Oral health disparities and the workforce: a framework to guide innovation

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Abstract

Introduction: Oral health disparities currently exist in the United States, and workforce innovations have been proposed as one strategy to address these disparities. A framework is needed to logically assess the possible role of workforce as a contributor to and to analyze workforce strategies addressing the issue of oral health disparities.
Methods: Using an existing framework, *A Strategic Framework for Improving Racial/Ethnic Minority Health and Eliminating Racial/Ethnic Health Disparities*, workforce was sequentially applied across individual, environmental/community, and system levels to identify long-term problems, contributing factors, strategies/innovation, measurable outcomes/impacts, and long-term goals. Examples of current workforce innovations were applied to the framework.
Results: Contributing factors to oral health disparities included lack of racial/ethnic diversity of the workforce, lack of appropriate training, provider distribution, and a nonuser-centered system. The framework was applied to selected workforce innovation models delineating the potential impact on contributing factors across the individual, environmental/community, and system levels. The framework helps to define expected outcomes from workforce models that would contribute to the goal of reducing oral health disparities and examine impacts across multiple levels. However, the contributing factors to oral health disparities cannot be addressed by workforce innovation alone.
Conclusion: The *Strategic Framework* is a logical approach to guide workforce innovation, solutions, and identification of other aspects of the oral healthcare delivery system that need innovation in order to reduce oral health disparities.

A decade ago in 2000, the US surgeon general issued a report on oral health that highlighted what many clinicians and epidemiologists observe, namely, that we have profound disparities in oral health in the United States and that a large burden of oral disease exists for underserved populations (1). The report highlighted differences between racial and ethnic, and high- and low-income groups. For example, the prevalence of untreated decay was higher for African-Americans and Mexican-Americans than for whites. Additionally, the prevalence of untreated decay was higher for low-income people within each racial or ethnic (RE) group when compared to higher-income people within the same RE group. Unfortunately, these disparities persist today and can lead to tragic outcomes. Three years ago, two children died in the same week – one in Maryland and one in Mississippi – from infections originating in the oral cavity (2).

Results of the most current 1999-2004 NHANES survey show that while for the population overall, oral health status has improved in the last 10 years, and Mexican-American and African-American children and adults still have more untreated decay compared to white children and adults (3). For example, among Mexican-American and African-American children aged 2-4 years, dental caries experience was 35 and 26 percent, respectively, as compared to 20 percent for whites. Additionally, American Indian/Alaska Native populations have oral health problems on a much greater

scale than the rest of the United States, with those ages 2-4 years experiencing five times the rate of decay as all other children (4).

Similarly, disparities associated with socioeconomic status persist. The prevalence of untreated decay is higher for people living below 200 percent of the federal poverty level than for those living above this level (3). The 2004 Medical Expenditure Panel Survey showed that more people with public or private dental insurance coverage visit the dentist than those without dental coverage (5). These economic factors contribute to disparities in access to oral health care, with 29 percent of Hispanic/Latinos, 30 percent of African-Americans, and 33 percent of Alaskan Indian/Alaska Natives aged 2 and older reporting an annual dental visit compared to 50 percent of whites (6).

Given that there are multiple determinants of oral health disparities, addressing these disparities will require a multidimensional strategy (7). One approach is the development of new workforce models. Innovations could include retooling existing providers, diversifying types of providers, or expanding allied provider scopes of practice. The development of new members of the dental workforce targeted to underserved communities has been one of many suggested changes. Efforts are underway to develop and implement new US dental workforce members including the dental therapist (DT), community dental health coordinator (CDHC), and the advanced dental hygiene practitioner (ADHP) (8). However, there is no systematic way to assess how the current workforce is contributing to disparities or how new models may help to alleviate these disparities.

A framework to guide workforce innovation

A multilevel framework that includes a system component is needed to guide the design and evaluation of any workforce innovation meant to redress the long-term problem of oral health disparities. Such a framework would facilitate identification of key factors that contribute to disparities, strategies that effectively moderate or address the causal factors, and expected outcomes and impacts that link to the desired objectives and goals of reducing and eliminating oral health disparities.

The purpose of this article is to adapt and apply a framework developed by the Office of Minority Health (OMH) in the US Department of Health and Human Services – *A Strategic Framework for Improving Racial/Ethnic Minority Health and Eliminating Racial/Ethnic Health Disparities* (9) (Figure 1) to oral health. The OMH developed this model to guide systematic planning, implementation, and evaluation of programs to reduce and ultimately eliminate health disparities. It was developed after an extensive review of both the research literature and environmental scans to identify what is known about health disparities, contributing factors, desired outcomes, and effective solutions.

There are a variety of models that could be used to analyze the impact of workforce and other factors on oral health disparities, such as Fisher-Owens's "Influences on Children's Oral Health: A Conceptual Model" (7); however, we felt that the OMH framework with its specific focus on health disparities and explicit consideration of systemic factors would be more appropriate and provide a unique perspective.

Our adapted framework may be thought of as a logic model that builds upon current science and expert consensus regarding disparities in oral health. In this case, we use our framework to look specifically at the role of workforce in oral health disparities.

By considering examples of current workforce innovation in the context of the OMH model, the efforts of the dental community can be evaluated in perspective with federal efforts to improve the health of the nation.

The adapted framework, focusing on workforce innovations to help reduce or eliminate oral health disparities, is displayed in Figure 2. The multilevel design of this model permits logical and sequential analysis of any workforce innovation. Each section of the model (top row of Figure 2) is discussed in this article. First, the long-term problem of oral health disparities has already been described. Second, we discuss workforce factors contributing to oral health disparities across the individual, environmental/community, and system levels. Third, we examine workforce innovations (using the DT, CDHC, and ADHP as examples) as strategies to reduce or eliminate disparities. Next, we discuss measurable outcomes and impacts one might expect as a consequence of implementing workforce innovations. Finally, we describe the long-term objectives and goals associated with workforce innovation on oral health disparities.

Contributing workforce factors

A number of the current dimensions of the dental workforce can be understood as a contributing factor to oral healthcare disparities at the individual, community, and system levels (Figure 2). These contributing factors provide direction as to where innovations might be most effective.

Individual level

Individual's and provider's knowledge, attitudes, skills, and behavior can be contributing factors to health disparities. The percentage of minority dental professionals lags behind the percentage of minorities in the US population (10); moreover, the percentage of minorities represented in dentistry lags behind the percentage in medicine, nursing, pharmacy, physician assisting, and podiatry (11). A lack of diversity and lack of appropriate cultural training in dental education

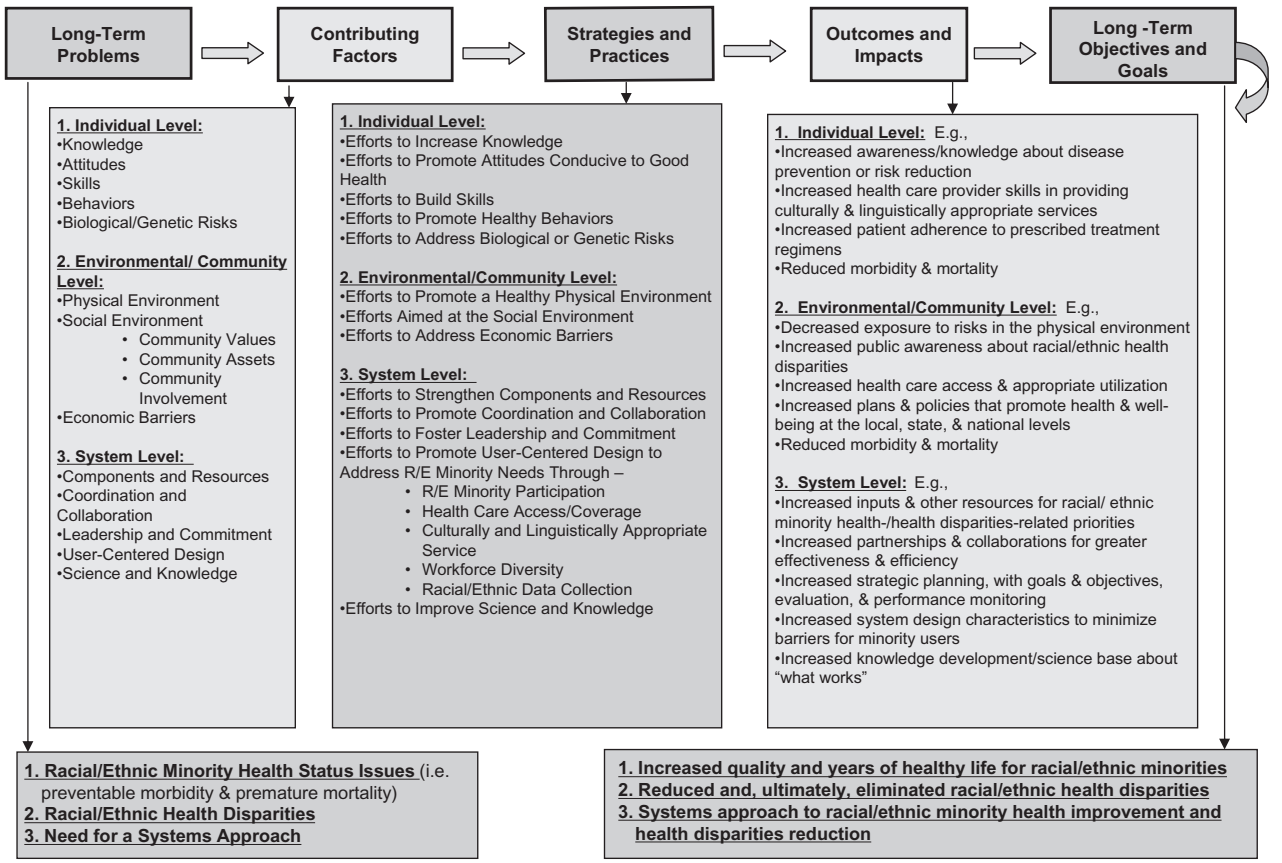

Figure 1 A strategic framework for improving racial/ethnic (R/E) minority health and eliminating R/E health disparities. (Source: Office of Minority Health, US Department of Health and Human Services, January 2008.)

contribute to a lack of understanding of cultural beliefs, attitudes, and values. This has been shown to influence how medical care is delivered (12,13), and likely has a similar effect on the delivery of oral health care to the underserved. In a recent study of dental students' beliefs, researchers found that few could identify any cultural group that they knew well even though students believe that culturally sensitive practices in dentistry are important (14). For racial and ethnic groups, these aspects of the workforce may affect patient choice, satisfaction, and access to culturally and linguistically appropriate services.

The current US workforce of dentists, hygienists, and assistants receive, respectively, 6, 13, and 10 percent of their education in the sociobehavioral domain (15). This may be insufficient emphasis on the skills needed to be effective in influencing the individual-level factors that contribute to disease risk, such as knowledge, attitudes, and behaviors. To be effective in disease prevention, the future workforce should be equipped with the cultural sensitivity and skills required to facilitate individual change among all patients (16).

Environmental or community level

Healthy communities have features such as well-established social networks, health-maintaining cultural norms, and high levels of trust that facilitate cooperation and coordination for mutual benefit (17). A diverse and appropriately trained oral health workforce is also a community asset that enhances the social environment. Aside from the role played by most dental professionals in support of water fluoridation, the dental workforce is in large part focused on delivery of care to individual patients, not environmental improvements at the community level aimed at reducing dental disease. Community-level factors that affect oral health status include poverty, low-quality education, poor access to transportation, substandard housing, environmental pollution, and poor public investment in health-related infrastructure (18).

Substantial economic barriers exist in many low-income communities that limit access to most fee-based dental care. Moreover, most states do not offer adult dental coverage under Medicaid. Consequently, much of a community's oral health status can be related to the availability of accessible

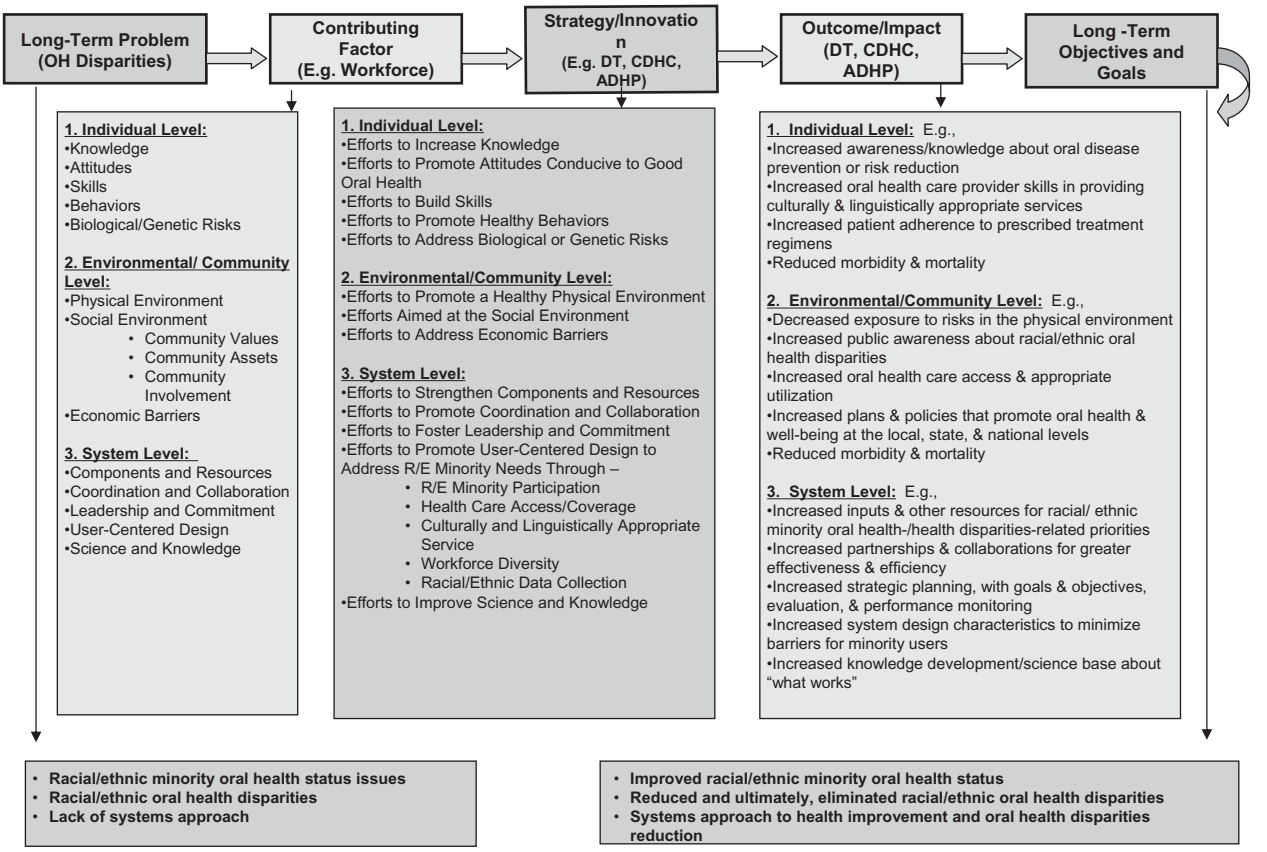

Figure 2 Application of *A Strategic Framework for Improving Racial/Ethnic (R/E) Minority Oral Health and Eliminating Racial/Ethnic Oral Health Disparities to Workforce*. (Adapted from: Office of Minority Health, US Department of Health and Human Services, January 2008.)

(affordable) care. One contributing factor to the cost of dental care is the nature of the workforce. For example, the considerable expense of training dentists – the highest level of the current dental workforce – contributes to overall cost. The largest practice expense for a dentist with a private practice is his or her salary, followed by salaries for staff and employed dentists (19).

System level

Several systemic factors related to the current configuration of the dental workforce contribute to oral health disparities. For example, in the United States, federal and state governments play only a minor role in influencing the numbers and types of healthcare workers that are trained. Only recently have state governments moved to increase the number of dentists by opening new dental schools. Prior to these recent changes, training slots had been declining for 30 years as schools closed and class sizes were reduced, with these decisions being made at the local level.

In addition to a declining dentist-to-population ratio, there is a distinct geographic maldistribution of the current US dental workforce, with 4,230 dental health personnel shortage areas encompassing 49 million people (20). In the current system, the majority of dentists (84 percent) are solo practitioners (21) who do not participate in government-sponsored dental coverage plans, which are a primary source of care for low-income people. In 2001, among practitioners billing more than $10,000 annually, just 23 percent participated in Medicaid and CHIP (22). As a result, the dental care delivery system cannot be considered user-centered for many populations, especially low-income, rural, or institutionalized ones (see Edelstein, Glassman and Subar, and Skillman *et al.* this issue). Studies show dissatisfaction of Medicaid beneficiaries with the current system (23,24). In considering this state of affairs, the ethical responsibilities of belonging to a profession call upon "dentists to be catalysts for effective action" (25,26).

Also contributing to a slow response to addressing disparities is the fact that a very small percentage of the academic

workforce focuses on research related to oral health disparities. The consequent dearth of health services research hinders efforts to design effective solutions; only recently, with projects such as the NIH Centers to Reduce Oral Health Disparities, has work begun to understand both the basic science and interrelated social determinants of oral health and disparities (27). In summary, there are a number of individual-, community-, and system-level problems identified regarding the dental workforce which may be contributing to disparities in oral health.

Workforce strategies and innovations

While current dimensions of the workforce contribute to disparities, the workforce may also be a key strategy in addressing disparities. Among the proposed workforce innovations being discussed currently are new provider types including the DT, CDHC, and ADHP. In the United States, a DT model was recently introduced in Alaska (DHAT), and in Minnesota three levels of DT (BS, MS, and advanced) are in various stages of implementation. In 2006, the American Dental Association proposed the CDHC role, and 12 candidates began training in 2009. A few years ago, the American Dental Hygienists' Association proposed the ADHP, a licensed role that expands that of the dental hygienist (28). The following section discusses the strategies and innovations section of the framework using these three proposals. The workforce models are not evaluated comprehensively; rather, they are used to exemplify issues in the framework at the individual, community, and system levels.

Individual level

Workforce innovations may be able to improve racial and ethnic diversity of the workforce leading to several positive outcomes at the individual level. Both the DT and CDHC models are based on selecting trainees from within the communities they will serve (29). As an example, the Alaska DHATs now in practice were selected from Alaska Native communities (30). This process of selection should lead to greater cultural competency among the dental workforce. For the Minnesota Advanced DT and ADHP, on the other hand, candidates will be drawn from the existing US dental hygiene workforce, which is predominantly non-Hispanic white (92 percent) (31). A commitment to increasing diversity and improved cultural competency is crucial in improving access and health outcomes at all levels, thus any proposed workforce innovation should include these factors as central to their model development and trainee selection.

Looking at the potential for these new workforce members to develop the skills needed to effectively influence individual-level factors that contribute to oral health disparities, a recent analysis for the W.K. Kellogg Foundation shows that the CDHC curriculum devotes the most time to sociobehavioral studies, compared to the Alaska DHAT and Minnesota BS/MS DT curricula, which devote more time to clinical studies (15). Sociobehavioral training may prove challenging in programs that range from 12 to 24 months in length. The Minnesota Advanced DT and the ADHP programs range in length from 4 to 6 years, and there may be opportunity to incorporate these critical sociobehavioral competencies into curricula at higher-than-current levels.

The current training models (e.g., dental schools and dental hygiene schools) are also in need of improvement in the sociobehavioral domain. Efforts need to be strengthened to ensure that dentists have the critical cultural competencies to deliver care and to supervise others who deliver care to diverse populations.

Environmental or community level

Workforce strategies at the community level may make it possible to enhance community social capital. For example, a review of curricula reveals that the CDHC and Minnesota Advanced DT program contain courses which may lend themselves to community-level enhancements such as social psychology, community mobilization and social networking, and community-based intercultural communications (15). As with the existing dental workforce, the ability to impact oral health disparities at this level will depend on how much time these new providers will be able to spend on community-strengthening activities in relation to time spent providing clinical services.

It is unknown at this time whether any of these three workforce innovations will have an impact of the direct cost of dental care. The Alaska DHAT and CDHC, because of reduced costs for shorter training periods and presumed lower salaries, could reduce the direct cost of care and increase access. However, these savings will not translate to the patient level unless fees are set at a lower level for procedures performed by the new workforce members, compared to the current workforce.

System level

New provider types have the potential to mitigate the current maldistribution of care availability through innovations at the system level. All of the new workforce models will require changes in state practice acts relating to scope of practice and supervision requirements. This alone could result in a redistribution of care delivery resources into high-need areas through enhanced staffing at safety net clinics and within institutions (e.g., nursing homes) that currently lack access to care. If a concomitant change in public financing of dental care, such as changes in Medicaid reimbursement, were to occur that allowed these new providers appropriate

compensation for care delivered, a substantial improvement in access would likely result. Whether these new providers will impact areas beyond safety net clinics and institutions will depend on ability and willingness to participate in private-sponsored insurance plans, and whether these providers can be catalysts for effective change in developing a more integrated and user-centric delivery system.

Measurable outcomes and impacts

The final component of the framework describes the outcomes and impacts that strategies and innovations are intended to produce at the individual, community, and system levels. A strength of the framework is its ability to conceptually link contributing factors, strategies, and outcomes at each level, allowing proposed workforce innovations to be logically and sequentially analyzed and evaluated as to its potential impact on disparities in oral health.

Individual level

The outcomes of any proposed workforce innovations would include a more diverse, culturally competent workforce that displays understanding, consideration, and incorporation of cultural traditions into care delivery. All individuals involved in the delivery of clinical care should be trained in the skills to effectively and appropriately promote individual behaviors that improve oral health.

Environmental or community level

The outcomes at the community level should include a workforce that has the skills to assess how the patient's community, social, and economic environment contributes to oral health status. Further, the workforce would consider it part of their role to identify and collaborate with other community resources to improve the local environment in ways that contribute to disparities reduction and improved access to care.

An essential part of improving access is the removal of economic barriers. Developing providers such as the Alaska DHAT and CDHC may accomplish this, if services are delivered by lower-cost providers. However, this will not happen without concurrent innovation in the financing of oral health care. This highlights the fact that workforce innovation alone cannot eliminate economic inequity as a contributing factor to oral health disparities for all individuals.

System level

The impact of workforce innovations at the system level could be considerable, particularly as the workforce relates to the acquisition of resources for oral health, improving systems design, and developing evidence-based solutions.

The three specific workforce models discussed all target areas that are underserved; implementation would ease geographic maldistribution, as well as increase the overall number of providers. Appropriate training of these workforce members would include developing leadership skills resulting in providers ready to help modify aspects of the delivery system that have contributed to oral health disparities, such as lack of integration and user-centeredness. As well, training would include aspects of research, planning, and strategic development, which would result in improved provider input into system design and development of evidence-based solutions focused on improving resource use and oral health outcomes of all patients.

Lack of workforce participating oral health disparities research is a contributing factor that will not be directly affected by the examples of workforce innovation discussed. This is an example of a contributing factor, which may be addressed with innovation in other aspects of the oral healthcare system such as education/training.

Long-term objectives and goals

In the long term, successful workforce innovation strategies may be an essential component of multidimensional efforts focused on: a) improving oral health status for racial and ethnic minorities, and low-income groups; b) reducing and ultimately eliminating oral health disparities that currently exist; and c) leading to a permanent comprehensive system approach to oral health disparities reduction.

Discussion

Since the surgeon general's report, the issue of oral health disparities has been widely discussed; constituencies such as patient advocates, legislators, and other healthcare professionals have become aware of the many factors contributing to oral health disparities. Workforce, as a component of the existing oral healthcare delivery system, has been identified as an area in which change could help reduce oral health disparities. We have presented an adapted strategic framework and have applied it to workforce to draw attention to known workforce-related contributing factors so that any workforce innovation model can be logically and sequentially evaluated. Other workforce-related challenges exist if we are to reduce disparities and improve access to good oral health care. We briefly summarize some of the broader issues which require consideration when designing workforce innovations.

Economic and educational disparities

Workforce models that involve attaining advanced degrees are problematic given that existing economic disparities are closely associated with educational disparities. Thus, many

minority youth never realize their educational potential, resulting in a small pool of qualified students for training. Furthermore, well-qualified minority students have many career options besides oral health.

New dental schools

Several new schools of dentistry opened in the past few years (32). Although the number of highly trained providers will increase, opening these schools highlights the lack of system-level planning. The number of dental hygiene programs has also increased, but these programs are disconnected from the education of dentists. Training opportunities should be coordinated and assure development of an adequate workforce at all levels, not just at the highest level.

Dental public health workers

We need more trained individuals to carry out public health tasks, such as planning and evaluation of population-based educational and behavioral interventions in order to impact disparities at the community and system levels. Over the last two decades, the Health Services Resource Administration has funded programs to increase the number of dentists trained in public health (33). However, these programs have been inconsistently funded and are not available for all communities.

Funding and reimbursement

Funding and reimbursement in the current oral healthcare delivery system reward treatment over prevention, despite the fact that common oral diseases are completely preventable. Moreover, because funding also impacts provider participation in government-sponsored insurance plans, strategies to reduce disparities require systematic examination of the economics of the oral healthcare delivery system.

Maldistribution of dental providers

Aside from developing new workforce members, other system-wide strategies are possible. For example, the most well-known strategies to improve distribution of the existing oral health workforce into underserved areas are federal and state-funded loan repayment programs (34), and the Pipeline, Profession & Practice: Community-Based Dental Education project (35). Expanding programs known to be effective in attracting providers to underserved communities, as well as developing innovations and incentives that increase the number of dental providers practicing in these communities, are complementary ways to improve distribution.

Some states use regulation and legislation to change the workforce and its distribution. For example, California recently passed laws to expand the scope of practice and modify supervision of workers, such as dental hygienists and dental assistants (36). Over 30 states are reimbursing medical or nursing professionals trained to perform certain aspects of oral health care (37). This last innovation improves the distribution of the workforce because in some communities, there may be medical or nursing providers but not dental providers.

Limitations

Our adapted strategic framework has two major limitations. First, workforce innovations address multiple contributing factors that may have multiple outcomes and impacts. Thus, there is no one-to-one correspondence between contributing factors, strategies and practices, and outcomes or impacts. Second, adequate scientific evidence does not exist for the effectiveness of the proposed workforce innovations in reducing oral health disparities. Hence, we stress the importance of systematic evaluation. Given these limitations, the strategic framework should not be viewed as a causal model for problem solving and decision making. Rather, it is a dynamic model that provides guidance for action beyond achievement of objectives and goals.

Conclusion

In this article, we demonstrated how an adapted OMH, *A Strategic Framework for Improving Racial/Ethnic Minority Health and Eliminating Racial/Ethnic Health Disparities*, can be used to guide workforce innovation. As examples, three contemporary workforce innovations, the DT, CDHC, and ADHP, were incorporated into the OMH framework to better visualize long-term problems, contributing factors, strategies, or innovations, as well as outcomes and impacts related to reducing and eliminating oral health disparities.

Given the large number of variables that contribute to existing oral health disparities, no single workforce innovation can address all contributing factors. This review emphasizes some of the proposed workforce innovation models, and the impact across multiple levels. We also emphasize that some of the factors related to workforce cannot be addressed by workforce innovation alone.

Further, our adapted framework can help guide the critical planning process outlined in a recent publication from the Pew Center on the States (38). The planning process includes: a) needs assessment; b) inventory of the current infrastructure; c) analysis of the delivery systems; d) survey of financial resources; and e) appraisal of the political landscape. The strategic framework could also be utilized to examine any other aspect of the oral healthcare delivery system such as financing, regulation, and education/training to guide

systematic planning, implementation, and evaluation, and provide a rational basis for efforts to reduce oral health disparities.

In sum, we have an opportunity to reconsider what we are doing, identify what should be done, and contemplate how best to change the workforce to improve oral health. Because the workforce is part of a larger healthcare delivery system, we know that changing the workforce is but one facet of a necessarily complex solution. Nevertheless, we hope the next generation will view workforce innovation as one of the effective strategies that reduced or eliminated oral health disparities.

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