

Role of the Diabetes Care & Education Specialist in Inpatient Diabetes Management

Diabetes mellitus is the second most common diagnosis for those discharged from hospitals among adults age 18 and older.¹ Patients with diabetes are frequently hospitalized, for treatment of conditions other than diabetes.^{2, 3} A study published in 2010 showed that those with higher A1C levels had higher rates of diabetes-related hospitalizations.⁴ Research suggests that early and aggressive intervention to control hyperglycemia in hospitalized patients could significantly reduce morbidity, mortality, length of stay, and medical costs.⁵⁻¹⁰ In 2012, 25% of the total \$176-billion burden in direct medical costs for diabetes were related to hospitalizations.¹¹ Guidelines for inpatient management of diabetes have been published to provide standards of care for health care professionals.¹²⁻¹⁵ Additionally, the Society of Hospital Medicine provides an online Glycemic Control Implementation Tool Kit to support quality improvement efforts.¹⁵ Another publicly available resource is the American Association of Clinical Endocrinologists' Inpatient Glycemic Control Resource Center.¹⁶

Diabetes self-management education and support is widely recognized as an important component of patient care, recovery, and reduced cost in the hospital setting.¹⁷ The 2015 ADCES National Practice Survey reported that 15% of diabetes care & education specialists work in hospital inpatient services.¹⁸ It is the position of ADCES that all inpatient interdisciplinary teams include a diabetes care & education specialist to lead or support improvement efforts that affect patients hospitalized with diabetes or hyperglycemia. This not only encompasses patient and family education, but education of interdisciplinary team members, and achievement of diabetes-related organizational quality metrics and performance outcomes.

Role of the Diabetes Care & Education Specialist

Diabetes Care & Education Specialists are a valuable asset to the interdisciplinary team and are uniquely prepared to facilitate change and implement processes and programs to improve glycemic control.^{19, 20} Diabetes Care & Education Specialists play a key leadership role in creating or implementing:

- interdisciplinary teams (related to quality improvement, patient or medication safety, documentation/tool development, clinical informatics & decision support)
- comprehensive staff diabetes education
- the collection of blood glucose data and the surveillance of outcome measurements
- evidence-based hypoglycemia and hyperglycemia management order sets and protocols (as well as monitoring, tracking, and root cause analysis to prevent errors and patient harm)
- individualized medication management plans within the hospital setting and for use after discharge, and
- a plan of care that facilitates a smooth transition across the care settings
- The Diabetes Care & Education Specialist's responsibility as a leader or member of the interdisciplinary team includes input into patient education, identifying barriers to care, care coordination and transition, nutrition therapy, medication therapy and management, hypoglycemia management and prevention,

monitoring glycemic control, and professional education.^{19, 21-23} All components of hospital care that affect inpatient glycemia need to be considered in initiatives to improve inpatient care.^{12, 17, 24-27}

Patient Education

Patient education planning by the team should begin as soon as a learning need is identified during assessment. Early intervention provides time to identify and address barriers, offers opportunities for practice, and facilitates problem-solving and coping skills. The goal is to prepare the patient (or caregiver) to perform (self-management) survival skills by the time of discharge.^{21, 23, 24} Inpatient diabetes education focuses on basic skills and knowledge and should serve as a bridge to ongoing outpatient education centered on the AADE7™ Self-Care Behaviors. The role of the Diabetes Care & Education Specialist in the inpatient setting is to serve as an expert and role model for other health care professionals.^{19, 27, 28}

Best practices modeled by a diabetes care & education specialist include:

- performing learning needs assessments including health literacy, and setting and prioritizing goals^{12, 21, 29}
- evaluating and updating prior diabetes knowledge^{12, 21, 23, 29, 30}
- structuring the environment and teaching approach to optimize learning (e.g., focused, short sessions)
- focusing on self-management survival skills - meal planning, safe medication administration, monitoring blood glucose including targets, timing of testing and technique (and ketones as appropriate), and prevention and treatment of hypoglycemia and hyperglycemia^{12, 21, 23, 24, 29}
- documenting and communicating status of self-management education and identified needs to other health care professionals
- evaluating the ability of the patient to obtain diabetes supplies and medication^{23, 31} and
- providing referrals to community resources to continue diabetes self-management education.^{21, 22}

Care Coordination and Transitions of Care

Diabetes is a complex condition that requires ongoing care management through interdisciplinary collaboration across the continuum of care.^{14, 32} One of the four critical times identified to assess, provide, and adjust diabetes self-management education and support (DSME/S) is when transitions in care occur, such as those related to hospital discharge.³³

Diabetes-focused discharge planning should begin upon admission and continue throughout hospitalization to prepare for a smooth transition from hospital to outpatient care.^{14, 21, 34} Diabetes case management adherence guidelines are available online from the Case Management Society of America.³⁵

The diabetes care & education specialist's role in coordination of care and facilitating transitions should include:

- utilizing a patient and family-centered approach^{14, 34,}
- collaborating closely with other team members, including social workers, case managers, pharmacists, home care coordinators, and community health workers^{14, 16, 34,}
- empowering patients and caregivers to actively participate in their care^{14, 21,}
- providing a clear and feasible management plan at discharge based on clinical needs, patient preferences, goals, and abilities^{14, 16, 21, 34,}
- ensuring that a follow-up appointment for diabetes care is scheduled prior to discharge^{21, 32, 34,}
- establishing partnerships with community-based providers and services to address health and social needs^{16,}
- communicating the status of diabetes self-management education, plan of care, and medication reconciliation to next provider and/or site of care^{16, 21,}
- identifying and mitigating risk factors for readmission^{34, 36,} and
- evaluating outcomes of care coordination efforts such as readmission rates, scheduled post-discharge appointment rates, communication of

self-management plans, and patient satisfaction with readiness for discharge.^{31,35}

Nutrition Therapy

The primary nutrition goals during hospitalization are to optimize glycemic control, provide adequate nutrition and calories to meet metabolic demands, and create a discharge plan for follow up care.²

Some of the challenges in the inpatient setting that may impact achievement of these goals include. 19, 21, 37, 38:

- meal timing and modifications based on need for testing, procedures, and surgery
- changes in appetite and ability to eat secondary to medications and acute illness
- inconsistent carbohydrate intake
- visitors bring in outside food that is not included in the meal plan
- meal timing and modifications vary from those at home and are based on need for testing, procedures, and surgery
- suboptimal coordination of nutrition delivery with point of care glucose testing and insulin administration
- lack of understanding of current diabetes nutrition principles by staff, patients and their families
- variation in insulin requirements with enteral and parenteral feedings
- decreased activity levels

Consistent carbohydrate meal plans are preferred by many hospitals to reduce the variations in blood glucose levels that occur when carbohydrate levels differ from meal to meal.²¹ Hospitals may implement carbohydrate-based insulin dosing to improve accuracy in prandial dosing of insulin, and the flexibility of meal plans to enhance patient satisfaction, however this approach requires more intensive staff education.

Diabetes care & education specialists should assist in the coordination of hospital food delivery, insulin administration, and point-of-care blood glucose testing schedules to optimize glycemic control.^{13, 39} Coordinating care with a registered dietitian is essential due to the many nutrition challenges in

the hospital.²¹ Educating and involving patients and family members in meal planning throughout hospitalization will facilitate self-care behavior during and beyond hospitalization.

Medication Therapy and Management

Obtaining optimal glycemic management and achieving glycemic targets while minimizing hypoglycemia requires an understanding and use of effective insulin therapy. Recent studies have emphasized the importance of avoiding hypoglycemia to reduce risks but it is equally important to avoid hyperglycemia.^{40, 41}

An interdisciplinary team with administrative support is recommended to establish policies, order sets, and glycemic targets.¹⁵ Development and implementation of hospital-wide policies and standardized insulin order sets will guide providers in selecting the appropriate insulin regimen while avoiding adverse events.^{12, 21} The use of a reactive "sliding scale" should be eliminated and rather, physiologic insulin regimens that utilize basal, prandial, and correction insulin should be the standard of care.^{12, 21}

Guidelines for insulin therapy to achieve glycemic targets include:

- Continuous intravenous insulin infusions are recommended in critical care to achieve glycemic targets. Infusions can also be used for management in noncritical care areas for patients meeting established criteria. When intravenous insulin is discontinued, the transition to scheduled subcutaneous insulin should occur 1-2 hours before the infusion is discontinued.^{12, 21}
- Scheduled subcutaneous basal, prandial, and correction insulin orders are preferred, rather than "sliding scale" alone, for non-critically ill patients.^{12, 21} It is particularly important that patients who were receiving insulin at home receive scheduled insulin as inpatients.¹² Intravenous insulin therapy alone for patients who are eating meals does not control blood glucose very effectively. In situations where intravenous insulin is given to patients who are eating, subcutaneous insulin to cover carbohydrate ingestion can be used to manage meal-related glucose variability.
- Use of oral antihyperglycemic agents is of limited value, may be potentially harmful in acute care

settings, and should be avoided.^{12, 21} Safety and efficacy of other injectable diabetes medications has not been studied yet in hospitalized patients.⁴

- Use of insulin in acute care should be explained to patients to avoid unnecessary anxiety concerning use of insulin therapy after discharge.¹³
- Insulin therapy adjustments should be made considering response to insulin doses, type of diabetes, current A1C, nutritional status including carbohydrate intake, clinical status (such as weight and renal function), insulin resistance, and concomitant medication therapy.^{12, 21, 29}
- Patients transitioning to insulin therapy for home use (especially those who are new to using insulin) should begin to self-administer insulin as soon as possible under supervision in order to assess the patient's ability. Hospitalization is an opportunity to evaluate and improve home diabetes medication regimens and promote self-care.¹²
- Use of patients' own insulin pumps may be appropriate based on the patient's clinical condition and ability to competently manage the pump during acute illness.²¹

Hypoglycemia Management

Hypoglycemia occurs when the plasma glucose level is < 70 mg/dL (non-pregnant). This correlates with the initial threshold for the release of counter-regulatory hormones.⁴² Cognitive impairment begins in all individuals with and without diabetes below 50 mg/dL. Institutions often use less than 50mg/dL or 40mg/dL to denote severe hypoglycemia. The impact of hypoglycemia can be profound. In the hospital, it is associated with an increased risk of falls, seizures, and other complications as well as increased length of stay, death, and death within one year of discharge.⁴³ Thus, efforts must be made to mitigate risk and incidence of hypoglycemia.

Diabetes care & education specialists can provide leadership with the development and implementation of tools to assess and document hypoglycemia. An initial assessment for hypoglycemia that documents the threshold at which symptoms are experienced, and treatment used to correct hypoglycemia can help guide the

interdisciplinary team in the plan of care for the patient. Hypoglycemia management orders must be in place for each individual on glucose-lowering medications. The diabetes care & education specialist can also facilitate the development and use of standardized insulin order sets and protocols in combination with a patient-centered approach to prevent hypoglycemic events, achieve optimal outcomes, and reduce potential for harm. The diabetes care & education specialist should also support the implementation and use of hypoglycemia management protocols and as well as make recommendations for changes as needed.

When care is transferred from one healthcare provider to another, hand-off communication should include a current blood glucose value and last insulin administered. This helps to determine timing of assessments and when the next blood glucose test is needed.⁴⁴ The diabetes care & education specialist can assist with analysis of hypoglycemic events and determine likely cause(s), including antihyperglycemic medications and dosages, other medications that alter blood glucose, caloric intake whether it be oral, enteral or parenteral, and co-morbid conditions that can effect glucose regulation such as renal and or liver impairment as a means of determining ways to prevent and reduce hypoglycemia.⁴⁴

Monitoring Glycemic Control

An A1C test and routine glucose monitoring are recommended for all patients with hyperglycemia or at high risk for hyperglycemia. This includes patients with a history of diabetes as well as patients receiving high-dose steroids, immunosuppressants, and enteral or parenteral nutrition.³¹ The A1C test may not be accurate after blood transfusions, or with a history of excessive glucose fluctuations or if there are hemoglobinopathies such as in dialysis or patients following chemotherapy. Point-of-care ketone testing should be considered for emergency, pediatric, and obstetric patients.

The diabetes care & education specialist's role in recommending and evaluating products used for bedside blood glucose monitoring may include:

- working in collaboration with other care providers to ensure reliable blood glucose test results,
- developing and implementing written protocols/order sets to address the treatment of both hypoglycemia- and hyperglycemia,
- involving the patient and family in care and decision making whenever possible,
- troubleshooting patient comfort concerns,
- establishing policies in collaboration with the laboratory and nursing for utilization of the hospital meter and patients' home glucose meters simultaneously if appropriate, and
- systematically analyzing blood glucose data (glucometrics) for surveillance to evaluate outcomes and revising protocols/order sets as needed for patient care and performance improvement.

The challenge of obtaining accurate glucose point-of-care results in acutely and critically ill patients has been the focus of much attention.^{45, 46} Results can be compromised by medications, clinical states, and treatments.⁴⁴ Because of this, a glucose monitoring system utilized in the hospital must meet criteria being established by the FDA. The diabetes care & education specialist is encouraged to work with the laboratory point-of-care staff to develop policies, procedures, and educational competencies for staff to follow. Annual observed competencies of finger stick technique should include obtaining a blood sample appropriately and include timing of testing related to meals and medications.

Professional Education

All health care professionals who care for patients with diabetes should receive ongoing diabetes

management updates. This includes nurses, nurse practitioners, physician assistants, physicians, dietitians, pharmacists, case managers, and point-of-care testing personnel. With this goal in mind, the inpatient diabetes care & education specialist may participate in the following educational activities²⁸:

- assessing staff diabetes knowledge and skill,
- enhancing staff competencies,
- providing education in a variety of settings, including staff orientation, clinical areas, and grand rounds,
- developing curricula to share with other members of the team; and
- utilizing a variety of learning tools, such as case studies, self-learning modules, journal clubs, survival skills toolkits, and pocket cards to accommodate all settings and learners' needs and preferences.

Topics should include types of diabetes, early recognition and screening for hyperglycemia, rationale for inpatient glycemic control, glycemic targets, nutrition therapy, and insulin therapy. Additional topics include the use of bedside blood glucose monitoring data, oral agents in the hospital, acute complications, diabetic ketoacidosis, hyperosmolar hyperglycemic non-ketotic syndrome, perioperative care, hypoglycemia prevention and treatment, insulin pumps and documentation, including type of diabetes and complications. Coding and hospital medical records should reflect newly diagnosed diabetes, hospital hyperglycemia, diabetes related complications, and patient education provided.

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