



American Diabetes Association

1. Improving Care and Promoting Health in Populations: *Standards of Medical Care in Diabetes—2020*

Diabetes Care 2020;43(Suppl. 1):S7–S13 | <https://doi.org/10.2337/dc20-S001>

The American Diabetes Association (ADA) “Standards of Medical Care in Diabetes” includes the ADA’s current clinical practice recommendations and is intended to provide the components of diabetes care, general treatment goals and guidelines, and tools to evaluate quality of care. Members of the ADA Professional Practice Committee, a multidisciplinary expert committee (<https://doi.org/10.2337/dc20-SPPC>), are responsible for updating the Standards of Care annually, or more frequently as warranted. For a detailed description of ADA standards, statements, and reports, as well as the evidence-grading system for ADA’s clinical practice recommendations, please refer to the Standards of Care Introduction (<https://doi.org/10.2337/dc20-SINT>). Readers who wish to comment on the Standards of Care are invited to do so at professional.diabetes.org/SOC.

DIABETES AND POPULATION HEALTH

Recommendations

- 1.1 Ensure treatment decisions are timely, rely on evidence-based guidelines, and are made collaboratively with patients based on individual preferences, prognoses, and comorbidities. **B**
- 1.2 Align approaches to diabetes management with the Chronic Care Model. This model emphasizes person-centered team care, integrated long-term treatment approaches to diabetes and comorbidities, and ongoing collaborative communication and goal setting between all team members. **A**
- 1.3 Care systems should facilitate team-based care and utilization of patient registries, decision support tools, and community involvement to meet patient needs. **B**
- 1.4 Assess diabetes health care maintenance (see **Table 4.1**) using reliable and relevant data metrics to improve processes of care and health outcomes, with simultaneous emphasis on care costs. **B**

Population health is defined as “the health outcomes of a group of individuals, including the distribution of health outcomes within the group”; these outcomes can be measured in terms of health outcomes (mortality, morbidity, health, and functional status), disease burden (incidence and prevalence), and behavioral and metabolic factors (exercise, diet, A1C, etc.) (1). Clinical practice recommendations for health care providers are tools that can ultimately improve health across populations; however, for optimal outcomes, diabetes care must also be individualized for each patient. Thus, efforts to improve population health will require a combination of system-level and patient-level approaches. With such an integrated approach in mind, the American Diabetes Association (ADA) highlights the importance of *patient-centered care*, defined as care that considers individual patient comorbidities and prognoses; is respectful of and responsive to patient preferences, needs, and values; and ensures that patient values guide all clinical decisions (2). Clinical practice recommendations,

Suggested citation: American Diabetes Association. 1. Improving care and promoting health in populations: Standards of Medical Care in Diabetes—2020. *Diabetes Care* 2020;43(Suppl. 1):S7–S13

© 2019 by the American Diabetes Association. Readers may use this article as long as the work is properly cited, the use is educational and not for profit, and the work is not altered. More information is available at <http://www.diabetesjournals.org/content/license>.

whether based on evidence or expert opinion, are intended to guide an overall approach to care. The science and art of medicine come together when the clinician is faced with making treatment recommendations for a patient who may not meet the eligibility criteria used in the studies on which guidelines are based. Recognizing that one size does not fit all, the standards presented here provide guidance for when and how to adapt recommendations for an individual.

Care Delivery Systems

The proportion of patients with diabetes who achieve recommended A1C, blood pressure, and LDL cholesterol levels has remained stagnant in recent years (3). In 2013–2016, 64% of adults with diagnosed diabetes met individualized A1C target levels, 70% achieved recommended blood pressure control, 57% met the LDL cholesterol target level, and 85% were nonsmokers (3). Only 23% met targets for glycemic, blood pressure, and cholesterol measures while also avoiding smoking (3). The mean A1C nationally among people with diabetes increased slightly from 7.3% in 2005–2008 to 7.5% in 2013–2016 based on the National Health and Nutrition Examination Survey (NHANES), with younger adults, women, and non-Hispanic black individuals less likely to meet treatment targets (3). Certain segments of the population, such as young adults and patients with complex comorbidities, financial or other social hardships, and/or limited English proficiency, face particular challenges to goal-based care (4–6). Even after adjusting for these patient factors, the persistent variability in the quality of diabetes care across providers and practice settings indicates that substantial system-level improvements are still needed.

Diabetes poses a significant financial burden to individuals and society. It is estimated that the annual cost of diagnosed diabetes in 2017 was \$327 billion, including \$237 billion in direct medical costs and \$90 billion in reduced productivity. After adjusting for inflation, economic costs of diabetes increased by 26% from 2012 to 2017 (7). This is attributed to the increased prevalence of diabetes and the increased cost per person with diabetes. Ongoing population health strategies are needed in order to reduce costs and provide optimized care.

Chronic Care Model

Numerous interventions to improve adherence to the recommended standards have been implemented. However, a major barrier to optimal care is a delivery system that is often fragmented, lacks clinical information capabilities, duplicates services, and is poorly designed for the coordinated delivery of chronic care. The Chronic Care Model (CCM) takes these factors into consideration and is an effective framework for improving the quality of diabetes care (8).

Six Core Elements. The CCM includes six core elements to optimize the care of patients with chronic disease:

1. Delivery system design (moving from a *reactive* to a *proactive* care delivery system where planned visits are coordinated through a team-based approach)
2. Self-management support
3. Decision support (basing care on evidence-based, effective care guidelines)
4. Clinical information systems (using registries that can provide patient-specific and population-based support to the care team)
5. Community resources and policies (identifying or developing resources to support healthy lifestyles)
6. Health systems (to create a quality-oriented culture)

A 5-year effectiveness study of the CCM in 53,436 primary care patients with type 2 diabetes suggested that the use of this model of care delivery reduced the cumulative incidence of diabetes-related complications and all-cause mortality (9). Patients who were enrolled in the CCM experienced a reduction in cardiovascular disease (CVD) risk by 56.6%, microvascular complications by 11.9%, and mortality by 66.1% (9). The same study suggested that health care utilization was lower in the CCM group, resulting in health care savings of \$7,294 per individual over the study period (10).

Redefining the roles of the health care delivery team and empowering patient self-management are fundamental to the successful implementation of the CCM (11). Collaborative, multidisciplinary teams are best suited to provide care for people with chronic conditions such as diabetes and to facilitate patients' self-management (12–14). There are references to guide the implementation of the CCM into

diabetes care delivery, including opportunities and challenges (15).

Strategies for System-Level Improvement

Optimal diabetes management requires an organized, systematic approach and the involvement of a coordinated team of dedicated health care professionals working in an environment where patient-centered high-quality care is a priority (6,16,17). While many diabetes processes of care have improved nationally in the past decade, the overall quality of care for patients with diabetes remains suboptimal (3). Efforts to increase the quality of diabetes care include providing care that is concordant with evidence-based guidelines (18); expanding the role of teams to implement more intensive disease management strategies (6,19,20); tracking medication-taking behavior at a systems level (21); redesigning the organization of the care process (22); implementing electronic health record tools (23,24); empowering and educating patients (25,26); removing financial barriers and reducing patient out-of-pocket costs for diabetes education, eye exams, diabetes technology, and necessary medications (6); assessing and addressing psychosocial issues (27,28); and identifying, developing, and engaging community resources and public policies that support healthy lifestyles (29). The National Diabetes Education Program maintains an online resource (www.betterdiabetescare.nih.gov) to help health care professionals design and implement more effective health care delivery systems for those with diabetes.

Care Teams

The care team, which centers around the patient, should avoid therapeutic inertia and prioritize timely and appropriate intensification of lifestyle and/or pharmacologic therapy for patients who have not achieved the recommended metabolic targets (30–32). Strategies shown to improve care team behavior and thereby catalyze reductions in A1C, blood pressure, and/or LDL cholesterol include engaging in explicit and collaborative goal setting with patients (33,34); identifying and addressing language, numeracy, or cultural barriers to care (35–37); integrating evidence-based guidelines and clinical information tools into the process of care (18,38,39); soliciting performance feedback, setting reminders, and providing structured care (e.g., guidelines,

formal case management, and patient education resources) (6); and incorporating care management teams including nurses, dietitians, pharmacists, and other providers (19,40). Initiatives such as the Patient-Centered Medical Home show promise for improving health outcomes by fostering comprehensive primary care and offering new opportunities for team-based chronic disease management (41).

Telemedicine

Telemedicine is a growing field that may increase access to care for patients with diabetes. Telemedicine is defined as the use of telecommunications to facilitate remote delivery of health-related services and clinical information (42). A growing body of evidence suggests that various telemedicine modalities may be effective at reducing A1C in patients with type 2 diabetes compared with usual care or in addition to usual care (43). For rural populations or those with limited physical access to health care, telemedicine has a growing body of evidence for its effectiveness, particularly with regard to glycemic control as measured by A1C (44–46). Interactive strategies that facilitate communication between providers and patients, including the use of web-based portals or text messaging and those that incorporate medication adjustment, appear more effective. There is limited data available on the cost-effectiveness of these strategies.

Behaviors and Well-being

Successful diabetes care also requires a systematic approach to supporting patients' behavior change efforts. High-quality diabetes self-management education and support (DSMES) has been shown to improve patient self-management, satisfaction, and glucose outcomes. National DSMES standards call for an integrated approach that includes clinical content and skills, behavioral strategies (goal setting, problem solving), and engagement with psychosocial concerns (28). For more information on DSMES, see Section 5 "Facilitating Behavior Change and Well-being to Improve Health Outcomes" (<https://doi.org/10.2337/dc20-S005>).

Cost Considerations

The cost of diabetes medications, particularly insulin, is an ongoing barrier to achieving glycemic goals. Up to 25% of

patients who are prescribed insulin report cost-related insulin underuse (47). The cost of insulin has continued to increase in recent years for reasons that are not entirely clear. There are recommendations from the ADA Insulin Access and Affordability Working Group for approaches to this issue from a systems level. Recommendations including concepts such as cost-sharing for insured people with diabetes should be based on the lowest price available, list price for insulins that closely reflect net price, and health plans that ensure that people with diabetes can access insulin without undue administrative burden or excessive cost (48).

Access to Care and Quality Improvement

The Affordable Care Act has resulted in increased access to care for many individuals with diabetes with an emphasis on the protection of people with preexisting conditions, health promotion, and disease prevention (49). In fact, health insurance coverage increased from 84.7% in 2009 to 90.1% in 2016 for adults with diabetes aged 18–64 years. Coverage for those ≥ 65 years remained near universal (50). Patients who have either private or public insurance coverage are more likely to meet quality indicators for diabetes care (51). As mandated by the Affordable Care Act, the Agency for Healthcare Research and Quality developed a National Quality Strategy based on the triple aims that include improving the health of a population, overall quality and patient experience of care, and per capita cost (52,53). As health care systems and practices adapt to the changing landscape of health care, it will be important to integrate traditional disease-specific metrics with measures of patient experience, as well as cost, in assessing the quality of diabetes care (54,55). Information and guidance specific to quality improvement and practice transformation for diabetes care is available from the National Diabetes Education Program practice transformation website and the National Institute of Diabetes and Digestive and Kidney Diseases report on diabetes care and quality (56,57). Using patient registries and electronic health records, health systems can evaluate the quality of diabetes care being delivered and perform intervention cycles as part of quality improvement strategies (58). Critical to these efforts is provider adherence to clinical practice recommendations (see **Table 4.1**)

and the use of accurate, reliable data metrics that include sociodemographic variables to examine health equity within and across populations (59).

In addition to quality improvement efforts, other strategies that simultaneously improve the quality of care and potentially reduce costs are gaining momentum and include reimbursement structures that, in contrast to visit-based billing, reward the provision of appropriate and high-quality care to achieve metabolic goals (60) and incentives that accommodate personalized care goals (6,61).

TAILORING TREATMENT FOR SOCIAL CONTEXT

Recommendations

- 1.5 Providers should assess social context, including potential food insecurity, housing stability, and financial barriers, and apply that information to treatment decisions. **A**
- 1.6 Refer patients to local community resources when available. **B**
- 1.7 Provide patients with self-management support from lay health coaches, navigators, or community health workers when available. **A**

Health inequities related to diabetes and its complications are well documented and are heavily influenced by social determinants of health (62–66). Social determinants of health are defined as the economic, environmental, political, and social conditions in which people live and are responsible for a major part of health inequality worldwide (67). The ADA recognizes the association between social and environmental factors and the prevention and treatment of diabetes and has issued a call for research that seeks to better understand how these social determinants influence behaviors and how the relationships between these variables might be modified for the prevention and management of diabetes (68). While a comprehensive strategy to reduce diabetes-related health inequities in populations has not been formally studied, general recommendations from other chronic disease models can be drawn upon to inform systems-level strategies in diabetes. For example, the National Academy of Medicine has published a framework for educating health care professionals on the

importance of social determinants of health (69). Furthermore, there are resources available for the inclusion of standardized sociodemographic variables in electronic medical records to facilitate the measurement of health inequities as well as the impact of interventions designed to reduce those inequities (70–72).

Social determinants of health are not always recognized and often go undiscussed in the clinical encounter (65). A study by Piette et al. (73) found that among patients with chronic illnesses, two-thirds of those who reported not taking medications as prescribed due to cost never shared this with their physician. In a study using data from the National Health Interview Survey (NHIS), Patel et al. (65) found that one-half of adults with diabetes reported financial stress and one-fifth reported food insecurity. One population in which such issues must be considered is older adults, where social difficulties may impair the quality of life and increase the risk of functional dependency (74) (see Section 12 “Older Adults,” <https://doi.org/10.2337/dc20-S012>, for a detailed discussion of social considerations in older adults). Creating systems-level mechanisms to screen for social determinants of health may help overcome structural barriers and communication gaps between patients and providers (65,75). In addition, brief, validated screening tools for some social determinants of health exist and could facilitate discussion around factors that significantly impact treatment during the clinical encounter. Below is a discussion of assessment and treatment considerations in the context of food insecurity, homelessness, and limited English proficiency/low literacy.

Food Insecurity

Food insecurity is the unreliable availability of nutritious food and the inability to consistently obtain food without resorting to socially unacceptable practices. Over 18% of the U.S. population reported food insecurity between 2005–2014 (76). The rate is higher in some racial/ethnic minority groups, including African American and Latino populations, low-income households, and homes headed by a single mother. The rate of food insecurity in individuals with diabetes may be up to 20% (77). Additionally, the risk for type 2 diabetes is increased twofold in those with food insecurity (68) and has been associated

with low adherence to taking medications appropriately and recommended self-care behaviors, depression, diabetes distress, and worse glycemic control when compared with individuals who are food secure (78,79). Older adults with food insecurity are more likely to have emergency department visits and hospitalizations compared with older adults who do not report food insecurity (80). Risk for food insecurity can be assessed with a validated two-item screening tool (81) that includes the statements: 1) “Within the past 12 months we worried whether our food would run out before we got money to buy more” and 2) “Within the past 12 months the food we bought just didn’t last and we didn’t have money to get more.” An affirmative response to either statement had a sensitivity of 97% and specificity of 83%.

Treatment Considerations

In those with diabetes and food insecurity, the priority is mitigating the increased risk for uncontrolled hyperglycemia and severe hypoglycemia. Reasons for the increased risk of hyperglycemia include the steady consumption of inexpensive carbohydrate-rich processed foods, binge eating, financial constraints to filling diabetes medication prescriptions, and anxiety/depression leading to poor diabetes self-care behaviors. Hypoglycemia can occur as a result of inadequate or erratic carbohydrate consumption following the administration of sulfonylureas or insulin. See **Table 9.1** for drug-specific and patient factors, including cost and risk of hypoglycemia, for the treatment options for adults with food insecurity and type 2 diabetes. Providers should consider these factors when making treatment decisions in people with food insecurity and seek local resources that might help patients with diabetes and their family members to more regularly obtain nutritious food (82).

Homelessness

Homelessness often accompanies many additional barriers to diabetes self-management, including food insecurity, literacy and numeracy deficiencies, lack of insurance, cognitive dysfunction, and mental health issues (83). The prevalence of diabetes in the homeless population is estimated to be around 8% (84). Additionally, patients with diabetes who

are homeless need secure places to keep their diabetes supplies, as well as refrigerator access to properly store their insulin and take it on a regular schedule. Risk for homelessness can be ascertained using a brief risk assessment tool developed and validated for use among veterans (85). Given the potential challenges, providers who care for homeless individuals should be familiar with resources or have access to social workers that can facilitate temporary housing for their patients as a way to improve diabetes care.

Migrant and Seasonal Agricultural Workers

Migrant and seasonal agricultural workers may have a higher risk of type 2 diabetes than the overall population. While migrant farmworker-specific data are lacking, most agricultural workers in the U.S. are Latino, a population with a high rate of type 2 diabetes. Living in severe poverty brings with it food insecurity, high chronic stress, and increased risk of diabetes; there is also an association between the use of certain pesticides and the incidence of diabetes (85a).

Data from the Department of Labor indicates that there are 2.5–3 million agricultural workers in the U.S., and these agricultural workers travel throughout the country serving as the backbone for a multibillion-dollar agricultural industry. According to 2018 health center data, 174 health centers across the U.S. reported that they provided health care services to 579,806 adult agricultural patients, and 78,332 had encounters for diabetes (13.5%) (86).

Migrant farmworkers encounter numerous and overlapping barriers to receiving care. Migration, which may occur as frequently as every few weeks for farmworkers, disrupts care. Cultural and linguistic barriers, lack of transportation and money, lack of available work hours, unfamiliarity with new communities, lack of access to resources, and other barriers prevent migrant farmworkers from accessing health care. Without regular care, those with diabetes may suffer severe and often expensive complications that affect quality of life.

Health care providers should be attuned to the working and living conditions of all patients. If a migrant farmworker with diabetes presents for care, appropriate referrals should be initiated to social

workers and community resources, as available, to assist with removing barriers to care.

Language Barriers

Providers who care for non-English speakers should develop or offer educational programs and materials in multiple languages with the specific goals of preventing diabetes and building diabetes awareness in people who cannot easily read or write in English. The National Standards for Culturally and Linguistically Appropriate Services in Health and Health Care (National CLAS Standards) provide guidance on how health care providers can reduce language barriers by improving their cultural competency, addressing health literacy, and ensuring communication with language assistance (87). The National CLAS Standards website offers a number of resources and materials that can be used to improve the quality of care delivery to non-English-speaking patients (87).

Community Support

Identification or development of community resources to support healthy lifestyles is a core element of the CCM (8). Health care community linkages are receiving increasing attention from the American Medical Association, the Agency for Healthcare Research and Quality, and others as a means of promoting translation of clinical recommendations for lifestyle modification in real-world settings (88). Community health workers (CHWs) (89), peer supporters (90–92), and lay leaders (93) may assist in the delivery of DSMES services (70,94), particularly in underserved communities. A CHW is defined by the American Public Health Association as a “frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served” (95). CHWs can be part of a cost-effective, evidence-based strategy to improve the management of diabetes and cardiovascular risk factors in underserved communities and health care systems (96).

References

- Kindig D, Stoddart G. What is population health? *Am J Public Health* 2003;93:380–383
- Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: The National Academies Press, 2001 (<https://doi.org/10.17226/10027>)
- Kazemian P, Shebl FM, McCann N, Walensky RP, Wexler DJ. Evaluation of the cascade of diabetes care in the United States, 2005–2016. *JAMA*

- Intern Med*. 12 August 2019 [Epub ahead of print]. DOI: 10.1001/jamainternmed.2019.2396
- Kerr EA, Heisler M, Krein SL, et al. Beyond comorbidity counts: how do comorbidity type and severity influence diabetes patients' treatment priorities and self-management? *J Gen Intern Med* 2007;22:1635–1640
- Fernandez A, Schillinger D, Warton EM, et al. Language barriers, physician-patient language concordance, and glycemic control among insured Latinos with diabetes: the Diabetes Study of Northern California (DISTANCE). *J Gen Intern Med* 2011;26:170–176
- TRIAD Study Group. Health systems, patients factors, and quality of care for diabetes: a synthesis of findings from the TRIAD study. *Diabetes Care* 2010;33:940–947
- American Diabetes Association. Economic costs of diabetes in the U.S. in 2017. *Diabetes Care* 2018;41:917–928
- Stellefson M, Dipnarine K, Stopka C. The chronic care model and diabetes management in US primary care settings: a systematic review. *Prev Chronic Dis* 2013;10:E26
- Wan EYF, Fung CSC, Jiao FF, et al. Five-year effectiveness of the multidisciplinary Risk Assessment and Management Programme-Diabetes Mellitus (RAMP-DM) on diabetes-related complications and health service uses—a population-based and propensity-matched cohort study. *Diabetes Care* 2018;41:49–59
- Jiao FF, Fung CSC, Wan EYF, et al. Five-year cost-effectiveness of the multidisciplinary Risk Assessment and Management Programme-Diabetes Mellitus (RAMP-DM). *Diabetes Care* 2018;41:250–257
- Coleman K, Austin BT, Brach C, Wagner EH. Evidence on the Chronic Care Model in the new millennium. *Health Aff (Millwood)* 2009;28:75–85
- Piatt GA, Anderson RM, Brooks MM, et al. 3-Year follow-up of clinical and behavioral improvements following a multifaceted diabetes care intervention: results of a randomized controlled trial. *Diabetes Educ* 2010;36:301–309
- Katon WJ, Lin EHB, Von Korff M, et al. Collaborative care for patients with depression and chronic illnesses. *N Engl J Med* 2010;363:2611–2620
- Parchman ML, Zeber JE, Romero RR, Pugh JA. Risk of coronary artery disease in type 2 diabetes and the delivery of care consistent with the chronic care model in primary care settings: a STARNet study. *Med Care* 2007;45:1129–1134
- Del Valle KL, McDonnell ME. Chronic care management services for complex diabetes management: a practical overview. *Curr Diab Rep* 2018;18:135
- Tricco AC, Ivers NM, Grimshaw JM, et al. Effectiveness of quality improvement strategies on the management of diabetes: a systematic review and meta-analysis. *Lancet* 2012;379:2252–2261
- Schmittiel J, Gopalan A, Lin MW, Banerjee S, Chau CV, Adams AS. Population health management for diabetes: health care system-level approaches for improving quality and addressing disparities. *Curr Diab Rep* 2017;17:31
- O'Connor PJ, Bodkin NL, Fradkin J, et al. Diabetes performance measures: current status and future directions. *Diabetes Care* 2011;34:1651–1659
- Jaffe MG, Lee GA, Young JD, Sidney S, Go AS. Improved blood pressure control associated with

- a large-scale hypertension program. *JAMA* 2013;310:699–705
- Peikes D, Chen A, Schore J, Brown R. Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries: 15 randomized trials. *JAMA* 2009;301:603–618
- Raebel MA, Schmittiel J, Karter AJ, Konieczny JL, Steiner JF. Standardizing terminology and definitions of medication adherence and persistence in research employing electronic databases. *Med Care* 2013;51(Suppl. 3):S11–S21
- Feifer C, Nemeth L, Nietert PJ, et al. Different paths to high-quality care: three archetypes of top-performing practice sites. *Ann Fam Med* 2007;5:233–241
- Reed M, Huang J, Graetz I, et al. Outpatient electronic health records and the clinical care and outcomes of patients with diabetes mellitus. *Ann Intern Med* 2012;157:482–489
- Cebul RD, Love TE, Jain AK, Hebert CJ. Electronic health records and quality of diabetes care. *N Engl J Med* 2011;365:825–833
- Battersby M, Von Korff M, Schaefer J, et al. Twelve evidence-based principles for implementing self-management support in primary care. *Jt Comm J Qual Patient Saf* 2010;36:561–570
- Grant RW, Wald JS, Schnipper JL, et al. Practice-linked online personal health records for type 2 diabetes mellitus: a randomized controlled trial. *Arch Intern Med* 2008;168:1776–1782
- 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
- Beck J, Greenwood DA, Blanton L, et al.; 2017 Standards Revision Task Force. 2017 National standards for diabetes self-management education and support. *Diabetes Care* 2017;40:1409–1419
- Pullen-Smith B, Carter-Edwards L, Leathers KH. Community health ambassadors: a model for engaging community leaders to promote better health in North Carolina. *J Public Health Manag Pract* 2008;14(Suppl.):S73–S81
- Davidson MB. How our current medical care system fails people with diabetes: lack of timely, appropriate clinical decisions. *Diabetes Care* 2009;32:370–372
- Selby JV, Uratsu CS, Fireman B, et al. Treatment intensification and risk factor control: toward more clinically relevant quality measures. *Med Care* 2009;47:395–402
- Raebel MA, Ellis JL, Schroeder EB, et al. Intensification of antihyperglycemic therapy among patients with incident diabetes: a Surveillance Prevention and Management of Diabetes Mellitus (SUPREME-DM) study. *Pharmacoepidemiol Drug Saf* 2014;23:699–710
- Grant RW, Pabon-Nau L, Ross KM, Youatt EJ, Pandiscio JC, Park ER. Diabetes oral medication initiation and intensification: patient views compared with current treatment guidelines. *Diabetes Educ* 2011;37:78–84
- Tamhane S, Rodriguez-Gutierrez R, Hargraves I, Montori VM. Shared decision-making in diabetes care. *Curr Diab Rep* 2015;15:112
- Schillinger D, Piette J, Grumbach K, et al. Closing the loop: physician communication with diabetic patients who have low health literacy. *Arch Intern Med* 2003;163:83–90

36. Rosal MC, Ockene IS, Restrepo A, et al. Randomized trial of a literacy-sensitive, culturally tailored diabetes self-management intervention for low-income Latinos: Latinos en control. *Diabetes Care* 2011;34:838–844
37. Osborn CY, Cavanaugh K, Wallston KA, et al. Health literacy explains racial disparities in diabetes medication adherence. *J Health Commun* 2011;16(Suppl. 3):268–278
38. Garg AX, Adhikari NKJ, McDonald H, et al. Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: a systematic review. *JAMA* 2005;293:1223–1238
39. Smith SA, Shah ND, Bryant SC, et al.; Evidens Research Group. Chronic care model and shared care in diabetes: randomized trial of an electronic decision support system. *Mayo Clin Proc* 2008;83:747–757
40. Stone RA, Rao RH, Sevick MA, et al. Active care management supported by home telemonitoring in veterans with type 2 diabetes: the DiaTel randomized controlled trial. *Diabetes Care* 2010;33:478–484
41. Bojadziewski T, Gabbay RA. Patient-centered medical home and diabetes. *Diabetes Care* 2011;34:1047–1053
42. American Telemedicine Association. About Telehealth [Internet], 2018.. Available from: <http://www.americantelemed.org/main/about/about-telemedicine/telemedicine-faqs>. Accessed 25 October 2019
43. Lee SWH, Chan CKY, Chua SS, Chaiyakunapruk N. Comparative effectiveness of telemedicine strategies on type 2 diabetes management: a systematic review and network meta-analysis. *Sci Rep* 2017;7:12680
44. Faruque LI, Wiebe N, Ehteshami-Afshar A, et al.; Alberta Kidney Disease Network. Effect of telemedicine on glycated hemoglobin in diabetes: a systematic review and meta-analysis of randomized trials. *CMAJ* 2017;189:E341–E364
45. Marcolino MS, Maia JX, Alkmim MBM, Boersma E, Ribeiro AL. Telemedicine application in the care of diabetes patients: systematic review and meta-analysis. *PLoS One* 2013;8:e79246
46. Heitkemper EM, Mamykina L, Travers J, Smaldone A. Do health information technology self-management interventions improve glycemic control in medically underserved adults with diabetes? A systematic review and meta-analysis. *J Am Med Inform Assoc* 2017;24:1024–1035
47. Herkert D, Vijayakumar P, Luo J, et al. Cost-related insulin underuse among patients with diabetes. *JAMA Intern Med* 2019;179:112–114
48. Cefalu WT, Dawes DE, Gavlak G, et al.; Insulin Access and Affordability Working Group. Insulin Access and Affordability Working Group: Conclusions and recommendations. *Diabetes Care* 2018;41:1299–1311
49. Myerson R, Laiterapong N. The Affordable Care Act and diabetes diagnosis and care: exploring the potential impacts. *Curr Diab Rep* 2016;16:27
50. Casagrande SS, McEwen LN, Herman WH. Changes in health insurance coverage under the Affordable Care Act: a national sample of U.S. adults with diabetes, 2009 and 2016. *Diabetes Care* 2018;41:956–962
51. Insurance coverage and diabetes quality indicators among patients in NHANES. *Am J Manag Care* 2016;22:484–90
52. Stiefel M, Nolan K. Measuring the triple aim: a call for action. *Popul Health Manag* 2013;16:219–220
53. Agency for Healthcare Research & Quality. About the National Quality Strategy, [Internet], 2017. Available from: <https://www.ahrq.gov/workingforquality/about/index.html>. Accessed 25 October 2019
54. National Quality Forum. Homepage [Internet], 2017. Available from: <http://www.qualityforum.org/Home.aspx>. Accessed 25 October 2019
55. Burstin H, Johnson K. Getting to Better Care and Outcomes for Diabetes Through Measurement. Evidence-Based Diabetes Management [Internet], 2016. Available from: <http://www.ajmc.com/journals/evidence-based-diabetes-management/2016/march-2016/getting-to-better-care-and-outcomes-for-diabetes-through-measurement>. Accessed 25 October 2019
56. Practice Transformation [Internet], 2017. Available from: <https://www.niddk.nih.gov/health-information/health-communication-programs/ndep/health-care-professionals/practice-transformation/Pages/resourcedetail.aspx>. Accessed 25 October 2019
57. Diabetes Care and Quality: Past, Present, and Future [Internet], 2017. Available from: <https://www.niddk.nih.gov/health-information/health-communication-programs/ndep/health-care-professionals/practice-transformation/defining-quality-care/diabetes-care-quality/Pages/default.aspx>. Accessed 25 October 2019
58. O'Connor PJ, Sperl-Hillen JM, Fazio CJ, Averbeck BM, Rank BH, Margolis KL. Outpatient diabetes clinical decision support: current status and future directions. *Diabet Med* 2016;33:734–741
59. Centers for Medicare & Medicaid Services.. CMS Equity Plan for Medicare [Internet], 2017. Available from: <https://www.cms.gov/About-CMS/Agency-Information/OMH/equity-initiatives/equity-plan.html>. Accessed 25 October 2019
60. Rosenthal MB, Cutler DM, Feder J. The ACO rules—striking the balance between participation and transformative potential. *N Engl J Med* 2011;365:e6
61. Washington AE, Lipstein SH. The Patient-Centered Outcomes Research Institute—promoting better information, decisions, and health. *N Engl J Med* 2011;365:e31
62. Hutchinson RN, Shin S. Systematic review of health disparities for cardiovascular diseases and associated factors among American Indian and Alaska Native populations. *PLoS One* 2014;9:e80973
63. Borschuk AP, Everhart RS. Health disparities among youth with type 1 diabetes: a systematic review of the current literature. *Fam Syst Health* 2015;33:297–313
64. Walker RJ, Strom Williams J, Egede LE. Influence of race, ethnicity and social determinants of health on diabetes outcomes. *Am J Med Sci* 2016;351:366–373
65. Patel MR, Piette JD, Resnicow K, Kowalski-Dobson T, Heisler M. Social determinants of health, cost-related nonadherence, and cost-reducing behaviors among adults with diabetes: findings from the National Health Interview Survey. *Med Care* 2016;54:796–803
66. Steve SL, Tung EL, Schlichtman JJ, Peek ME. Social disorder in adults with type 2 diabetes: building on race, place, and poverty. *Curr Diab Rep* 2016;16:72
67. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva, World Health Organization. Available from: http://www.who.int/social_determinants/final_report/csdh_finalreport_2008.pdf. Accessed 25 October 2019
68. Hill JO, Galloway JM, Goley A, et al. Socio-ecological determinants of prediabetes and type 2 diabetes. *Diabetes Care* 2013;36:2430–2439
69. National Academies of Sciences, Engineering, and Medicine. A Framework for Educating Health Professionals to Address the Social Determinants of Health. Washington, DC. The National Academies Press, 2016 (<https://doi.org/10.17226/21923>)
70. National Academies of Sciences, Engineering, and Medicine. A Framework for Educating Health Professionals to Address the Social Determinants of Health. Washington, DC. The National Academies Press, 2016 (<https://doi.org/10.17226/21923>)
71. Chin MH, Clarke AR, Nocon RS, et al. A roadmap and best practices for organizations to reduce racial and ethnic disparities in health care. *J Gen Intern Med* 2012;27:992–1000
72. National Quality Forum. National Voluntary Consensus Standards for Ambulatory Care—Measuring Healthcare Disparities [Internet], 2008. Available from: https://www.qualityforum.org/Publications/2008/03/National_Voluntary_Consensus_Standards_for_Ambulatory_Care%E2%80%9494Measuring_Healthcare_Disparities.aspx. Accessed 25 October 2019
73. Piette JD, Heisler M, Wagner TH. Cost-related medication underuse among chronically ill adults: the treatments people forgo, how often, and who is at risk. *Am J Public Health* 2004;94:1782–1787
74. Laiterapong N, Karter AJ, Liu JY, et al. Correlates of quality of life in older adults with diabetes: the Diabetes & Aging Study. *Diabetes Care* 2011;34:1749–1753
75. O'Gurek DT, Henke C. A practical approach to screening for social determinants of health. *Fam Pract Manag* 2018;25:7–12
76. Walker RJ, Grusnick J, Garacci E, Mendez C, Egede LE. Trends in food insecurity in the USA for individuals with prediabetes, undiagnosed diabetes, and diagnosed diabetes. *J Gen Intern Med* 2019;34:33–35
77. Berkowitz SA, Karter AJ, Corbie-Smith G, et al. Food insecurity, food “deserts,” and glycemic control in patients with diabetes: a longitudinal analysis. *Diabetes Care* 2018;41:1188–1195
78. Heerman WJ, Wallston KA, Osborn CY, et al. Food insecurity is associated with diabetes self-care behaviours and glycaemic control. *Diabet Med* 2016;33:844–850
79. Silverman J, Krieger J, Kiefer M, Hebert P, Robinson J, Nelson K. The relationship between food insecurity and depression, diabetes distress and medication adherence among low-income patients with poorly-controlled diabetes. *J Gen Intern Med* 2015;30:1476–1480
80. Schroeder EB, Zeng C, Sterrett AT, Kimpo TK, Paolino AR, Steiner JF. The longitudinal relationship between food insecurity in older adults with diabetes and emergency department visits, hospitalizations, hemoglobin A1c, and medication adherence. *J Diabetes Complications* 2019;33:289–295

81. Hager ER, Quigg AM, Black MM, et al. Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics* 2010;126:e26–e32
82. Seligman HK, Schillinger D. Hunger and socioeconomic disparities in chronic disease. *N Engl J Med* 2010;363:6–9
83. White BM, Logan A, Magwood GS. Access to diabetes care for populations experiencing homelessness: an integrated review. *Curr Diab Rep* 2016;16:112
84. Bernstein RS, Meurer LN, Plumb EJ, Jackson JL. Diabetes and hypertension prevalence in homeless adults in the United States: a systematic review and meta-analysis. *Am J Public Health* 2015;105:e46–e60
85. Montgomery AE, Fargo JD, Kane V, Culhane DP. Development and validation of an instrument to assess imminent risk of homelessness among veterans. *Public Health Rep* 2014;129:428–436
- 85a. Evangelou E, Ntritsos G, Chondrogiorgi M, Kavvoura FK, Hernández AF, Ntzani EE, Tzoulaki I. Exposure to pesticides and diabetes: a systematic review and meta-analysis. *Environment International* 2016;91:60–68
86. U.S. Department of Health & Human Services, Health Resources & Services Administration. 2018 Health Center Data [Internet], 2018. Available from: <https://bphc.hrsa.gov/uds/datacenter.aspx?q=tall&year=2018&state=&fd=mh>. Accessed 25 October 2019
87. U.S. Department of Health & Human Services. Think Cultural Health [Internet], 2017. Available from: <https://www.thinkculturalhealth.hhs.gov/>. Accessed 25 October 2019
88. U.S. Department of Health & Human Services, Agency for Healthcare Research and Quality, Clinical-Community Linkages [Internet], 2016. Available from: <http://www.ahrq.gov/professionals/prevention-chronic-care/improve/community/index.html>. Accessed 25 October 2019
89. Egbujie BA, Delobelle PA, Levitt N, Puoane T, Sanders D, van Wyk B. Role of community health workers in type 2 diabetes mellitus self-management: a scoping review. *PLoS One* 2018;13:e0198424
90. Heisler M, Vijan S, Makki F, Piette JD. Diabetes control with reciprocal peer support versus nurse care management: a randomized trial. *Ann Intern Med* 2010;153:507–515
91. Long JA, Jahnle EC, Richardson DM, Loewenstein G, Volpp KG. Peer mentoring and financial incentives to improve glucose control in African American veterans: a randomized trial. *Ann Intern Med* 2012;156:416–424
92. Fisher EB, Boothroyd RI, Elstad EA, et al. Peer support of complex health behaviors in prevention and disease management with special reference to diabetes: systematic reviews. *Clin Diabetes Endocrinol* 2017;3:4
93. Foster G, Taylor SJC, Eldridge SE, Ramsay J, Griffiths CJ. Self-management education programmes by lay leaders for people with chronic conditions. *Cochrane Database Syst Rev* 2007 (4): CD005108
94. Piatt GA, Rodgers EA, Xue L, Zgibor JC. Integration and utilization of peer leaders for diabetes self-management support: results from Project SEED (Support, Education, and Evaluation in Diabetes). *Diabetes Educ* 2018;44:373–382
95. Understanding Scope and Competencies: A Contemporary Look at the United States Community Health Worker Field: Progress Report of the Community Health Worker (CHW) Core Consensus (C3) Project: Building National Consensus on CHW Core Roles, Skills, and Qualities [Internet], 2016. Available from: <http://files.ctctcdn.com/a907c850501/1c1289f0-88cc-49c3-a238-66def942c147.pdf>. Accessed 25 October 2019
96. Community Health Workers Help Patients Manage Diabetes [Internet], 2017. The Guide to Community Preventive Services (The Community Guide). Available from: <https://www.thecommunityguide.org/content/community-health-workers-help-patients-manage-diabetes>. Accessed 25 October 2019