non-medical professionals and to provide recommendations for future medical-dental integration (MDI) interventions.

Methods This phenomenological qualitative study used a purposive sample of PCPs and non-medical professionals (n=12) and virtual semi-structured interviews for data collection. Inductive followed by deductive analysis approaches were used for thematic analysis.

Results Nine themes across four domains emerged; systems level barriers within healthcare systems, educational barriers, workflow challenges, and provider perceptions. Barrier themes included approval processes within the healthcare system, billing and coding processes, lack of oral health education, training challenges, lack of workflow time, shortage of oral health providers, oral health professionals' views on SDF, as well as perceptions SDF is a novel treatment and outside the medical scope of practice. Further analysis identified 10 recommendations to assist other professionals or health systems in future MDI efforts.

Conclusion This study provides insight into barriers for development and implementation of SDF integration initiatives to aid increased adoption of SDF into primary care, and MDI efforts overall. The barriers identified and recommendations offer opportunities for dental hygienists to engage in collaborative interprofessional care.

Keywords dental caries, minimally invasive dental treatment, silver diamine fluoride, medical dental integration

NDHRA priority area, **Population level: Access to care** (interventions).

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INTRODUCTION

Dental caries is a preventable oral disease estimated to affect 3.5 billion people worldwide, including 60-90% of all schoolchildren.[1–3] In the United States (US) over 50% of school-aged children have experienced dental caries, with estimates of 70% for children from low-income and racial or ethnic minority populations.[4–6] Untreated dental caries can cause pain leading to impaired chewing, sleep disturbances, missed school, poor nutrition and growth, and in its most severe cases, hospitalization and even death.[4,7–9]

The prior standard of care for treating dental caries involves the use of local anesthesia, the removal of decay, and restoring the tooth.[5] However, in young children, cooperation during invasive treatments can be challenging and may lead to the need for sedation or general anesthesia, posing increased health risks and costs.[10–12] Therefore, current guidelines by the American Dental Association recommend prioritizing minimally invasive, nonrestorative treatment options, such as silver diamine fluoride (SDF), a topical agent that prevents and arrests dental caries.[13] Although SDF is approved by the Food and Drug Administration for use as a medical device to treat dentinal hypersensitivity, high quality evidence supports its use for arresting caries.[13,14]

While SDF application permanently stains the carious lesion, potentially impacting parental acceptance and a child's self-esteem,[10] use of SDF is gaining interest due to its safety, efficacy, low-cost, and ease of use.[15–17] In addition, placement of SDF does not require drilling to remove decay, so it can be provided without the need for local anesthetics and can be completed outside the traditional dental setting by dental hygienists and non-dental providers.[10,18,19] Despite the potential benefits of SDF, children facing the highest burden of this disease also face significant challenges in accessing dental care due to a low number of dental providers participating in state Medicaid programs.[6,20] Due to frequent well-child visits and more common participation in public health insurance by primary care providers, the US Preventive Services Task Force recommends integration of oral health assessments and minimally invasive services into primary care as a means to address this disparity.[6,18,21,22] In addition, as of July 2023, SDF application has been included as a billable service for medical providers.[23]

Although SDF seems promising in reducing rates of dental caries in children and medical providers can now bill for it, little is known about the challenges faced in integrating this service into well-child visits. Therefore, the purpose of this qualitative study was to identify the barriers to integrating SDF into well-child visits experienced by primary care physicians and non-medical professionals and to provide recommendations for future medical-dental integration efforts.

METHODS

This study utilized a qualitative descriptive design aimed at revealing in-depth information about a phenomenon,[24,25] in this case barriers to SDF implementation within primary medical care. Phenomenology seeks a detailed description about individuals' lived experiences and has a history of use in nursing and healthcare research.[24,25]

Study Participants/Setting

A nonprobability, purposive sampling method was utilized to identify and recruit PCPs and non-medical professionals involved in SDF integration efforts from among three major health organizations in the state of Maine where routine well-child visits are conducted. The use of purposive sampling within this study ensured recruitment of participants most likely to provide relevant and useful information.[24,26,27] In addition, a snowball sampling method was utilized to aid in recruiting other individuals attempting to implement SDF into primary medical care.

Inclusion criteria for participation included any PCP or non-medical professional involved in the implementation of SDF into primary care for children in Maine, able to read and speak English, and had access to an email account and computer with audio capabilities. While recommended sample sizes for

phenomenological research vary,[24,26,28] the minimum acceptable sample size for adequate saturation of themes in this study was 12 participants.

Participants were recruited through an email invitation sent to PCPs employed at 3 health organizations in Maine (MaineHealth, MaineGeneral Health, Northern Light Health) and to local oral health advocacy groups, as well as through snowball sampling. The invitation email was disseminated by the Children's Oral Health Network of Maine, a local entity that unites individuals and local organizations in the shared vision of ensuring all children in Maine grow up free from preventable dental disease.[29] The recruitment period was between May and June 2024.

Qualitative data was collected through one-on-one interviews over a web-conferencing platform (Zoom; San Jose, CA, USA). In addition, an online survey software program (Qualtrics; Provo, UT, USA) was utilized to collect demographic (4 items) and work history data (6 items). Interviews are recognized as an effective method for eliciting views and opinions from participants, and are useful in gathering historical data, such as barriers experienced during an implementation process.[24] Furthermore, the use of web-based conferencing has been shown to be a cost-effective method for conducting interviews, facilitating long-distance communication, and allowing interviews to be recorded for transcription.[30]

The primary researcher served as the facilitator conducting the interviews following an interview guide developed for this study. The facilitator, a registered dental hygienist, had no prior relationship with the study participants, although participants were privy to the facilitator's credentials. The interview used one central open-ended question to explore participants' experiences of barriers faced in implementation of SDF into primary medical care. A secondary open-ended question was used to gather participants' advice for other PCPs or health organizations on medical-dental integration (MDI) efforts. The facilitator prompted participants for additional details as necessary and took field notes of any pertinent information. Participation in the survey and interviews lasted approximately 30 to 60 minutes.

Data analysis consisted of thematic analysis of participants' reported barriers, and occurred concurrently with data collection until saturation of the themes was established. Saturation was achieved when no new themes were revealed from additional interviews.[24,31] Analysis began with verbatim transcriptions of interview recordings assisted by auto-generated captions in Zoom. The transcriptions were checked by the researcher multiple times for accuracy. Following transcription, inductive analysis of the data consisted of multiple reviews of the transcriptions to highlight patterns and significant quotes, categorizing the patterns into codes, and using those codes to identify themes, continuing this process until a comprehensive set of themes were identified. Deductive analysis was then employed to review the identified themes, assessing for data saturation, and further coding the data to identify overarching themes.

This study was approved by the Massachusetts College of Pharmacy and Health Sciences' Institutional Review Board under protocol #IRB-2023-2024-99. To maintain autonomy, participants were required to read and agree to an informed consent form prior to participation. This study posed minimal risks to participation and there were no penalties for withdrawal. To maintain confidentiality, interviews were conducted in private with the researcher through a closed access Zoom meeting, and interview recordings were stored on a secure password protected account until data analysis was complete and recordings were deleted. To enhance validity and reliability, a pre-developed interview guide was used, and all study materials and processes were piloted. In addition, there was member checking of interview transcripts, triangulation of perceptions, and inter-coding agreement by two researchers coding independently.

RESULTS

A total of 12 individuals completed the survey and participated in the interviews, satisfying the minimum acceptable sample size for adequate saturation of themes. All participants were White and the majority were female (75%, n=9), employed in a medical

position (58.3%, n=7), and had prior MDI experience (83.3%, n=10). In addition to PCPs (n=6), participants roles included director of operations at local health centers (n=3), executive director of a public health organization (n=1), medical program coordinator (n=1), and public health program management specialist (n=1). One participant also served as a medical consultant, and another had a background in dental hygiene. Sample demographics are shown in Table I.

Table I. Participant demographics (n=12)

Demographic	n (range)	%
Average age, years	**51 (SD 31-64)**	**—**
Gender		
Male	3	25.0
Female	9	75.0
Ethnicity		
Non-Hispanic or Latino	12	100
Race		
White	12	100.0
Area of practice		
Pediatrics (MD)	5	41.7
Family medicine (MD)	1	8.3
Other medical professional	1	8.3
Other non-medical professional	5	41.7
Average years in current position	**13.75 (SD 2-32)**	**—**
Prior experience with Medical-dental integration		
Yes	10	83.3
No	2	16.7
Organizational affiliation		
MaineGeneral Health	1	8.3
MaineHealth	5	41.7
Northern Light Health	4	33.3
Other	2	16.7
Role within organization		
Employee	8	66.7
Collaborative (External Consultant)	4	33.3

Thematic analysis revealed nine overarching themes related to barriers across the following four domains: systems level barriers within healthcare systems, educational barriers, workflow challenges, and provider perceptions (Table II). The nine barrier themes included *approval processes* within the healthcare system, *billing and coding processes, lack of oral health education, training challenges, lack of workflow time, shortage of oral health providers, oral health professionals' views on SDF,* as well as perceptions that SDF is a *novel treatment* and worries that medical providers view it as *outside the medical scope of practice*. Thematic analysis also identified ten key recommendations to aid other professionals or health systems in MDI efforts (Table III). The following sections provide greater details on the themes and recommendations with supporting quotes.

Barriers

Systems Level Barriers

Approval processes within the healthcare systems required to add a new service, such as SDF, were reported by most participants (83.3%, n=10) citing barriers with a lack of awareness on the number of committees within the system and which committee approvals were required from: *"I didn't realize that there would be so many layers of approval within our hospital system"* (Pediatrician). Participants commented on the need for approval from senior leadership roles, as well as the timeframe for approval processes: *"Some of these early-stage implementations ... have definitely been lengthy"* (Director of Operations). Half of the participants (50%, n=6) mentioned the consent processes, discussing the timeframe for consent form approval within the healthcare system and the need for translation into several languages at an appropriate grade level. In addition, most (83.3%, n=10) remarked on barriers with electronic health/medical record (EHR/EMR) software, suggesting a

Table II. Emergent themes of barriers to SDF integration

Domain	Representative Quotes
Systems Level Barriers within Healthcare Systems	
Billing and Coding Processes (100%)	"I think it's really imperative that the billing team … has the right codes and … makes it easy for the provider team to … enter those" (Pediatrician).
Financial Benefits & Reimbursement (91.7%)	"There's no RVUs (relative value units) associated with it (SDF) … because it's really a disincentive to do if there's no reimbursement for our time to do it" (Pediatrician). "Trying to make sure that … we're able to sustain this program and to not only see benefits for our patients but also for the practice as well, so we can continue giving these services" (Director of Operations).
Confusion (66.7%)	"The coding and reimbursement and just getting that clearer…we keep getting snags and I think we gotta have it easy, is it coming to medical, is it coming to dental, which way do we do it?" (Pediatrician). "I'm a little … little nervous about that, … the coders will review my procedure note and then that'll go to medical billing, and then I'm worried that medical billing is gonna bounce it back to say, 'this isn't a dental code, we can't … bill for this'" (Pediatrician).
Approval Processes (83.3%)	"Compliance is like a huge thing, you have to do it, but then it's done" (Family Practice Physician). "We had to go through … a whole procedure with like, getting it approved by different committees" (Pediatrician).
Electronic Health Record (83.3%)	"We do not have an integrated EMR, which makes it extremely difficult, and I feel like that's probably one of the biggest barriers that we have" (Director of Operations). "Medical electronic records aren't really set up for dental, and I guess they, they really don't integrate or share information well" (Medical Program Coordinator).
Approval Time (66.7%)	"Really the barrier was just time, realizing that there will be multiple approval processes that people will have to go through" (Pediatrician). "I anticipate that it probably won't be a long process in the future, but … some of these early-stage implementations … have definitely been lengthy" (Director Operations).
Consent Processes (50%)	"We had to go through an approval process regarding the consent" (Pediatrician). "Also … translating consent documents and … information documents to all the appropriate languages at the appropriate grade level" (Pediatrician).
Educational Barriers	
Lack of Oral Health Education (91.7%)	"My pediatric colleagues feel like they've never been trained to do this, this might be too intensive or invasive for a primary care provider" (Pediatrician). "We can only teach the things we know and the whole point is we don't know enough, … we don't learn about it in medical school" (Family Practice Physician).

Table II. Emergent themes of barriers to SDF integration (continued)

Lack of Comfort (58.3%)	"The idea that it makes the teeth black and that's forever is, feels very heavy, you know?" (Family Practice Physician). "There's so many unknowns for people, they just don't want to make any mistakes, so they'd rather wait" (Pediatrician). "For me personally, the training and comfortability piece has, has been, was a barrier" (Pediatrician).
Need for Training (83.3%)	"SDF is much more technique sensitive than fluoride varnish so that is why the training is so important" (Medical Program Coordinator). "Other barriers have included … training, getting everyone trained on how to use it" (Pediatrician).
Training Time (41.7%)	"The hardest part is the time, right, is, is in these settings, it's hard to find time that's not patient encounter time, that's not taking away from the providers personal time, and trying to be mindful of that" (Director of Operations). "Trying to have … several dentists that are willing to train with the application of SDF" (Director of Operations).
Workflow Challenges	
Lack of Workflow Time (66.7%)	"So many physicians say they just don't have the time to do one more thing" (Pediatrician). "There's so many things that get added to the expectation of, of a provider in providing preventative health care, and so people sort of default to seeing a new … opportunity like this as like 'oh, this is cutting into the already limited time we have'" (Pediatrician).
Shortage of Oral Health Providers (58.3%)	"There aren't enough dentists, the dentists we have are flat out and they just don't have the time to do the things that they would like to do" (Family Practice Physician). "We can't even get 60 kids into (dental) homes right now" (Executive Director).
Provider Perceptions	
Treatment is New (66.7%)	"It's, it's newer … so even though other countries have used it, but it's just new for the U.S. and U.S. physicians" (Pediatrician). "This entire concept, right, of anything dental in the medical setting is very … unestablished" (Pediatrician).
Oral Health Professionals Views on SDF (58.3%)	"There seems to be a sentiment around those who know what SDF is that this is a bad thing to do because of tooth staining" (Pediatrician). "They just kind of felt like would they, would the medical providers know what they were doing, it's a bit of a tricky application…which, in my understanding, I don't think it is super tricky" (Director of Operations).
Outside Medical Scope of Practice (50%)	"I think a lot of people in the organization, at kind of all levels, was sort of like, 'well, this isn't our thing…we just don't do dental, we don't know that, we don't do dental, that's serviced somewhere else'" (Director of Operations). "I think, is their worry about … 'God, you get those black teeth, this is new, the dentist should be doing it'" (Pediatrician).

Table III. Recommendations to aid other professionals and health systems in MDI efforts

Collaborate with other oral health and medical professional individuals and organizations
"If we could really have our dental hygienists come in and teach us how to teach…that would be huge because that would raise the level of what we do" (Family Practice Physician).
"It's always been a very confusing … siloing and I'm so pleased that in Maine we figured out a way to kind of bring our professional organizations together, and that kind of how all these, all of these collaborations are, um, birthed out of that sort of professional collaboration that we have with the Maine Dental Association and the AAP" (Pediatrician).
Establish guidelines and develop implementation toolkits
"It seems like we're kind of … doing things out of order because there isn't like a formal process" (Program Management Specialist).
"It would be really helpful if there was like, an implementation guide" (Pediatrician).
Highlight community needs and value of service/s
"If you could somehow tie the integration, the value of the integration into helping … improve a major problem in our state, which is access to dentistry … and give it meaning so that people don't see it as yet another thing I need to do, if they see it more like, here's something I can do to … help prevent … one of the number one causes of morbidity in children, which is dental caries" (Pediatrician).
"It's important to remember…we're making a difference and we're trying to implement these programs to help community members for access to dental care and to all have the same ability to dental access in some capacity, even if it is SDF alone" (Director of Operations).
Vary piloting and implementation methods based on practice workflow
"It might be beneficial to kind of try different methods for piloting to see how it fits with their office" (Pediatrician).
"I'm trying to think about some different ways to slice this that might improve the education, cause like, if you do a bunch of mouths one after the other, you get very comfortable, but if you do one well child check every other week, that doesn't lend itself to that same level of competency and confidence" (Family Practice Physician).
Increase oral health knowledge and skills
"I think the big thing is becoming educated on it…and then have someone come in and do the training" (Pediatrician).
"I find a lot of times if you train students on a concept that makes sense, even though the system isn't ready for it yet, you can move the needle" (Pediatrician).
Reassure oral health professionals of limited medical integration scope
"Like what can we do now, so that you still can and will see an oral health provider … but we don't want things to get worse while you're waiting" (Pediatrician).
"It might be that there's primary care providers who can do some minimally invasive stuff and then there's dental hygienists who can do more invasive things, but they can't do what a dentist can do, and you become, sort of, that specialist, the way like a primary care provider often refers to a specialist for some kind of chronic disease that they're not able to handle" (Pediatrician).
Employ champions across departments to advocate for integration
"The biggest one is you gotta have a connectivity, someone in the system who is gonna run with this" (Pediatrician).
"Make sure that you have champions at multiple levels" (Pediatrician).

Table III. Recommendations to aid other professionals and health systems in MDI efforts (continued)

Gain leadership approval and develop an integration workforce
"Obviously, get that approval from your leadership and executive leadership team, because without the support of them … that stops the workforce pretty quickly" (Director of Operations).
"If the higher-ups have approved it then you should be good to go once you get everything else in place" (Medical Program Coordinator).
Start small and tackle one challenge at a time
"You start small, you identify barriers, you identify disadvantages and what's not working well, and then you move quickly to change that, and continue to monitor that on a small scope, and then slowly increase that program as it gets more well-defined and more fluent" (Director of Operations).
"Just have a few people do it at first and then kind of expand it to a larger group" (Family Practice Physician).
Compare to other successful integration efforts into primary care
"We've been able to really integrate behavioral health into primary care over time, so why can't we integrate oral health?" (Pediatrician).
"It's probably a decade now that we started doing oral, … just fluoride varnish on kids teeth, and … initially it was kind of a big lift, but now this is part of what we do and nobody blinks an eye, like it's part of the workflow, it doesn't take a lot of extra time" (Pediatrician).

lack of oral health integration capabilities, as well as the timeframe for addition of new services to the software recording, documenting, and billing and coding processes: *"Our electronic health record is not built out to accommodate ... documentation of SDF and subsequent ... billing"* (Community Health Director).

Billing and Coding Process barriers were reported by all, particularly regarding concerns over reimbursement and financial benefits of SDF: *"We're a nonprofit, but it has to be revenue neutral"* (Family Practice Physician). These concerns are further complicated by confusion on which billing codes, medical or dental, to submit to payers in Maine, along with inconsistencies across and within EHR software. One participant reported that even within healthcare systems where practices use the same EHR: *"They're not using the same codes and they're not billing the same amount"* (Medical Program Coordinator).

Educational Barriers

A *lack of oral health education* was reported by most participants (91.7%, n=11), particularly in relation to oral health education during residency programs. Although participants claimed there has been an increase in oral health education among these programs, PCPs reported minimal or no training during their residency education: *"In medical school in general, there's very limited amount of education on dental, which is sort of fascinating"* (Family Practice Physician). Due to the lack of oral health knowledge, participants also expressed a lack of comfort in providing oral health services: *"I don't feel comfortable myself identifying what are ... baby teeth and which are adult teeth in some kids"* (Family Practice Physician). This barrier was also reported in the use of SDF through a lack of comfort in identifying cavities: *"Early-detection of what caries is was not my strong suit"* (Pediatrician).

In the effort of increasing oral health education and comfort with providing SDF, most participants (83.3%, n=10) cited *training challenges* in relation to time and to the perceived need that training be provided by oral health professionals. One participant expressed: *"In fact, that could be a barrier, if they're [dentists] taking more and more time out of their schedules to come and teach primary care docs this process"* (Pediatrician). Time concerns were expressed both in terms of time needed from oral health providers to perform the training, and primary care providers to participate in the training.

Workflow Challenges

Among time barriers, participants also expressed concerns over adding SDF to physicians' *workflow time* during well-child visits (66.7%, n=8). Participants remarked on the numerous services and assessments already required of PCPs during well-child visits and felt the addition of another service would disrupt practice workflow: *"We could not figure out how to do it [SDF] in our practice because of how we run, … there just wasn't enough time"* (Pediatrician).

In addition to concerns over oral health providers' availability to provide training, a *shortage of oral health providers* was cited (58.3%, n=7) as an ongoing barrier to referral of patients requiring dental care beyond SDF capabilities: *"Getting them (patients) connected to a dental home or even just a dentist to be seen is a huge challenge"* (Community Health Director).

Provider Perceptions

A barrier identified by some participants (66.7%, n=8), in association with several other themes, was the perception that SDF is a *novel treatment* within the medical field*: "Every possible part has been a challenge because it's all new"* (Pediatrician)*.* This sentiment was expressed not only in terms of the integration of SDF into medical workflows, a part of medical-dental integration (MDI), but also in terms of approval requirements, billing codes, financial reimbursement from both public and private insurance, and overall worthiness of providing this service.

With this perception, half of the participants (50%, n=6) also expressed concerns that physicians view SDF, and oral health in general, as *outside the medical scope of practice: "I do think there might be some who would say 'nope, not my job, not my area, not my thing'"* (Director of Operations)*.* A few participants attributed this concern to the lack of oral health education and integration in medical educational programs, further driven by a "clear lineation" (Family Practice Physician) or "siloing of services and roles" (Community Health Director) between medical and dental delivery and insurance structures in the US.

In addition to the division between medical and dental care, some participants (58.3%, n=7) also highlighted perceptions of *oral health professionals' views on SDF* as a barrier to integration: *"Not all dentists are necessarily as familiar or champions of SDF application"* (Director of Operations). However, most participants did not report a lack of support from oral health professionals, which was attributed to oral health provider shortage areas, where the need for increased oral health care is evident: *"The dentists in the area are super well aware that we could be extenders for them, and that there aren't enough"* (Family Practice Physician).

Recommendations

To overcome some of the barriers identified, the following recommendations were shared for other professionals and health systems attempting MDI efforts, such as the SDF application. First and foremost was the recommendation for *collaboration with other professionals and local organizations,* both medical and dental, for initiation of MDI programs, training, ongoing support, and collaboration. Where participants highlighted the novelty of SDF in the medical setting, *development of formal guidelines and implementation toolkits* were suggestions for facilitating integration processes. In gaining buy-in from colleagues, leadership and other key personnel, participants recommended *highlighting the need for these services within the community* and outlining the benefits that would be derived from its implementation. Among integration initiatives and development of guidelines and toolkits, participants recommended *varying SDF integration methods* to fit one's specific practice workflow. One example was the initial designation of an oral health day where providers apply SDF to patients with a previously identified need, until processes become more efficient, and physicians are more comfortable providing the procedure during well-child visits. Another example was to hire one dental hygienist to go between the various clinic settings.

To increase comfort in providing SDF, participants recommended *increasing one's oral health knowledge* through different instruction methods (e.g., hands-on training or online videos), as well as an increase of oral health content, including SDF, within educational

and residency programs. Although a lack of support from oral health professionals was not prominent in this study, several participants suggested *reassuring dentists that integration efforts would remain limited* to minimally invasive preventative services. In advocating for integration, participants recommended *identifying champions* across multiple roles and departments. However, they highlighted the foremost need for *approval from leadership roles*, as well as establishment of and collaboration with an integration team or workforce. Half of the participants also recommended *starting small* with integration efforts and tackling one challenge or question at a time. Within that recommendation was also the notion of being patient during all integration processes. In addition, they also suggested *comparing MDI efforts to other integration efforts,* such as behavioral health, and prior oral health integration efforts, such as fluoride varnish application. Representative quotes are shown in Table III.

DISCUSSION

This qualitative analysis provides early insight into barriers faced among some of the first SDF integration attempts into primary care practice and builds on a very limited body of evidence exploring the use of SDF within the medical field. The barriers and recommendations identified within this study may aid other professionals, health systems, and community stakeholders in exploring, initiating, and implementing SDF integration for the betterment of their patients' oral and overall health. Through widespread MDI efforts, a reduction in the rate of dental caries could lead to decreasing healthcare costs and reducing the burden on emergency healthcare systems.[32,33]

In developing SDF integration initiatives, although systems level barriers within healthcare systems were most frequently identified by these participants, they are one-time barriers. Once leadership approval and committee approvals are obtained, consent processes are finalized, and all documenting, billing, and coding processes are incorporated in the EHR, they will no longer pose challenges. One exception was the concern over the financial aspects of integration, such as insurance reimbursement from public and private payers and confusion over insurance coding procedures in Maine. However, participants noted these same concerns were present when first integrating fluoride varnish, supporting the literature regarding the lack of data exploring the economics involved in MDI.[33] Without these details, concerns existed over the financial feasibility of providing SDF among varied health systems. However, participants believed that the practice guidelines would contribute to more widespread adoption of SDF integration by PCPs.

Educational barriers were also identified in regard to PCPs implementation of SDF application. Although studies exploring SDF and MDI are not available for direct comparison, these findings align with fluoride varnish integration studies demonstrating a lack of oral health knowledge among PCPs and the need for more oral health education.[7,8,34–36] These barriers in fluoride varnish integration have also identified the need for interprofessional collaboration for successful MDI initiatives.[20,33,36–38]

In addition, a relationship between educational barriers and workflow challenges was highlighted by some participants, suggesting the workflow issues might be improved with additional oral health education. Participants reported similarities to the initial integration of fluoride varnish, which is now considered to be minimally disruptive to the PCPs workflow.[8,39] However, the other reported workflow challenge was the shortage of oral health providers, particularly those participating in state Medicaid programs, necessary for patient referral and treatment collaboration. Given the ability of dental hygienists in many states to provide direct patient care, including application of SDF in medical settings, a possible solution to these challenges is for dental hygienists to co-locate in primary care offices to assist in educating the staff and patients, provide the SDF applications, and coordinate the referrals for patients needing restorative care.[40]

Despite some participants feeling that SDF applications was outside of their scope of practice, studies exploring MDI adoption by PCPs have been shown to have positive oral health outcomes,

increased access to care, and better dental experiences for children.[33] In addition, literature shows referral from a PCP increased dental visits and children who established a dental home.[4,9,33]

Recommendations from participants included the need for collaboration between medical and dental professionals and organizations, and it was suggested dental hygienists could be helpful in educating medical providers. In addition, it was suggested an implementation guide or kit was needed as a resource, which is also something dental hygienists as prevention specialists could provide for medical settings.

Participants emphasized the importance of MDI efforts, such as SDF integration, to reduce the community oral disease burden by intervening earlier in the disease process and potentially limiting progression until children could find a dental home. Given the broad range of developmental issues pediatric PCPs need to manage during well-child visits, the focus needs to be placed on minimally invasive preventive oral health services with referral for more complex needs. However, an ongoing challenge is the need for dental offices who will accept patients with state Medicaid coverage.[6]

Another recommendation from participants was to have advocates or "champions" for integration and adoption of SDF application in well-child visits. Dental hygienists are well suited to serve in this role to advance MDI in primary care. This could begin at educational institutions in entry-level programs for dental and medical providers to enhance the interprofessional education experience and prepare graduates for collaboration once they are practitioners in the community.

Future studies should aim to explore more established SDF integration initiatives for post-implementation barriers as most participants were still in the early stages of integration. Investigation into the financial feasibility of SDF integration into primary care would be valuable in supporting its adoption as a common practice within pediatric primary care.

The study had several limitations. Researcher bias, where the views of the researcher could influence identification of major themes, [24] may have been possible. Non-response error may also have been present, occurring when potential participants are not contacted and do not have the chance to respond.[41] In addition, recall bias may have been present in the form of participants not remembering or mis-remembering experiences and details related to the topic under study.[41]

A strength in this study included collaboration with a local advocacy group to aid in recruitment of individuals engaged in SDF integrative efforts. As SDF integration is a novel concept among primary care well-child visits, it would otherwise have been challenging to gather enough participants for an adequate sample. Collaboration with the Children's Oral Health Network of Maine allowed for sampling of PCPs, a population who may have been difficult to recruit considering their time constraints. Another strength in this study was adherence to Standards for Reporting Qualitative Research (SRQR) guidelines to ensure high-quality reporting of identified themes.[42]

CONCLUSION

Findings from this study identified multiple barriers to integrating SDF into primary care well-child visits along with recommendations to improve MDI efforts. The primary barriers related to system level, educational barriers, workflow issues, and provider perceptions. A common thread of the participants' recommendations were ways to improve collaboration between medical and dental professionals to ultimately benefit at risk children through early intervention. Dental hygienists have opportunities to engage in collaborative interprofessional care with pediatric medical providers to support integration of SDF in medical settings.

IMPLICATIONS FOR DENTAL HYGIENE PRACTICE

- Medical providers report feeling inadequately prepared to address oral health when integrating minimally invasive dental services such as SDF and invite collaboration from dental professionals such as dental hygienists.
- Dental hygienists are in a unique position to champion minimally invasive dental services in primary care. This may involve educating medical students and practicing professionals on the value of oral health along with caries prevention and management, facilitating protocol development for SDF, and providing ongoing support.
- Medical-dental integration (MDI) in primary care also offers opportunities for dental hygienists to engage in collaborative interprofessional care, such as co-location in primary care practices to coordinate patient oral care, provide minimally invasive treatment, and make referrals for more complex dental needs.

DISCLOSURES

The authors have no conflicts of interest to disclose.

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