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## How Population Health Can Address Diabetes | WHITE PAPER

Diabetes mellitus and associated complications have increased dramatically in the United States, up 40 percent from 2002 to 2010.[1] The disease affects 25.8 million Americans at an annual cost of $174 billion, and is the sixth leading cause of death in the U.S., as well as the leading cause of kidney failure, non-traumatic amputations and new cases of blindness.[2] A chronic and progressive illness, diabetes requires early diagnosis, effective coordination of care and diligent self-management to stem its progression. Shortcomings in current care of diabetes are complex and multi-faceted. New population health management strategies, supported by a new generation of health information technologies, hold promise to improve outcomes.

## Challenges

Timely diagnosis presents an ongoing challenge. Of the Americans affected by diabetes, nearly a third—an estimated 7 million—have yet to be diagnosed. Because of this lag, roughly 25 percent of those newly diagnosed with type 2 diabetes already have microvascular complications. Even with an effective screening program, the median delay from the onset of diabetes to physician diagnosis was 2.4 years, with more than 7 percent of cases remaining undiagnosed for at least 7.5 years.[3] Finding more effective ways to identify undiagnosed individuals – as well as pre-diabetics who are trending toward the illness – is critical.

## Complex Conditions

Fragmentation in healthcare services receives much of the blame for what has been called a 'quality chasm' in diabetes care. Chronic patients often see over a dozen different physicians in a year. An Institute of Medicine study has shown that, even within the provider community of a given hospital, medical errors result most often from a lack of effective data-sharing and teamwork.[4]

Transitioning from acute care to other settings increases the risk of such disconnects. The patient or family often ends up saddled with the daunting task of coordinating care across the medical community. Studies have determined that adults with a chronic illness typically receive only 56 percent of the care recommended by clinical guidelines due to ineffective transitions and/or personal barriers.[5]

## Poor Self-Management

Because diabetes is heavily influenced by lifestyle choices, managing the disease means managing behavior. Getting chronic patients to take more responsibility for looking after their own health is a challenge, particularly for diabetics, who face a long struggle in managing their condition.

A typical 15- to 20-minute office visit leaves negligible time to discuss self-management, a critical element of diabetes care. In addition, patient education often takes a unilateral, one-size-fits-all approach that doesn't address the patient's individual needs, goals or resources. The less a patient is engaged as a unique individual and active participant in the care plan, the less likely s/he is to adhere to that plan. According to CDC data, compliance among diabetes patients with a range of measures—from immunizations to cholesterol control to more direct diabetes performance indicators—falls short. In a 2004 study, just 46 percent of diabetics surveyed had received influenza vaccinations, 39 percent had received pneumococcal vaccinations and only 69 percent had had their hemoglobin A1c measured in the past year.[6]

## Enabling a Population-Health Strategy

Provider and payer organizations are embracing population health management as a core strategy for addressing shortfalls in diabetes care. Once they have defined a patient cohort of interest – based on diagnosis, age, geographic region and other factors – organizations set out to identify gaps in care, stratify the cohort based on risk, engage patients, manage care and measure outcomes. They use education, outreach, prevention, treatment and assessment to reach people before, during and after medical intervention. Deployment of new generation population health IT can enable organizations to meet the new demands of such a strategy.

1  *National Diabetes Fact Sheet*, 2011. Centers for Disease Control: National Center for Chronic Disease Prevention and Health Promotion
2  *National Diabetes Fact Sheet*, 2011. Centers for Disease Control: National Center for Chronic Disease Prevention and Health Promotion
3  Samuels, TA, Cohen D, Brancati, FL, Coresh, J, Kao, WH. "Delayed diagnosis of incident type 2 diabetes mellitus in the ARIC study." Am J Manag Care. 2006 Dec;12(12):717-24
4  *The Fragmentation of U.S. Health Care: Causes and Solutions*. Einer Elhauge, ed. 2010: Oxford Univ Press, pp. 3-4.
5  American Diabetes Association. Standards of medical care in diabetes – 2011. *Diabetes Care* 34: supplement 1.
6  American Diabetes Association. Standards of medical care in diabetes – 2011. *Diabetes Care* 34: supplement 1.

# How Population Health Can Address Diabetes

Through the joint efforts of clinicians, financial analysts and IT teams, strategists have mapped three paths based on population-health principles to achieving better diabetes outcomes at lower cost:

1. **Identify relevant patients and stratify them according to clinical risk –** Use predictive analysis of aggregated data to identify at-risk patients, reduce delays in diagnosis, consistently manage care according to established guidelines, and allocate resources more efficiently.

2. **Coordinate care across the continuum –** Improve collaboration across the care community to eliminate miscommunication among providers and ineffective transitions between care settings. Deploy care management programs to provide more intensive guidance to those at highest risk.

3. **Engage the patient to improve outcomes –** Include the patient and family as active members of the care team to motivate self-management, increase satisfaction and better enable compliance with proven preventive practices.

## Stratifying Patients by Risk

Diabetic populations pose a high level of risk due to the prevalence of multiple complications associated with the disease. Achieving early glycemic control in newly diagnosed patients can dramatically reduce this risk, but early treatment requires timely diagnosis. Even with effective screening programs, an alarming number of cases slip through the cracks for several years. Automated patient identification systems and surveillance applications that ingest data in near-real time can help healthcare organizations close this gap and begin intervention at the earliest possible date.

As an example, researchers at the University of California/ San Francisco devised a case-finding algorithm that accurately identified diabetic patients within a healthcare system's member population, leveraging data in near-real time, making early recognition of diabetes much more likely. Previously, "we would have missed a quarter of the cases in our cohort," said endocrinologist and principal investigator Anil Makam, MD. "Another 11 percent would have had a delayed diagnosis."[7]

Rather than providing a single risk score, advanced surveillance applications use multiple risk assessments and predictions to identify and stratify patients. This allows more flexibility in targeting individual members or populations. Once patients have been stratified, care managers can determine which patients would benefit most from managed care programs and other bundled-care pathways. Data-driven analysis thus allows care providers to allocate intensive, evidence-based interventions to those who truly need them. Equally important, it curtails use of a catch-all approach that can exhaust precious resources by applying the most costly treatments to all patients whether or not they are indicated.

In addition to speeding the diagnosis of diabetes, analytics can help to identify pre-diabetic individuals who have presented high glycemic levels – or are *trending* in that direction – but who do not yet register as diabetics based on diagnosis or clinical indicators. Such early identification can prompt assignment to a glycemic control program that can slow or halt progression toward a diabetic diagnosis.

By integrating both clinical and financial risk analysis into care management at the patient level – and into diabetes management at the population level – healthcare systems can manage care to optimize clinical and financial outcomes.

## Coordination of Care is Essential

Effective diabetes care requires collaboration among an array of clinical and non-clinical providers. Patients utilize services across the entire medical neighborhood –dietitians, labs, exercise physiologists, behavioral health specialists and long-term care facilities – as well as a range of specialty physicians. Population health requires the development of care programs targeted to the needs of a specific population and integration of IT systems that enable delivery of seamless service over time and across care settings.

As an exemplary case study, the Hawaii Island Beacon Community (HIBC) implemented a regional health information exchange and a 'healthcare intelligence platform' that analyzes clinical and claims data to realize its vision of a connected healthcare community. In partnership with Hilo Medical Center and the island's largest payer, HMSA, HIBC demonstrated how integrating healthcare technology with innovative population-health practices can improve the quality and efficiency of care in an ethnically diverse, geographically scattered, low per-capita income population.[8]

HIBC posted consensus-based treatment plans that enable clinicians to better coordinate care, especially for patients with complex diagnoses. They also activated a notification system— enabled by the health information exchange-- to alert primary care providers whenever any new information about their patients is received from any care setting.

As a top priority of the initiative, HIBC sought to ensure high-quality referrals and transitions based on a full understanding of the patient's needs and care preferences. The implemented systems enabled sharing of this information among providers, institutions, patients and their families as patients moved from one healthcare setting to another.

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7   Anil N. Makam, Oanh K Nguyen, Billy Moore, Ying Ma and Ruben Amarasingham. "Identifying patients with diabetes and the earliest date of diagnosis in real time: an electronic health record case-finding algorithm." *Medical Informatics and Decision Making*, vol 13: 81 (2013).
8   Hawaii Island Beacon Community – 2012 Annual Report.

Kristine I. McCoy, MD, MPH, director of the family medicine residency program at the associated Hilo Medical Center, stated that the technology provides "a complete picture of health for individual patients in both the hospital and outpatient settings. As a team, we'll be more effective and efficient, with fewer redundancies, and the patient will feel understood and safe, thanks to these connections."[9]

## Patient Engagement is Integral to Diabetes Care

Because they face a long struggle in managing their condition, motivating diabetics to manage their own health poses a perennial challenge. Offering them a variety of ways to interact with the rest of the care team makes them more inclined to 'buy in.' Self-management – such as modifying lifestyle, staying on schedule with medications and building a support network – can be reinforced through team-based practices that leverage sophisticated patient-engagement technology.

Efforts to transform diabetes care align with the aims of the patient centered medical home (PCMH), which has emerged chiefly as a strategy for improving primary care for the chronically ill. Actively managed diabetes care calls for patient empowerment, self-management and team-based care – all integral elements of PCMH transformation.

In a fully transformed PCMH workflow, the patient experiences a planned office visit because the team has already assembled results from recent lab work and specialist consultations and merged this data with the patient's medical history. Patient or their families are expected to track glucometer readings and enter other information into a personal health record (PHR) or patient portal.[10]

During the visit, the team addresses barriers to care, attending to clinical, psychological and social needs, to enable the patient to manage his or her own care.

9   Hawaii Island Beacon Community – 2012 Annual Report.
10 Trajko Bojadzievski, MD and Robert A. Gabbay, MD, PhD, "Patient-centered medical home and diabetes." *Diabetes Care*, April 2011, pp. 1047-1053.
11 Hawaii Island Beacon Community – 2012 Annual Report.

After the visit, care coordinators follow up with high-risk patients to address potential adherence problems, and track referral visits to subspecialty consultants, diabetes educators or nutritionists to ensure that appointments are kept and care is received. When new problems arise –insulin dosages, medication side effects or transportation barriers, for example – a care coordinator responds via secure messaging or home-monitoring typically on a round-the-clock basis.

At HBIC, each enrolled diabetic patient was assigned a care-coordinator nurse, a health coach and an in-home health monitoring system. The home-monitoring technology enabled them to take their own biometric readings for blood pressure, blood sugar and weight; submit the data electronically to the nurse; track their own progress; log food intake, exercise and activities; and communicate with the nurse via video calls.

The HIBC program's brief 12-month duration project produced the following results:[11]

- HbA1c blood sugar levels reduced by 36 percent;
- Triglyceride levels reduced by 37 percent;
- Inpatient hospital admissions reduced by 29 percent;
- Emergency room visits reduced by 25 percent.

## Positive Impact of Health IT on Diabetes Care

Diabetes has a significant personal and financial impact on the United States. Despite the enormity of the problem, positive results can be achieved through the application of best practices, supported by a new generation of health IT technologies specifically designed to support population health initiatives. Stratification and identification of at-risk patients, coordination of care across the health system and patient engagement to promote effective self-management all contribute to improved clinical outcomes and financial results.

For information on Caradigm's solutions for risk stratification, care coordination, care management and patient engagement, please visit www.caradigm.com.

# ABOUT CARADIGM

Caradigm is a healthcare analytics and population health company dedicated to helping organizations improve care, reduce costs and manage risk. Caradigm analytics solutions provide insight into patients, populations and performance, enabling healthcare organizations to understand their clinical and financial risk and identify the actions needed to address it. Caradigm population health solutions enable teams to deliver the appropriate care to patients through effective coordination and patient engagement, helping to improve outcomes and financial results.

The key to Caradigm analytics and population health solutions is a rich set of clinical, operational and financial data delivered to healthcare professionals within their workflows in near-real time. This data asset serves as the foundation for a growing number of innovative healthcare applications developed by Caradigm and industry partners, providing rapid incremental value to customers. For more information about the company, please visit www.caradigm.com.

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