Field Guide: Glycemic Agent Related Adverse Drug Events

Definition and Harm Impact

An adverse drug event (ADE) is an injury resulting from medical intervention related to a drug.¹ This includes medication errors, adverse drug reactions, allergic reactions, and overdoses. Adverse drug events (ADEs) are among the most preventable causes of death in hospitals and ADE involving hypoglycemic agents comprise 57 percent of all ADEs, making this the largest drug class contributing to ADE-related harms. Fifty percent of all medication errors involve insulin—including one-third of all that are fatal—and approximately one-quarter of all safety incidents involving insulin result in patient harm.²,³ Rates of ED visits and subsequent hospitalizations for insulin-related hypoglycemia and errors were highest in patients 80 years or older, so it is important that patients and families understand safe administration of insulin at home prior to discharge from the hospital setting.⁴

Key to addressing prevention of hypoglycemic-related ADE is for clinicians to engage in patient/family partnerships to create and meet individualized glycemic targets while patients are hospitalized. Also key is to ensure a discharge planning that transitions patient’s post-discharge diabetic treatment successfully.

Engaging Patients and Families

Educate patients and family members about the risk of hypo/hyperglycemia and diabetic complications. Partner with patients and families to set up goals, treatment plans, and address education needs regarding the disease and its management. Diabetes is a complex disease process involving medication, lifestyle issues, prevention of diabetic complications, and support from the medical community and family members.

Education Points: 5, 6, 7, 8

- Provide education on the definition of hypoglycemic adverse drug events.
- Validate patient and family knowledge of the signs and symptoms of hyper/hypoglycemia and encourage ongoing dialogue with clinical team during hospitalization.
- Address rationale for using insulin during hospitalization for achieving individualized glycemic control goals.
- Address timing of hospital meals/insulin administration.
- Discharge planning key points: For new diabetics, use Teach-Back methods to ensure patient/family competency and comfort with all aspects of diabetic care post-discharge through the following tools.
  - Safe medication administration techniques, and individualized treatment plan
  - Blood glucose monitoring: meter use, how often to check blood glucose, and how to keep a log of the blood glucose numbers
  - Home nutrition plan and resources to begin lifestyle changes, including referrals
  - Address importance of maintaining proper diet and exercise, monitoring blood pressure practicing good foot and skin care, evaluating your eyes, and managing stress
- Discharge planning key points for chronic diabetes:

Additional resources are available at: www.hsag.com/hiin
a. Address updates to their hospital treatment plan, include goals discussion and explanation for any differences from “usual home regimen.”
b. Prior to discharge, address updates and changes to home treatment plan, including rationale for changes; include nutrition, medication, lifestyle factors, signs/symptoms of hyper/hypoglycemia.
c. Validate patient/family knowledge of home care, including safe medication administration practices, importance of maintaining proper diet and exercise, monitoring blood pressure, practicing good foot and skin care, evaluating your eyes, and managing stress.
d. Assist patient in developing a daily visual schedule of their diabetic medications, meals, and blood sugar testing regimen.9

- Include post-discharge tools such as the “HSAG Zone Tool for Diabetes Self-Management” to identify warnings and emergency situations.

**Patient and Family Engagement Strategies:** 5, 6, 7, 10

- Encourage patient and family participation in shift-to-shift and bedside rounding by soliciting their voice in goal setting and treatment plan.
- Use plain language and Teach-Back technique to ensure patient understanding of the disease management, and the purpose, names, dosage, directions, and side effects of their diabetic medication while hospitalized.
- Be cognizant of patient cultural values and health literacy. Invite PFAC members to review and have input into patient education materials.
- Recruit patients as PFAC members to multidisciplinary diabetes quality and/or patient education and communications committees.

**Hospital Improvement Strategies**

Create an interdisciplinary team to address and monitor diabetes care and hypoglycemic-related ADE performance to include: endocrinologist, diabetic nurse educator, nursing, pharmacist, case manager, social worker, home care coordinator, community health worker, and a patient and family advisory council (PFAC) member. One key task includes revising protocols/order sets as needed for patient care and performance improvement.

**Program Best Practices:**

1. Implement standardized insulin protocol involving basal/bolus versus insulin sliding scale.
2. Address identified disparities regarding access to care and post-discharge resources for diabetic population, such as food security, access to primary care, transportation, and safe insulin storage issues.
3. Adhere to medication reconciliation to avoid inconsistencies during care transitions.
4. Address potential for readmission by ensuring adequate quantity of medication and diabetic supplies upon discharge.
5. Schedule a follow up with primary doctor and a diabetic education clinic with transportation addressed.
6. Standardize and provide comprehensive staff diabetic education6
   - Regularly assess staff diabetes knowledge and skill and enhance staff competencies.
   - Use various learning tools, including simulation to accommodate all settings and learner’s needs and preferences.
7. Standardize recognition of hypo- and hyperglycemic events using screening tools, and technology-driven alert systems:
   - Screen patients on admission with A1C labs and monitor through hospitalization.
   - Automate review of labs and insulin orders for patients with set blood glucose lab results. For example, review hypoglycemic report daily and utilize the HSAG HEAT tool to do root cause analysis of hypoglycemic events.
   - Establish specific glycemic goals and responses to glycemic results outside of goal results. Implement nurse-driven hypoglycemia management protocol.

**Standardize clinical practice to achieve individualized glycemic targets:**
- Perform A1C screening on all patients with diabetes or hyperglycemia (blood glucose >140 mg/dL) admitted to the hospital if not performed in the prior three months.
- Implement basal bolus practice (avoid sliding scale)—physiological approach to treating diabetes.
- Develop individualized insulin administration order sets with specific goals based on patient’s sensitivity to insulin (i.e., sensitive, average, resistant, and patients on concurrent steroid administration) and clinical condition. (i.e., terminal illness, severe comorbidities).

**Use best practices to improve inpatient glycemic management:**
1. Use insulin in acute care setting by automatic medication dispensers and discontinue use of any other diabetic agents. Institute periodic review of overrides and address.
2. Standardize insulin formulary (keep formulary of 4–5 insulins) and standardize the size and type of insulin on the floor (do not stock U-500 on floor)—keep one type of insulin in the smallest-size vial (short-acting).
3. Avoid using insulin pens to prevent adverse events and prevent cross-contamination.
4. Insulin verification before administration by nurse (nurse double check). Examples: first three months of new hires, new order sets, > 10 units of insulin.

**Optimize glycemic control:**
1. Coordinate meal time, blood glucose testing, and insulin administration.
2. Modify therapy for changes in oral intake and needs for testing, procedures, and surgery.
3. Ensure proper transition from IV insulin to SQ and adjust insulin dose for care transition.
4. Monitor patient status and adjust insulin dose based on patient nutritional status, clinical status, changes in corticosteroid use, insulin resistance, and concomitant medication therapy.

**Measurement**

The Hospital Improvement Innovation Network (HIIN) goal for reduction in ADE is a 20 percent reduction from baseline of calendar year 2015. ADEs are measured through outcome measures related to glycemic management ADE. The population for all measured is adult patients except for those in the emergency department:
- Glucose value <50 mg/dL per 1,000 patient days
  - Self-reported measure
  - Is measured by number of patient days with at least one glucose reading < 50 mg/dL for adult patients on insulin over the number of patient days for adult (18 years of age or older) patients on insulin, excluding the emergency department.
• Glycemic-related adverse drug events per 1,000 acute inpatient admissions
  – Medicare Fee-for-Service claims based on ICD-10 codes.
  – Measured by the number of glycemic-related adverse drug events, with a primary or secondary ICD-10-CM diagnosis as defined in glycemic ADE code list, not present on admission (POA). POA over all acute inpatient admissions (including transfers and left against medical advice [LAMA]) in the measurement timeframe.

Resources and Guides for Hospitals

• ISMP Medication Self-Assessment for High-Alert Medications. Available at: https://www.ismp.org/sites/default/files/attachments/2018-01/EntireAssessmentWorkbook.pdf
• American Association of Clinical Endocrinologists—Clinical Evidence for Glucose Control in the Inpatient Setting. Available at: http://inpatient.aace.com/rationale-for-achieving-glycemic-control
• National Institute of Diabetes and Digestive and Kidney Disease—Managing Diabetes. Available at: https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/4-steps#page2
• Association of Clinicians for the Underserved (ACU)—Patient education materials. Available at: http://clinicians.org/our-issues/acu-diabetes-patient-education-series/
• Optimizing Glucose Management in Hospitalized Patients Using a Subcutaneous Basal-Bolus Insulin Therapy Approach. Available at: https://health.uconn.edu/pharmacy/wp-content/uploads/sites/60/2016/03/Hypoglycemia-protocol-3-16-2016.pdf
• Society of Hospital Medicine (SHM)—Improving Glycemic Control in the Non-Critical Care Setting. Available at: https://www.nyspfp.org/Materials/2017_0510_ADE_SinhaNonCrit.pdf
• American Diabetes Association—15. Diabetes Care in the Hospital: Standards of Medical Care in Diabetes. Available at: http://care.diabetesjournals.org/content/42/Supplement_1/S173


