



Improving Quality Outcomes: The Value of Diabetes Care and Education Specialists

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Given the growing prevalence and accelerating cost of diabetes, there is an urgent need to expand strategies in health care that improve access and outcomes and reduce the financial and human burden of the disease. Diabetes care and education specialists (DCEs) are well positioned to assist health care systems with delivery models that enhance diabetes care through evidence-based standards and quality improvement strategies. DCEs have increased opportunities to apply their competencies in primary, specialty, hospital, and acute care settings; accountable care organizations; community settings; research; and academia. Two national certification programs provide an evidence-based foundation for quality in the specialty, with updated competencies guiding practice. This article serves as a call to action for health care systems to integrate specialists in diabetes care and education into diabetes care delivery models and raise awareness of the positive impact these professionals have on the lives of people with diabetes.

In the United States, the traditional role of diabetes care and education specialists (DCEs) has been the provision of evidence-based diabetes self-management education and support (DSMES). DSMES has long been recognized as a tool for improving health and is a critical element of care for people with diabetes (1). DCEs represent multiple disciplines and are skilled in DSMES delivery (2). This specialty comprises nurses, dietitians, pharmacists, and other health professionals who demonstrate expertise in collaborative, person-centered

care, education, and support for people with diabetes and their families and other support people. Although often underused in U.S. health care models, DCEs deliver comprehensive DSMES that addresses clinical, educational, psychosocial, and behavioral aspects of care. In addition, they teach people how to reduce risks associated with diabetes and related cardiometabolic conditions. DSMES, guided by national standards, provides a foundation for the daily self-care behaviors of diabetes management (Table 1) (3–6).

Two credentials exist to recognize the advanced knowledge and skills needed for practice within this specialty. The Certification Board for Diabetes Care and Education (CBDCE) oversees the certified diabetes care and education specialist (CDCES) credential, which validates expertise and knowledge base in diabetes care and education (7). The BC-ADM (board certified–advanced diabetes management) credential, administered by the Association of Diabetes Care and Education Specialists (ADCES), demonstrates advanced diabetes-related clinical practice skills and therapeutic problem-solving (8). Table 2 (7,8) highlights some of the differences. CBDCE provides a resource for finding local CDCESs (<https://www.cbdce.org/locate>) (9).

The DCEs role has evolved significantly in response to a changing health care landscape and emerging health care models (10). In 2018, ADCES articulated a vision of comprehensive care delivery for diabetes and cardiometabolic conditions. The overarching goal is to provide health care that is quality driven, effective, accessible, and affordable in a changing health care delivery system. This goal requires skills to deliver the level of service and care that address the complex needs of people living with diabetes and health care organizations (11). The ADCES vision outlines six areas of focus for the specialty to demonstrate effectiveness, efficiency, and impact on clinical outcomes across diabetes management, education, and care delivery (Table 3) (11). The ADCES vision inspired retitling and rebranding efforts for the specialty, with a subsequent transition from the title “diabetes educator” to “diabetes care and education specialist” in recognition of expanded roles and impact beyond traditional DSMES (10).

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TABLE 1 ADCE7 Self-Care Behaviors (3–6)

1. Healthy coping
2. Healthy eating
3. Being active
4. Taking medication
5. Monitoring
6. Problem-solving
7. Reducing risk

TABLE 3 ADCE7 Vision for Diabetes Care and Education Delivery (11)

- Achieve the quadruple aim
- Include related conditions
- Drive integration
- Promote person-centered care
- Focus on behavioral health
- Leverage technology

The 2020 Competencies for Diabetes Care and Education Specialists (12) provide a quality assurance framework for the specialty. The competencies encompass six domains, including program management, service administration, and care coordination, among others (Table 4). The DCES competencies have been applied at patient and population health levels, providing strong

evidence for quality and value. Essential skills and knowledge include clinical and systems-based practice, integrated care, person-centered care, behavioral health support, and a focus on equitable, quality-driven care. DCESs also have roles in workforce training, capacity building, outcomes monitoring, and process improvement activities (12–14). Competence in these six

TABLE 2 CDCES Compared With BC-ADM Credential

	CDCES (7)	BC-ADM (8)
Discipline requirements	<ul style="list-style-type: none"> • Licensed as clinical psychologists, occupational therapists, optometrists, pharmacists, physical therapists, physicians (doctor of medicine or doctor of osteopathic medicine), podiatrists, registered nurses (includes nurse practitioners and clinical nurse specialists), and social workers (master’s degree) • Registered or certified as a dietitian or dietitian nutritionist holding active registration with the Commission on Dietetic Registration; a physician assistant holding active registration with the National Commission on Certification of Physician Assistants; an exercise physiologist holding active certification as an American College of Sports Medicine Clinical Exercise Physiologist; or a health educator holding active certification as a Master-Certified Health Education Specialist from the National Commission for Health Education Credentialing • Master’s degree or higher in a health-related area (Unique Qualifications pathway) 	<p>Master’s degree or higher requirements across eligible professions: registered nurses (includes nurse practitioners and clinical nurse specialists), registered dietitians, pharmacists, physician assistants, and physicians</p>
Certification requirements	<ul style="list-style-type: none"> • Standard certification: At least 2 years of professional practice experience in eligible discipline, 1,000 hours of DCES experience in the previous 4 years (20% within the preceding year), and 15 hours of continuing education in the preceding 2 years; examination for 5-year renewal • Unique Qualifications certification: At least 2 years of experience after earning degree, 2,000 hours of DCES experience in the previous 5 years (20% within the preceding year), and 30 hours of continuing education in preceding 2 years; examination for 5-year renewal 	<p>500 clinical practice hours in advanced diabetes management within the 48 months prior to taking the certification examination; examination for 5-year renewal</p>
Credential holders’ roles	<p>Ongoing process of facilitating the knowledge, skill, and ability necessary for prediabetes and diabetes self-care, as well as activities that assist people in implementing and sustaining the health practices needed to manage the condition on an ongoing basis, beyond or outside of formal self-management training</p>	<p>Adjust medications, treat and monitor acute and chronic complications and other comorbidities, counsel patients on lifestyle modifications, address psychosocial issues, and participate in research and mentoring</p>
Online information	<p>Available from https://www.cbdce.org/eligibility</p>	<p>Available from https://www.diabeteseducator.org/education/certification/bc_adm</p>

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TABLE 4 DSMES Competencies (12)

- Domain 1. Clinical management practice and integration
- Domain 2. Communication and advocacy
- Domain 3. Person-centered care and counseling across the life span
- Domain 4. Research and quality improvement
- Domain 5. Systems-based practice
- Domain 6. Professional practice

domains differentiate DCEs from general practitioners. This article highlights the value of DCEs as integral members of team-based diabetes and cardiometabolic care, who provide evidence-based interventions, improve outcomes, and enhance cost-effective care (6).

Value of DCEs

Although “value” can be defined in a variety of ways, in this article, the word refers to something’s usefulness, importance, and worthiness (15). Value in health care systems can also be described as the provision of the best quality care for the lowest cost. Evidence shows that the value of DCEs to health care delivery systems is directly related to quality outcomes and reduced health care costs of diabetes (16). A systematic review and meta-analysis found diabetes educators to be effective in mitigating therapeutic inertia and improving outcomes (16). Another meta-analysis of 50 high-quality systematic reviews found three types of quality-improvement interventions that were effective in improving diabetes care: patient education and support, multidisciplinary teams, and technology-enabled health care (17,18). These interventions, as well as population health and disease management strategies, have implementation costs that are largely offset by short-term reductions in health expenditures (18). There is a crucial need and an opportunity to further integrate DCEs into diabetes care delivery models and services, especially in supporting primary care practices, where the majority of diabetes and cardiometabolic disease prevention and management occurs. The following sections outline the value of DCEs in care processes, delivery, and outcomes across a variety of settings.

Cost-Effective Care

By 2060, the number of U.S. adults with diagnosed type 2 diabetes is projected to nearly triple, and the prevalence of diabetes is likely to double (19). As incidence rates continue to rise, the projected economic impact on direct and indirect costs related to diabetes

and cardiometabolic conditions will be increasingly taxing to health care systems, payers, and society (20–23). The evidence clearly indicates an urgent need for health care leaders to identify cost-effective, evidence-based solutions that meet quality standards.

The diabetes epidemic has resulted in a corresponding surge in diabetes-related costs, rising 26% from 2012 to 2017 to \$327 billion annually (19). The medical costs alone, for a person with diabetes, are 2.3 times more than for a person without diabetes (23). Confounding the diabetes epidemic and high costs, therapeutic targets are not being met, despite medical advances (24). For these reasons, the Quadruple Aim, expanded from the Institute for Healthcare Improvement’s Triple Aim, outlined the need to focus on the four areas: 1) quality care delivery at scale, 2) patient experience, 3) provider experience, and 4) reduced cost of care (25). The financial impact of diabetes, in particular, threatens the viability of health care systems and communities and supports the need for using DCEs in implementing cost-effective strategies.

Studies demonstrate that health care is most effectively delivered by interdisciplinary teams with multidimensional skill sets (26). Many direct clinical care and care coordination activities can be provided by nonphysician members of a care team (27,28). An interdisciplinary approach can improve and reduce the cost of care through enhanced clinical care integration, service coordination, and education. Studies show that DCE services are often underutilized despite evidence that they can have a positive impact on health care costs (3,29). Compared with general practitioners, DCEs have documented outcomes, including:

- Reduced emergency and inpatient services (30–34)
- Lower Medicare and insurance claims (30–34)
- Higher adoption of best-practice treatment recommendations (30,31,35)
- Improved clinical outcomes, quality of life, and health care utilization (30–37)

DCEs deliver interdisciplinary care and practice efficiencies that support lower-cost, preventive care strategies as opposed to high-cost, acute care services. These costs include direct health care costs and indirect costs associated with disability, premature mortality, workplace absenteeism, and reduced productivity (23). As quality metrics are achieved, the costs of care decrease because of reductions in lifetime costs (38).

Team-Based Care

Inpatient diabetes care and education provides another opportunity for health systems to improve care and reduce costs. DCEs are important team members in acute care settings; they provide specialized diabetes care and education services at the bedside, beyond usual care. Inpatient DCEs support quality and safety measures, coordinate glucose management, monitor and support patient-owned diabetes technology, and educate patients and care teams. They also guide development of order sets and provide policy and protocol education and implementation. As part of quality and safety teams, DCEs assist with root cause analyses to meet quality metrics and ensure diabetes-related performance outcomes. Inpatient DCEs also support safe transitions of care from discharge to post-acute settings and home, reducing patients' risk for avoidable readmissions (39).

In the outpatient setting, DCEs help to achieve individual, system, and payer goals by contributing to post-acute and transitional care (40). As integral members of the diabetes care team, DCEs increase patient access to quality care, implement therapeutic recommendations, and support both person-centered and clinically focused approaches. DCEs furnish care coordination and improve the provider experience by reducing provider tasks such as collecting and reporting data, especially in complex cases (3,40). In particular, there is value in integrating DCEs in the management of patients with type 1 diabetes in primary care settings, where clinical experience is primarily in the management of type 2 diabetes. For organizations supported by outcomes-based payment models, these are particularly essential contributions.

Accountable care organizations (ACOs) are responsible to their network of patients and third-party payers for the quality, appropriateness, and efficiency of the health care provided. This quality care framework makes ACOs an ideal health care delivery model for people with diabetes. Diabetes is a progressive chronic disease with substantial morbidity and mortality and, therefore, enormous personal and societal costs. DSMES, provided by a DCE as opposed to a non-DCE, reduces these burdens to payers, providers, and patients. ACOs that implement interventions that result in lower costs, including DSMES, team-based care, and diabetes disease management plans, are poised to receive incentive payments from health insurers when quality process and outcome measures are met (38,40).

Population Health Management

DCEs implement population health management through their broad focus on physical, biological, social, psychological, and environmental influences on health. Within the health care system, DCEs serve as a primary contact and advocate for patients, families, the health care team, and communities. According to Dr. Ken Moritsugu, former U.S. Surgeon General, "The DCE expands access to the full range of science, tailoring the message to specific populations, and thereby reducing health disparities" (K. Moritsugu, personal communication). DCEs play a key role in enhancing the responsiveness of the health care system to the needs of individuals and populations (40). They identify issues affecting the health and well-being of people with diabetes, discern patterns across patient populations, link patients with community resources and social services, and develop broad-based interventions (41,42).

Given projections that, by 2050, the U.S. health care system will be unable to afford the costs of diabetes care (20), population health strategies aim to deliver more effective and efficient disease prevention and management at scale. DCEs endorse population health models that direct care when and where it is needed, resulting in timely and cost-effective care delivery (40). DCEs engage in activities that support patients' self-management between health care visits, which, in turn, promote preventive care models over high-cost acute care services. DCEs are core team members in population health methods who promote improved access to quality care. They drive point-of-care decision support to achieve desired health and organization outcomes.

Integrated care is a proposed solution for fragmented diabetes care delivery. Integrated diabetes care means integration between primary, community, specialist, and tertiary care, through provision of the same or similar services (horizontal integration) or connecting with organizations delivering different services or care levels (vertical integration). The goal of integrated care is community partnership in owning the health outcomes of people with diabetes (43,44). DCEs function within an interprofessional team and blend the clinical and behavioral components of care into their practice (12,40). Through involvement across the life span of patients and presence across all layers of health care delivery, DCEs provide a skilled clinical resource to foster horizontal and vertical integrated care (40).

DCEs integrate population health care delivery through workforce training and leveraging; stratified

care management; and clinical and business coordination, including pre-visit planning, reimbursement, and follow-up (40). Simmons et al. (45) proposed that integrating care across disciplines and organizations and supporting the assessed needs of people with diabetes are approaches that could improve care delivery and reduce cost. In one study, a multidisciplinary team that included a DCEs identified patients with an A1C >8%; undertook care team visits, including covisits; utilized interdisciplinary case conferences; and developed and implemented person-centered care plans. This approach resulted in reduced A1C, improved medication management, and cost reduction through improved Medicare part A utilization (46). Integration is optimized when all team members, including DCEs, contribute their own expertise while sharing common goals and plans of care.

Mitigation of Therapeutic Inertia

Therapeutic inertia is a multifactorial and pervasive problem arising from complex barriers encountered at the clinician, patient, and health system levels (47,48). Therapeutic inertia is a failure to advance or to de-intensify pharmacological therapy when it is appropriate or necessary to do so (49). Previously called “clinical inertia,” this phenomenon refers to the underuse of interventions known to prevent negative outcomes. It also encompasses care deficits such as lack of screening, risk assessment, preventive measures and referrals, and attention to patient engagement barriers. Therapeutic inertia can delay a person’s ability to attain target glucose levels, as well as other important clinical and individualized goals, resulting in negative outcomes and higher costs of care. This is especially relevant in the primary care setting, where the vast majority of diabetes care occurs. DCEs have a direct impact on patients’ understanding of the complex science of the disease and actions they must take to maximize their health. DCEs also directly influence patients’ engagement in and satisfaction with their self-management, and, in turn, the reduction of risk for negative outcomes.

DCEs’ capacity to reduce therapeutic inertia begins with timely and appropriate referral. Seven health care organizations developed a consensus report outlining the four critical times at which to provide and modify self-care education and support for people with diabetes (3). These include:

1. At diagnosis
2. Annually and/or when not meeting treatment targets

3. When complicating factors develop
4. When transitions in life and care occur

DSMES is a crucial clinical intervention that is underutilized and has been identified as a priority in the campaign to reduce therapeutic inertia (49). Through relationship-based DSMES, DCEs provide behavioral, educational, psychosocial, and clinical support (50). They play a role in improving timely treatment modification and, in turn, outcomes, by promoting the adoption and expansion of person-centered diabetes care and shared decision-making. DCEs assess and address social determinants of health to identify potential and actual barriers to implementing therapeutic recommendations. They help people with diabetes problem-solve and develop individualized diabetes management plans. DCEs also help patients achieve the mutual goals of reducing risk for diabetes-related complications, mortality, and health care costs through their advanced skills in diabetes technology and population health approaches (31–33,35,36).

“DSMES contributes to an individual’s ability to achieve health literacy: to hear, understand, and embrace the message, and to ultimately put the information into action. This is more than clinical intervention, but rather a concept of how, rather than what” (K. Moritsugu, personal communication).

Health care providers and systems can engage DCEs using the electronic health record to address and mitigate therapeutic inertia, as follows:

- Embedding automated prompts for DCE/DSMES referrals at the four critical times
- Tracking process metrics to assess rates of referrals to DCE/DSMES
- Developing treatment algorithms or decision support prompts for DCE/DSMES referrals
- Risk stratifying elevated glucose (A1C) and other cardiometabolic results for DCE/DSMES referrals
- Identifying medication-taking processes and outcomes for referral to a DCE
- Referrals to telehealth education and consultation programs or digital coaching as alternatives to in-person diabetes education and support

Technology Integration

DCEs advocate for technology use by people with diabetes and are leading the way in encouraging clinical practices and the broader health care system to incorporate diabetes technology into standard care (51). People

with diabetes are using technology, including diabetes devices, and software, at increasing rates. These tools are improving management of glucose and cardiometabolic conditions, point-of-care decision support, and quality of life (4). Systematic reviews focused on technology-enabled DSMES have identified significant A1C reductions with implementation of technology interventions that incorporated tailored communication and education strategies, patient-generated health data, and individualized feedback (52,53). Beyond reducing A1C, DCEs expand individuals' understanding of glycemic time in range, an increasingly important metric in diabetes management.

DCEs are competent and passionate advocates for incorporating technology through their provision of education on the use of continuous glucose monitoring, insulin pump therapy, connected insulin pens, remote patient monitoring, and telehealth services. DCEs developed and published the Identify, Configure, and Collaborate Framework and the Technology-Enabled Self-Management Taxonomy (53). These resources outline standardized approaches to adopting and implementing technology-enabled interventions for diabetes and cardiometabolic health (53,54). Positioning DCEs as the key team members to lead technology integration in all settings, given the evolution of the specialty's role from conveyor of information to full partner in diabetes care and self-management, establishes their value for people with diabetes, the care team, and the health system.

The recent national expansion of access to telehealth services and the Centers for Medicare & Medicaid Services updating of its guidance on acceptable provider types highlight the value of such patient communication platforms (55). The use of remote and real-time telecommunication technologies in delivering health care demonstrates improvements in the quality of, access to, and costs of care (54). There remain even broader opportunities in which to harness the value of DCEs within the technology landscape.

Quality Improvement

The quality of diabetes care can vary widely, and gaps in care can lead to complications, death, and increased costs (56). Quality improvement interventions led or supported by DCEs result in the achievement of glucose targets (29,57,58). They also increase value from the health system perspective by improving health outcomes

and quality measures (12,13,31,32,35,38,56,59–67). Studies show that DSMES provided by DCEs has a positive impact on clinical, psychosocial, and behavioral aspects of diabetes (29).

Quality improvement efforts are crucial for monitoring effective care in heart failure and atherosclerotic cardiovascular disease, including peripheral arterial disease. These conditions are significant risks for people with diabetes, and prediabetes is considered a risk for cardiovascular disease (68,69). DCEs encourage effective and timely care for people with diabetes and related cardiometabolic conditions through various approaches, including:

- The ADCE7 Self-Care Behaviors framework (Table 1)
- Identification of conditions (4)
- Treatment recommendations and referrals (70)
- Evidence-based guidelines (4,71,72)
- Shared decision-making (70)

DCEs also advocate for routine cardiovascular risk assessments and, in collaboration with patients and their diabetes and/or primary care team, facilitate the management of modifiable risk factors and treatment of abnormal cardiovascular screenings or clinical findings according to current guidelines (4). A full table of documented outcomes of diabetes care and education are outlined in Table 5 (12–15,23,26,27,29,31,32,35,37,38,45,46,49,57–60,62–70,73–75). Supplementary Figure S1 provides a comprehensive overview of the ways in which DCEs improve workflow in multiple health care settings.

TABLE 5 Sixteen Areas in Which There Are Documented Positive Outcomes From DSMES

1. A1C (29,57,58,73)
2. Onset/progression of diabetes complications (13,29)
3. Quality of life (12–15,37,38)
4. Self-efficacy and empowerment (67)
5. Coping (45,46)
6. Distress and depression (60,62–64)
7. Blood pressure and cholesterol (23,26)
8. Weight and BMI (27,68)
9. All-cause mortality (59)
10. Lifestyle behavior changes (e.g., food and exercise) (69,70)
11. Total health care costs (31,65,66)
12. Prevention of type 2 diabetes with intensive lifestyle change (74,75)
13. Diabetes knowledge and self-care behaviors (58,67)
14. Use of primary care and preventive services (31,32,35)
15. Therapeutic inertia (49,59)
16. Care transitions (35)

Conclusion

DCEs are highly skilled and qualified health professionals who lead timely, cost-effective, evidence-based diabetes care and education delivery and impart broad value to people with diabetes, care teams, health care organizations, and payers. The interprofessional composition of the specialty and inherent roles across all layers of the health care system provide a rich framework for integrated individual and population health approaches to care. DCEs contribute to lower costs, improved access, and achievement of clinical and health care organization goals, with improved patient engagement, self-care, and satisfaction.

DSMES, led by DCEs, addresses the comprehensive blend of clinical, educational, psychosocial, and behavioral aspects of care needed for daily self-management and provides the foundation to help all people with diabetes navigate their daily self-care with confidence and improved outcomes (1,4). Interprofessional teams that include DCEs support a strong path forward to improve quality of life and clinical metrics.

We intend this article to serve as a call to action for health care systems to include DCEs as integral partners in the care of people with or at risk for diabetes and cardiometabolic conditions. It is clear that this specialty is useful, important, and worthy and therefore holds immense value for every clinical setting in which people with diabetes seek care.

NOTE ADDED IN PROOF

Between initial publication of this article online and its publication in print, the authors requested revisions to Table 2 to more completely describe the CDCES credential. A new version was posted online, and the print issue also reflects those revisions.

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DUALITY OF INTEREST

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AUTHOR CONTRIBUTIONS

All authors contributed intellectual content during manuscript writing and revision and approved the final version for submission. V.P. is the guarantor of this work and, as such, accepts responsibility for the integrity and accuracy of the work.

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