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HOSPITAL MANAGEMENT OF DIABETES (A WALLIA AND JJ SELEY, SECTION EDITORS)

Inpatient Diabetes Education in the Real World: an Overview of Guidelines and Delivery Models

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Abstract

Purpose of Review Diabetes self-management education and support improves diabetes-related outcomes, yet less than 50% of persons with diabetes in the USA receive this service. Hospital admissions present a critical opportunity for providing diabetes education. This article presents an overview of the current state of inpatient diabetes education. It incorporates a summary of existing guidance relative to content followed by an overarching discussion of existing inpatient diabetes education models and their reported outcomes, when available.

Recent Findings As diabetes rates continue to soar and adults with diabetes continue to have high hospitalization and readmission rates, hospitals face challenges in assessing and meeting diabetes patients' educational needs. The consensus recommendation for inpatient diabetes teaching is to provide survival skills education to enable safe self-management following discharge until more comprehensive outpatient education can be provided. Established and emerging models for delivery of diabetes survival skills education in the hospital may be broadly grouped as diabetes-specialty care models, diabetes non-specialty care models, and technology-supported diabetes education. These models are often shaped by the availability of diabetes specialists, including endocrinologists and diabetes educators—or lack thereof, and staffing resources for provision of services. Recent studies suggest that all three approaches can be deployed successfully if well planned.

Summary This article presents an overview of the current state of inpatient diabetes education. It incorporates a summary of existing guidance relative to content followed by an overarching discussion of existing inpatient diabetes education models and their reported outcomes, when available. The authors seek to make the reader aware of the heterogeneous approaches that are being implemented nationwide for inpatient diabetes education delivery. Meeting inpatient diabetes educational needs will require a sustained effort, diverse strategies based on resources available, and additional research to explore the impact of these strategies on outcomes.

Keywords Inpatient · Diabetes · Education

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Introduction

Diabetes self-management education and support (DSMES) improves diabetes-related outcomes including hemoglobin A1C (A1C) [1••], medication usage [2], and utilization of acute care services [3]. Nonetheless, in the first year after diagnosis, less than 7% of patients with private insurance receive DSMES [4], and only 1.7% of Medicare beneficiaries with diabetes had a Medicare claim for DSMES in 2012 [5]. Additionally, 1 in 4 American adults with diabetes is not aware that they have diabetes [6].

Adults with diabetes have high hospitalization rates both for diabetes-related and non-related diagnoses and higher rates of 30-day readmissions when compared with persons without diabetes [7]. Readmissions can be partially attributed to

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deficits in diabetes knowledge and self-management skills, including taking diabetes medications as prescribed. Therefore, hospital admissions present a critical opportunity not only for appropriate diagnosis and treatment but also for providing self-management education to persons with diabetes. Traditionally considered a suboptimal environment in which to provide education, a slowly accumulating heterogeneous body of evidence suggests that inpatient diabetes education, improving communication of discharge instructions, and involving patients in medication reconciliation may reduce risk for early readmissions [8] and improve health outcomes. [2, 3, 9]. Interestingly and reassuringly in this regard, a recent study that compared the impact of a standardized diabetes education program delivered by diabetes educators and physician assistants to both inpatients and outpatients reported that A1C decreased significantly and equally in both groups from baseline (1.3 vs 1.2% respectively at 1 year from a baseline of 9.3%), regardless of the care setting [10•]—again making the case that inpatient diabetes education can be impactful.

This article presents an overview of the current state of inpatient diabetes education. It incorporates a summary of existing guidance relative to content areas for inpatient diabetes education followed by an overarching discussion of existing inpatient diabetes education models and their reported outcomes, when available. The authors seek to make the reader aware of the heterogeneous approaches that are being implemented nationwide for inpatient diabetes education delivery. The approach taken tends to be designed based largely on the availability of diabetes-specialty expertise and staffing resources within a hospital or hospital system.

Guidelines for Inpatient Diabetes Education

The American Diabetes Association (ADA) recommends that diabetes self-management skills and need for support should be assessed for all diabetes patients admitted to the hospital and that DSMES should be provided when a need is identified [11]. Diabetes organizations have provided recommendations for the provision and content of diabetes education in the hospital [11–13]. The consensus recommendation for inpatient education is to provide content focused on "survival skills" that will prepare patients for discharge and enable them to safely manage their diabetes at home until they are able to receive more detailed instructions in the outpatient setting. Survival skill self-management education will convey basic self-care information to include the following:

- An understanding of the diabetes diagnosis;
- Ability to monitor glucose at home;
- Identification of individual glycemic goals;
- Recognition, prevention, and treatment of hypoglycemia and hyperglycemia;
- Basics of a healthy meal plan for optimizing glycemic targets;
- How/when to take prescribed diabetes medications, including insulin, their mechanisms of action, and if relevant, home sharps disposal;
- Sick day rules; and
- When to call a health care provider or go to the Emergency Room or Urgent Care.

In addition, inpatient diabetes education should include a discharge plan that ensures continuity of care by providing referrals to outpatient diabetes education and/or providers [14], as the transition from hospital to home has been found to be especially challenging for this patient population and is associated with a high risk of negative outcomes [15].

Delivery of Inpatient Diabetes Education: Where Are We Now?

The Joint Commission recently revised its certification requirements for inpatient diabetes care to specify that clinicians involved in providing diabetes care to hospitalized patients should have education and training specific to diabetes and that newly diagnosed patients or those with identified deficits should receive inpatient diabetes education to address the necessary survival skills identified above [16]. The American Association of Clinical Endocrinologists (AACE) and the ADA state that diabetes educators can assist hospitals in meeting the needs of their patients with diabetes, especially as part of the discharge process [13]. In a 2016 position statement, the American Association of Diabetes Educators (AADE) recommended that inpatient care teams include a diabetes educator to help improve diabetes patient care [17]. Yet, the presence of inpatient diabetes educators remains rare. The 2017 AADE National Practice Survey revealed that only 24% of diabetes educators were working in an inpatient setting, which is low considering the high rates of hospitalized patients with diabetes [18].

Inpatient Diabetes Education Care Delivery Models

Few hospitals are uniformly providing standardized, structured inpatient diabetes education despite recommendations from leading organizations, and despite the evidence linking diabetes education to improved outcomes [19]. Confronted with the rising numbers of patients with a diabetes diagnosis and their high hospitalization rates, the challenge of reaching all hospitalized adults with diabetes to assess and meet their education needs remains formidable. Hospitals are attempting to meet the educational needs of their patients with diabetes in a variety of ways.

There are reports on the structure and impact of a wide variety of models which have been examined for the provision of inpatient diabetes education. These models may be broadly grouped as diabetes-specialty care models, diabetes non-specialty care models, and technology-supported diabetes education, as shown in Table 1. Technology may also be used to support the specialty and non-specialty care models. These models are often shaped by the availability of diabetes specialists, including endocrinologists and diabetes educators—or lack thereof, and staffing resources for the provision of services.

Diabetes-Specialty Care Education Models

The Multidisciplinary Diabetes-Specialty Care Team

When diabetes specialists are available, a dedicated multidisciplinary diabetes-specialty care team approach can be utilized. A diabetes educator, often certified in diabetes education (CDE) and/or advanced diabetes management (BC-ADM), typically delivers the education component and the service tends to target designated high-risk patients including those with markedly elevated A1c levels, diabetic ketoacidosis (DKA), and/or a new diagnosis or pre-existing diabetes requiring initiation of insulin therapy. A recent study compared the outcomes of care by a Diabetes Team versus a primary medical service. The team was composed of an Endocrinologist, a diabetes nurse practitioner (NP), a diabetes nurse specialist (RN), and discharge coordinators. Team treatment was associated with a significant 30.5% reduction in 30-day readmissions, decreased inpatient costs, and higher rates of post-discharge follow-up when compared with those receiving diabetes care from the primary medical team [20••]. Additionally, patients who were referred to the Diabetes Team within 24 h of admission had a significantly shorter length of stay (LOS) at 4.7 vs 6.1 days, $p<0.001$, as compared with patients seen later in their stay. The diabetes educator provided 30 to 60 min of education. The impact of the education was not evaluated separately from that of the medical care provided, as is typically the case in reports of care by a multidisciplinary team. Another team-based approach utilizing an endocrinologist to provide medication management, NP to provide diabetes self-management education, and discharge planning support demonstrated improved blood glucose (BG) management in the hospital when compared with usual care (176 ± 66 vs. 195 ± 74 mg/dl [9.7 vs. 10.8 mmol/l], $p=0.001$), as well as greater A1C reduction a year after discharge [21].

The Diabetes-Specialty Nurse Practitioner Service

The use of advanced practice NPs or Physician Assistants (PAs) as the cornerstone of inpatient hyperglycemic management, in conjunction with supervision by a board-certified endocrinologist, has long been known to be effective and financially viable. The NP is responsible for initial inpatient consultation and daily diabetes management, including the provision of diabetes education. The service may see patients in response to a provider request for a consultation, may see all patients with diabetes on a given service, e.g., cardiac surgery, or may see patients in response to an Electronic Health Record (EHR) triggered referral based on a set of inclusion criteria, e.g., new diagnosis of diabetes and DKA. Revenue generated by billing and reimbursement for the NP service may support the NP salary and may help to offset the cost of administrative support and part of the supervising physician's salary [22–24].

The Diabetes Education Service

Hospitals may deploy a dedicated inpatient diabetes educator to provide education consults, who may also provide recommendations for medication management to the requesting provider service. These consults are typically generated by a physician or nurse referral or may be triggered by a set of automated rules based on inclusion criteria. Such an approach is associated with a reduction in all-cause hospital readmissions. For example, a retrospective study which compared readmission rates among patients admitted to the hospital with an A1C>9% and whom either received or did not receive diabetes education by a diabetes educator during the hospital stay. Those who received education had lower readmission rates at 30 days (11% vs. 16%, $p=0.0001$). The trend towards lower readmission rates continued at 180 days but was not as significant [3].

The reach of such an approach has several important current limitations. It is limited by the number of diabetes educators available at a hospital for the provision of the service. A persistent challenge for hospitals in providing diabetes education is lack of reimbursement by payers for education provided in the hospital by diabetes educators if they are Registered Dietitians (RDs) or Registered Nurses (RNs), even though the same service is reimbursed in the outpatient setting. However, as more systems move to value-based care reimbursement models, a compelling financial case can be made for these services in their positive impact on readmissions aversion—a core goal of value-based care. This business case model is strengthened if patients at high risk for readmission are prioritized.

Non-specialty care diabetes education models

Diabetes Education Delivery by Nursing Unit Staff within Usual Workflow

Empowering and training bedside nurses to provide inpatient diabetes education is one of the avenues being explored to help expand capacity to assure its delivery to a higher

Table 1 Models for delivery of inpatient diabetes education

Inpatient diabetes education model	Education provider	Services delivered	Comments
Diabetes-specialty care			
Multidisciplinary diabetes team	Endos, NPs, diabetes educators, case managers	Diabetes management, education, discharge planning; by referral or in response to pre-designated consult trigger criteria.	Evidence supports impact and business case [20••, 21]; not all hospitals have inpatient endo services available; reach may be limited by team size.
Diabetes-specialty NP service	NP, diabetes educator consultation service	Diabetes management and education, links to outside resources; by referral or in response to pre-designated trigger criteria.	Evidence supports impact and business case; particularly effective when targeted service [22–24], e.g., peri-operative management; broad reach may by limited by number of NPs available.
Diabetes education service	Diabetes educator (RN, RD, PharmD)	Diabetes education consults may include DM medication management recommendations; by referral or auto-trigger criteria.	Reach limited by number of inpatient diabetes educators; no policy for reimbursement at present [3, 17, 18]
Diabetes non-specialty care			
Nursing unit RNs, PCTs	Unit staff within usual workflow processes	Patient education using tablets, DVDs, or written materials. May be augmented by referral to inpatient RD for diet instruction as needed.	Potentially scalable for offering survival skills education to all DM inpatients; competing priorities for staff, particularly in high acuity, high throughput hospital [25, 26]
Pharmacy-based team	Pharmacists, pharmacy interns, or students	Patient education. May be augmented by referral to inpatient RD for meal planning instruction as needed.	PharmDs with evidence-based role in outpatient DM meds management and education [27]; when interns/students on team requires
General hospital staff	Medicine and/or hospitalist service, hospital RDs and PharmDs	Diabetes education, medication education, meal planning education per usual care protocols	Conflicting priorities limit ability to deliver diabetes education; often defaults to printed materials and limited education at time of discharge; may be uncomfortable with delivering diabetes content.
	Ancillary staff	AA, CNA, MA, LPN, CHW, PCT, etc.	Delivers education to the bedside and engages patient in content; not a DM content expert; lower cost option; may deliver content for multiple medical conditions and may perform other functions to facilitate care transitions
Technology-supported diabetes education			
Patient engagement technologies	SMART TVs	Curated generic DM education content; medical or nursing staff may assign videos to view during hospital stay.	Offers potential to extend the reach of diabetes education, including to augment 1:1 education and when diabetes-specialty resources are not available or alternative staff resources are limited [28, 29]
	Tablet computer-based content	Curated DM education content delivered from web by tablet computer (or smartphone) or embedded on tablet	Potential to extend DM education reach; content may be generic or patient-specific; ability to administer surveys and be interactive [30]. When use electronic devices, infection control, data security and privacy, physical management of the devices and ergonomic issues must be addressed; not all patients comfortable with navigating tablets; often requires staff time to familiarize patient with use [2, 31]

Endos, endocrinologists; *DNP*, diabetes-specialty nurse practitioner; *CDE*, certified diabetes educator; *RN*, registered nurse; *RD*, registered dietitian; *PharmD*, pharmacist; *AA*, administrative assistant; *CNA*, certified nursing assistant; *MA*, medical assistant; *LPN*, licensed practical nurse; *CHW*, community health worker; *PCT*, patient care technician

proportion of patients than may be reached by dedicated diabetes specialists. A 2015 report by Hardee et al. describes one large academic medical center's transition from a centralized inpatient diabetes education program composed of diabetes educators and specially trained nurses under the supervision of an endocrinologist to an interdisciplinary model utilizing bedside nurses as well as hospital dietitians and pharmacists [25]. Using an approach informed by implementation science methods, a review of the literature was carried out, and input from multiple stakeholders including nursing, nutrition, pharmacy, hospitalists, and endocrinologists was obtained. Clinician and patient advisor focus group findings informed program design. The consensus was reached to focus teaching on survival skills education provided by bedside nurses and

referrals to a dietitian for newly diagnosed patients and for those requesting meal planning instruction. The resulting model included the following: (1) enhanced patient education resources, (2) education for unit nurses and a diabetes education tool kit, (3) modification of the electronic health record (EHR) for documentation of survival skills education, (4) algorithms for use by the pharmacists when consulted for complex cases, (5) identification of newly diagnosed patients for referral to the dietitians, and (6) discharge planning support with referrals to outpatient and community resources. While there were no statistically significant differences in length of stay and readmission rates in pre- and post-program, the new model accrued substantial cost savings to the hospital in the year it was implemented, compared with the diabetes-specialty model. These results suggest that inpatient diabetes education can be effectively decentralized when preceded by careful planning that engages and trains all stakeholders, and if EHR technology is leveraged to support the effort.

Engaging bedside nurses to provide inpatient diabetes education has been explored by other institutions. The Nurse Education and Transition (NEAT) model examined bedside nurses' attitudes towards providing inpatient diabetes education and utilized these findings to inform the development of a nurse-based inpatient diabetes education program [26]. During pre-program focus groups, nurses reported that they considered providing bedside diabetes education a part of their role. They identified several roadblocks to delivering the education including constraints on their time amid multiple patient priorities, as well as their own perceived lack of expertise in the most up-to-date diabetes treatments and information. Survival skills education was again identified as the necessary focus. Nurses were trained to deliver bedside diabetes education by having patients view education videos on iPads. The nurses found the education delivery protocol easy to follow within their workflow and did not report technological issues with iPad patient usability for video viewing. However, they recommended improvements to the program which included adding a patient-driven knowledge self-assessment after watching the videos, including caregivers in the education delivery and improving access to an outpatient educator.

The Diabetes To Go study explored the effectiveness of targeted video-based inpatient diabetes education in a large urban teaching hospital. Research assistants (RA) invited adults with diabetes mellitus, an admission blood glucose >200 mg/dl or $\leq$ 40 mg/dl, and expected LOS $\geq$ 2 days to participate in a survival skills education intervention delivered at the bedside [2]. Following administration of a baseline diabetes knowledge assessment (KNOW Diabetes ([32]) and medication usage surveys), the RA directed each patient to watch relevant survival skills video content based on incorrect responses to the knowledge survey on a DVD player. A Diabetes to Go book and DVD were provided. Participants were contacted by phone post-discharge. Significant improvements in diabetes knowledge and medication usage, as well as a trend towards a reduction in hospital admissions in the 3 months post-intervention, were observed. While implementation was feasible and preliminary efficacy was demonstrated, an important impediment to the spread of this approach was its reliance on research assistants to deliver the intervention, which required spending a total of 30 to 60 min with each patient. More recently, these investigators have examined the feasibility of implementing the Diabetes to Go education program by nursing unit staff using tablets within unit workflow under the auspices of NIH funding (DK-109503). During the design phase, nurses and Patient Care Technicians (PCTs) expressed interest in identifying workable approaches to delivering diabetes education at the bedside. Their main concerns were potential patient difficulties in navigating the tablet-based education due to limited technical skills, logistical issues in using the tablets on nursing units including cost, infection control and fear of theft, and the ability to integrate program delivery into existing nursing workflow given workloads and staffing limitations [31]. Preliminary results of a time and motion study suggested that integrating the delivery of video-based survival skills education by nurses and/or PCTs would be feasible if well planned. A pilot integration of Diabetes To Go within nursing unit workflow has been conducted. The primary results of this research will be reported in a forthcoming manuscript.

The Pharmacy-Based Diabetes Education Team

Pharmacists with diabetes expertise may also provide inpatient diabetes education. In a recent Pharmacist-led inpatient diabetes education program (IDEP), adults with diabetes, and an admission blood glucose >200 mg/dl (>11.11 mmol/L) or hemoglobin A1C>6.5% (>48 mmol/L) and with a LOS>24 h were eligible for inclusion in the study [27]. Pharmacy students and residents were trained to deliver the program under the supervision of a clinical pharmacist. Patients received one-on-one education from the pharmacy team with sessions lasting about 20 min and focused on the following: medication usage, home blood glucose monitoring, how to inject insulin, and additional survival skills education as well as recommendations for outpatient follow-up and referrals to outpatient diabetes education. Intervention group participants were younger than those in the control group (61 vs 65 years old, p=0.14) and had a higher median hemoglobin A1C (9.5% [80 mmol/mol] vs 6.8% [51 mmol/mol] p=0.0001). The study reported a significantly lower 30-day readmission rate for the intervention group as compared with the controls (13.2% vs. 21.5% p=13.1). Of interest, this pharmacy-led IDEP was developed because hospital leadership recognized the paucity of inpatient diabetes education services available and looked outside its limited staffing resources to the college of pharmacy to help meet this need.

The General Hospital Staff Diabetes Education Model

Inpatient diabetes care management is often undertaken by general medicine and surgery services and increasingly so by hospitalists. In this model, diabetes education is provided per each hospital's usual care protocols. Where in-person education cannot be offered, printed education tools are typically provided before or at the time of discharge. Krames and HealthWise are providers of online education tools which are integrated into provider workflow via the EHR. They offer databases of educational content, including handouts and discharge instructions. Such tools are increasingly also offered in a digital format [28, 29]. If certified by the Office of the National Coordinator Authorized Testing and Certification Body, these resources may be used by hospitals to help meet meaningful use requirements for electronic copies of discharge instructions, patient-specific education resources, and medication reconciliation. Evidence on the impact of such an approach to education on patient-reported and clinical outcomes education is needed.

Finally, ancillary staff may be deployed to deliver education to the bedside and engage patients in the content, as was done in the Diabetes To Go study [2]. The staffer in this model is typically not a diabetes content expert and may be charged with delivering education for multiple medical conditions and/or may perform additional functions to facilitate care transitions. This role may be performed by a community health worker (CHW), a medical or administrative assistant (MA or AA), a certified nursing assistant (CAN), etc. Their lower salaries offer a cost-effective way to deliver education at the bedside, particularly in a value-based model of care delivery. A limitation of non-clinicians delivering this bedside education would be their inability to address follow-up questions from the patients. This could be addressed by referring those patients back to their bedside nurse for additional education, to an inpatient educator if available, or by ensuring that these patients are scheduled to see an outpatient educator after discharge.

Technology-Enabled Inpatient Diabetes Education.

Patient engagement technologies offer the potential to expand the reach of diabetes education in the hospital setting. Research in this field is emergent. From the perspective of inpatient diabetes education, generic health information may be referred to as the provision of health-related content to patients, including tailored information for a particular diagnosis or treatment. Patient-specific information implies unique content delivered to an individual. Within the body of health information technology literature, education is often considered in broader patient engagement strategies. Prey et al. conducted a systematic review of inpatient engagement which revealed considerable gaps in knowledge in this area, particularly relative to impact on health outcomes and cost-effectiveness. This represents a critical gap in knowledge, particularly as current care delivery models now place patients at the center of care. While none of the studies included in this review were on diabetes education, several important themes emerged which may be used to inform diabetes education efforts that use technology. If electronic devices are provided to patients, there are issues regarding infection control, data security and privacy, physical management, and ergonomic issues [30].

Patient education and entertainment systems are evolving into patient engagement systems. Solutions have advanced from basic methods of nurses conversing with patients and providing printed education materials, to current interactive systems that deliver content on the in-room television, accessed and navigated from a patient remote control device, or via a tablet computer. Interactive patient engagement platforms are now also beginning to be used to streamline operations and enhance the patient experience [33]. The educational content delivered via SMART TVs is typically generic health information and may be sourced from education providers such as KRAMES and Healthwise®. SMART TVs offer the advantage that television is a familiar platform to patients, is available at every bedside within a hospital, avoids the need for infection control measures except during room turnover, and poses less of a burden in terms of physical management and ergonomic issues than tablet computers.

We are not aware of any studies that have assessed the impact of providing this type of content to inpatients with diabetes on clinical outcomes. It should also be noted that when surveyed about programming preference for a hospital's closed-circuit TV channel, only 34% of patient respondents indicated that the content should include health information whereas 66% preferred light entertainment [34], which highlights the need for robust engagement strategies if these tools are to successfully provide inpatient diabetes education. In addition, whether hospitalized patients would choose to watch health information videos in large numbers also remains in question.

Inpatient Diabetes Education: Where Do We Go from Here to Move the Field Forward?

Timely provision of well-defined individualized DSMES to persons with diabetes is recommended by all the leading diabetes organizations and recognized as an essential component for enabling the achievement of blood glucose targets and avoiding long term complications. The majority of DSMES continues to be provided in the outpatient setting which 2/3rds of diabetes educators report as their practice setting [18]. Given the rising numbers of hospital admissions that include a diabetes diagnosis, and the knowledge that a significant

proportion of persons with diabetes do not receive appropriate outpatient DSMES, hospitalization does present an opportunity to provide knowledge through delivery of survival skills education to help assure safe and effective self-care management, decrease readmission rates, and improve allied diabetes-related outcomes.

Based on the literature, multiple models may be considered for the provision of inpatient diabetes survival skills education. One approach is to have dedicated diabetes specialists, either as part of a multidisciplinary team or a NP consult service which provides survival skills education in conjunction with diabetes management to inpatients. Financial models support deploying endocrinologists or NPs who can bill for inpatient diabetes care management services. Although a diabetes educator-alone model for inpatient SSE is currently limited by lack of reimbursement for diabetes educator inpatient services, a growing move to value-based reimbursement models may make this model financial viable via its impact on readmission aversion.

In the words of Voltaire, "the best is the enemy of the good" [35] and not being able to implement an inpatient diabetes-specialty care model should not deter hospitals from exploring other avenues to meet the health care management and education needs of their patients with diabetes through implementation of non-specialty care delivery models for education. Indeed, the latter may be necessary to enable scalability and sustainability of these models nationwide. As presented in this review, some hospitals are training bedside nurses to provide SSE supported with printed materials or videos via tablet computers and augmented by referrals prior to and following discharge to trained Dietitians, Nurse Specialists, Diabetes Educators, Pharmacists, and Case Managers as needed. One institution reached out to the local College of Pharmacy to augment its ability to provide inpatient diabetes education. Where such outside help is not available and nurse staffing and workflow do not provide the opportunity for patient teaching, hospitals may explore deploying a dedicated unlicensed health care worker (e.g., MA, AA, PCT, CHW) to assist with the delivery of tablet or print-based education. Such an approach would be more effective if the education being offered is patient-centered and based on identified knowledge deficits from a baseline knowledge survey. This lower cost option could ensure that all hospitalized patients with a diabetes diagnosis receive the recommended SSE content. Finally, in this field, there are significant opportunities for researching the feasibility and effectiveness of technology-enabled diabetes education, including utilizing smartphones, EHR tools, and other engagement technologies such as virtual reality platforms to reach more patients.

There is clearly an ongoing need for evidence-based scalable and sustainable strategies for learner-centered, knowledge-based survival skills education in hospitals for persons with diabetes. Until we are able to stem the tide of new diabetes diagnoses and expand the reach of outpatient diabetes education to all patients who need it, it is imperative for our hospitals to continue examining various methods to provide inpatient diabetes education and to report on their successes and failures until evidenced-based consensus models emerge which can be standardized for implementation based on available resources.

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