

Population Health Management for Diabetes: Health Care System-Level Approaches for Improving Quality and Addressing Disparities

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Abstract

Purpose of Review Population care approaches for diabetes have the potential to improve the quality of care and decrease diabetes-related mortality and morbidity. Population care strategies are particularly relevant as accountable care organizations (ACOs), patient-centered medical homes (PCMH), and integrated delivery systems are increasingly focused on managing chronic disease care at the health system level. This review outlines the key elements of population care approaches for diabetes in the current health care environment. **Recent Findings** Population care approaches proactively identify diabetes patients through disease registries and electronic health record data and utilize multidisciplinary care teams, personalized provider feedback, and decision support tools to target and care for patients at risk for poor outcomes. Existing evidence suggests that these strategies can improve care outcomes and potentially ameliorate existing race/ethnic disparities in health care. However, such strategies may be less effective for patients who are disengaged from the health care system. **Summary** As population care for diabetes continues to evolve, future initiatives should consider ways to tailor population care to meet individual patient needs, while

leveraging improvements in clinical information systems and care integration to optimally manage and prevent diabetes in the future.

Keywords Population care · Diabetes · Population health · Quality improvement · Disparities · Chronic illness care

Introduction

Diabetes mellitus is a chronic health condition affecting more than 29 million people in the USA [1]. In addition to its negative effects on patients' health and quality of life, diabetes is also costly to individual patients, their families, and society at large [2–7]. Optimal management of diabetes requires a complex and demanding self-management regimen involving the monitoring of symptoms and blood glucose levels, adherence to medication, efforts at smoking cessation when necessary, and often difficult changes in diet and physical activity level [8–9].

Despite recent decreases in the rates of diabetes-related complications [10], the overall number of diabetes cases has increased steadily in the past decades [11]. For example, the CDC has suggested without major changes in health behaviors, one in three Americans will have diabetes by the year 2050 [12]. Diabetes continues to disproportionately affect vulnerable subgroups such as racial and ethnic minorities and those with low income and education attainment [13, 14]. As diabetes continues to affect larger portions of the US and global populations, effective health care approaches that address diabetes at the population level are urgently needed.

The Chronic Care Model developed by Ed Wagner and colleagues in the 1990s put forth a model of chronic disease care that highlights the role of addressing disease management at the population level [15]. This model emphasizes health care system design strategies that leverage clinical information

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systems and decision support tools in an effort to optimize population-level disease care, patient self-management, and patient access to community resources. Since the Chronic Care Model was first introduced, health policy initiatives such as accountable care organizations (ACOs), patient-centered medical homes (PCMHs), meaningful use of electronic health records, and Medicare reform have continued to increase the focus on accountability for patient-centered care and outcomes [16–20]. Clinicians, researchers, and health care system leaders face the challenge of creating, maintaining, and improving health care delivery systems that can proactively identify their diabetes populations and provide them with evidence-based patient-centered care. The purpose of this paper is to give an overview of the recent literature and evidence base for current population care management practices and characterize the key components of population health management for diabetes care. In addition, we discuss the role of population-level care in addressing health care disparities and outline a potential research and policy agenda for continuing to improve diabetes population management over time.

Key Components of Diabetes Population Management

Diabetes Population Registries

The starting point for diabetes population management is a comprehensive registry that defines the patients who are in a health care system's population. In this context, a health care system can be a physician practice, a health plan, an integrated delivery system, or a geographic population at a city, county, state, or national level [21–22]. Registries can be formed using diabetes-related diagnosis, laboratory, and/or prescription data available through both claim databases and electronic health records (EHRs). Early diabetes registries often relied on claim data; however, even as EHR use has become much more widespread [17], the ability to automatically harness individual-level data into registries that can be harnessed for population care may not exist without additional investment and technology. Research suggests that disease registries are a critical component for improving chronic disease care for conditions such as diabetes [23], and that their formation and use are fostered through the use of clinical information systems proposed in the Chronic Care Model framework [24–25]. Once a diabetes registry is formed, it can be used as a foundation for proactive care monitoring and improvement, and to identify and track patients at risk for diabetes complications and related mortality and morbidity. The continued development, maintenance, and expansion of diabetes care registries are an important foundation for population health-level diabetes care moving forward.

Electronic Health Records

While EHR data is not necessary for forming a disease population registry, comprehensive EHR-based data on processes and outcomes of care can significantly improve diabetes registry quality. An EHR allows care data to be linked across care delivery sites (lab, pharmacy, inpatient, outpatient, etc.) to both manage individual care (e.g., individuals overdue for eye exams) and track population-level outcomes (e.g., the proportion of patients with neuropathy) [26]. EHRs can also allow ordering of lab tests and medications at the point of care, provider prompts, and secure messaging between patients and their providers. EHRs also enhance the ability to conduct comparative effectiveness research across a range of diabetes outcomes [27]. Recent research suggests that when clinicians and practices use electronic health records, as opposed to traditional paper-based records, they enhance their ability to provide high-quality diabetes population care [28–29].

Team-Based Diabetes Care

Team-based care that is multidisciplinary, and includes a range of providers across settings, is an important component of population care [26]. A diabetes care team can take many forms but may include primary care physicians, medical assistants (MAs), nurses, health education and behavioral medicine specialists, nutritionists, and endocrinologists. When a diabetes care team has registries and EHR data at its disposal, it can use these tools to proactively identify patients at elevated risk who might not be achieving care goals and outreach to patients to address nutrition, exercise, medication use, and other aspects of self-care that happen at home and within the community. An ideal care team is centered on the patient's needs and concerns and includes primary care, specialty care, and health education providers [30]. Evidence suggests that when care is provided by a multidisciplinary team in a population context, diabetes complications can be reduced [31]. It is important to note that with team-based care approaches comes an additional need to coordinate care across providers and settings. Population care that uses clinical information tools and data to facilitate care coordination has the potential to maximize efforts and improve health care outcomes [32].

Information on Race/Ethnicity and Preferred Language

When population care management strategies have access to patient-level information on race/ethnicity, and preferred language, they have the potential to identify and address disparities in chronic disease care and outcomes [33•, 34]. One health care system that implemented a population care management program for colorectal cancer screening that focused on identifying patients overdue for screening and facilitated screening outreach outside of the physician office visit

was able to both increase screening rates and reduce disparities [33••]. In another example, one population care management program for hypertension was able to not only increase rates of blood pressure control for the whole population but also decrease the gap in blood pressure control between Blacks/African Americans and Whites by strengthening care teams for hypertension and incorporating culturally tailored communication and self-management tools [35].

Health care providers who deliver care in a patient's primary language may improve their communication and rapport with patients, which may lead to better outcomes. In one study for example, Spanish-speaking patients who had Spanish-speaking doctors had better adherence to diabetes medications [36]. Access to information about primary language can help health care systems deliver care in the language most appropriate for each patient. When clinical information systems contain the demographic, socioeconomic, and language information necessary for identifying and targeting potentially vulnerable groups, they can be used by care teams to better tailor care in a way that is both language and culturally appropriate [35, 38••], leading to improvements in overall quality and a reduction in disparities.

Decision Support Tools and Feedback

As noted by Wagner and colleagues [15, 23–24], effective models for chronic disease care emphasize decision support tools that can be used to guide evidence-based, guideline-concordant care that is consistent with patient needs and preferences. Registries and EHRs can provide timely information to care teams, and EHRs in particular can be designed to include “best practice alerts” for physicians that flag potential diabetes care concerns and offer evidence-based guidance. Ideally, clinical information systems will include tools that embed evidence-based guidelines directly into practice and further the integration of specialist expertise with primary care [15]. Research suggests that the use of decision support tools as an element of population care, combined with timely feedback to the care team providers on performance of recommended diabetes care practices and patient outcomes, is a key element of effective diabetes population management [22, 37].

Limitations to Current Population Care Approaches and New Directions

Diabetes care processes and outcomes have improved significantly in recent years, during a time when clinical information systems have expanded, and diabetes population care practices, along with key policies and incentives designed to encourage these practices, have grown [38••].

However, there is also evidence that while improvements for the overall population in diabetes complications, morbidity, and mortality have been dramatic, they have been accompanied by potential increases in racial/ethnic disparities in these outcomes [13–14]. A major concern for population care approaches is that while their systematic approach can improve quality of care, their standardization comes with an increased chance that individuals who are not engaged with the health care system may “fall through the cracks” [39]. Population care should be designed in ways that help empower patients to be more engaged with their health care system, address patient-centered outcomes [20], and are in tune with each individual's barriers and facilitators to receiving optimal care that meets their needs [22, 37]. For example, the Chronic Care Model recommends population care approaches that connect patients with community-based resources that can address disease risk factors outside of the clinical context [15], which can be of particular value for patients who are not regularly accessing the traditional health care system. In addition, mobile applications and other strategies that encourage engagement and sharing of lifestyle and other data between patients and care teams may be important new frontiers for diabetes population care.

Population care for managing chronic conditions has been adopted for a wide range of conditions, including diabetes, congestive heart failure, and hypertension, and implemented across a range of clinical settings within the USA [40]. The US population is aging, and the number of residents who are 65 and older is expected to double by 2050 [41]. As our population ages, the number of patients who have multiple chronic conditions will continue to increase. Approaches to care management are often “siloesd” by disease, with different providers responsible for separate clinical areas. Future approaches to population care for diabetes should be well-integrated with care for other chronic conditions a patient may have, reducing the burden on patients and increasing the efficiency of the health care system.

Glasgow and others have suggested that approaches shown to be successful for chronic disease management could be also adopted as an effective approach for preventing diabetes and other chronic diseases [42]. Even as diabetes complication rates decrease, the incidence of diabetes continues to affect significant portions of the population, including younger age groups [10]. Policies such as the recently approved Medicare eligibility for covering Diabetes Prevention Program participation [43] for patients at high risk for developing diabetes are examples of how health care policies can encourage the spread prevention programs at the population level. Leveraging registries of high-risk patients, clinical information systems, feedback, and decision support towards preventing diabetes is an important new frontier in expanding population care principles.

Recommendations for Future Research and Policy

Many research studies have noted that the use of the Chronic Care Model and population-based care strategies are strongly correlated with external incentives and other policy initiatives designed to improve care at the population level [24, 28, 38••, 40, 44]. Our current review of the evidence suggests that population-based approaches to diabetes care have significant potential for continuing to improve diabetes care and outcomes and are well-aligned with current policy initiatives to increase both the accountability and patient centeredness of the US health care system. However, our review of the literature also found that there are a limited number of published evaluations of specific diabetes population care approaches, and those that are published may not have the level of programmatic detail required for dissemination into other settings. Future research in this area should continue to identify, rigorously evaluate, and publish results from high-quality “natural experiments” in diabetes population care management [45].

As we write this review, there are major questions regarding the future of both the Affordable Care Act and Medicare policy, and uncertainty as to what the health care policy landscape holds for chronic disease care in general. However, we believe that issues surrounding the affordability and efficiency of health care will remain top priorities in the coming years, and that the future of diabetes population care initiatives lies on our ability to better understand how to provide the highest *value* in diabetes care to the largest portion of the population [46]. In addition, it is important that we continue to promote policies and engage in research that helps to ensure that best practices in diabetes population care are implemented and disseminated in ways that ameliorate racial and ethnic disparities in health care outcomes. Research results have a significantly greater potential to directly impact care practices when researchers work closely with patient, clinical, health care system, and policy stakeholders [47–48]. We recommend that those studying how to continue to improve population care for diabetes engage directly with a wide range of stakeholders to help shape the health care policy agenda.

Conclusions

Population care for diabetes that uses effective principles of care management can have a significant impact on diabetes quality and outcomes of care. As population care for diabetes continues to evolve, future research should consider ways to tailor population care to individual patient needs and vulnerable subgroups, while leveraging improvements in information technology and data integration to optimally manage and prevent diabetes in the future.

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Compliance with Ethical Standards

Conflict of Interest Julie Schmittiel, Anjali Gopalan, Mark Lin, Somalee Banerjee, Christopher Chau, and Alyce Adams declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any new studies with human or animal subjects performed by any of the authors.

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