

بنام خداوند جان و خرد

Management of challenging and complicated patients with DM

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Introduction

- Most patients with diabetes can be effectively managed using oral medications while considering other risk factors.
- However, in both inpatient and outpatient settings, we occasionally encounter challenging patients whose diabetes or underlying conditions are difficult to control.
- These patients may present challenges due to issues with blood sugar regulation or because they have complex underlying diseases.



Introduction

- ✦ Effective diabetes management in these patients (for example in the ICU) not only focuses on maintaining appropriate glucose levels but also takes into account individual patient needs and medical conditions.
- ✦ This presentation will explore the significance of glycemic control, monitoring strategies, protocols for insulin therapy, and the essential role of a multidisciplinary team in optimizing outcomes for challenging diabetic patients in the outpatient or in the critical care settings.

Which patients are complicated?

- ✚ Patients at intensive care settings
- ✚ Patients at psychiatry wards
- ✚ Pregnant patients with uncontrolled type 1 diabetes mellitus
- ✚ Patients with multiple underlying problems, like ASCVD, hyperlipidemia, diabetic foot infection and GI problems(malignancies, pancreatitis)
- ✚ Patients with antibody induced insulin resistance
- ✚ All patients with brittle diabetes
- ✚ And many others.....

Case 1

- You are requested for consultation about a patient with uncontrolled diabetes mellitus in the ICU.
- He is a 65-year-old man who was admitted to the hospital six days ago for a respiratory infection, likely COVID-19, and was transferred to the ICU due to respiratory failure four days ago. He has been intubated and is on mechanical ventilation.
- He has had diabetes mellitus for 16 years (treated with metformin 500 milligrams twice daily) and has had chronic kidney disease for two years. He does not have ASCVD.
- He has been receiving Dexamethasone 8 milligrams BD since six days ago and is in a light coma by midazolam. He is also receiving insulin based on a sliding scale protocol.
- His nutrition is provided via a nasogastric tube, administered every four hours during the day, along with IV fluids. His recent blood glucose measurements by glucometer and lab have been 232, 320, 410, and 360 mg/d.
- BP = 160/96 to 128/78
- Cr: 1.9 mg/dl, Na: 135 meq/l, K: 4.4 meq/l.

Case 2

- ✚ The patient is a 34-year-old divorced woman, hospitalized in the psychiatric ward with a history of diabetes for 3 years, currently receiving treatment with NPH insulin 36 units at night and metformin tablets 2 to 3 times daily irregularly, as well as atorvastatin and losartan tablets irregularly.
- ✚ The patient has a history of psychotic attacks for 12 years and was currently hospitalized due to suicide attempts and threats to kill others.
- ✚ The patient is addicted to cigarettes, opium, and possibly amphetamines.
- ✚ You have been consulted for diabetes control.
- ✚ On examination, the patient is obese. Her BMI is over 32. The patient's face is Cushingoid and she has some purple striae on the abdomen, but she does not have proximal muscle weakness. The patient's feet are completely dirty and her hygiene is in a completely unfavorable condition.
- ✚ BP = 180/110
- ✚ FBS= 64-283 mg/dl, Cr = 1.42 mg/dl, Na = 135 meq/l, K = 3.5 meq/l, TG 641, Chol 312, TSH = 4.6,

Management of a complicated patient

- ✦ Glycemic management/ TIR/ Variability
- ✦ Hypoglycemia prevention
- ✦ Medical Nutrition Therapy/ weight goals
- ✦ Exercise planning
- ✦ Lipid management
- ✦ BP control
- ✦ Foot care, DFU prevention and management
- ✦ Infections / specific/ non specific
- ✦ Eye and retinopathy
- ✦ Neuropathy(sensory, motor and autonomic)
- ✦ Electrolyte abnormalities
- ✦ kidney function and albuminuria
- ✦ liver considerations, MASLD and MASH
- ✦ Cardiovascular management (IHD, HF, CAN and orthostatic hypotension....), cerebrovascular health
- ✦ Peripheral vascular
- ✦ Osteoporosis and bone health
- ✦ Mood, cognition and psychiatric situation
- ✦ Polypharmacy and drug interactions
- ✦ Pregnancy management, fertility issues
- ✦ Sexual dysfunction
- ✦ Drug side effects/ complications
- ✦ Social determinants of health
- ✦ Multi specialty needs, visit programs...
- ✦ And.....

Headlines and titles

- ✦ Standard Definitions of Glucose Abnormalities
- ✦ Glycemic Goals in Hospitalized Adults
- ✦ Glucose Monitoring
- ✦ Glucose-Lowering Treatment in Hospitalized Individuals
 - Critical Care Setting
 - Noncritical Care Setting
- ✦ Hypoglycemia
- ✦ Medical Nutrition Therapy in the Hospital
- ✦ Self-Management in the Hospital
- ✦ Special Situations
 - Enteral and Parenteral Feedings
 - Glucocorticoid Therapy
 - Perioperative Care
 - Diabetic Ketoacidosis and Hyperglycemic Hyperosmolar State
- ✦ Transition From the Hospital to the Ambulatory Setting
- ✦ Preventing Admissions and Readmissions

Standard Definitions of Glucose Abnormalities

- Hyperglycemia in hospitalized individuals is defined as blood glucose levels >140 mg/dL (>7.8 mmol/L).
- An admission A1C value $\geq 6.5\%$ (≥ 48 mmol/mol) suggests that the onset of diabetes preceded hospitalization.
- Level 1 hypoglycemia is defined as a glucose concentration of 54–69 mg/dL (3.0–3.8 mmol/L).
- Level 2 hypoglycemia is defined as a glucose concentration <54 mg/dL (<3.0 mmol/L), which is typically the threshold for neuroglycopenic symptoms.
- Level 3 hypoglycemia is defined as a clinical event characterized by altered mental and/or physical functioning that requires assistance from another person for recovery.
- Levels 2 and 3 require immediate intervention and correction of low blood glucose.
- Prompt treatment of level 1 hypoglycemia is recommended for prevention of progression to more significant level 2 and level 3 hypoglycemia.

Glycemic Goals in Hospitalized Adults

- Insulin should be initiated or intensified for treatment of persistent hyperglycemia starting at a threshold of ≥ 180 mg/dL (≥ 10.0 mmol/L) (confirmed on two occasions within 24 h) for the majority of critically ill individuals (those in the intensive care unit [ICU]).
- Insulin and/or other glucose-lowering therapies should be initiated or intensified for treatment of persistent hyperglycemia starting at a threshold of ≥ 180 mg/dL (≥ 10.0 mmol/L) (confirmed on two occasions within 24 h) for the majority of noncritically ill individuals (those not in the ICU).
- Once therapy is initiated, a glycemic goal of 140–180 mg/dL (7.8–10.0 mmol/L) is recommended for most critically ill individuals (those in the ICU) with hyperglycemia.
- More stringent glycemic goals, such as 110–140 mg/dL (6.1–7.8 mmol/L), may be appropriate for selected individuals (e.g., critically ill individuals undergoing cardiac surgery) if they can be achieved without significant hypoglycemia.
- For noncritically ill individuals (those not in the ICU), a glycemic goal of 100–180 mg/dL (5.6–10.0 mmol/L) is recommended if it can be achieved without significant hypoglycemia.
- Glycemic levels up to 250 mg/dL (13.9 mmol/L) may be acceptable in selected populations (terminally ill individuals with short life expectancy, advanced kidney failure [and/or on dialysis], high risk for hypoglycemia, and/or labile glycemic excursions).

Glucose Monitoring

- ✦ In hospitalized individuals with diabetes who are eating, point-of-care (POC) blood glucose monitoring should be performed before meals; in those not eating, glucose monitoring is advised every 4–6 h.
- ✦ More frequent POC blood glucose monitoring ranging from every 30 min to every 2 h is the required standard for safe use of intravenous insulin therapy.
- ✦ Any glucose result that does not correlate with the individual's clinical status should be confirmed by repeating the test first and measuring a sample in the clinical laboratory if the second result is similar, particularly for asymptomatic hypoglycemic events.
- ✦ Several studies have demonstrated that inpatient use of continuous glucose monitoring (CGM) has advantages over POC glucose monitoring in detecting hypoglycemia, particularly nocturnal, prolonged and/or asymptomatic hypoglycemia, and in reducing recurrent hypoglycemia.
- ✦ Continuation of personal CGM device use, particularly for people with type 1 or type 2 diabetes treated with intensive insulin therapy and at increased risk for hypoglycemia during hospitalization, is recommended.



Glucose-Lowering Treatment in Hospitalized Individuals

Critical Care Setting

- ✦ Continuous intravenous insulin infusion is recommended for achieving glycemic goals and avoiding hypoglycemia in critically ill individuals.
- ✦ Basal insulin or a basal plus bolus correction insulin plan is the preferred treatment for noncritically ill hospitalized individuals with poor or no oral intake.
- ✦ An insulin plan with basal, prandial, and correction components is the preferred treatment for most noncritically ill hospitalized individuals with adequate nutritional intake.
- ✦ For most individuals, sole use of a correction or supplemental insulin without basal insulin (formerly referred to as a sliding scale) in the inpatient setting is discouraged.
- ✦ For diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) management, continuous intravenous insulin infusion is given for correction of hyperglycemia, hyperketonemia, and acid-base disorder following a fixed-rate intravenous insulin infusion or nurse-driven protocol with a variable rate based on glucose values.
- ✦ Individuals with mild and uncomplicated DKA can be managed with subcutaneous rapid-acting insulin doses given every 1–2 h.



Glucose-Lowering Treatment in Hospitalized Individuals

Noncritical Care Setting

- ✦ In most instances, insulin is the preferred treatment for hyperglycemia in hospitalized individuals.
- ✦ In certain circumstances, it may be appropriate to continue home oral glucose-lowering medications or initiate use of agents such as dipeptidyl peptidase 4 inhibitors (DPP-4i).
- ✦ Several reports indicate that inpatient use of insulin pens is safe and may improve nurse satisfaction when safety protocols, including nursing education, are in place to guarantee single-person use.
- ✦ Use of insulin analogs or human insulin results in similar glycemic outcomes in the hospital setting, but regular insulin may increase the risk of hypoglycemic events.
- ✦ The use of subcutaneous rapid- or short-acting insulin before meals, or every 4–6 h if no meals are given or if the individual is receiving continuous enteral or parenteral nutrition, is indicated to correct or prevent hyperglycemia.
- ✦ Prolonged use of correction or supplemental insulin without basal insulin is strongly discouraged in the inpatient setting, with the exception of that for people with type 2 diabetes in noncritical care with mild hyperglycemia or stress hyperglycemia.



Glucose-Lowering Treatment in Hospitalized Individuals

Noncritical Care Setting

- ✦ A prospective randomized inpatient study of 70/30 intermediate-acting (NPH)/regular insulin mixture versus basal-bolus therapy showed comparable glycemic outcomes but significantly increased hypoglycemia in the group receiving the insulin mixture.
- ✦ Therefore, insulin mixtures such as 75/25, 70/30, or 50/50 insulins are not routinely recommended for in-hospital use.
- ✦ Data on the use of glargine U-300 and degludec U-100 or U-200 in the inpatient and perioperative settings are limited.
- ✦ A few studies have shown that they demonstrated similar efficacy and safety compared with glargine U-100.
- ✦ An insulin schedule with basal and correction components is necessary for all hospitalized individuals with type 1 diabetes, even for those taking nothing by mouth, with the addition of prandial insulin when individuals are eating.

Transitioning From Intravenous to Subcutaneous Insulin

- ✦ When discontinuing intravenous insulin, a transition protocol is recommended, as it is associated with less morbidity and lower costs.
- ✦ Subcutaneous basal insulin should be given 2 h before intravenous infusion is discontinued, with the aim of minimizing rebound hyperglycemia while the subcutaneous insulin action rises.
- ✦ Emerging data from studies in people with hyperglycemia with and without DKA show that the administration of a low dose (0.15–0.3 units/kg) of basal insulin analog in addition to intravenous insulin infusion may reduce the duration of insulin infusion and length of hospital stay and prevent rebound hyperglycemia without increased risk of hypoglycemia.
- ✦ For transitioning, the total daily dose of subcutaneous insulin may be calculated based on the insulin infusion rate during the prior 6–8 h when stable glycemic goals were achieved, based on prior home insulin dose, or following a weight-based approach.

Noninsulin Therapies

- ✦ The safety and efficacy of noninsulin glucose-lowering therapies in the hospital setting has recently expanded.
- ✦ The use of DPP-4i with or without basal insulin may be a safer and simpler plan for people with mild to moderate hyperglycemia on admission (e.g., admission glucose <180–200 mg/dL), with reduced risk of hypoglycemia.
- ✦ Data on the inpatient use of glucagon-like peptide 1 receptor agonists (GLP-1 RAs) are still mostly limited to research studies and select populations that are medically stable.
- ✦ For people with type 2 diabetes hospitalized with heart failure, it is recommended that use of a sodium–glucose cotransporter 2 (SGLT2) inhibitor be initiated or continued during hospitalization and upon discharge, if there are no contraindications and after recovery from the acute illness.
- ✦ SGLT2 inhibitors should be avoided in cases of severe illness, in people with ketonemia or ketonuria, and during prolonged fasting and surgical procedures.

Hypoglycemia

- ✦ A hypoglycemia management surveillance protocol should be adopted by all health systems. A plan for identifying, treating, and preventing hypoglycemia should be established for each individual.
- ✦ Episodes of hypoglycemia in the hospital should be documented in the health record and tracked to inform quality improvements.
- ✦ Treatment plans should be reviewed and changed as necessary to prevent hypoglycemia and recurrent hypoglycemia when a blood glucose value of <70 mg/dL (<3.9 mmol/L) is documented.
- ✦ Hypoglycemia is a severe consequence of dysregulated metabolism and/or diabetes treatment.
- ✦ A standardized hospital-wide, nurse-initiated hypoglycemia treatment protocol should be in place to immediately address blood glucose levels <70 mg/dL (<3.9 mmol/L).
- ✦ An individual's treatment plan be reviewed any time a blood glucose value of <70 mg/dL (<3.9 mmol/L) occurs.
- ✦ A key strategy is embedding hypoglycemia treatment into all insulin and insulin infusion orders.



Inpatient Hypoglycemia: Risk Factors, Treatment, and Prevention

- ✚ Errors in insulin dosing, missed doses, and/or administration errors including incorrect insulin type and/or timing of dose:
 - Include prescriber (ordering), pharmacy (dispensing), and nursing (administration) errors.
- ✚ Kidney failure is an important risk factor for hypoglycemia in the hospital.
- ✚ Iatrogenic hypoglycemia may occur:
 - after a sudden reduction of corticosteroid dose,
 - reduced oral intake, emesis,
 - inappropriate timing of short- or rapid-acting insulin doses in relation to meals,
 - reduced infusion rate of intravenous dextrose,
 - unexpected interruption of enteral or parenteral feedings,
 - delayed or missed blood glucose checks, and
 - altered ability of the individual to report symptoms

Predicting and Preventing Hypoglycemia

- ✦ In people with diabetes, it is well established that an episode of severe hypoglycemia increases the risk for a subsequent event, partly because of impaired counterregulation.
- ✦ In a study of hospitalized individuals, 84% of people who had an episode of severe hypoglycemia (defined as <40 mg/dL [<2.2 mmol/L]) had a preceding episode of hypoglycemia (<70 mg/dL [<3.9 mmol/L]) during the same admission
- ✦ Recent inpatient studies show promise for CGM to alert of impending hypoglycemia, offering an opportunity to mitigate it before it happens.
- ✦ The ability to download and interpret diabetes device data during hospitalization can inform insulin dosing during hospitalization and care transitions.

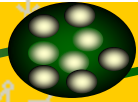


Medical Nutrition Therapy in the Hospital

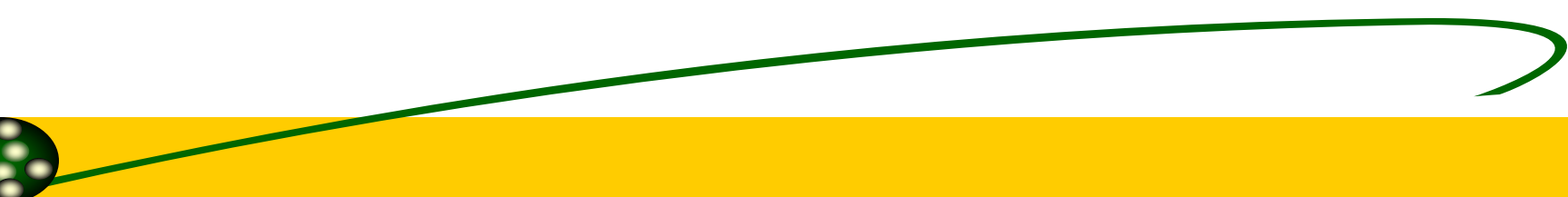
- The goals of medical nutrition therapy in the hospital are to provide adequate calories to meet metabolic demands, optimize glycemic outcomes, address personal food preferences, and facilitate the creation of a discharge plan.
- The ADA does not endorse any single meal plan or specified percentages of macronutrients.
- Current nutrition recommendations advise individualization based on treatment goals, physiological parameters, and medication use.
- Orders should indicate that the meal delivery and nutritional insulin coverage should be coordinated, as their variability often creates the possibility of hyperglycemic and hypoglycemic events.

Self-Management in the Hospital

- ✦ Diabetes self-management in the hospital may be appropriate for select individuals who wish to continue to perform self-care while acutely ill.
- ✦ Candidates include children with parental supervision, adolescents, and adults who successfully perform diabetes self-management at home and whose cognitive and physical skills needed to successfully self-administer insulin and perform glucose monitoring are not compromised.
- ✦ In addition, they should have adequate oral intake, be proficient in carbohydrate estimation, take multiple daily insulin injections or wear insulin pumps, have stable insulin requirements, and understand sick-day management.



Special Situations



Enteral and Parenteral Feedings

- ✦ For individuals receiving enteral or parenteral nutrition who require insulin, the insulin orders should include coverage of basal, prandial, and correctional needs.
- ✦ It is essential that people with type 1 diabetes continue to receive basal insulin even if feedings are discontinued.
- ✦ Most adults receiving basal insulin should continue with their basal dose, while the insulin dose for the total daily nutritional component may be calculated as 1 unit of insulin for every 10–15 g of carbohydrate in the enteral and parenteral formulas.
- ✦ Amounts of carbohydrates and infusion rates must be considered when calculating insulin doses to cover the nutritional component of enteral nutrition.
- ✦ Giving NPH insulin two or three times daily (every 8 or 12 h) or regular insulin every 6 h to cover individual requirements are reasonable options.
- ✦ For adults receiving enteral bolus feedings, approximately 1 unit of regular human insulin or rapid-acting insulin per every 10–15 g of carbohydrate should be given subcutaneously before each feeding.
- ✦ To mitigate any hyperglycemia, correctional insulin should be added as needed before each feeding.

Enteral and Parenteral Feedings

- ✦ In individuals receiving nocturnal tube feeding, NPH insulin administered along with the initiation of the feeding to cover this nutritional load is a reasonable approach.
- ✦ For individuals receiving continuous peripheral or central parenteral nutrition, human regular insulin may be added to the solution, particularly if >20 units of correctional insulin have been required in the past 24 h.
- ✦ A starting dose of 1 unit of regular human insulin for every 10 g of dextrose has been recommended and should be adjusted daily in the solution.
- ✦ Adding insulin to the parenteral nutrition bag is the safest way to prevent hypoglycemia if the parenteral nutrition is stopped or interrupted.
- ✦ Correctional insulin should be administered subcutaneously to address any hyperglycemia.
- ✦ Because continuous enteral or parenteral nutrition results in a continuous postprandial state, efforts to bring blood glucose levels to below 140 mg/dL (7.8 mmol/L) substantially increase the risk of hypoglycemia in these individuals.

Glucocorticoid Therapy

- Glucocorticoid therapy can induce hyperglycemia in 56–86% of these individuals with and without preexisting diabetes.
- If left untreated, this hyperglycemia increases mortality and morbidity risk, e.g., infections and cardiovascular events.
- Daily-ingested intermediate-acting glucocorticoids such as prednisone reach peak plasma levels in 4–6 h, but have pharmacologic actions that can last throughout the day.
- When monitored by CGM, the typical glycemic pattern for individuals treated with daily prednisone or prednisolone, administered in the morning, is characterized by normal or mild fasting hyperglycemia, with trends of increasing hyperglycemia during the afternoon, and peaking in the evening.
- For individuals treated with once- or twice-daily steroids, administering NPH insulin with prednisone or prednisolone dosing is a standard approach, aimed at matching the NPH actions with the steroid-induced hyperglycemic response.
- NPH may be administered in addition to daily basal-bolus insulin or in addition to oral glucose-lowering medications, depending on the type of diabetes and recent diabetes medication prior to starting steroids.
- For long-acting glucocorticoids such as dexamethasone and multidose or continuous glucocorticoid use, long-acting basal insulin may be required to manage fasting blood glucose levels.

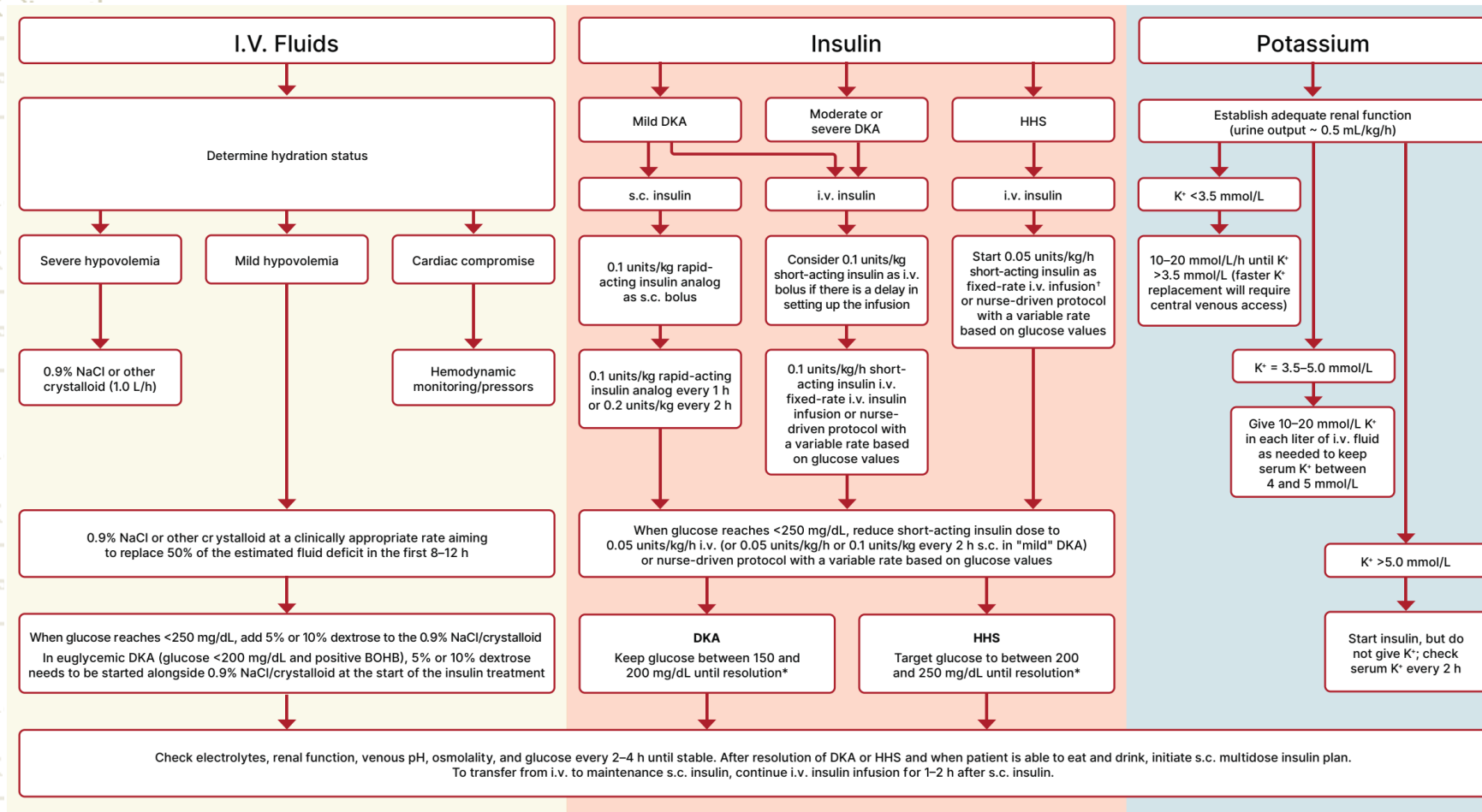
Perioperative Care

- ✦ A preoperative risk assessment should be performed for people with diabetes who are at high risk for ischemic heart disease and those with autonomic neuropathy or renal failure.
- ✦ The A1C goal for elective surgeries should be <8% (<64.0 mmol/L) whenever possible.
- ✦ The blood glucose goal in the perioperative period should be 100–180 mg/dL (5.6–10.0 mmol/L) within 4 h of the surgery. CGM should not be used alone for glucose monitoring during surgery.
- ✦ Metformin should be held on the day of surgery.
- ✦ SGLT2 inhibitors should be discontinued 3–4 days before surgery.
- ✦ Other oral glucose-lowering agents should be held the morning of surgery or procedure.
- ✦ Insulin dose reductions include NPH insulin to one-half of the dose or long-acting basal insulin analogs to 75–80% of the dose or adjustment of insulin pump (if not in automated mode) basal rates based on the type of diabetes and clinical judgment.

Perioperative Care

- Monitor blood glucose at least every 2–4 h while the individual takes nothing by mouth and administer short- or rapid-acting insulin as needed.
- Compared with usual dosing, a reduction of 25% of basal insulin dose given the evening before surgery is more likely to achieve perioperative blood glucose goals with a lower risk for hypoglycemia.
- In individuals undergoing noncardiac general surgery, basal insulin plus premeal short- or rapid-acting insulin (basal-bolus) coverage has been associated with improved glycemic outcomes and lower rates of perioperative complications compared with the reactive, correction-only short- or rapid-acting insulin coverage alone with no basal insulin dosing.
- There is little data on the safe use and/or influence of GLP-1 RAs on glycemia and delayed gastric emptying in the perioperative period.
- These drugs may be associated with nausea, vomiting, and delayed gastric emptying and have the potential to increase the risk of pulmonary aspiration during general anesthesia and deep sedation.
- The American Society of Anesthesiologists recommends holding GLP-1 RAs on the day of the procedure or surgery for daily dose agents and for at least 7 days prior to the procedures or surgery for once-weekly dose agents

Diabetic Ketoacidosis and Hyperglycemic Hyperosmolar State



† Some have recommended that insulin be withheld until glucose has stopped dropping with fluid administration alone.

* Definitions of resolution (use clinical judgment and do not delay discharge or level of care if these are not met):

- › DKA: Venous pH >7.3 or bicarbonate >18 mmol/L and plasma/capillary ketones <0.6 mmol/L
- › HHS: Calculated serum osmolality falls to <300 mOsm/kg and urine output is >0.5 mL/kg/h and glucose is <250 mg/dL

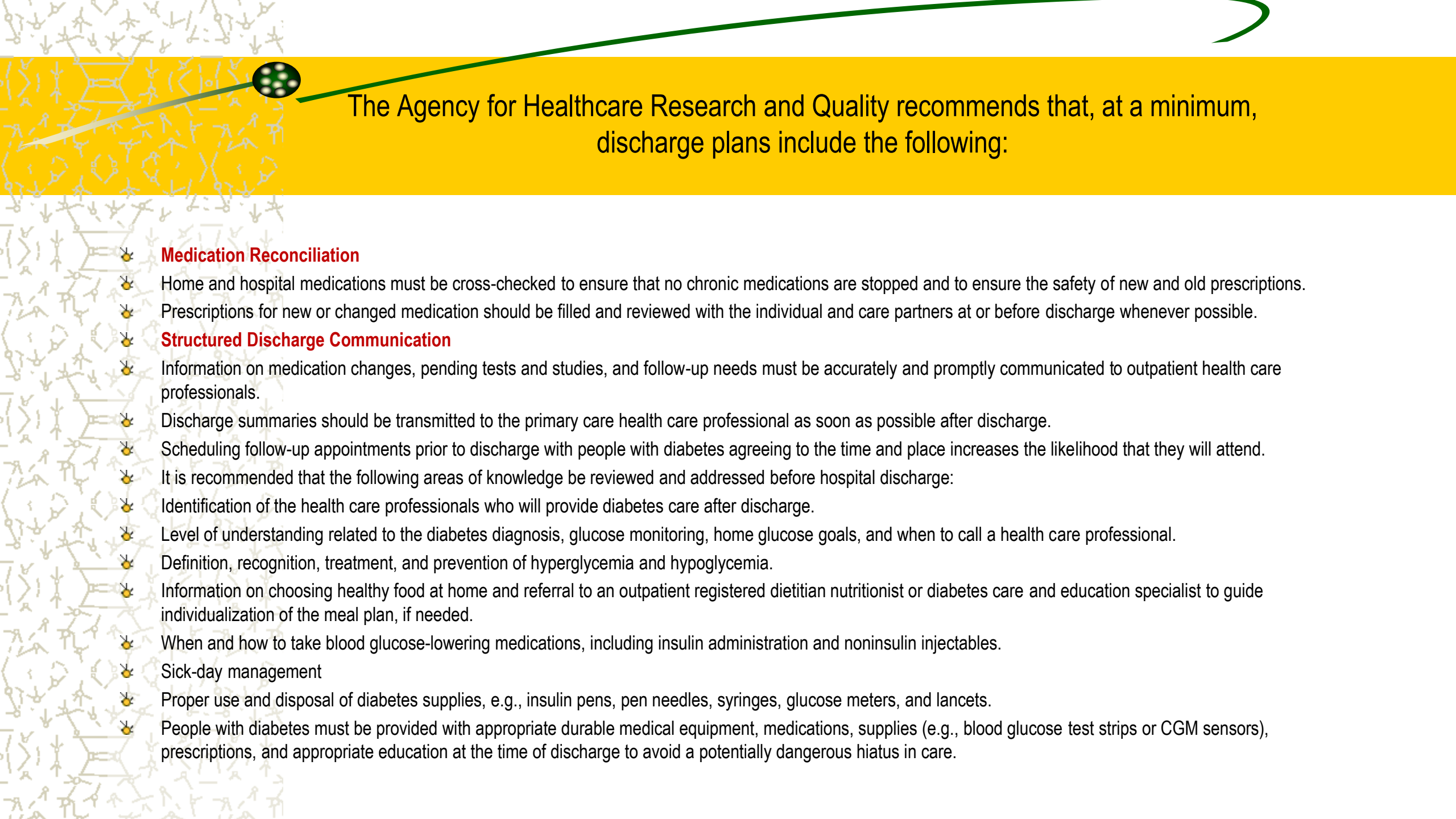
150 mg/dL = 8.3 mmol/L
 200 mg/dL = 11.0 mmol/L
 250 mg/dL = 13.9 mmol/L
 300 mg/dL = 16.6 mmol/L

① Bicarbonate should only be considered if pH is <7.0
 ① Phosphate should not be given unless there is muscle weakness, respiratory compromise, and a phosphate <1.0 mmol/L



Transition From the Hospital to the Ambulatory Setting

- ✦ An outpatient follow-up visit with primary care, endocrinology, or a diabetes care and education specialist within 1 month of discharge is advised for all individuals experiencing hyperglycemia and/or hypoglycemia in the hospital.
- ✦ If glycemic management medications are changed or glucose management is not optimal at discharge, an earlier appointment (in 1–2 weeks) is preferred, and frequent contact to consider therapy adjustments may be needed to avoid hyperglycemia and hypoglycemia.
- ✦ A discharge algorithm for glycemic medication adjustment, based on admission A1C, diabetes medications before admission, and insulin usage during hospitalization was found useful to guide treatment decisions and significantly improve A1C after discharge.
- ✦ Clear communication with outpatient health care professionals directly or via hospital discharge summaries facilitates safe transitions to outpatient care.



The Agency for Healthcare Research and Quality recommends that, at a minimum, discharge plans include the following:

✦ **Medication Reconciliation**

- ✦ Home and hospital medications must be cross-checked to ensure that no chronic medications are stopped and to ensure the safety of new and old prescriptions.
- ✦ Prescriptions for new or changed medication should be filled and reviewed with the individual and care partners at or before discharge whenever possible.

✦ **Structured Discharge Communication**

- ✦ Information on medication changes, pending tests and studies, and follow-up needs must be accurately and promptly communicated to outpatient health care professionals.
- ✦ Discharge summaries should be transmitted to the primary care health care professional as soon as possible after discharge.
- ✦ Scheduling follow-up appointments prior to discharge with people with diabetes agreeing to the time and place increases the likelihood that they will attend.
- ✦ It is recommended that the following areas of knowledge be reviewed and addressed before hospital discharge:
 - ✦ Identification of the health care professionals who will provide diabetes care after discharge.
 - ✦ Level of understanding related to the diabetes diagnosis, glucose monitoring, home glucose goals, and when to call a health care professional.
 - ✦ Definition, recognition, treatment, and prevention of hyperglycemia and hypoglycemia.
 - ✦ Information on choosing healthy food at home and referral to an outpatient registered dietitian nutritionist or diabetes care and education specialist to guide individualization of the meal plan, if needed.
 - ✦ When and how to take blood glucose-lowering medications, including insulin administration and noninsulin injectables.
 - ✦ Sick-day management
 - ✦ Proper use and disposal of diabetes supplies, e.g., insulin pens, pen needles, syringes, glucose meters, and lancets.
 - ✦ People with diabetes must be provided with appropriate durable medical equipment, medications, supplies (e.g., blood glucose test strips or CGM sensors), prescriptions, and appropriate education at the time of discharge to avoid a potentially dangerous hiatus in care.



Preventing Admissions and Readmissions

- ✦ In people with diabetes, the hospital readmission rate is between 14% and 20%, which is nearly twice that in people without diabetes.
- ✦ Factors contributing to readmission include male sex, longer duration of prior hospitalization, number of previous hospitalizations, number and severity of comorbidities, and lower socioeconomic and/or educational status;
- ✦ Factors that may reduce readmission rates include scheduled home health visits and timely ambulatory follow-up care.
- ✦ To prevent readmissions, monitor insulin adjustments for individuals admitted with A1C >9% (>75 mmol/mol) or DKA and follow a transitional care model.
- ✦ For individuals hospitalized with severe hypoglycemia, impaired awareness of hypoglycemia, or high risk for hypoglycemia (end-stage kidney disease, intensive insulin management, frailty, etc.), consider prescribing glucagon to treat any future severe hypoglycemia events



The Future

- ✦ Inpatient diabetes management is challenging for hospitals, health care professionals, and people with diabetes, as acute illness increases the risk of both hypoglycemia and hyperglycemia.
- ✦ The use of decision support tools and best practice advisories in the EHR has facilitated health care professionals following the recommendations in this standard of care.
- ✦ In addition, personal and hospital-owned diabetes devices and dosing algorithms are changing the way we provide care.
- ✦ Future enhancements will likely continue to improve the quality of care we deliver in hospitals and in transitions from inpatient to outpatient.

Thank you and hope for a good rain

