The National Diabetes Education Program at 20 Years: Lessons Learned and Plans for the Future

The National Diabetes Education Program (NDEP) was established to translate findings from diabetes research studies into clinical and public health practice. Over 20 years, NDEP has built a program with partnership engagement that includes science-based resources for multiple population and stakeholder audiences. Throughout its history, NDEP has developed strategies and messages based on communication research and relied on established behavior change models from health education, communication, and social marketing. The program’s success in continuing to engage diverse partners after 20 years has led to time-proven and high-quality resources that have been sustained. Today, NDEP maintains a national repository of diabetes education tools and resources that are high quality, science- and audience-based, culturally and linguistically appropriate, and available free of charge to a wide variety of audiences. This review looks back and describes NDEP’s evolution in transforming and communicating diabetes management and type 2 diabetes prevention strategies through partnerships, campaigns, educational resources, and tools and identifies future opportunities and plans.

Twenty years ago, in 1997, the National Diabetes Education Program (NDEP) was launched to translate findings from diabetes research studies into clinical and public health practice. The U.S. Department of Health and Human Services’ National Institutes of Health and Centers for Disease Control and Prevention (CDC) jointly initiated the NDEP to apply key findings of the Diabetes Control and Complications Trial (DCCT) (1) to current health care practices and educational outreach to people with type 1 diabetes (T1D). The urgent public health message of the DCCT was that intensive blood glucose control could significantly reduce the microvascular complications, retinopathy, neuropathy, and nephropathy in T1D, and these findings were later confirmed for type 2 diabetes (T2D) by the UK Prospective Diabetes Study (UKPDS) (2). The NDEP evolved to address findings from these landmark trials and subsequent large-scale studies that built the evidence about the effectiveness of metabolic control (3). To support the achievement of quality outcomes and prevent costly complications, the NDEP worked with a wide range of partners to develop resources to teach people with diabetes and their family members to manage diabetes; assist health care systems and providers attend to practice redesign, patient-centered approaches, and team care; and help community-based organizations address diabetes in their populations. Soon after release of the 2001 report that showed the effectiveness of lifestyle intervention in the prevention of T2D in Finland (4), findings from the Diabetes Prevention Program (DPP) showed that T2D could be prevented or delayed in those at high risk in the U.S. (5). In response, the NDEP expanded its efforts to translate important findings from the DPP to support outreach and education around primary prevention and to provide marketing and educational support for the expansion of the National Diabetes Prevention Program (National DPP) in communities across the U.S. (6).
Significant advances in the treatment for T1D and T2D and primary prevention for those with prediabetes have occurred during the past 20 years. There is a plethora of new therapies, insulin delivery options, and glucose-monitoring technologies. The paradigm of nutrition therapy has changed from strict regimens to more flexible eating patterns for people with diabetes, while increased attention supports healthy lifestyle behaviors for those with diabetes and prediabetes (7). Recognition that living with diabetes is associated with emotional challenges is finally gaining attention (8). Diabetes self-management education and support (DSMES) (9,10), now considered to be a cornerstone of care, has moved beyond the provision of knowledge to include behavior change strategies, and the National DPP (6) is implementing the best evidence on T2D prevention through structured lifestyle change across the U.S. Important progress has been achieved, but there are still far too many people with diabetes and prediabetes, and the complications of diabetes continue to wreak devastation. Challenges in addressing the burgeoning problem have been identified with recognition that lifestyle habits are not easily changed and diabetes care is not a “one size fits all” proposition. The nation’s elderly (11,12), minority, and economically challenged populations, who are at highest risk for diabetes, are growing (11,13–15) and rates of overweight and obesity are escalating (11,16), while health care disparities remain pervasive (17), and issues associated with costs and access to quality care persist.

During these 20 years of change, the NDEP has continued to address its major goal: to prevent or delay T2D onset and reduce illness and premature death caused by its complications (18). The NDEP has adapted to the emerging science; new priorities in diabetes education, prevention, and care; changing demographics; and new communication technologies and priorities. Throughout its history, NDEP has focused on its audience’s needs, developing resources tailored to different cultural groups in multiple languages, age-groups, and varied professions. In its first 10 years, NDEP worked with partners to develop and disseminate print-based educational resources for a variety of audiences to increase awareness and knowledge about diabetes prevention and management. In the next 10 years, the NDEP continued to create new resources to fill gaps but primarily focused on increasing use and adoption of NDEP resources and changing diabetes-related behavior of people with and at risk for diabetes, family members, health care providers, worksites, and community-based organizations. With recognition of the gap between research-proven benefits of therapy and prevention strategies and their implementation in practice, more practice-based and behavioral study findings emerged and translational research expanded (19). The availability of information from studies helped the NDEP transition from a focus on education and the dissemination of research results to a focus on behavioral change (for patients and providers) as the NDEP matured. NDEP also adapted to changing technology, moving to web-based resources, more interactivity, and social media.

Over the course of two decades, the NDEP has evolved from a young, developing program to a mature recognized resource in the diabetes and public health communities. The NDEP has been built with strong partnership engagement and provides science-based educational products and resources for multiple populations and stakeholders. In recognition of NDEP’s 20th anniversary, this review looks back and describes NDEP’s evolution in transforming and communicating diabetes management and T2D prevention strategies through partnerships, campaigns, educational resources, and tools and identifies future opportunities and plans.

RESEARCH DESIGN AND METHODS
The NDEP uses education, communication, and marketing approaches to plan, implement, and evaluate efforts in diabetes prevention and control (20). NDEP strategies and resources 1) are based on scientific evidence, including epidemiologic, clinical, and demonstration studies, and guided by expert opinion across a broad spectrum of issues; 2) engage relevant partners and stakeholders at all stages; 3) are grounded in theory and principles of effective communication, education, and behavior change (e.g., audience focused and culturally tailored, using multiple channels); and 4) include both process and outcome evaluation.

Partner Engagement
Before launching in 1997, the NDEP actively engaged key public- and private-sector stakeholders in four planning meetings to determine how best to plan and structurally organize the program (NDEP, unpublished data). It was decided that initial target audiences would include people with diabetes and their families; health care providers and educators (important groups for reaching and influencing patients); payers, purchasers, and policy makers (people and organizations who could affect access to care); and the public. Special emphasis was given to reaching racial/ethnic minority and underserved populations that have a higher disease burden and worse outcomes.

The NDEP Partnership Network (Fig. 1) evolved from this planning effort, bringing together relevant and forward-looking stakeholders with the ability to increase access to and improve diabetes education efforts for the identified target audiences. Rather than creating new solutions from scratch and competing with existing endeavors, NDEP’s philosophy was to engage established groups and incorporate their respective organizational efforts. In addition, the NDEP’s leadership recognized the importance of engaging nontraditional partners to reach people where they lived, worked, and played. The NDEP partners have expertise in their fields, strong leadership and organizational linkages, strong ties to populations and communities they represent, and other assets needed for a successful partnership. The high stature of the initial partners quickly helped to increase visibility, credibility, and acceptance of the NDEP.

For the first 15 years, the NDEP partnership model consisted of representative work groups that met regularly by phone and every 2 years in person; a 25- to 30-person steering committee of work group leaders and representatives of national partner organizations who met annually to identify priorities and assist in strategic planning; an operations committee of work group chairs and NDEP staff meeting biannually to put the strategic plan into practice; and an executive committee for oversight. The committees and work groups included individuals from professional medical and voluntary health associations; community, minority, and civic organizations; media companies; health care providers; employer, purchaser, and business organizations; and the public. People with T1D and T2D were represented in the work groups. The active partners at any given
time reflected NDEP’s priorities and provided advice and counsel across a broad spectrum of diabetes-related issues. Work group members played an essential role in addressing the needs of high-risk and other priority populations and guiding development and adaptation of materials that would meet the needs of their representative communities. For its 2009–2014 strategic plan, the NDEP focused on dissemination of existing tools and resources, with work group members and other partners playing an important role in identifying effective communication channels and reaching their constituents.

The current strategic plan (2014–2019) (18) was developed when survey data showed high rates of awareness and knowledge and pointed to the need to support people in moving toward behavior change. This resulted in a strategic plan focusing on behavior change, health system strategies, and community-based interventions. The NDEP, its groups and committees, reassessed the partnership structure and operations. A strategic planning task group met multiple times to update partnership objectives and activities and identify ways to make the partnership structure more responsive and effective. A more streamlined partnership model was put into effect that included stakeholders representing specific audience groups and task forces to carry out specific projects, including the development of a new evaluation plan.

NDEP’s Partnership Network provides a “community” for identifying gaps and needs in education and care. Partner networking offers a forum for collaboration, consensus building, dissemination, and training through numerous channels. The NDEP has built strong relationships with other organizations who share a mission to better the lives of people affected by diabetes. For example, the NDEP collaborates with the American Diabetes Association (ADA) on a variety of projects that range from developing school resources to promoting areas of agreement across various clinical guidelines to participating in symposia at ADA meetings.

Projects have been wide-ranging and include development of culturally appropriate and audience-specific diabetes media campaigns and educational materials (e.g., Rayos y Truenos; Control Your Diabetes. For Life; Small Steps. Big Rewards; Family Health History and Diabetes) and intervention tools and resources (e.g., Diabetes at Work website; Working Together to Manage Diabetes: A Toolkit for Pharmacy, Podiatry, Optometry, and Dentistry [PPOD]; Practice Transformation for Physicians and Health Care Teams). As health care professionals apply direction from the growing number of diabetes guidelines and standards being disseminated, interpretation can be conflicting and confusing. In response, the NDEP leveraged its unique role as a convener to bring together partners to prepare the Guiding Principles for Diabetes Care to synthesize areas of agreement. The NDEP’s rich portfolio of tools and resources, listed in Tables 1 and 2, are openly available at no cost.

Use of Education, Communication, Marketing Principles, and Strategies

Throughout its history, the NDEP has developed strategies and messages based on communication research and relied on established behavior change models from health education, communication, and social marketing. Given the relatively young area of diabetes translational science, studies had been limited to reporting a direct association between intervention effectiveness and proximal and intermediate outcomes, particularly around behavior change. The NDEP focused on addressing lifestyle behaviors shown to prevent or delay the onset of T2D (improved nutrition behaviors and increased physical activity) (5) and self-management behaviors associated with better glycemic control and reduction in diabetes-related complications (improved nutrition behaviors; weight management; physical activity; monitoring glucose, blood pressure, and cholesterol; and health provider visits) (National Diabetes Education Program, unpublished data, and refs. 7,9,10). Studies of communication interventions have shown that behavioral impact among interventions that are theory based have extensive reach and exposure and are tailored to specific audiences (21–23).

In addition, the Community Guide for Preventive Services recommends several communication and education-related interventions for behavior change (24–26). NDEP has relied on two major behavior change models, the Communication/Persuasion Model, which presents the process for behavior change starting with exposure to and awareness of messages (27) and Fishbein’s Integrative Model, which incorporates variables from a range of theories shown to predict behavior environmental barriers or enablers,
### Table 1—History of NDEP campaigns, resources, and program objectives/characteristics

| Campaigns | Resources/Characteristics |
|-----------|---------------------------|
| **Diabetes Management Program:** |  |
| • Control Your Diabetes. For Life (1998) | Promote the importance of comprehensive diabetes control; based on findings from the DCCT. |
| • Be Smart About Your Heart: Manage the ABCs of Diabetes (2001) | Promote awareness of the link between diabetes and heart disease. |
| • Managing Diabetes. It’s Not Easy, But It’s Worth It (2009) | Communicate the seriousness and importance of managing diabetes and the idea that managing diabetes is not easy but is worth it. |
| **Type 2 Diabetes Prevention Program:** |  |
| • Small Steps. Big Rewards. Prevent Type 2 Diabetes (2003) | First comprehensive multicultural campaign to translate findings from the landmark DPP. |
| • It’s Never Too Early...To Prevent Diabetes (2010) | Campaign targeting women with a history of gestational diabetes mellitus about their future risk (and their baby’s future risk) of developing T2D. |
| • Family Health History and Diabetes (2012) | Raise awareness about family history as a risk factor for T2D. |
| **Tools and resources** |  |
| **Diabetes Management Program:** |  |
| • 4 Steps to Manage Your Diabetes for Life (multiple languages) | Booklet to help people with diabetes understand, monitor, and manage their diabetes. |
| • Practice Transformation for Physicians and Health Care Teams (formerly known as “Better Diabetes Care”) | Web-based resource designed for health care professionals and administrators who want to change systems of health care delivery around diabetes. |
| • Helping the Student with Diabetes Succeed | Comprehensive guide to help students with diabetes, their health care team, school staff, and parents work together to provide optimal diabetes management in the school setting. |
| • New Beginnings: A Discussion Guide for Living Well with Diabetes | Helps diabetes support group leaders facilitate discussions about the emotional aspects of living with diabetes. |
| • Working Together to Manage Diabetes: A Toolkit for Pharmacy, Podiatry, Optometry, and Dentistry (PPOD). | Tool kit to help PPOD practitioners collaborate with each other and with other members of the health care team to promote better outcomes in people with diabetes. |
| • Living a Balanced Life with Diabetes: A Toolkit Addressing Psychosocial Issues for American Indian and Alaska Native People | Tools to help health care providers address the emotional issues often accompanying diabetes among AIAN individuals, including depression and substance use. |
| • Promoting Medication Adherence in Diabetes | Resource to support health care professionals in promoting medication-taking behavior among their patients and within their teams. |
| • The Power to Control Diabetes Is in Your Hands | Community action kit to assist community organizations help older adults learn how to manage diabetes and live longer, healthier lives (no longer available). |
| • Choosing Healthy Foods (English and Spanish) | Tip sheets for African Americans and 6 Asian American groups on holiday eating and recipe booklet for Hispanic/Latinos. |
| • Developing Community-Based Programs for People with Diabetes | An online training that provides a basic introduction to strategies that community-based organizations can adopt to support people with diabetes. |
| **Type 2 Diabetes Prevention Program:** |  |
| • Choose More Than 50 Ways to Prevent Type 2 Diabetes | Tip sheet for African Americans at risk for T2D to find ways to make lifestyle changes to lower their risk. |
| • Did You Have Gestational Diabetes When You Were Pregnant? | Tip sheet encourages women who had gestational diabetes mellitus to get tested for diabetes after pregnancy and take actions to help the whole family stay healthy. |
| • Family Health History Quiz | Four questions (true/false) to help people understand more about family history and T2D. |
| • Get Real! You Don’t Have to Knock Yourself Out to Prevent Diabetes | Tip sheet helps people at risk for T2D move more and eat less to lower their risk for diabetes. |
| • Move It! And Reduce Your Risk of Diabetes | School kit with diabetes education resources for AIAN youth (no longer available). |
| • Road to Health Toolkit (English and Spanish) | Comprehensive collection of resources to start a community outreach program to delay or prevent T2D in African Americans and Hispanic/Latinos. |

*Continued on p. 213*
the skills and ability to carry out the behavior, and a strong intention to do it (which itself is associated with attitudes, social norms, and self-efficacy) (28). More recently, the program has used the Trans-theoretical Model of Stages of Change (29) to develop messages tailored to meet people at different points on the behavior change continuum.

The NDEP was initiated at a time when knowledge about diabetes was limited (30). The idea that an individual could act to manage his or her diabetes, prevent complications, and prevent or delay T2D was a relatively new concept for people with diabetes and their health care providers. This led to a campaign with educational resources to increase awareness of diabetes, its consequences, and the idea that one could do something about it. However, recognizing that knowledge may be necessary but insufficient to change behavior (30), the NDEP worked with experts in the four initial planning conferences to develop a comprehensive set of program objectives, including increasing awareness and knowledge, but also promoting individual behavior change, addressing health care professionals, promoting an integrated approach to diabetes care, and promoting quality and access to health care policies (31).

Over time, NDEP has changed its focus from increasing awareness and knowledge to improving the skills and self-efficacy and supporting behavior change of people with diabetes and people at risk. NDEP also has addressed those who support people with diabetes or at risk or who can provide access to quality care or provide a supportive environment.

### Planning and Implementation

The NDEP and its partners have developed, tested, and disseminated diabetes prevention and management educational materials for a wide range of audiences, including websites and web-based tools, tool kits, guides, booklets and flyers, videos, webinars, and technical assistance resources. The NDEP’s resources and campaigns start with an evidence base and then use

---

**Table 1—Continued**

| Tools and resources                                                                 |
|-----------------------------------------------------------------------------------|
| Tool kit to provide health care professionals and teams with evidence and resources to identify, counsel, and support patients to prevent or delay T2D. |
| Resource helps people assess their risk for developing diabetes and implement a program to prevent or delay the disease. |
| Fotonovela telling the story of 3 Latina women and their efforts to maintain a healthy lifestyle to prevent or delay T2D. |
| Tool kit to help African Americans learn how to prevent diabetes through increased physical activity and healthy eating (no longer available). |

**Diabetes Management Program and Type 2 Diabetes Prevention Program:**

- **Behavior Change Video Series**
  - Short videos providing information and practical tips on changing behavior to improve outcomes.
- **Diabetes At Work website**
  - Web resource to help the business community address prevention and management of diabetes in the workplace.
- **Diabetes HealthSense**
  - Online library of resources providing tools and programs that support the behavior change process. Diabetes HealthSense has coping with emotions and stress as a major emphasis.
- **Guiding Principles for Diabetes Care**
  - Resource that identifies and synthesizes areas of agreement among existing guidelines.
- **NDEP Cross-Cutting Webinar Series**
  - Quarterly professional development webinars on a range of diabetes education topics by national experts.

**Table 2—History of NDEP measures and outcomes (annual NDEP progress reports)**

| Primary data sources                                                                 |
|-----------------------------------------------------------------------------------|
| NDEP Work Group/Task Group feedback                                               |
| Program records                                                                  |
| Clearinghouse data (calls/materials fulfillment)                                   |
| National and local media coverage (print, radio, television, online)              |
| Social media and website metrics                                                  |
| Webinar records                                                                   |
| Partner surveys                                                                   |
| Program and strategic reviews                                                     |

**NDEP’s first 10 years:**

- Reach of >1 billion impressions through media outreach
- Television and radio PSA (free placement) valued at >$30 million
- >53 million readers through print PSA outreach
- >3 million publications distributed
- >3 million visitors to the YourDiabetesInfo.org website

**20-year milestones:**

- Reach of >5.7 billion impressions through media outreach
- >20 million readers through print PSA outreach
- Nearly 6 million publications distributed
- Nearly 10 million visitors to the YourDiabetesInfo.org website

**Social media**

- >26,100 Facebook followers
- >42,300 Twitter followers
- >8,500 views to NDEP YouTube videos
- >26,000 professionals have attended NDEP’s cross-cutting webinars live or on the website
theory, existing and updated needs assessments, and audience evaluation to inform strategies, messages, and productions.

Needs assessments often start with the NDEP stakeholders and partners identifying gaps, followed by literature reviews, environmental scans of existing resources, and analysis of any existing data. This information informs qualitative formative research (generally focus group discussions) with members of the audience (e.g., Hispanic/Latino people with diabetes, family members, health care professionals) to determine audience needs, perceived benefits and barriers to action, and relevant formats and channels. For example, the need for a resource addressing the emotional aspects of diabetes for use by those working with American Indians and Alaska Natives (AIAN) was first identified by members of the AIAN Work Group. A subgroup then worked with NDEP staff to identify and gather relevant resources and develop tip sheets in response to audience formative research, design the tool kit, test it with audience members, and make revisions, resulting in the Living a Balanced Life with Diabetes tool kit. Messages, materials, and campaigns were pretested with audience members to ensure relevance, understanding, and usefulness. An example of the process used in testing NDEP messages and materials for the Game Plan tool kit for consumers is one that used the results of testing with overweight individuals to validate the content and format and identify needs for future revisions of the resource (32). At every opportunity, representatives from committees and work groups are invited to participate. For example, task force members were invited from the diabetes education and behavioral disciplines to identify gaps and review resources available in Diabetes HealthSense.

Secondary research resources from federal government health surveys such as the National Health and Nutrition Examination Survey (NHANES) provide core data, while partner organizations such as the ADA, American Academy of Nurse Practitioners, Academy of Nutrition and Dietetics, and American Association of Diabetes Educators (AADE) have shared results of public, health care professional, and member surveys to guide NDEP in determining the need and direction for specific campaigns, websites, tools, and resources. Table 1 presents a partial list of resources that are based on extensive audience research and have been tested with relevant groups to ensure that they are understandable, relevant, and culturally appropriate. Many have been translated into Spanish and several into Asian and other languages. The NDEP carefully pretests materials to assess their potential effectiveness and works closely with partners to monitor the impact of materials when they are used. All materials are available from the NDEP websites, with some available in print, and are promoted through a variety of communications channels including NDEP partners, social media, and webinars.

Evaluation

The NDEP bases its program evaluation on CDC’s “Framework for Program Evaluation in Health,” developing a logic model and evaluation plan in 2005 (20,33) and working with an evaluation task group to revise the logic model in 2012 to incorporate changes in direction (20) (Fig. 2). The NDEP’s evaluation task group recognized early on that measuring diabetes outcomes and attributing them directly to a national education effort like the NDEP would be difficult. The task group recommended that evaluation efforts focus on components of the logic model (20) and on specific activities. This was of importance, given the evolution of diabetes care and insights gained over the course of 20 years. For example, the relationship of the persons’ psychosocial, behavioral, and emotional needs and methods to provide effective support for improved diabetes outcomes were just beginning to receive widespread attention (34–36). The NDEP has relied on program evaluation approaches relying on research and reviews reported in the diabetes literature, frequently presented through partner relationships. Frameworks, like the Health Care Continuum, helped to guide evaluation that refers to health status as a distal outcome (37). Process evaluation is designed to measure program implementation, short-term outreach and training effects, and partner engagement through the web, social media metrics, media placement figures, tracking of print materials distribution, partner feedback, and training and webinar evaluations.

The NDEP uses evaluation findings to identify areas in need of midcourse correction and to make improvements. For example, consumer satisfaction and annual partner surveys were used to gain insights on the usefulness of specific NDEP strategies and tools, to identify how and to what extent partners used these resources, and to determine partner’s unmet needs. Over time, the NDEP recognized the importance and opportunities available through technology and evolved to provide partners with content that could be used and consumed across multiple platforms beyond print, including websites, social media, mobile websites, mobile apps, and patient portals. Analysis of website metrics has provided data on the number of people exposed to NDEP’s resources (through visiting the sites and downloading resources) and identified materials that may need revision. Additionally, examining website traffic after promotional activities has shown that promotions are important and need to reach a larger audience.

In addition, the NDEP examines national data to keep abreast of trends such as the health status of people with diabetes who have major risk factors that contribute to diabetes complications, using data from the CDC’s National Health Interview Survey and Behavioral Risk Factor Surveillance System. Long-term outcomes are tracked by data from CDC’s National Health Care Surveys, NHANES, and the National Health Interview Survey, which provide data and reports on prevention of diabetes complications as well as incidence and prevalence of blindness, kidney failure, amputations, and cardiovascular disease (CVD). Follow-up observational studies such as those from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)–supported DCCT/Epidemiology of Diabetes Interventions and Complications (EDIC) study (38), and the DPP Outcomes Study (DPPOS) (39) also provide data and reports on prevention and diabetes-related complications and are relied upon to track long-term outcomes. The NDEP monitors these trends and uses results to determine what messages and educational activities the program needs to emphasize.

To measure diabetes awareness, knowledge, and behavior over time, the NDEP conducts the National Diabetes Education Program Survey (NDEPS). The NDEPS is a periodic population-based probability survey of U.S. adults that has been conducted in 2006, 2008, 2011, and 2014. Questions are designed to capture information from specific populations and to assess attitudes,
perceptions, and beliefs about diabetes. Survey findings have provided insights for program development. For example, the 2011 NNDS showed that <10% of people surveyed understood that heart attacks, CVD, stroke, and hypertension are linked to diabetes. This finding suggested a need for the NDEP to reenergize efforts to communicate the link between diabetes and CVD, the actions people can take to reduce their risk for heart disease and stroke, and the critical importance of comprehensive management of diabetes (30). The NDEP refreshed its Be Smart About Your Heart: Control the ABCs of Diabetes campaign and worked with partners, including the media, to promote awareness and to encourage people with diabetes to manage their diabetes ABCs (A1C, Blood Pressure, Cholesterol and stop smoking), and to develop an action plan to stay healthy. Webinars were also conducted with NDEP partners to increase awareness about the relationship between prediabetes/diabetes and CVD, to review current prevention and treatment guidelines for CVD and diabetes, and to encourage provision of information about the diabetes-CVD link early in the education process.

The NDEP also organizes original evaluation studies to gain insights into its programs that have been implemented with partner organizations. For example, the NDEP collaborated with the AADE to evaluate the Diabetes HealthSense resource, an online compendium of more than 150 resources designed to promote behavior change and to address the psychosocial and lifestyle-change challenges associated with diabetes self-management. Selected AADE education program sites were identified and participated in randomized two-group pretest/posttest design (40). The purpose was to assess how the Diabetes HealthSense website can be used to help individuals with or at risk for diabetes improve their knowledge, attitudes, and behaviors related to management or prevention of the disease and to gauge diabetes educators’ and patients’ experience and satisfaction with the site. Evaluation has also been conducted on NDEP tools that have been integrated into large-scale studies. For example, the NDEP’s 4 Steps to Manage Your Diabetes for Life booklet provides key strategies to help people with diabetes better understand, monitor, and manage their disease. This booklet was used in the NIDDK-supported Glycemia Reduction Approaches in Diabetes: A Comparative Effectiveness (GRADE) study. The NDEP partnered with GRADE study investigators to determine whether diabetes and management self-efficacy increased after exposure to the booklet (41).

RESULTS
Over its 20-year existence, the NDEP and its partners have developed and evaluated numerous evidence-based, culturally and linguistically appropriate messages and resources. Table 1 gives just a sample of both diabetes management and T2D prevention resources that have been made available to the diabetes community. Campaign messages range from motivational and empowering to empathetic and encouraging with messages such as “Managing diabetes. It’s not easy, but it’s worth it.” The NDEP’s extensive catalog of information and education materials is offered in multiple formats and languages for people with diabetes, people at risk,
health care professionals, state and local health departments, diabetes coalitions, employers, and schools and communities. Tools and resources include a variety of approaches such as booklets, tip sheets, tool kits, videos, websites, and webinars.

The NDEP’s reach has grown over the past 20 years (Table 1). In its first decade, NDEP messages were reported to have just over 1 billion impressions through media outreach. Television, print, and radio public service announcements (PSAs) reached millions, with more than 53 million readers reached through print PSAs alone. In addition, more than 3 million NDEP publications were distributed through partners or sent directly to users (NIDDK Health Information Center, unpublished data). At the time, when websites were just beginning to be used as an informational resource, more than 3 million people visited the NDEP’s original YourDiabetes Info website, currently available at ndep.nih.gov and cdc.gov/diabetes/ndep websites. Over the next decade, additional milestones included nearly 6 billion impressions through media outreach and print PSA outreach. Nearly 6 million publications were distributed, and nearly 10 million visitors have gained access to the NDEP website, and many have received information from NDEP social media channels through Facebook, Twitter, and YouTube. NDEP webinars presented by experts on a range of diabetes education topics are each regularly attended by as many as 1,000 health and community-based professionals.

While the NDEP’s evaluation efforts provide valuable data to guide future program planning, it is limited in its ability to measure the direct impact of NDEP campaign messages and materials. Studies conducted to evaluate Diabetes HealthSense and GRADE are encouraging. Key findings from the Diabetes HealthSense evaluation conducted in partnership with the AADE showed that participants who were introduced to the Diabetes HealthSense website by a diabetes educator and encouraged to continue using the site made significant increases in self-reported knowledge, self-efficacy, and healthy behaviors (23). Participants also showed significant improvement in their self-efficacy and healthy behaviors from pretest to posttest compared with a control group. Diabetes educators expressed satisfaction with Diabetes HealthSense as a tool for use with patients to support and extend the reach of DSMES.

CONCLUSIONS
The NDEP takes pride in providing educational resources to the diabetes community while continuing to evaluate and explore additional opportunities for meeting their educational needs. The NDEP’s history is a story of partnerships. The program’s success in continuing to engage diverse partners after 20 years has led to time-proven and high-quality resources that have been sustained. The NDEP’s partners have provided access to scientific, clinical, community, and audience expertise; increased message consistency across partner organizations; helped reduce duplication and leverage limited resources; and provided the inspiration of working with numerous colleagues who are passionately committed to diabetes prevention and control. Over two decades, NDEP has adapted to incorporate advances in the science and in communication approaches and technologies. Today, NDEP maintains a national repository of diabetes education tools and resources that are high quality, science- and audience-based, culturally and linguistically appropriate, and available free of charge to a wide variety of audiences.

Lessons Learned
A great deal has changed in 20 years. The NDEP recognizes the need to continue to listen, learn, and stay relevant to meet the needs of the diabetes community. For example, we recognize the opportunity in engaging new partners who are working to meet the needs of their diabetes community. NDEP is now working with worksite and technology companies that are relying on NDEP educational content in their video libraries and resources like the NDEP behavior change video series. We have learned that being flexible and willing to adapt and keeping an eye to the future are more important than ever as diabetes science, population dynamics, and technology are changing and moving at a rapid pace. At the inception of NDEP in 1997, it is unlikely that NDEP’s founders could have predicted the rising rates of diabetes; the science and technology available today, and that health care disparities would continue. The NDEP realizes that it takes a variety of stakeholders across numerous sectors to keep pace. The need to nurture and maintain current partnerships, along with exploring relationships with collaborators in areas such as technology, the behavioral sciences, and people living with diabetes in local communities, is critically important.

In the early days, the NDEP worked to disseminate information to improve knowledge. This was at a time when approaches to patient care were directive and people were expected to do what they were told. The burden of care was the responsibility of the providing physician. The psychosocial needs of the person living with diabetes, like depression and diabetes distress, had not been identified or recognized. Findings from behavioral and translational science informed the diabetes community that living with a chronic disease takes an emotional toll—that the patient is the center of care and team approaches are the best predictor of success. Linking the clinical and public health sectors so patients can more effectively implement care recommendations when they return home and providing knowledge that translates into addressing the emotional and behavioral needs are critical components of success. Messages and resources for our audiences needed to change accordingly. We have learned that when it comes to evaluating a health education program, mapping program activities directly to improved health outcomes can be very difficult. Furthermore, attributing the impact of any national program is a challenge because the lack of a comparison group makes it difficult to separate the effects of the program itself from those of other contextual factors. National health education programs tend to be complicated, with multiple audiences, strategies, activities, and messages. While the NDEP’s evaluation framework and logic
model have succeeded in guiding and informing short- and long-term strategic planning, additional methods must be identified to ensure further evaluation of the program.

The Future
The NDEP was established to translate research findings and promote education. It recognizes its role in informing and partnering with the very organizations whose charge is to promote advocacy on behalf of those affected by diabetes. With that responsibility, NDEP will continue to work with its partners to facilitate knowledge and behavior change in support of the diabetes community. This endeavor continues to be important, given the growing global burden of diabetes, the changing dynamics of the U.S. population, and the continuing national health disparities. The NDEP serves as a trusted “one-stop shop” for resources that attend to today’s “hot topics,” e.g., diabetes distress, self-management, practice transformation, and primary prevention. At the same time, new opportunities to enhance reach through technology demand that NDEP explore technology-based delivery solutions.

The NDEP is currently undergoing a careful review of its resources and processes. An initial internal review of currently available resources, website traffic, and costs has recently been conducted. Based on the review, the NDEP recognizes that a more timely, relevant, and engaging approach would be beneficial while continuing to focus on the topics outlined in the NDEP’s strategic plan (18). Additionally, the review identified resources already available from other organizations and partners, and the NDEP will inform audiences about these other resources while focusing on addressing unfilled gaps. The NDEP will continue to focus on underserved populations and communities to address inequities. The NDEP will continue to collaborate with partners and inform stakeholders about relevant diabetes management and T2D prevention topics and explore methods to develop a nimble system in reaching its audiences. Looking back at our accomplishments can be a rewarding activity; however, diabetes demands that NDEP not rest on its laurels and, instead, look forward toward reaching our goals.

Acknowledgments. The NDEP’s 20 years would not have been possible without the significant contributions of its founders, leaders from the diabetes community, dedicated partners, and committed stakeholders.

Duality of Interest. No potential conflicts of interest relevant to this article were reported.

Author Contributions. L.M.S. contributed to the review conception and design, critical analysis of the results, and preparing the drafts and final manuscript. A.A. and J.F. contributed to the analysis and provided multiple reviews and final drafting. J.G., J.M., and D.T. contributed to the literature search, program description, program development, multiple reviews, and final drafting. B.R. and F.W. provided background from a historical perspective. L.M.S. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

References
1. Nathan DM, Genuth S, Lachin J, et al.; Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 1993;329:977–986.
2. UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. BMJ 1998;317:703–713.
3. Clark CM, Fradkin JE, Hiss RG, Lorenz RA, Vinicor F, Warren-Boulton E. Promoting early diagnosis and treatment of type 2 diabetes: the National Diabetes Education Program. JAMA 2000;284:363–365.
4. Tuomilehto J, Lindström J, Eriksson JG, et al.; Finnish Diabetes Prevention Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med 2001;344:1343–1350.
5. Knowler WC, Barrett-Connor E, Fowler SE, et al.; Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 2002;346:393–403.
6. Albright AL, Gregg EW. Preventing type 2 diabetes in communities across the U.S.: the National Diabetes Prevention Program. Am J Prev Med 2013;44(Suppl. 4):S346–S351.
7. Bantle JP, Wylie-Rosett J, Albright AL, et al.; American Diabetes Association. Nutrition recommendations and interventions for diabetes: a Position Statement of the American Diabetes Association. Diabetes Care 2008;31(Suppl. 1):S61–S78.
8. Young-Hyman D, de Groot M, Hill-Briggs F, Gonzalez JS, Hood K, Peyrot M. Psychosocial care for people with diabetes: a Position Statement of the American Diabetes Association. Diabetes Care 2016;39:2126–2140.
9. Powers MA, Bardsley J, Cypress M, et al.; diabetes self-management education and support in type 2 diabetes: a Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. Clin Diabetes 2016;34:70–80.
10. Beck J, Greenwood DA, Blanton L, et al.; 2017 Standards Revision Task Force. 2017 national standards for diabetes self-management education and support. Diabetes Educ 2017;43:449–464.
11. Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA, U.S. Department of Health and Human Services, 2017.
12. Kirkman MS, Briscoe VI, Clark N, et al. Diabetes in older adults. Diabetes Care 2012;35:2650–2664.
13. Chow EA, Foster H, Gonzalez V, McIver L. The disparate impact of diabetes on racial/ethnic minority populations. Clin Diabetes 2012;39:130–133.
14. Krishnan S, Cozier YC, Rosenberg L, Palmer JR. Socioeconomic status and incidence of type 2 diabetes: results from the Black Women’s Health Study. Am J Epidemiol 2010;171:564–570.
15. Narayan KM, Boyle JP, Geiss LS, Saadine JB, Thompson TJ. Impact of recent increase in incidence on future diabetes burden: U.S., 2005–2050. Diabetes Care 2006;29:2114–2126.
16. Centers for Disease Control and Prevention. Obesity and overweight [Internet], 2016. Available from https://www.cdc.gov/nchs/fastats/obesity-overweight.htm. Accessed 8 May 2017.
17. Meyer, PA, Yoon P, Kaufman RB. CDC Health Disparities and Inequalities Report—United States. MMWR 2013;62(Suppl. 3):1–187.
18. National Diabetes Education Program. NDEP Strategic Plan for 2014–2019. Available from https://www.niddk.nih.gov/health-information/health-commUNICATION-PROGRAMS/ndep/about-ndep/strategic-plan/Pages/strategic-directions.aspx. Accessed 24 April 2017.
19. Fisher EB, Fitzgibbon ML, Glasgow RE, et al. Behavior matters. Am J Prev Med 2012;40:e15–e30.
20. Gallivan J, Greenberg R, Brown C. The National Diabetes Education Program evaluation framework: how to design an evaluation of a multifaceted public health education program (Abstract). Prev Chronic Dis 2008;5:A134.
21. Hornik RC. Public Health Communication: Evidence for Behavior Change. Mahwah, NJ, Lawrence Erlbaum Associates, 2002.
22. Snyder LB, Hamilton MA, Mitchell EW, Kiwanuka-Tondo J, Fleming-Milici F, Proctor D. A meta-analysis of the effect of mediated health communication campaigns on behavior change in the United States. J Health Commun 2004;9(Suppl. 1):71–96.
23. Noar SM, Harrington NG, Aldrich RS. The role of message tailoring in the development of persuasive health communication messages. In Communication Yearbook 33. New York, Routledge, 2009, p. 73–133.
24. Community Preventive Services Task Force. Diabetes: combined diet and physical activity promotion programs to prevent type 2 diabetes among people at increased risk [Internet]. 2014. Available from https://www.thecommunityguide.org/findings/diabetes-combined-diet-and-physical-activity-promotion-programs-prevent-type-2-diabetes. Accessed 18 August 2017.
25. Task Force on Community Preventive Services. Diabetes management: interventions engaging community health workers [Internet]. 2017. Available from https://www.thecommunityguide.org/findings/diabetes-management-interventions-engaging-community-health-workers. Accessed 18 August 2017.
26. Task Force on Community Preventive Services. Diabetes management: intensive lifestyle interventions for patients with type 2 diabetes [Internet]. 2016. Available from https://www.thecommunityguide.org/findings/diabetes-intensive-lifestyle-interventions-patients-type-2-diabetes. Accessed 18 August 2017.
27. McGuire WJ. Theoretical foundations of campaigns. In Public Communication Campaigns. Rice RE, Atkins CK, Eds. Newbury Park, CA, Sage Publications, 1989, p. 43–65.
28. Fishbein M, Cappella JN. The role of theory in developing effective health communications. J Commun 2006;56:51–517.
29. Prochaska JO, DiClemente CC. The transtheoretical approach. In Handbook of Psychotherapy Integration (Oxford Series in Clinical Psychology). Norcross JC, Goldfried MR, Eds. 2nd ed. New York, Oxford University Press, 2005, p. 147–171.
30. Griffey S, Piccinino L, Gallivan J, Lotenberg LD, Tuncer D. Applying national survey results for strategic planning and program improvement: the National Diabetes Education Program. Eval Program Plann 2015;48:83–89.
31. Leontos C, Wong F, Gallivan J, Lising M; The National Diabetes Education Program Strategic Planning Committee. National Diabetes Education Program: opportunities and challenges. J Am Diet Assoc 1998;98:73–75.
32. Gallivan J, Greenberg R, Leontos C. Role of food and nutrition professionals in stemming the diabetes epidemic. J Am Diet Assoc 2007;107:1394–1397.
33. Framework for program evaluation in public health. MMWR Recomm Rep 1999;48:1–40.
34. Rubin RR, Peyrot M, Sinimerio LM. Health care and patient-reported outcomes: results of the cross-national Diabetes Attitudes, Wishes and Needs (DAWN) study. Diabetes Care 2006; 29:1249–1255.
35. Nicolucci A, Kovacs Burns K, Holt RI, et al.; DAWN2 Study Group. Diabetes Attitudes, Wishes and Needs second study (DAWN2): cross-national benchmarking of diabetes-related psychosocial outcomes for people with diabetes. Diabet Med 2013;30:767–777.
36. Peyrot M, Burns KK, Davies M, et al. Diabetes Attitudes Wishes and Needs 2 (DAWN2): a multinational, multi-stakeholder study of psychosocial issues in diabetes and person-centred diabetes care. Diabetes Res Clin Pract 2013;99:174–184.
37. Mulcahy K, Maryniuk M, Peeples M, et al. Diabetes self-management education core outcomes measures. Diabetes Educ 2003;29:768–770, 773–784, 787–788 passim.
38. National Institute of Diabetes and Digestive and Kidney Diseases. DCCT and EDIC: the Diabetes Control and Complications Trial and follow-up study [Internet]. Available from https://www.niddk.nih.gov/about-niddk/research-areas/diabetes/dcct-edic-diabetes-control-complications-trial-follow-up-study/Pages/default.aspx. Accessed 8 May 2017.
39. National Institute of Diabetes and Digestive and Kidney Diseases. Diabetes Prevention Program Outcomes Study (DPPOS) [Internet]. Available from https://www.niddk.nih.gov/news/for-reporters/diabetes-prevention-program-outcomes-study/Pages/default.aspx. Accessed 8 May 2017.
40. Sadler MD, Saperstein SL, Carpenter C, et al. Community evaluation of the National Diabetes Education Program’s Diabetes HealthSense website. Diabetes Educ 2017;43:476–485.
41. Devchand R, Nicols C, Gallivan JM, et al.; GRADE Research Group. Assessment of a National Diabetes Education Program diabetes management booklet: the GRADE experience. J Am Assoc Nurse Pract 2017;29:255–263.
42. Piccinino L, Griffey S, Gallivan J, Lotenberg LD, Tuncer D. Recent trends in diabetes knowledge, perceptions, and behaviors: implications for national diabetes education. Health Educ Behav 2015;42:687–696.