Using the Essential Public Health Services as Strategic Leverage to Strengthen the Public Health Response to Diabetes

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SYNOPSIS

If current trends continue, health systems will soon be overwhelmed by type 2 diabetes mellitus. Successful population-based diabetes prevention and control efforts require a sound and continually improving infrastructure. In states and U.S. territories, the Diabetes Prevention and Control Programs supported by the U.S. Centers for Disease Control and Prevention's Division of Diabetes Translation serve as a fulcrum for building and refining the infrastructure that links diverse and dynamic partners dedicated to increasing the years and quality of life and achieving health equity among people with and at risk for diabetes. The National Public Health Performance Standards offer a conceptual framework that articulates the requisite infrastructure and services provided by an interconnected network of intersectoral partners to strengthen the public health response to diabetes. These standards associated with the Essential Public Health Services are valuable tools to assess the status of the performance of the health system's infrastructure to guide improvement. The process of engaging system partners in a system-wide assessment informs and leverages cross-sectoral assets to improve health outcomes for citizens in communities shouldering the growing burden of diabetes.

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Infectious disease scientists at the U.S. Centers for Disease Control and Prevention (CDC) have responded to demands for intricate technical and communication competencies to protect the public against threats of new and resurgent old diseases (e.g., anthrax, smallpox) amid the uncertainty of bioterrorism. The far-reaching import of the work of public health and of preparedness in the event of an epidemic has become clear.

In recent decades, another old, in fact, ancient,[1] and insidiously dangerous disease—type 2 diabetes mellitus—has threatened the health of millions of Americans, including many young people. The epidemic of diabetes is expected to rise in coming years, and when it crests, it will overwhelm existing health care systems faced with increasing demands for diabetes care and costly treatment of complications. The looming threat of diabetes and the functions of a system to turn back this rising tide must be clearly translated to the public. The response by a system of health assets organized to protect the public's health must be strong and integrated at all levels—local, tribal, state, and national.[2]

Uncontrolled diabetes damages every organ system in the body, leading to heart disease, lower extremity amputations, blindness, kidney failure, and premature death.[3] Preventive care practices that help individuals maintain glucose control and identify complications at a treatable stage can work to prevent or delay complications of diabetes,[4] but only about 55% of people with diabetes receive recommended annual foot exams; the recommended annual dilated eye exam is administered to only 43% of those with no insurance and to 66% of those who are insured.[5] The failure to secure preventive care is rooted in multiple individual and systems-based variables. A major barrier is access to quality, culturally competent health care, exacerbated by the fact that many people with or at risk for diabetes are among the 44 million Americans without insurance.[6]

Keen interest in moving upstream to identification of the causes and preventive actions for chronic diseases has been building internationally[7] and nationally for years. Recent studies providing scientific evidence confirming the feasibility of preventing or delaying the onset of type 2 diabetes[8–10] have added momentum to this movement. In this country, the National Institutes of Health (NIH) led the Diabetes Prevention Program (DPP), a randomized clinical trial involving 3,234 adults at risk for diabetes, almost half of whom represented populations disproportionately burdened by diabetes (i.e., American Indians, Hispanics, and African Americans). The DPP found that an intensive lifestyle intervention, which involved achieving and maintaining an average 7% weight loss and 150 minutes of physical activity a week, reduced the risk of developing type 2 diabetes by 58%.[10] An arm of the trial that included administration of a drug, metformin, demonstrated a 31% reduced risk.[10]

Deliberate, preventive actions to avoid diabetes can be taken by other individuals with pre-diabetes, a condition marked by impaired glucose tolerance or elevated fasting glucose levels, or both, that occurs before the actual onset of diabetes and affects about 12 million adults aged 45–74.[11] The support of a strong health care team, families, and communities is instrumental in taking and sustaining such actions.

For people who have diabetes or pre-diabetes, and their communities, the challenges of adopting recommended health actions lie in complex factors sewn from history and sociology that interact reciprocally with physiological risk factors. Integrated population-based approaches, built on a sound public health infrastructure articulated by the Essential Public Health Services (Figure 1) and continually improved by a mobilized system of partners, must be in place to influence outcomes in a positive direction. This article outlines some of the factors inherent in the diabetes

Figure 1. The Essential Public Health Services

1. Monitor health status to identify and solve community problems.
2. Diagnose and investigate health problems and hazards in the community.
3. Inform, educate, and empower people about health issues.
4. Mobilize community partnerships and action to identify and solve health problems.
5. Develop policies and plans that support individual and community health efforts.
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal diabetes services and ensure the provision of health care when otherwise unavailable.
8. Ensure a competent public and personal health care workforce.
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10. Research for new insights and innovative solutions to health problems.

SOURCE: Public Health Functions Steering Committee, Public Health in America, July 1995.

epidemic, the history of the ongoing transformation in public health that has led to the establishment of performance standards based on the Essential Public Health Services and informed the vision and mission of the CDC's Division of Diabetes Translation (DDT), associated national performance standards, and the process the DDT is undertaking to incorporate these ideas into its National Diabetes Program.

INCREASING PREVALENCE OF TYPE 2 DIABETES

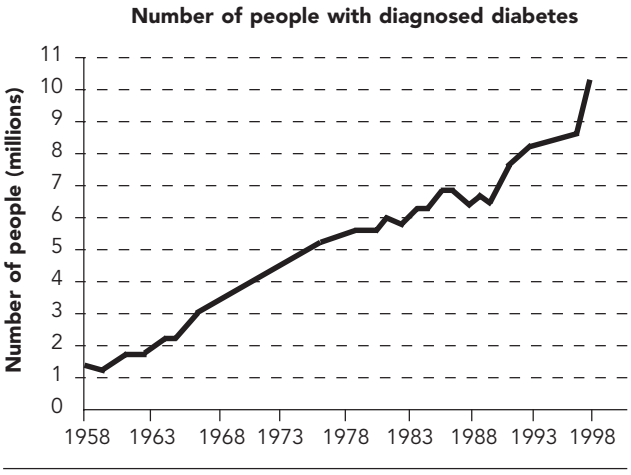
In the past four decades, the prevalence of diagnosed diabetes has increased six-fold (Figure 2).[12] From 1990 to 1998, diabetes prevalence increased 33%, including a 76% increase among people in their 30s.[13] The number of Americans with diabetes is projected to increase 165%, from 11 million in 2000 (4.0%) to 29 million in 2050 (7.2%).[14]

This upward spiral contains a disturbing trend. Type 2 diabetes, long described as a "middle-aged" disease,[15] is now occurring among youth. From 1990 to 2001, the Indian Health Service observed a 68% increase in diabetes among 15- to 19-year-olds.[16] Although type 2 diabetes in youth particularly burdens those populations with disproportionate rates among adults, it is appearing in all pediatric populations.[17] It now accounts for 30% to 50% of all cases of diabetes in childhood,[17] compared to only 5% of such cases before 1994.[18] Type 2 diabetes in youth has been said to be "the first consequence" of the epidemic of obesity in youth,[17] which is reflected in the 15% prevalence of overweight (1999–2000) among children and adolescents aged 6 to 19 years.[19]

Complexity is the central challenge for prevention of diabetes and its complications. Self-management behaviors are complex, multidimensional, and multiply determined[20] for people with either type 1 or type 2 diabetes. With type 2 diabetes, interaction of physical and social determinants begins much earlier. Milieus conducive to rising incidence and earlier development are created by interactions between a person's innate traits (e.g., genetics, sex, age, intrauterine environment), acquired behavioral patterns (e.g., eating and physical activity patterns), and social, historical, economic, political, and physical environments—natural and built.[21]

Biological explanations for the cause of type 2 diabetes are powerful and specific for associations with obesity[22] and lack of physical activity.[23–26] These explanations are further supported by the role of such factors in preventing type 2 diabetes found in the DPP[10] and other major intervention studies.[8,9] Research is steadily revealing more about the role of innate individual traits, including genetics[27] and the previously unimagined contribution of the intrauterine environment.[28–31] Standing alone, however, biological risk factors for chronic diseases including diabetes are "impoverished"[32] and "noncontextualized."[33] Restricting inquiry and intervention development to these risk factors would limit exploration of the array of contributing causes and solutions,[34] thereby potentially sustaining a focus on behaviors of individuals rather than the risk conditions that contributed to the development of disease in the first place.[35]

Figure 2. Prevalence of diagnosed diabetes in Americans (in millions), 1958–1998



SOURCE: CDC, Division of Diabetes Translation.

The prevalence of diabetes cannot be reduced to single cause-and-effect sources, and categorical responses are no match for its complexity. Acknowledging the complex interplay of causative physiological, sociological, and historical factors carries implications for strengthening the interaction and efficiency of systems so that solutions extend beyond a focus on individual behaviors to broader, more deeply rooted drivers and the systems that influence these. By examining the interrelationships of the many driving forces of diabetes causation, care, and quality of life, we can better leverage our resources to change the direction of the trend.

DEVELOPMENT OF THE ESSENTIAL PUBLIC HEALTH SERVICES

More than a decade ago, a sea change began building in public health. At that time, discussions about health care reform forced public health to reassess its mis-

sion and purpose. In many ways, this scrutiny helped to reestablish a focus on the initial charge to public health[36] to assure the conditions necessary for people to live healthy lives, through community-wide prevention and protection programs.

Important shifts marked the landscape of public health: *(1)* from treating disease to sustaining health and promoting prevention; *(2)* from individuals' needs to the health of populations; *(3)* from community problems and needs to looking at community-wide capacities and opportunities; *(4)* from being reactive to being proactive; *(5)* from managing individual health system components to supporting the dynamic interaction of these components through a systems approach to health; and *(6)* from internal expertise to setting expectations, outcomes, and accountability that can only be achieved through collaboration and empowerment.[36]

In *The Future of Public Health* (1988), the Institute of Medicine critically assessed the status of public health in the United States and formulated a three-part statement of the "core functions" of public health: assessment, policy development, and assurance.[37] While the three-part core functions accurately reflected the key services of public health, they were difficult to articulate and failed to communicate meaningfully to the public or to policy makers who were drafting the blueprints for a reformed health system.[37] Therefore, in 1994, a working group convened to focus on the core functions of public health, leading to establishment of the Public Health Functions Steering Committee in 1995, which articulated the public health vision, mission, and the Essential Public Health Services as a more descriptive way to define the core functions.

The Essential Public Health Services offer a holistic view of population-based health that can be used by any health promotion or disease prevention program to establish direction for strategic planning and action for the foreseeable future.[36] This framework emphasizes a proactive strategy for protection and prevention, with a focus on community strengths and opportunities versus deficits. Its key tenets are grounded in public health values of systems and communities, empowerment, and collaboration.[36]

The interdependence of the Essential Public Health Services within and among systems has been likened to a circle (Figure 3), which is interactive rather than linear. "System integration and accountability" serves as a connecting circle integrating the Essential Services, united by shared goals, and frequently, shared partners and processes.

A number of forces have substantially contributed to the articulation and application of the Essential

Figure 3. Interdependence of the 10 Essential Public Health Services

SOURCE: Nelson J, Essien J, Loudermilk R, Cohen D. The public health competency handbook; optimizing individual and organizational performance for the public's health. Atlanta: Center for Public Health Practice, Rollins School of Public Health, Emory University; 2002.

Public Health Services. Self-assessment of capacity in local health departments was furthered by the work of the Assessment Protocol for Excellence in Public Health, released in 1991. Since 1997, Turning Point, an initiative of The Robert Wood Johnson and WK Kellogg Foundation to improve and transform the U.S. public health infrastructure, has been instrumental in providing local communities with paths for assessment, planning, and action.[38] Mobilizing for Action through Planning and Partnerships (MAPP), developed by the National Association of County and City Health Officials (NACCHO) and CDC, is a strategic planning and action model that provides a web-based instrument to guide communities through a health improvement process.[39] The Institute of Medicine report, *The Future of the Public's Health in the 21st Century*[40] provides important leverage for decision making in many areas, including legislative. *Healthy People 2010,* a "road map" for the nation's public health agenda, established 467 objectives aimed at increasing years and quality of life for Americans and eliminating health disparities.[41] Included are 17 objectives directly tied to diabetes,[42] at least another 30 of which are indirectly related, and

two process measures devoted to the establishment of culturally appropriate and linguistically competent community health programs. *Healthy People 2010* also includes a chapter on public health infrastructure, introducing the concept of a public health system that consists of public, private, and community assets in delivering the Essential Public Health Services.[41]

National Public Health Performance Standards Program

Building on the contributions of such forces, the CDC's Public Health Practice Program Office (PHPPO) began in 1997 to promote public health infrastructure by advancing the capacity of local and state health systems throughout the country.[2] The National Public Health Performance Standards Program (Standards Program) is a partnership effort of the CDC through cooperative agreements with NACCHO, the Association of State and Territorial Health Officials (ASTHO), the American Public Health Association (APHA), the National Association of Local Boards of Health (NALBOH), and the Public Health Foundation (PHF). The vision of the Standards Program is "excellence in public health practice defined by recognized performance standards." The Standards Program's mission is to ". . . improve the practice of public health by providing leadership in research, development, and implementation of science-based performance standards. . . ."[2] Based on the precept that "what gets measured, gets done," the use of nationally recognized performance standards as benchmarks helps advance public health to higher levels of performance.[2] State and local health departments created the early groundswell of leadership and support for establishing the Essential Public Health Services and their assessment and capacity-building. The Essential Public Health Services (Figure 1) and the performance standards provide the fundamental framework for the three Standards Program assessment instruments released in 2002: local, state, and governance. Benefits of the Standards Program's ongoing work are expected to include quality improvement, accountability, and an increase in the science base for public health practice, all of which serve better decision making and action at all levels of communities, or systems.

TRANSLATING SCIENCE AND VALUES INTO PRACTICE: DDT'S MISSION, VISION, AND PRINCIPLES

Out of the complexity that surrounds the cresting tide of diabetes, and the chaos that accompanies it, there is hope for order built on a public health system with a sound and always improving infrastructure. Foremost, a clear lens with a wide angle[43] and ears that are "clean and clear"[44] are being employed to grasp the causes and solutions fully. Accordingly, the DDT built its organization on a plan to make the *what* clear by establishing an explicit public health vision, mission, and principles; clarify the *how* by applying the Essential Public Health Services to public health performance in diabetes; and link these to the *how much* in improving health outcomes. This plan hopefully provides an illuminated vision and path for DDT and its stakeholders and partners. Potential partners can examine these essential services for affinity with their own values and goals. Alliances based on common goals and shared values have great potential for sustainable, effective action.

Competencies—specifically organizational competencies—constitute the foundation on which to build the Essential Public Health Services to ensure the high performance and continual assessment and refinement of critical services, thereby creating leverage points useful at a number of layers. The grounding of systems-based approaches in organizational competencies (Figure 4) is meant to facilitate the enactment of our vision.[36] The DDT's vision and mission are aligned with those of CDC and *Healthy People 2010* (Figure

Figure 4. Organizational competencies grounding the systems-based approach of the Division of Diabetes Translation

1. **Visionary leadership/empowerment:** concerned with collaborative leadership to reach the shared vision
2. **Communication:** characterized by a dynamic process grounded in respect for diverse voices
3. **Information management:** using technology to manage the transfer of information to end users
4. **Assessment, planning, and evaluation:** depicting the continuous quality-improvement cycle
5. **Partnership and collaboration:** optimizing performance through shared resources and responibility
6. **Systems thinking:** with future-oriented problem solving and decision making
7. **Promoting health and preventing disease:** putting the science and art of public health into action

SOURCE: Nelson J, Essien J, Loudermilk R, Cohen D. The public health competency handbook; optimizing individual and organizational performance for the public's health. Atlanta: Center for Public Health Practice, Rollins School of Public Health, Emory University; 2002.

5).[41] These are expected to shift and settle over time with continued input from partners and a process of critical reflection.

Related to the multiple risk and protective factors contributing to prevention and control of diabetes is an important principle promoting sound scientific inquiry that looks for causes and effects beyond host, agent, and immediate environment,[7] one that emphasizes not only knowing but also knowing why.[45] Another inherent principle of the DDT, reflected in the choice of a systems-based approach, is collaborative partnerships, integrated by systems approaches.

The preeminent principle of public health practice is social justice.[46,47] The heart of public health is the community,[47] which is in itself a system of relationships. The word *community* can refer to localities, but also to groups that share common interests, values, and background even if they do not live in the same location. Community is the foundation for relationships built between and among organizations and individuals.[43] Stronger links tend to correspond to healthier communities.

Recognizing that community health and individual health are inseparable,[41] the DDT has maintained that the community's voice is essential in matters of its own health,[48] and has strived to listen to community members with or at risk for diabetes, through focus groups, its partners, and diverse workgroups of the National Diabetes Education Program (NDEP). Paulo Freire advised a process of "listen, dialogue, and action."[49] Through listening to diverse communities, it has become increasingly apparent that *all* domains of science and knowledge are needed to trace the paths and build the bridges for solutions to this complex disease. Therefore, DDT is building a learning community intent on continuous, open inquiry and regard for interdisciplinary knowledge. This emphasis on learning includes respect for local community knowledge about health protection and disease prevention. Local, or traditional, knowledge, grounded in lifetimes of intimate daily observation, habitation, and experience[50,51] helped protect people from diabetes for generations, and this "blueprint for a way of life that has survived"[52] deserves increased attention.

The DDT charted a journey beginning in 1995, when we began highlighting population-based, integrative systems to address diabetes—transitioning from direct provision of personal health.[53] This transition recognized that health outcomes are primarily impacted by influencing others—partners, communities, and systems. Striving to hold ourselves accountable for achievement of outcomes relevant to our mission and for communication of this information, the DDT in 1999 established six National Diabetes Objectives, which parallel a number of *Healthy People 2000* objectives (Figure 5). Utilizing these objectives, an evaluation protocol is based on CDC's Framework for Program Evaluation in Public Health[54] and training along this framework has been provided to staff members and partners. Additionally, Diabetes Prevention and Control Programs (DPCPs) have been engaged in development of logic models to map the intended effects of their efforts. A template is shown in Figure 6. Progress has already been demonstrated for several objectives.[55,56] In 2002, the DDT established a management information system to help track process and outcomes in terms of the national objectives, thereby supporting efforts to promote accountability, facilitate program monitoring, and share public health practices.

Figure 5. Division of Diabetes Translation vision, mission, and principles

Vision

World free of the devastation of diabetes

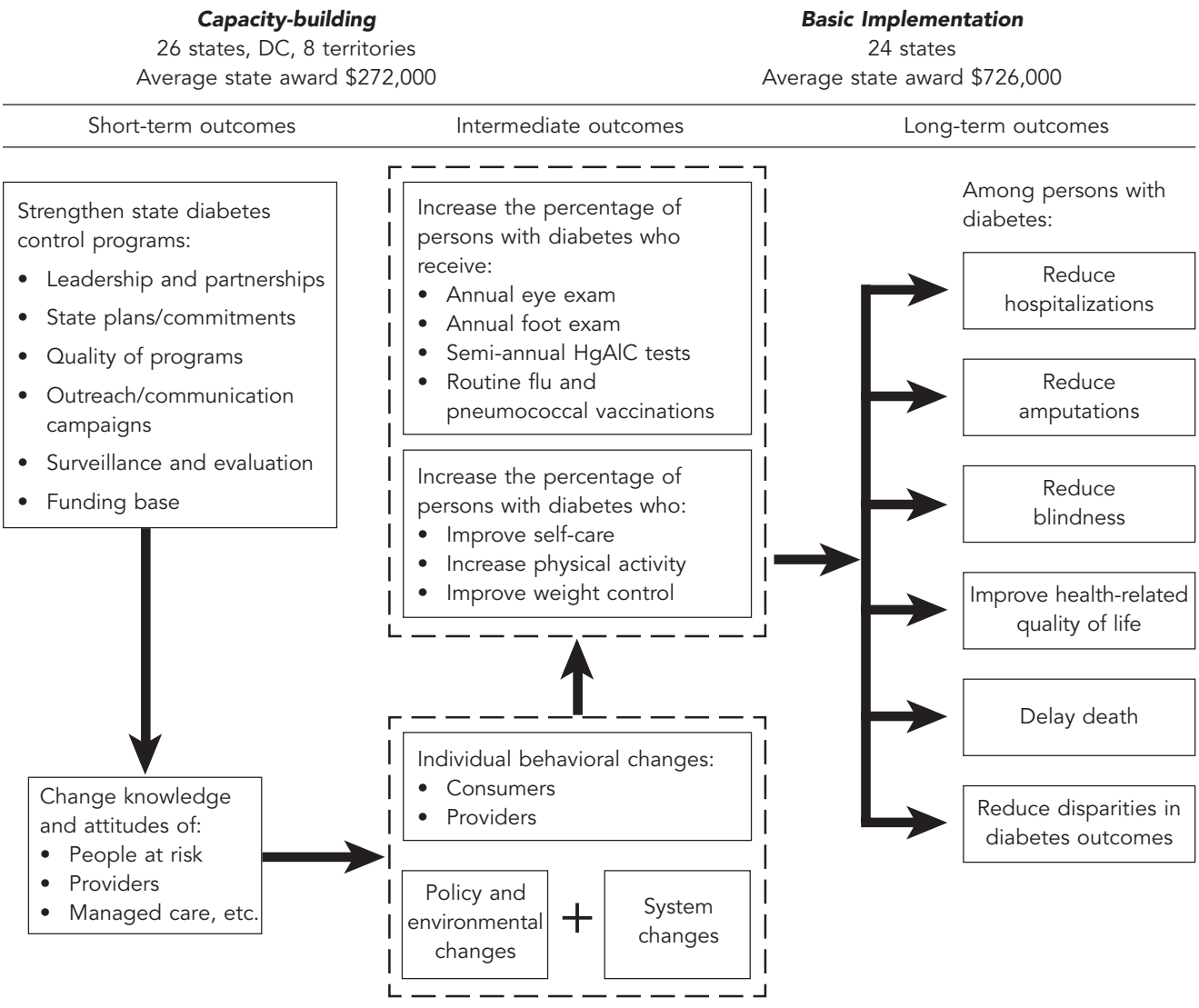
Mission

Eliminate the preventable burden of diabetes through public health leadership, linkages, research, programs, and policies that translate science into practice.

National Diabetes Prevention and Control Program Objectives

1. By 2008, demonstrate success in achieving an increase in the percentage of people with diabetes in your jurisdiction who receive the recommended foot examinations.
2. By 2008, demonstrate success in achieving an increase in the percentage of people with diabetes in your jurisdiction who receive the recommended eye exams.
3. By 2008, demonstrate success in achieving an increase in the percentage of people with diabetes in your jurisdiction who receive the recommended influenza and pneumococcal vaccines.
4. By 2008, demonstrate success in achieving an increase in the percentage of people with diabetes in your jurisdiction who receive the recommended A1C tests.
5. By 2008, demonstrate success in reducing health disparities for high-risk populations with respect to diabetes prevention and control.
6. By 2008, demonstrate success in linking to programs for promotion of wellness and physical activity, weight and blood pressure control, and smoking cessation for people with diabetes.

Figure 6. Diabetes prevention and control programs logic model



SOURCE: Murphy D. Centers for Disease Control and Prevention, Division of Diabetes Translation. Diabetes prevention and control: a public health imperative. In: CDC, National Center for Health Promotion and Disease Prevention. Promising practices in chronic disease prevention and control: a public health framework for action. Atlanta: Department of Health and Human Services (US); 2003.

INCORPORATING THE ESSENTIAL PUBLIC HEALTH SERVICES INTO THE NATIONAL DIABETES PROGRAM

A systems approach was implemented as we developed the "Systems-based Diabetes Prevention and Control Program" request for applications (RFA) for the five-year funding cycle ending in 2003. In preparation for writing the most recent RFA, a team of DDT staff members who provide consultation to DPCPs reviewed national, state, and local public health efforts, beginning with dialogues about health care reform in the early 1990s. The team sought a systems framework that would clarify the role of public health, provide a common language, and simultaneously acknowledge the diversity of each state or territory's peoples, needs, strengths, processes, and goals. The framework needed to be a catalyst for assessment, action, and evaluation and needed to encompass and promote accountability through integration of diverse systems, traditional and

nontraditional partners, and multilevel, multi-system, and multifaceted interventions to address the complex public health problem of diabetes. The team discovered that leadership in identifying a framework and developing standards and assessment tools to measure the capacity and performance of public health systems had already been provided by the Standards Program.[2,39,57,58]

The DDT adapted the Standards Program concepts and instruments to facilitate DPCP's self-assessments of the State Diabetes Public Health System, defined as the state public health agency's working in partnership with other state governmental agencies, private enterprises, and voluntary organizations that operate state-wide to provide services essential to the health of the public with diabetes. Assessments of the diabetes system should answer the questions, "What are the components, activities, competencies, and capacities of our diabetes public health system?" and "How well are the Essential Services being provided?" The goals are to *(1)* improve quality and accountability of public health practice, *(2)* conduct systematic collection and analysis of performance data, *(3)* develop a science base for public health practice improvement, and *(4)* generate discussions among partners that can result in stronger connections and greater awareness of the interconnectedness of public health activities. A State Diabetes Public Health System assessment instrument was designed by the Diabetes Council of the Chronic Disease Directors to focus on the entirety of the diabetes public health system components. DPCPs have the option of using this instrument, designing their own, or modifying any instrument. The main purpose is for the assessment to provide partners with an understanding of the gaps between their current system status and performance and the optimal performance described by the standards. Based on the assessment, each DPCP will work with its system partners to develop a performance improvement plan for the entire state diabetes public health system. The mobilization of system-wide efforts should lead to improved performance in the areas targeted—findings that may provide partners with encouragement and support their momentum to continue dedicated, linked efforts.

Since DPCPs are still in the process of conducting their assessments, the value of using the Essential Public Health Services as a conceptual framework for efforts to comprehensively address the challenges posed by diabetes is not yet known. The DDT chose this framework because of its capacity to encompass the systems needed to deal with the complexities of diabetes and because of the need for a common language for the multiple, diverse innovations, designed with knowledge and engagement of local communities and multiple disciplines. Benefits, as noted by the Standards Program, are expected to include:

- Improved organizational and community communication and collaboration, by bringing partners to the same table;
- Education of participants about public health and the interconnectedness of activities, which can lead to a higher appreciation and awareness of the many activities related to improving the public's health;
- Strengthened network of diverse partners within state and local public health systems, which can lead to more cohesion among partners, better coordination of activities and resources, and less duplication of services;
- Identification of strengths and weaknesses that can be addressed in quality improvement efforts. Responses to the instrument can be tracked over time to identify improvements or changes;
- Provision of a benchmark for public health practice improvements, by setting a "gold standard" to which diabetes public health systems can aspire.[1,57,58]

The DDT is anxious to learn from its state and territorial partners about their development of innovative cross-cutting strategies and experiences in leadership at multiple levels with traditional and nontraditional partners, based on assessments that identified the places where improvements within the delivery of Essential Public Health Services can have great influence. Action at strategic points of leverage by the DPCPs and the DDT over the next five years can make strong contributions to the art and science of public health practice in diabetes prevention and control and a measurable difference for people and communities with and at risk for diabetes.

CONCLUSION

In light of troubling trends in the pandemic of type 2 diabetes and the complexity inherent in protecting people from the ravages of this chronic disease, it is critical that communities and related systems share a common mission and language for action. The Essential Public Health Services and the National Public Health Performance Standards support the building and enhancement of a public health infrastructure to assure an appropriate breadth of scope to understand and address diabetes and a means to engage multiple partners. The hope is that environments will be im-

pacted so that people and communities are supported in health protection and disease prevention efforts. The Essential Public Health Services framework embraces respect for knowledge from many domains and principles including accountability, quality improvement, integrity, science, and social justice. In tandem with partners invested in a common mission and open to continuous reflection and refinement, strategic leverage points can be identified and acted upon to further the journey to promoting healthy communities, free of the devastation of diabetes.

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