

Medical-dental integration models:

A critical review of the last decade



Key takeaways

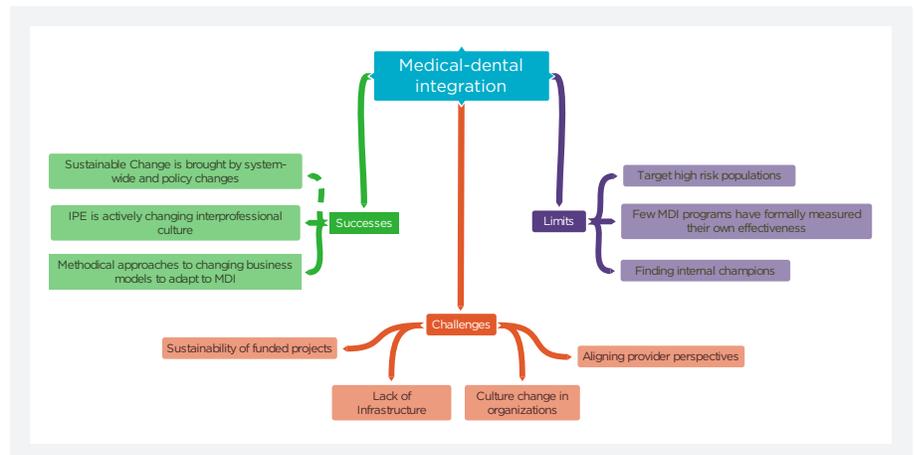
- Coordinated and streamlined communication of the entire care team involved in the medical-dental integration (MDI) model is critical for positive patient outcomes and provider engagement.
- Current MDI models reduce barriers and increase positive health outcomes in vulnerable populations, such as the elderly, children, pregnant women, and those in need of chronic disease management.
- Feasibility and simulation models suggest that in MDI models, the net revenue remains positive when patient volume and payer distributions are maintained.

Recommendations

- As the most common barrier, electronic health record (EHR) integration and interoperability is the central component of successful MDI.
- Two essential components in the success and sustainability of MDI models are identifying an internal oral health champion and aligning expectations of all providers and staff involved.

Executive summary

There is a well-demonstrated relationship between systemic and oral health. This relationship can be seen through chronic diseases such as cardiovascular disease, diabetes, and dementia, which have bi-directional associations between systemic and oral health. Because of this, the integration of medical and dental care is crucial for overall patient health.



In the medical-dental integration (MDI) model, coordinated and streamlined communication between the oral and systemic environments is critical to ensuring a patient's entire care team is aligned. By sharing information, and working collaboratively in a systematic and sustained manner, dental and medical professionals in integrated practices can identify disease precursors and underlying conditions in keeping with a patient-centered model of care. As a result, there is both improved interprofessional communication and overall health care outcomes.

The applicability of MDIs in public health efforts is valuable and outcome-driven — these models focus on developing and

- Successful sustainability of MDI models includes interprofessional training and practice, including training medical professionals on oral health care, maximizing the contribution of dental professionals, and cultural humility. Training future health care providers to be a member of the health team is necessary to improve health outcomes for all populations.

Models of medical-dental integration

- The *Co-Location of Service* model coordinates health care provided in a shared space, though not fully integrated.
- The *Integrated Care* model involves the collaboration and integration of health providers to improve services to patients.
- Successful clinics using integrated services commonly use warm hand-offs in making referral appointments. Using emerging trends to coordinate care, such as telehealth and teledentistry, can help with the treatment of complex patients and in closing the referral loop.

implementing strategies for providing care to individuals most at risk for falling through care gaps and who experience worse health outcomes, such as the elderly, children, pregnant women, and those in need of chronic disease management.

MDI closes care gaps in these vulnerable populations by decreasing the number of facilities, appointments, and providers a patient must interact with. These models also increase access to oral health education, screening, and prevention of dental disease, and reduce early childhood caries. MDI-focused clinics have built the capacity to diagnose and refer for chronic disease management. Furthermore, the expansion of Medicaid allowed MDI programs to focus on underinsured populations to receive the quality of care they need.

MDIs use various models, approaches, and methodologies to integrate care. Sustainable and successful integrations are brought about by system-wide and policy changes.

The central component to success and the main barrier to MDI is Electronic Health Record (EHR) integration. An interoperable EHR is necessary to access medical records, make referrals, and collect data to ultimately measure an MDI program's success. Common strategies for overcoming a lack of EHR interoperability include using workarounds within the current EHR, starting with a target patient population, and using data analysts and referral coordinators.

Referrals and care coordination are critical to the success of MDI. Also, clinics need care coordination plans for patients requiring extensive dental treatment. An essential part of EHR integration is closing the referral loop. Currently, MDIs have developed approaches to send referrals between EHRs, but it is challenging to see if those referrals are completed. To help this, the use of referral coordinators that track and close the referral loop has proven successful.

Another common challenge to the success of MDI is aligning expectations between providers and administrators. **Ultimately, most clinics found success through finding an oral health champion and using them to relay oral health information to the medical team to increase receptiveness.**

Because resistance to change is expected, organizational culture shifts are another barrier to MDI. This resistance comes from competing priorities, overwhelming staff, and difficulty establishing training programs. To alleviate this, clinics have used *Smiles for Life: A National Oral Health Curriculum* to provide the foundational training to staff. Clinics have then developed training programs that incorporate how MDI will fit into their environment while considering their resources and infrastructure. Additionally, having dental staff work full-time in medical clinics has made teamwork in health care more effective.

As part of the culture shift associated with MDI, interprofessional education (IPE) and interprofessional practice (IPP) have been vital in developing the groundwork for interprofessional culture.

Although a slowly progressing program, IPE, and IPP have gained momentum since 2010. This has been done through the creation of the Nation Interprofessional Initiative on Oral Health, reports published by the Institute of Medicine, and an initiative aimed at integrating oral health and primary care practice through the Health Resources and Services Administration (HRSA). Several health care campuses are establishing and using IPE programs, including didactic, simulated experiences, and clinical programs. These programs train future health care providers to be members of the health team and are necessary for improving the health outcomes for all populations.

Several MDIs use small and phased integrations as initiating steps that can build a foundation for more extensive programs. One of the most used MDI models is the co-location model, in which dental services are physically co-located with medical services. This model improves access to oral health care and dental referrals and increases oral health education and preventive procedures such as varnish application. Co-location of these services makes a more accessible foundation for MDI to build infrastructure around and creates “open door policies” for referrals within the clinic.

Additionally, co-location makes EHR integration between medical and dental services substantially easier and eliminates one of the most significant barriers to MDI. For non-co-located clinics, this has been accomplished through creating diverse referral relationships with dentists, allowing patients to find dental clinics based on their needs. Teledentistry strategies have also been utilized for patients with transportation barriers to help them get the care they need.

Financial viability is a critical success component of MDI. Cost savings are seen in the co-

management of diseases such as type 2 diabetes, where periodontal intervention was associated with lower health care costs. Additionally, MDI focuses on a value-based care model to align health care systems, the person, and the provider to achieve better health outcomes at lower costs.

Value-based payment models are currently being experimented with and encourage providers to care for a population with incentives for demonstrating value through disease prevention and keeping patients healthy. These payment models reduce costs for patients, providers, and payers as they work to promote and improve overall health, including dental health. Moreover, other MDI models have used financial incentives and integrated EHRs for dentists to encourage patients to stay up to date on vaccinations and medical screenings.

A key component of economic viability is also seen through accountable care organizations (ACOs) using MDI models. In these systems, a significant cost reduction is associated with diverting patients from emergency departments for dental emergencies to nearby dentists or on-site clinics. This increases patient traffic through dental clinics while preventing associated emergency department costs.

In general, the MDI model is widely supported, and coordinated communication of the entire team is necessary for positive patient outcomes. MDI models have been implemented throughout the U.S. with varying degrees of success. Each clinic faces its unique barriers and finds varying ways to overcome them. There is no single formula for the success of the MDI model. Adapting to specific situations in each clinic and finding creative ways to maximize the success of MDI is crucial to continuing the evolution of integrated care.

Introduction

The relationship between systemic health and oral health is well demonstrated. Systemic diseases such as cardiovascular disease, diabetes, and dementia have been associated with poor oral health outcomes, and there are bi-directional associations between systemic and oral health.¹ Apart from bi-directional associations with chronic diseases, dental diseases have a number of broader implications. Poor oral health affects eating habits and nutritional intake — potentially influencing growth and early childhood development, and may even affect the psychological status and school readiness.² In older adults, tooth loss is associated with cognitive decline, socialization, mental health, and quality of life.³

Integration of dental and medical care is widely supported as a concept — proper communication, collaboration, and care coordination between medical and dental providers are crucial for improving overall patient health. Medical-Dental Integration (MDI) models of care are being implemented in the United States with varying degrees of success.⁴ Benefits of the MDI model include improved interprofessional communications and improved health care outcomes.

Improved communication and emphasis on prevention and screening enhance patient health outcomes. Improving access to care and screenings is an essential component of prevention. MDIs have been shown to close care gaps for some of the most vulnerable populations in our country by bringing multiple silos of care together in one place.^{5,6} The MDI model minimizes accessibility barriers by decreasing the number of facilities, appointments, and providers a patient must interact with to receive comprehensive oral and systemic care. Children, the elderly, and people whose incomes are below the federal poverty threshold have benefited from MDI implementation.

The evidence for MDIs has not been extensively reviewed, and recommendations for sustained growth and success are few.

Purpose and significance

The purpose of this paper is to critically evaluate the integrated models used for care delivery for systemic-oral health implemented in the last ten years.

- To develop a deeper understanding of the approaches of MDI models.
- Understand the challenges and barriers MDI models face and the solutions implemented.
- Sustainability of MDI models and future of integration pathways.

Methodology

We performed a literature search in the PubMed database using a combination of relevant public health and interprofessional subject headings (Mesh) and keywords: (“Delivery of Health Care, Integrated”[MeSH]) AND “Oral Health”[MeSH]), (“Delivery of Health Care, Integrated”[MeSH] AND (Dental Health Services)[MeSH]), (medical-dental integration), (safety net clinics AND dental AND primary care). Additional search strategies were used in Google Scholar for pertinent grey literature:(medical-dental integration). This search was limited to studies in English done in the United States published between 2010 and 2021. We found 350 publications, of which 155 titles were considered relevant. The authors have used a systems-mapping technique and qualitative approach to tease out the themes and focus areas that describe sustainable changes in MDI and barriers to achieving this integration.

Key findings and discussions

Medical-Dental Integration models and the populations served

Models that serve high-risk populations

Health care integration presents an opportunity for vulnerable populations to be served and care gaps to be closed. This area of MDI implementation showcases this system’s applicability in public health efforts. The review demonstrated that most MDIs targeted high-risk populations — elderly cohorts, children, pregnant women, people who need chronic disease management such as diabetes, cardiovascular disease, and the under-insured. MDI is using multiple levels of prevention to serve these populations. Primary prevention was used with MDI programs targeting school-aged children. Secondary and tertiary prevention are used with MDI programs targeting the geriatric and underinsured populations. By using this approach, high-risk populations benefit from MDI aspects that will propel these models into future health programs.

MDI also helps increase oral health education, screening, and prevention among pediatric patients, thereby reducing the silent epidemic of early childhood caries (ECC).^{7,8} Several studies implemented medical and dental collaboration in the care of children. Burgette et al. in 2018 evaluated all the Early Head start programs in North Carolina. They showed that children enrolled in the integrated program were more likely to receive oral health assessments and fluoride compared to children not enrolled in the program.⁹ In 2014, Quissell et al. investigated another Head start program in the Navajo Nation and found that early childhood caries were reduced, and the cost of implementation of this intervention was cost-effective and sustainable.¹⁰ Oral health assessments and dental diagnosis at well-child visits have shown increased utilization of preventive dental visits by children of all ages, and at all kinds of health care locations, including hospitals, federally qualified health care centers (FQHC), and private medical offices.¹¹ Dooley et al. showed the ease, cost-effectiveness, and applicability of incorporating fluoride varnish into primary care visits for children in Safety Net clinics.¹²

Another high-risk population that benefitted from MDI programs was elderly adults. These individuals often have multiple medical conditions that directly and indirectly impact the oral environment. One long-term study showed the relevance and importance of medical screenings performed for elderly adults at routine dental visits. The program found a willingness among minority seniors to be screened for

diabetes and hypertension by dental professionals and a high percentage were diagnosed and referred for chronic disease management.¹³ A study demonstrated the benefits of staff training in oral health care and hygiene and involvement in oral health care in long-term care facilities for patients living with dementia.¹⁴ Finally, the underinsured population (those receiving Medicaid coverage, uninsured individuals, etc.) have received care within several MDI models. With the expansion of Medicaid came the opportunity for MDI programs to blossom in this patient population — providing oral health care at primary care facilities and safety nets. This expansion in states like Michigan and Colorado have allowed for more adults to utilize oral health care.¹⁵

These implementation schemes have strengths in providing care to individuals most at risk for falling through care gaps in the current health care system. However, this specificity of targeting high-risk populations is also a limitation of these MDI programs. These populations have very specific needs with respect to the connection between their oral and medical health. More generalized integration programs should be able to integrate care throughout entire populations.

Co-location MDI models

Co-location is the most commonly used MDI model that coordinates care provided by dental and medical providers in a shared physical space,^{16,17} which can include sharing equipment, staff, and interoperability of EHRs. Co-location models have a common administrative system where patients can be referred to a dentist either by the primary care provider and providers from other departments such as emergency room services or can locate a dental provider within the medical clinic. It is important to clarify the difference between co-located care and integrated care.

Co-located care is simply sharing the physical space, staff, and equipment, whereas integrated care involves the collaboration of different health care professionals to improve the services provided to the patients. For instance, integrated care can involve the administration of fluoride varnish by a primary care provider. On the other hand, an example of co-located care is dental services in a medical clinic.⁶ Co-located integration of medical and dental services provides improves access to oral health care and dental referrals and increases oral health education and preventive procedures like varnish application.¹⁸ A few examples of co-location integrated models and their successes are as follows:

- Giles Health Network G-SMILE Program in Pearisburg, Virginia, is a rural oral health initiative promoting medical and dental integration using a co-location model.¹⁹ The Giles clinic provides behavioral, primary, and oral health care services. This helped in easy referrals and complete health care in the exact location, reducing transportation barriers such as distance and cost. It also encouraged dental visits for children when they come for well-child visits promoting oral health at the early stages of life.
- Another project that used the co-location model is the UCLA-First 5 LA Oral Health Program in Los Angeles, California.²⁰ This project involved twenty-two clinics including twenty FQHCs consisting of medical-dental co-location. In addition to co-location, this program was a means to integrate medical and dental providers, thus increasing the access and quality of oral health care among children. This was achieved through supported infrastructure enhancements, technical assistance, clinical training, quality improvement, health education for parents and caregivers, and related policy analyses. At the end of two years, the diagnostic and treatment capacity for young children doubled, and the capacity of the preventive service tripled,

which were attributed to the improvement in the infrastructure and training provided to the medical and dental providers and other childcare support staff.

- Marshfield Clinic (MC) uses medical care team and medical home models.²¹ MC partnered with Family Health Center (FHC) of Marshfield to create ten dental clinics by expanding the infrastructure in its areas of service. Each FHC's dental co-location had five dentists and five dental hygienists. The medical and dental EHRs of patients were integrated (iEHR) to manage the oral and systemic diseases. From 2002 through 2014, the FHCs have provided oral health care to about 113,000 patients, especially those from low-income communities. Around 90% of these patients required medical care as well. Furthermore, one of the unique features of the FHCs is the prepaid sliding-fee program which allows for minimal or no out-of-pocket service costs. This has further doubled the oral health care service utilization among the low-income population.
- Salud Family Health Center (SFHC) is a FQHC and patient-centered medical home (PCMH) providing health services to Northern Colorado.²² There are about ten co-located medical and dental service sites and a mobile unit. The care team consists of a dental hygienist and other medical staff. The dental hygienist does the overall oral health screening. There is a unique "open door" policy throughout SFHC. The medical provider can go across the hall and ask the dental provider to perform an oral health evaluation during primary care, and the dental provider can request the medical provider for a medical consultation.
- Similarly, Yakima Valley Farm Workers Clinic (YVFWC) is a FQHC and patient-centered medical home (PCMH).²² YVFWC consists of about 19 health care service locations, out of which 10 of them have medical and dental services co-located. Additionally, three mobile units comprise one medical unit, one dental unit, and 1 with both medical and dental units. Oral health screenings are performed by clinic assistants or primary care providers in the health care service locations. At the same time, dental assistants perform oral health screenings in mobile units. Referrals are done through integrated EHRs and coordinated by dental outreach coordinator, who communicates with the clinic and patients to set up same-day appointments.
- Colorado Medical-Dental integration (CO MDI) project involves the co-location of registered dental hygienists in medical settings in 18 locations in Colorado.²³ Of those, twelve health care organizations in Colorado completed wave I, which lasted from 2015 to 2019, providing over 67,000 integrated hygiene visits. The objectives of this project were to expand access to dental services, improve oral health outcomes, and build financially sustainable CO MDI models. This project can reduce disparities, especially among the lower-income populations, and increase oral health care access and utilization. For instance, at Worthmore clinic, dental visits among patients increased from 55-80% at the baseline to 75-90% at the end of the project, with a decrease in untreated decay among the population. This project shows the importance of co-location in the early detection of systemic diseases by the following example: a dental hygienist who found a small round mass on the patient's tonsil referred the patient to the medical personnel for coordinated care in the same organization. Within a few hours, the care coordinator referred the patient to an Ear, Nose, and Throat specialist, and the mass was removed. One of the main challenges of this project was the limited restorative services. The program now in wave II is maximizing its success by lessons learned from wave I.

MDIs based on financial models and viability

Thoughtfulness about the financial viability of models and cost-saving when developing and implementing the MDIs are critical to their success. Various models have used several approaches.

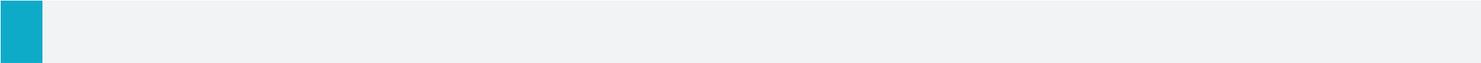
Feasibility and simulation models suggest that net revenue changes remain positive when the integrated care maintains the patient volume and the payer distribution. These were true for both publicly and privately insured patients.²⁴ The potential of utilization of preventive services goes up due to integration of care, which can generate revenue and improve the oral health of the patient population seeking care. In addition, cost savings have been seen in co-management dental and medical diseases. For individuals diagnosed with type 2 diabetes, the periodontal intervention was associated with lower total health care costs, lower total medical costs excluding pharmacy costs, and lower type 2 diabetes-related health care costs.²⁵ Other studies have demonstrated similar lowering of medical expenses and hospitalizations in patients with type 2 diabetes, coronary artery disease, cerebral vascular disease, and in pregnant women who received periodontal therapy.²⁶

The National Network of Oral Health Access surveyed health centers on different models of medical and dental integration. The survey showed that when dental providers were embedded in the primary care, they conducted and billed for mainly preventive dental care, including, fluoride varnish, oral health screenings and exams, dental sealants, prophylaxis, Silver Diamine Fluoride applications, and these procedures provided financially self-sustaining.²⁷

Value-based care models, which can be central to MDI implementation, are designed to align health care systems, the person, and the provider to achieve better health outcomes at lower costs. Successful designs are prevention-focused, minimally invasive, person-centered, and risk-based to ensure an equitable distribution of resources.²⁸ VBP models for oral health have

been explored by several organizations, including ACOs, FQHCs, large payers, and others.²⁸ VBP encourages providers to care for a population with incentives for demonstrating value by preventing dental disease and keeping patients healthy. One method of implementing VBP is moving away from fee for service and using bundled payments intended to push providers to offer improved coordination and efficiency of care as providers then carry a significant proportion of the cost risk associated with more extensive care.^{29,30} By bundling payments, incentives can be aligned across insurers, doctors, and patients.³¹ One example would be a bundled payment in school-based preventive care — silver diamine fluoride treatment of all caries, pits, and fissures; fluoride varnish; oral hygiene instruction; and provision of a toothbrush and fluoride toothpaste done by a nurse/dental hygienist during a regular preventive visit. It is estimated that twice-yearly, school-based, simple prevention would be a fraction of the yearly Medicaid oral health expenditures.³² FQHCs are suitable to implement a VBP model that rewards interprofessional practice while tracking health outcomes and lowering costs — these can be achieved by co-location of the dental hygienist in the training of medical health care workers to do billable dental preventive procedures.

Another approach that provides financial viability and improved patients' overall health is financial incentives to dentists. Permanente Dental Associates (PDA) is a professional corporation run by shareholder dentists providing evidence-based care.³³ Integrated EHRs allow for expansion of overall health care of patients and integration of the care provided for the dentists. The patient Support Tool (PST) within the EHR is a report that notifies the dental providers and patients of their pending screenings and vaccination. Due to integrated EHRs, dental providers encourage patients to be up-to-date on their vaccinations and complete medical screenings. With the help of PST, patients can get the pending services done on the same day at any nearby Kaiser Permanente facility,



and high data tracking helps close the referral loop and assist in quality improvement. PDA rewards the dentist in the form of financial incentives for their holistic approach and contribution towards overall health.

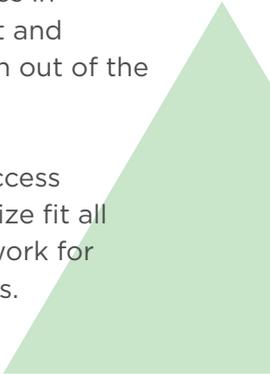
ACOs are an innovation model in health care, but only 3% have dental services in their care coordination strategy. The main motivations for ACOs to offer dental caries are based on the fact that they embrace a “whole health approach” and believe they can’t do that without dental care. Others include dental coverage because the primary payer (usually the state’s Medicaid program) includes it as a covered health benefit. Overall, promising results were seen with MDI integration with ACOs reporting more advanced care coordination techniques. Some ACOs have realized that dentists are critical patient touch-points because of how much they interact with patients comparatively and use dentists to close patient-care gaps.

Dental integration into ACO presents a particular opportunity to reduce costs associated with emergency department (ED) use for preventable dental conditions. ACO environments have shown that incentivizing the providers for preventive procedures can lead to a reduction in ED visits.³⁴ The Minnesota Hennepin Model is an excellent example of an ACO aimed at reducing hospital admissions for dental emergencies by creating an ED diversion program that connects patients to local dentists. The program was able to

divert patients experiencing dental pain from the emergency department to a nearby dental clinic; medication management with a pharmacist reduced medication costs by more than 50%.³⁵ They redirected patients to appropriate avenues for dental care, including their on-site dental clinic and co-location services. The model also includes coordination because all components (medical, social services and dental) assumed financial risk together through capitated payments to the organization. Although the program demonstrated cost-saving, the challenges included enrolling and retaining eligible patients, modifying statutes to enable data-sharing across care systems, and finding funding made sustainability difficult.

Another ACO, Partners for Kids Pediatric, implemented their MDI model “one-stop shop” based on capitated payment. They used a disease management approach that has extensively reduced the reoccurrence of dental caries in children under five years after treatment and showed cost savings by keeping children out of the operating room.³⁶

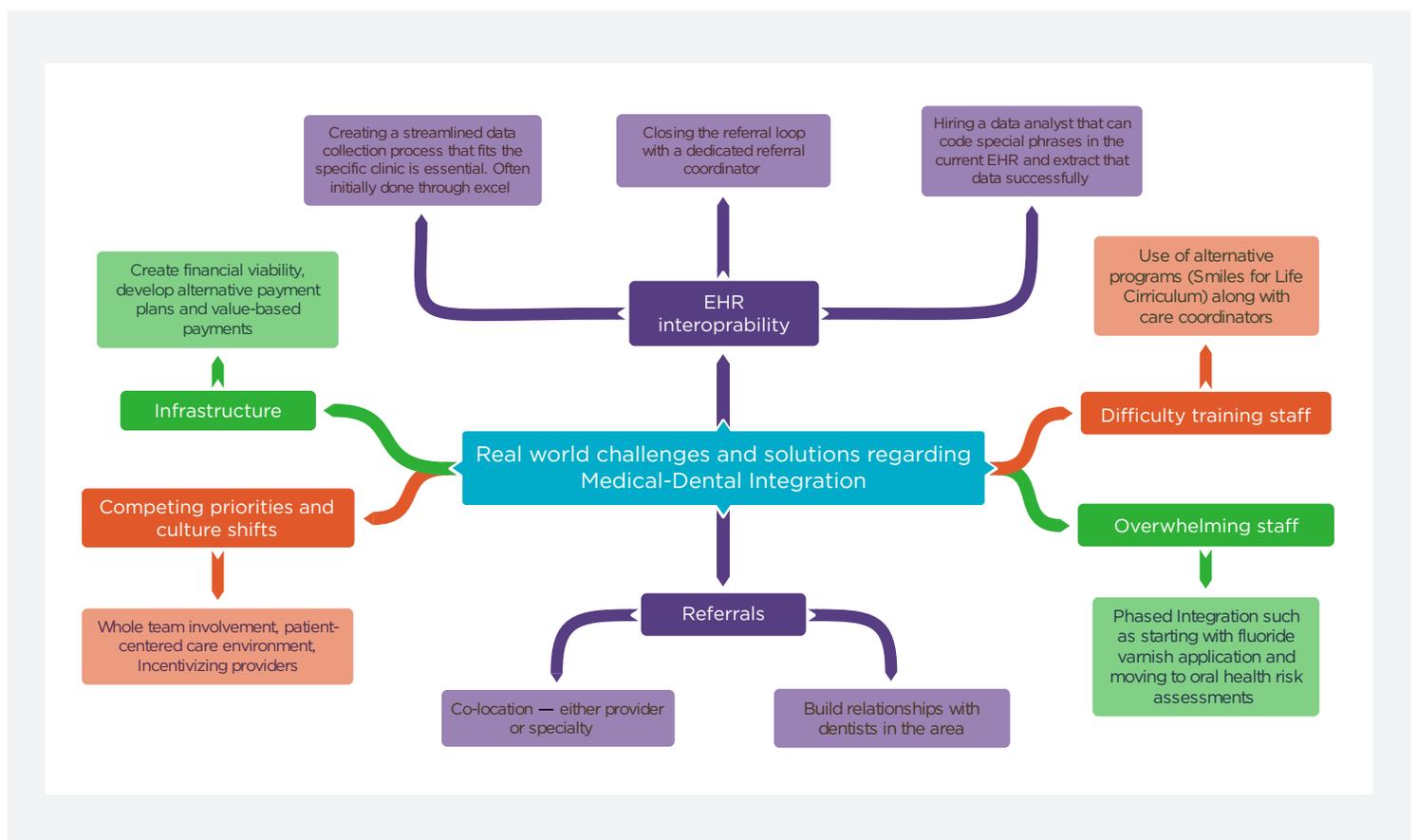
Financial viability remains key to the success and suitability of MDIs; there is no one size fit all solution, but a plethora of approaches work for different models, clinics, and populations.



Lessons from real-world clinical MDI models: challenges and solutions

Aligning expectations between providers and administrator

Strong leadership support is required to embed dental providers within a medical practice. Although funding remains the most crucial component of MDIs, finding an internal oral health champion and aligning expectations are two essential components of sustainability and success. Oral health champions do not have to be primary care providers, they can be support staff members such as medical assistants or front office staff. The oral health champions can help communicate the message about oral health to other medical team members, increasing receptiveness. In addition, establishing a relationship with the leadership team is essential in receiving buy-in for the project.



Electronic Health Record integration and interoperability

EHR integration and interoperability is the central component of successful MDI and the most common barrier. An interoperable EHR is essential for accessing patient medical/dental records, making referrals, collecting data, and ultimately developing a measure of success. Common strategies for overcoming the lack of EHR interoperability include using workarounds within the current EHR, starting with a targeted patient population, and using data analysts and referral coordinators. The lack of infrastructure and

participation for electronic dental records (EDR) sharing stems from the general lack of integration of EDRs within EHRs. EDR and EHR use and design have developed independently of one another. Although large entities such as U.S. Armed Forces, the Indian Health Service, and the Veterans Health Administration exist, large hospitals and FQHC. However, due to the siloed nature of dental offices, integration is rare in the private sector.³¹

Switching EHR programs requires extensive time and financial resources, so most clinics create workarounds within their current EHR. Most commonly, the use of Smart Phrases within the program for dental services completed by primary care providers worked well for initial EHR workarounds:

An example of developing innovative workarounds would be Multnomah County Health Department, East County. This is one of seven primary health care clinics managed by the Multnomah County Health department. By necessity, they used an EHR system hosted through a national service provider which limited each site's ability to modify the user interface to match their needs. The department did not have much infrastructure to bear the cost of a new or altered EHR, so they used smart phrases instead. Smart Phrases are text phrases typed that insert a block of text into patient discharge notes. They used three Smart Phrases³⁷ — one for oral health assessment, one for an oral exam, and one for the after-visit summary that includes educational information and referral contacts. The advantage is that each phrase can be tracked, quantifying the number of assessments, exams, and referrals given to patients within a period. The disadvantage is the lack of a qualitative assessment, meaning it does not capture the actual use of these phrases to improve the oral health of the patients.

The Community Health Center of Cape Cod used smart phrases to add oral health with diabetes educational information into the after-visit summary prints. They found that Smart Phrases

had unique IDs within the EHR that allowed for data tracking.³⁷ Because of the complication of integrating EHR, many community health centers pursuing MDI begin with pilot integration or projects targeting high dental disease risk populations. Common populations include children, diabetic patients, and pregnant women. The Community Health Center of Cape Cod began MDI efforts by targeting adult diabetic patients and used Smart Phrases in their EHR to track patient records and data, create referrals, send them through the EHR, add oral health and diabetes education material, and report data on these activities. Additionally, a common starting point for many community health centers in working on pediatric patients was a fluoride varnish application and tracking it via EHR.³⁷ Starting with small populations and limited services helps modify the EHR without overwhelming the staff.

While integrating EHR, closing the referral loop is one of the most complex components.³⁷ This means that it is easier to send out referral information between EHRs, but receiving information back on whether these referrals were completed is challenging. To alleviate this, using a referral coordinator is critical. This position was a common variable among successful MDI implementations because it minimized the confusion of working between dental and medical practices. At the Coulee Medical Center in WA, using an excel spreadsheet along with a referral coordinator was critical in tracking referrals between EHR systems. Using a spreadsheet worked around EHR difficulties while collecting data to measure the efficacy of the MDI model in this health center.

These strategies helped build the infrastructure necessary for health centers to refer patients and collect data on the efficacy of MDI. This allows clinics to review areas for success and improvement periodically.

Manage the culture shift of organizations

When implementing MDI, resistance to change is common among staff members in clinics. Some of the common factors to this resistance is competing priorities, overwhelming staff, and difficulty establishing training programs.

Because the success of MDI is dependent on cohesive teamwork, varying opinions on MDI within a clinic can make implementation difficult. Some essential components to alleviating this tension are allowing ample training time, promoting participation and questions, and being open to experimentation.³⁸ This allows the team to work through learning about other disciplines at their own pace. Additionally, it will enable team members to advocate for improvements to help MDI fit into their clinic better. Including the team in the implementation process minimizes competing priorities between members.

MDI can initially overwhelm staff members and providers — both primary care and dental providers. Additional efforts and training may be required for medical providers to blend with the culture shift when working alongside dental providers, such as hygienists and dental assistants, in using their skills to the fullest. One approach to assist with the cultural shift is to rotate dental hygienist students in the primary care clinic alongside medical providers. Timely evaluation and improvisation such as regular training and feedback will also help medical providers develop a closer working relationship with the dental providers in the medical setting and improve the sustainability of MDIs. Also, in case of co-location with integration, staff training is required to prepare them for patient counseling and administering preventive oral health care, and these services may take additional time.

A common strategy to avoiding this among different clinics is to do phased integration of care. At the Dimock Community Health Center, this strategy was implemented by initially only offering fluoride varnish to children. Later, the clinic expanded to risk assessment and oral health education.³⁷ Additionally, the clinic used Plan-Do-Study-Act cycles. This will allow the staff to master one phase of MDI, reflect on their performance, and advance in their integration efforts.

Additionally, it is crucial to have a dental provider willing to work in the medical clinic. Provision of oral health care in the medical setting differs from working in the dental clinic because there are team dynamics, different team members, and workflows. Also, some of the services provided can be limited depending on the model type, equipment availability and appointment timing. This can lead to low work satisfaction for the dental providers and low sustainability for the MDIs. To mitigate this issue, the interview process for the dental providers is used to gauge their interest and willingness to work in the medical clinic. Also, additional training and mentorship are helpful for dental providers entering medical practice. Furthermore, the type of employment such as part-time or full-time has an impact on the collaboration between the medical and dental providers. Part-time dental hygienists are often forgotten by medical team members than full-time dental hygienists as they were considered a member of their team. One of the successful programs, the Colorado Medical-Dental integration (COMDI) model marks the integration of a hygienist into the medical practice as a critical factor for success. The COMDI model showed that practice-level support including supportive practice leaders, especially around scheduling and billing as well as delegation across a care team were vital components of retention of the dental hygienist in the medical practice.^{20,36}

MDI training programs can start by including two core components: basic knowledge of oral health for staff and primary care providers and how the specific clinics are planning on implementing MDI. This can pose a challenge, especially if staff doesn't know how to create a training program. A solution to kickstart training for multiple clinics across the country has been using "*Smiles for Life: a National Oral Health Curriculum.*"^{21,22,39} This online program provides the knowledge base required to understand oral health and disease for children, and adults, acute dental problems, the relationship between oral and systemic health, and at-risk populations. This is the most commonly used program by several MDI models, states, and FQHCs to train the primary care providers.^{40,41,42} Oral health training for state Medicaid programs shows that 63% of the states use *Smiles for Life* and 28% use the Protecting All Children's Teeth (PACT) curriculum content, and 9% of states use their own web content. Apart from the oral health knowledge, the curriculum includes procedural skills, such as fluoride varnish application, patient management, anticipatory guidance, and best practices for oral hygiene and billing. There is no follow-up training once the initial training is complete. Although research has shown that reoccurring reinforcement has significant effects on practice behavior, skills, motivation, and support for physicians who have been through the initial sessions.^{43,44}

In addition to this, the clinic needs to create a training program that exemplifies how its clinic will incorporate MDI. This requires that the clinic define how the primary care team will promote and protect oral health, fit oral health care into their direct workflow, and provide a practical model for close collaboration between medicine and dentistry.³⁷ By planning a thorough training program, chances for the success of MDI implementation increase.

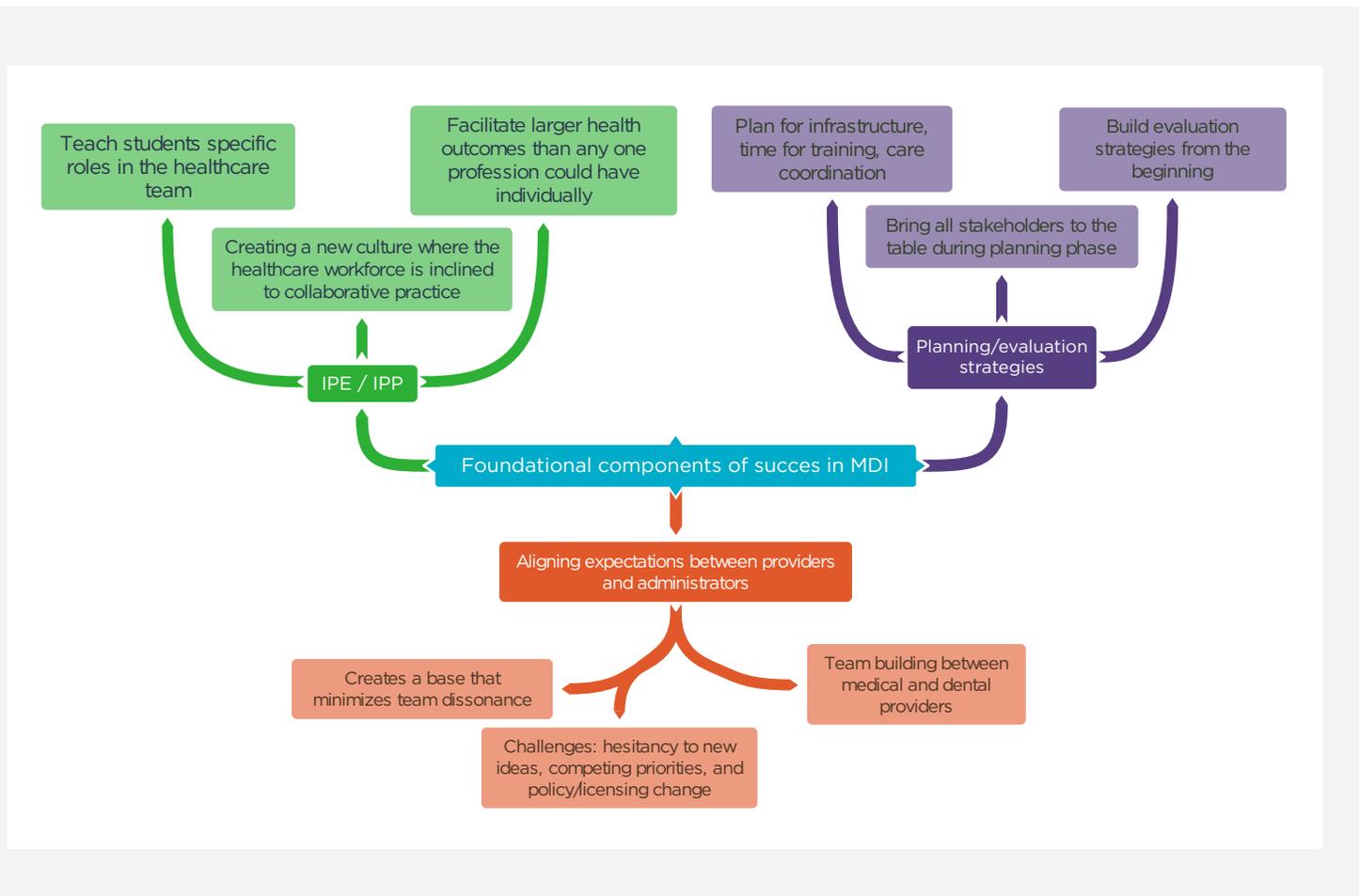
Referrals and care coordination

Programs that utilize an embedded dental provider, mainly hygienists, may have a limited scope of service due to the location of the clinic, equipment availability, and appointment timing. As a result, it is essential that these types of integration programs have a care coordination system in place for patients that may require extensive treatment. Here, teledentistry use is a variable approach that can make sure that the patient is getting the care that needs. Closing the referral loop is an important care coordination element that will ultimately lead to getting the appropriate dental care. Warm hand-offs are a common practice within MDIs to get the patient an appointment with the dental clinic.

Some practices include using a diverse mix of referral partners such as safety nets, free dental clinics, FQHCs, and dental groups that focus on underserved communities. These help patients figure out the best place to go for them based on location, language needs, barriers, etc. Others have used voucher systems — the patient uses a voucher with a private referral partner to get their dental care. The private practice then bills primary care practice for their services. This serves two purposes: ease the patient's billing process and close the referrals' loop. Another approach is a contractual relationship between primary care and dental offices. A memorandum of understanding outlines expectations of what the medical clinic provides and what the dental clinic needs to provide in return. Outlining this form of agreement in referral relationships streamlines the referral relationship and makes the goals of the relationship clear and concise.³⁷

Integration pathways for sustainable success: Interprofessional education and Interprofessional practice.

Since the separation of medicine and dentistry can be traced back to the education of health care professionals, it makes sense that part of medical-dental integration should be implemented at this stage. Although the movement towards interprofessional education and practice has been slow, it has gained momentum since 2010. The creation of the National Interprofessional Initiative on Oral Health was the catalyst that prompted medical specialties to focus on oral health curricula and practice development.⁴⁵ Then, in 2011, the Institute of Medicine issued two reports that emphasized the need to train medical professionals in oral health care, maximize the contribution of current and emerging dental professions, and increase both groups' diversity and cultural competence.^{46,47} Soon after that, the Health Resources and Services Administration (HRSA) launched an initiative aimed at the Integration of Oral Health and Primary Care Practice.⁴⁸ Specifically, the HRSA initiative sought to increase the clinical competence of primary care providers in safety-net clinics concerning oral health. In addition to governmental efforts, professional associations such as the American Dental Education Association and the Association of American Medical Colleges and private foundations have all devoted substantial time and effort to advancing understanding of and frameworks for medical-dental integration.⁴⁹⁻⁵²



Train the future generation of health care providers in interprofessional

Several professional schools across the country have introduced interprofessional education programs with varying degrees of success. One example of the interprofessional education program is New York University, which combines the School of Nursing with the School of Dentistry at various points throughout the educational experience, focusing on practical applications.⁵³ A familiar educational melding brings dental hygiene students into primary care education and settings.⁵⁴ It is essential to bring health care providers into the dental schools to give them hands-on experience with dental workflows, and equipment and to understand their scope of practice related to oral health.⁵⁵

Interprofessional education must be transformed into practice throughout these curricula, didactic integration is not enough.⁵⁶ In addition, the health care evaluations should include oral health components. For example, Boston University's Physician Assistant Program uses standardized patients, objective structured clinical exams case reviews, and clinical exposures for oral health

assessments. The American Board of Pediatrics included oral health questions in its examinations, and other national health organizations and

societies are making verbal health sections and continuing education that provides for oral health.⁵⁷⁻⁶⁰

Within health care campuses, interprofessional education experiences can be positive and beneficial in small group exercises.⁶¹ There are many moving parts in the coordination of interprofessional education modules, which often limit the availability, duration, or quality of these experiences.⁶² The importance of high-quality interprofessional education on the survivability and capacity of MDI programs should be evident. However, the execution of such educational programs has a history of limitations and barriers that compromises the future success of patient-centered care. Health care professionals interested in bolstering and growing medical-dental integration programs need adequate foundations to equip their interventions with the tools for success. Thus, the hurdles that hinder quality interprofessional education must be tackled to promote sustainable MDI programs. ■

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