

3-1. Cardiovascular Disease and Oral Health

Cardiovascular disease and oral health are interrelated, primarily through links between periodontal disease and atherosclerosis. Periodontal disease and heart disease share common risk factors, including cigarette smoking and diabetes. Although there is no conclusive evidence of a causal relationship, periodontal disease and cardiovascular disease share key physiologic features, including bacterial profiles and levels of inflammatory mediators.⁸ Early research has demonstrated the potential for cost savings by targeting oral health improvement in patients with heart disease.

The major modifiable risk factors for heart disease include high blood pressure, high cholesterol, cigarette smoking, diabetes, unhealthy diet, physical inactivity, and overweight and obesity.⁹ This chapter focuses primarily on integrated programs that target high blood pressure (hypertension) and high cholesterol (hypercholesterolemia). Other risk factors for heart disease—namely, tobacco use, diabetes, diet and physical activity, and overweight and obesity—are covered as separate program targets within this report.

The integrated activities that we identified related to cardiovascular and oral health are aimed at diagnosis and management of hypertension or hypercholesterolemia.

Guidelines for the detection of high blood pressure in adults

It should be noted that data collection for this environmental scan was conducted prior to the November 2017 release of updated clinical practice guidelines for high blood pressure (BP) (**Table 2**). Previous guidelines identified hypertension as a systolic BP ≥ 140 mm Hg or a diastolic BP ≥ 90 mm Hg.

Table 2. 2017 Guidelines for Classification of Blood Pressure^{10,a}

Category	Blood pressure
Normal	<120/80 mm Hg
Elevated	120-129/<80 mm Hg
Stage 1 hypertension	130-139/80-89 mm Hg
Stage 2 hypertension	≥ 140 systolic or ≥ 90 mm Hg diastolic

a Based on accurate measurements and an average of at least two readings on two or more occasions.

Environmental Scan of Publications

Eleven programs that targeted hypertension in clinical settings, including one that also targeted hypercholesterolemia, were identified by an internet search of peer-reviewed literature, reports, conference proceedings, and other publicly available information. Brief program descriptions are listed in **Table 3**.

Program Settings and Scope

Co-location of primary care and oral health services

Eight of the 11 programs identified by this scan involve co-location of medical and dental services in clinical settings—typically, community health centers. Two other programs were led by academic institutions (Columbia University College of Dental Medicine’s ElderSmile program and the University of Medicine and Dentistry of New Jersey). Although the ElderSmile program was instituted by Columbia University with public and private partners, it is a community-based program that provides prevention, transportation, and treatment services in 27 “prevention centers” located in senior centers and other gathering sites in northern Manhattan.¹¹

The **ElderSmile program** focuses on reducing health disparities by targeting minority adults age 50 and older.¹² Initiated in 2006 by the Columbia University College of Dental Medicine, the program initially focused on oral health education and dental screenings. In 2010, the program began also providing screenings for hypertension and diabetes with prompt referrals to nearby treatment centers for patients with positive screenings. Preliminary program findings found a high rate of positive hypertension screenings among those previously undiagnosed.¹²

Table 3. Integrated Programs That Target Cardiovascular and Oral Health

Program	State	Brief description
Blackstone Valley Community Health Care	RI	Co-location of medical and dental care: screenings for diabetes and cardiovascular disease for all adults in dental settings
ElderSmile	NY	Screenings for dental problems, diabetes, and hypertension; referrals as indicated
Gary and Mary West Senior Dental Center	CA	Senior Dental Center is located within the Senior Wellness Center; provides comprehensive medical and social services for low-income elderly
Kaiser Permanente Cedar Hills Dental & Medical Office	OR	Co-location of medical and dental care: dentists can arrange for primary care services to be provided during dental appointments, including blood pressure checks
Neighborcare Health	WA	Co-location of medical and dental care: blood pressure screenings on all patients; medical referrals as needed
Ohio Association of Community Health Centers	OH	Co-location of medical and dental care: blood pressure screenings on intake for dental patients at 81 health centers
Permanente Dental Associates, Inc	OR, WA	Co-location of medical and dental care: blood pressure taken during dental visits, medical referrals as needed
Salud Family Health Centers	CO	Co-location of medical and dental care: blood pressure screenings on all patients; medical referrals as needed ^a
University of Medicine and Dentistry of New Jersey pilot study	NJ	Pilot study using oral health care providers to identify patients with increased risk for heart disease by screening for several risk factors, including hypercholesterolemia
Wayne Memorial Community Health Centers	PA	Co-location of medical and dental care: blood pressure screenings on all patients; medical referrals as needed
Yakima Valley Farm Workers Clinic	WA	Co-location of medical and dental care: blood pressure screenings on all patients; medical referrals as needed ^b
^a Key informant interview, September 8, 2017. ^b Key informant interview, September 6, 2017.		

Targeting hypertension in dental settings

The most common clinical component among the identified programs was blood pressure screenings performed by dental providers (n=10). Most programs that provided blood pressure screenings also implemented formal protocols for referrals of high-risk patients to primary care. One notable exception among programs that we identified was the **Ohio Association of Community Health Centers**.¹³ A key informant interview with that association revealed that the organization is focusing current efforts on incorporating blood pressure screenings into the routine dental workflow; future efforts will focus on “closing the referral loop” (key informant interview, August 29, 2017). The intent behind this staging of activities was to avoid overburdening primary care services with referrals from dental providers.

Evaluation of programs targeting heart disease and oral health

Four programs provided information about outcomes evaluations:

- The **ElderSmile** program (New York City, NY) has published post-implementation information about program outcomes,¹⁴ with an AHRQ evidence rating of “suggestive”—indicating nonexperimental support for an association between this program and targeted health care outcomes.
- The **Neighborcare Integrated Oral Health Program** (Seattle, WA) is reported to take blood pressure measurements on all patients; those with elevated readings are referred to the medical clinic.¹⁵ Reportedly, Neighborcare collects information about selected quality metrics (e.g., percent of pregnant women receiving dental care prior to delivery), although we did not identify specific information related to blood pressure screenings.
- An initiative by **Ohio Association of Community Health Centers** reported numbers of dental sites, operatories, patients screened, and patients identified with elevated readings (>140/90).¹³
- A pilot project conducted by investigators at the **University of Medicine and Dentistry of New Jersey** reported the proportions of screened patients found to have abnormal levels of various risk factors, including cholesterol, blood pressure, A1C, and body mass index.¹⁶

Other common risk factors targeted

Several programs that targeted heart disease were also likely to target other common risk factors or conditions, including diabetes, obesity, or diet/nutrition. These are summarized in **Table 4**.

Table 4. Other Conditions or Common Risk Factors Targeted by Programs

Other conditions or common risk factors	Programs	Example
Diabetes	Blackstone Valley Community Health Care ElderSmile program Gary and Mary West Senior Dental Center Neighborcare Health Salud Family Health Center	A1C screening in the dental setting for patients with risk factors or symptoms
Obesity or diet/nutrition	Gary and Mary West Senior Dental Center Salud Family Health Center	Nutrition education alongside oral health education
Pregnancy/OB-GYN	Blackstone Valley Community Health Care Neighborcare Health Salud Family Health Center	Education and facilitation of dental care, including CHW home visits
HIV	Neighborcare Health	Aims to increase use of preventive services

Community Oral Health Programs

In our online survey of community dental programs, 21 of 30 respondents reported that dental providers in their organization performed blood pressure checks. Among these respondents, the majority (n=20) have a mechanism to refer patients with high blood pressure to primary care providers.

Mechanisms for referring high risk patients to primary care providers ranged from passive (e.g., handouts with list of resources or verbal recommendations) to active. Active referral mechanisms reported by survey respondents include:

- Required medical consults
- “Warm hand-offs,” whereby staff escort patients for scheduling
- Flagging electronic charts and having the front desk schedule an appointment

State Chronic Disease and Oral Health Programs

In our online survey of state and territorial oral health programs, 10 out of 26 respondents reported

that their office supports (i.e., funds or promotes) blood pressure checks and referrals to primary care providers. Few reported coordinating their efforts with the state chronic disease program.

In one example of collaboration, the Maryland Office of Oral Health has recently collaborated with their chronic disease program to establish a program to make blood pressure checks routine in dental settings, including providing referrals to physicians to help patients get treatment (key informant interview, August 7, 2017). This integration has two goals: to establish a stronger connection between physicians and oral health providers and to improve chronic health problems such as heart disease, diabetes, and periodontal disease. The Office of Oral Health is responsible for developing program protocols, while the Center for Chronic Disease Prevention and Control leads evaluation of these activities. This collaboration was originally funded by a CDC grant. Nineteen dental practices enrolled in the program and 15 are currently participating in screenings. Settings include county clinics, federally qualified health centers (FQHCs), and private practices. The program has plans to expand to 50 practices by the end of 2018 and to release a social marketing campaign (“15 minutes with your dentist will save your life”) to increase awareness among the public and dentists.

Evaluation by the Maryland Office of Oral Health primarily assesses process measures, including:

- Number of participating dental practices
- Number of patients referred to primary care
- Number of patients who made an appointment with a primary care provider

In a pilot project funded by the CDC (*Hypertension: Models of Collaboration*), the Minnesota State Oral Health Program addresses bidirectional referrals between dental and medical providers to target hypertension and periodontal disease (key informant interview, August 14, 2017). In FQHC and private practice settings, medical patients with hypertension receive dental screenings from dental assistants; patients with complex symptoms or other vulnerabilities are targeted for dental referrals to address periodontal needs. In dental settings, patients who are identified to have high blood pressure are either referred to urgent care or for routine primary care, accordingly.

Outcomes considered by this project are similar to the ones addressed by Maryland (e.g., numbers of patients and completed referrals); number of patients with periodontal disease that requires treatment is also compiled. One substantial challenge faced by Minnesota is that treatment of periodontal disease is not included in the adult dental benefits covered by Minnesota Medicaid.

In North Carolina, the Oral Health Section collaborates with the Chronic Disease Section to promote the dental team as part of the health care team for blood pressure control. The Chronic Disease Section trains dental providers to perform blood pressure screenings and refer to primary care for abnormal readings.

State Oral Health Plans

From our review of current state oral health plans (n=18), only two directly addressed the topic of cardiovascular disease: Alaska and Iowa. The **Alaska Oral Health Plan** (2012-2016) included a goal to support educational activities to increase awareness of oral health and implications for general health, including cardiovascular disease.¹⁷ One strategy to meet this goal was to collaborate with Chronic Disease Prevention and Health Promotion programs to increase awareness of risks associated with oral disease and cardiovascular disease. Another strategy to enhance medical-dental integration was to integrate information on the importance of oral health in publications and materials produced by Chronic Disease programs.

The **Iowa Oral Health Plan** (2016-2020) included a goal to increase the number of dental professionals who provide chronic disease assessment, including blood pressure screenings and referrals to primary care.¹⁸

Conclusions

Integrated activities targeting cardiovascular and oral health in public health settings typically involve clinical screenings of patients for hypertension. Programs that target hypertension are typically found in community health centers or other settings where medical and dental services are co-located.

The ElderSmile program (New York City, NY) is an example of a well-established, ongoing

community-based program. It is the only example of an integrated activity targeting heart disease and oral health we were able to identify that has published post-implementation information about program outcomes,¹⁴ with an AHRQ evidence rating of “suggestive”—indicating nonexperimental support for an association between this program and targeted health care outcomes.

Well-developed clinical programs shared several key characteristics:

- 1) An official protocol for identification and management of patients with elevated blood pressure is used.
- 2) Dental providers often receive standardized training to perform blood pressure screenings.
- 3) Diabetes screenings are also commonly performed in settings that target hypertension.
- 4) Providers use a formalized protocol for active referrals of at-risk patients to a primary care provider.
- 5) Electronic health records (EHR) facilitate and track outcomes of primary care referrals.

Among the identified programs targeting heart disease and oral health, most also target diabetes. This is likely due to large overlap among the populations with these diseases: a majority of American adults (74%) with diagnosed diabetes also have high blood pressure or take prescription medication for this.¹⁹

Challenges

The major challenges for integrated activities targeting cardiovascular disease and oral health identified by this scan include:

- Dental providers’ level of interest may not be sufficient; however, reimbursement for the referral process and patient education may help incentivize medical-dental integration for dentists.
- Limited information about effectiveness and health outcomes associated with these programs.
- Coordinating new efforts into existing activities and coordination across agencies (e.g., chronic disease and oral health programs) can be difficult.

In addition to the challenges listed above, the limited inclusion of cardiovascular disease as a topic addressed by state oral health programs may also limit emphasis and visibility of medical-dental integration in this area. The 2017 Synopses of State Dental Public Health Programs found that only 13 state oral health programs collaborate with their chronic disease counterparts to address blood pressure.²⁰ Additionally, a 2014 survey of state oral health programs²¹ found that the majority (69%) of programs rated state heart disease/stroke programs in the category of “least collaboration.”

Recommendations

- 1) Evaluate health outcomes associated with blood pressure screenings in dental settings.
- 2) Incorporate active referrals to primary care for high-risk patients identified in dental settings.
- 3) Explore potential cost-effectiveness of programs that target heart disease and diabetes jointly in dental settings, because these diseases share common risk factors.
- 4) Consider incorporating cholesterol screenings concurrently with blood pressure and A1C testing.
- 5) Identify sustainable funding streams, including public and private partnerships.
- 6) Develop professional guidelines and a toolkit for use in various settings on how to plan, implement, and evaluate prevention and referral activities around cardiovascular disease and oral health.