

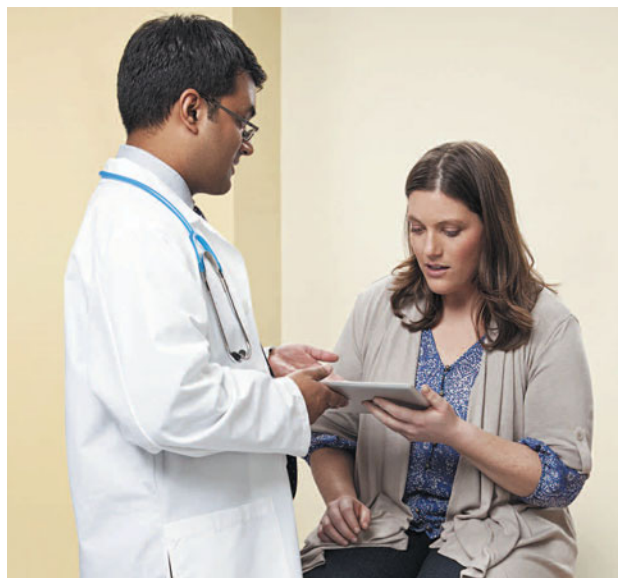
Management of Acute Hyperglycemia in Urgent Care (Part 1)

Urgent message: Acute hyperglycemia is a common and potentially challenging problem in urgent care that deserves to be managed appropriately based on the best available evidence and suitable consideration of the associated complexities.

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Hyperglycemia is common in acute care settings such as emergency rooms (ERs) or urgent care centers. Stress-induced hyperglycemia can result from an acute process, such as infection, pain, trauma, or vascular accident, or can be associated with pre-existing diabetes mellitus (DM) or previously unknown DM (new onset or undiagnosed). DM affects 25.8 million people in the United States, more than 7 million of whom are undiagnosed.¹

The observed incidence of DM in hospitalized patients ranges from 32% to 38%, including more than 40% of patients admitted with acute coronary syndrome or congestive heart failure.² Incidence of hyperglycemia in hospitalized patients without a history of DM is estimated to be 33% on the general medical/surgical ward and as high as 80% in patients in intensive care units (ICUs).³ Stress hyperglycemia (in nondiabetic patients) historically was felt to be physiologic and



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part of the natural course of acute illness—not treated unless glucose levels exceeded 200 mg/dL or a patient was symptomatic. We now know that stress hyperglycemia, left untreated, has been associated with longer hospital stays, higher rates of ICU admission, greater need for rehabilitation services at time of discharge, and higher mortality rates.⁴

The link between hyperglycemia and adverse outcomes is multifactorial. Elevated blood glucose (BG) concentrations produce a proinflammatory cytokine predominance, leading to a multitude of downstream effects, including capillary basement membrane thickening, impaired phagocytosis and immunity, oxidative stress, abnormal lipid metabolism, decreased vascular contractility, increased platelet adhesiveness, increased concentrations of coagulation factors, and increased C-reactive protein levels.⁵ Contributing factors to hyperglycemia include elevations in stress-related hormones (growth hormone, catecholamines, cortisol, glucagon), pharmacologic agents, and glucocorticoid therapy.^{6,7}

With the increased use of urgent care centers rather than ERs or routine visits to a primary care physician for various ailments, hyperglycemia is commonly encountered in both the diabetic and non-diabetic populations. In a recent study at an inner-city hospital in Detroit, HbA1c levels were checked on all patients who presented to the ER for any reason. In the non-diabetic population of 5,372 individuals, 7% had an elevated HbA1c of 6.5% indicating a new diagnosis of diabetes.

The authors are not aware of any guidelines specific to hyperglycemia management in urgent care, based on a Medline search using the MeSH terms (Diabetes or hyperglycemia and Urgent Care.) This article is based on extrapolation of the most relevant literature derived from guidelines applicable to the emergency room, outpatient, perioperative, inpatient, and intensive care settings.⁸⁻¹⁸ The Endocrine Society recently published a Clinical Practice Guideline for management of hyperglycemia in hospitalized patients in the non-critical care setting.³ A detailed review of these issues is beyond the scope of this article.

Unique challenges in the urgent care arena include the high likelihood that most patients will be discharged home and that care is designed to be problem-focused, episodic and delivered without continuity of care, even in the event of a return visit to the same facility. Additional challenges are that many patients lack health insurance and may not have an identifiable primary care physician.

When to Check Glucose Levels

For all patients with a history of DM, it is logical and reasonable to check aBG level to detect significant hypoglycemia or hyperglycemia. In diabetic patients who provide a history of having stopped their prescribed DM medications for beyond a few days, states of metabolic decompensation, such as diabetic ketoacidosis and hyperosmolar non-ketotic syndrome, should be identi-

fied if present. Random BG levels are also appropriate if the medical history raises a suspicion of new-onset or undiagnosed DM (classic symptoms such as polyuria, polydipsia, rapid weight loss, blurred vision, suspicious infections (significant skin yeast infections, abscess, anaerobic infections, foot infections, hidradenitis suppurativa), and patients present with severe illness (increased likelihood of at least stress-induced hyperglycemia and may be a marker of worse outcomes).

As noted above, DM is common. In U.S. adults over the age of 65, 26.9% of the population has DM—more than 1 in 4 individuals. DM is often undiagnosed and has serious long-term complications, so it is reasonable to consider near universal BG testing in adults. The Endocrine Society recommends universal screening with a BG level or HbA1C measurement for all adults admitted to a hospital to help differentiate between long-term or relatively new-onset hyperglycemia. According to The American Diabetes Association, an HbA1c level (obtained from a reference laboratory) 6.5% indicates a diagnosis of DM.¹⁹

In patients with symptoms suggestive of hypoglycemia (mental status changes, sympathetic discharge symptoms such as diaphoresis, tremor, palpitations and/or tachycardia.), it is also imperative to check a BG level. BG monitoring every 1 to 4 hours may be required for patients with prolonged stays in urgent care facilities who are on medications with risk of causing hypoglycemia, such as insulin or sulfonylurea. Risk factors for severe hypoglycemia include a history of Type 1 DM (more insulin sensitive), frequent or recent severe hypoglycemia, hypoglycemia unawareness, underlying renal and liver disease, and recent alcohol intake or misuse. If significant hypoglycemia is detected (<70 mg/dL), it should be promptly corrected (usually with administration of 15 g of a rapidly available oral carbohydrate) and steps taken to avoid recurrent hypoglycemia prior to discharge. Severe hypoglycemia (glucose levels <40 mg/dL and/or with mental status changes and/or myocardial or cerebral ischemic symptoms) requires urgent management. The authors recommend that each facility have a protocol in place for rapid detection, treatment, and secondary prevention of severe hypoglycemia, including intravenous (IV) dextrose and/or glucagon (which can be given subcutaneously (SQ), intramuscularly or IV).

On the contrary, one could argue that BG levels should NOT be checked routinely in urgent care patients who do not present with a glucose-related complaint. Medical reasons to consider not checking a BG level in patients with pre-existing DM would include clinical

futility and associated unnecessary expense. Patients in this category include those presenting with a minor problem (such as skin laceration, minor trauma) who report good home glucose control with frequent BG monitoring, regular and/or recent check of HbA1c levels, no signs or symptoms to suggest acute hypoglycemia or hyperglycemia (polyuria, polydipsia, blurred vision, tachypnea, orthostatic changes in pulse and/or blood pressure), and no evidence of DM-related acute complications. The reason to not monitor in this context is that marked hyperglycemia (or hypoglycemia) treatment is unlikely to be needed or helpful. It may also be reasonable to not check a BG level if insulin will not be provided by the urgent care facility regardless of the glucose result, if the BG level is unlikely to be in a dangerous range. Another factor is patient waiting time. If insulin is given, a patient is likely to be in the urgent care center for 2 to 3 hours or longer. Patients may need to be involved in the deciding whether to check a BG level and/or whether to give insulin if marked hyperglycemia is detected (>400 mg/dL).

Medico-legally an argument can be made for not checking a BG level in patients with preexisting DM so as to avoid the risk of the urgent care facility becoming directly responsible for glucose-related issues in the event of detection of marked hyperglycemia that could be transient or preexisting. However, the facility may be at increased risk legally from failing to detect or exclude hyperglycemia in the urgent care setting. Further, this risk can be avoided by documenting that advice has been given to patients to follow up with their responsible physician in a reasonably short period of time. We recommend that patients who do not have an established provider be given by the urgent care center a list of local facilities that can provide suitable follow up. Referrals to free health clinics, social work resources, or other suitable resources and facilities can be made to patients who do not have health insurance. Documentation of the need for follow up and a reasonable effort to provide applicable resources should be done for patients who are from a more distant community or out of state.

We propose checking BG levels in all patients with a history of DM, especially those on pharmacologic therapy, because of the minimal downside to the practice in individuals with DM in whom the check confirms a reasonable BG level confirmed, the possibility of detecting significant hypoglycemia or hyperglycemia with reasonable frequency, and the weakness of the legal argument for not checking BG levels. If marked hyperglycemia (>400 mg/dL) is detected, even if not treated acutely, this

should prompt a chemistry panel to evaluate for metabolic decompensation and a recommendation for the patient to follow up with his or her physician. We also recommend checking BG levels in any patient in whom hyperglycemia is suspected (major stress, symptoms of hyperglycemia, history of poorly controlled DM, possible new-onset or newly detected DM) or hypoglycemia. If hyperglycemia is detected, then a decision can be made about whether treatment is required.

When and How to Treat Glucose Elevation

What level of glucose elevation in the urgent care setting, should be treated, why, and to what level? Currently no evidence-based literature exists to determine what level of glucose elevation warrants therapy. As noted above, a normal fasting BG level is less than 100 mg/dL in a non-diabetic individual. The renal glucose threshold is in the range of 200-250 mg/dL. Above this BG level there can be polyuria followed by osmotic shifts and electrolyte disturbances as BG levels rise further.

BG levels at or above 600 mg/dL are markedly abnormal, often associated with dehydration and metabolic emergencies, and often require electrolyte measurement, IV hydration, insulin administration, more than brief observation and possibly require hospital admission. These patients require referral to an ER for further management and likely hospital admission.

BG levels above 400 mg/dL are also significantly abnormal and the authors propose prompt consideration of short-term treatment, regardless of whether the elevation is due to stress hyperglycemia, underlying DM or new-onset or newly diagnosed DM. One option would be to provide IV hydration without insulin because that may significantly lower BG and there should be no risk of inducing hypoglycemia. Signs of dehydration may be present, such as orthostatic fall in blood pressure and tachycardia. Use of rapid-acting insulin correction at a dose of 0.1-0.15 units/kg given SQ should be sufficient to return the glucose to a more acceptable range.

Individual facilities can consider treatment for BG levels between 200 and 399 mg/dL and certainly for BG levels above 300-350 mg/dL, depending on the individual circumstances (known history of DM, type of DM [insulin-deficient, type 1]); type of DM therapy being used (insulin vs. oral agents); reason for presentation, and so on. Insulin-treated patients will often use rapid-acting insulin to treat hyperglycemia, so it is logical to provide similar therapy while in an urgent care center.

One potential downside to treatment of acute hyper-

glycemia with insulin is the possibility of causing hypoglycemia 2 to 4 hours after the dose is given (duration of action of rapid-acting insulin is 4 hours). This risk should be minimized by using a suitable protocol with BG monitoring (using meters appropriate for the urgent care setting). The authors propose aiming for a glucose target between 120 and 180 mg/dL. There is currently no evidence-based literature to guide the goal of treatment, once undertaken. However, the authors proposed this target range to minimize the risk of hypoglycemia (<70 mg/dL) while being clinically effective. Another potential side effect of treatment may be the intracellular shift of potassium from insulin and resultant hypokalemia. It may be prudent to check electrolyte levels in patients treated with insulin prior to discharge.

In clinically stable patients (no abnormalities in vital signs, no underlying known insulin deficiency) with marked hyperglycemia, it is reasonable to consider NOT providing insulin therapy, thereby avoiding time delays and short-term clinical futility. Interaction with the health care professional is an opportunity to recommend improving DM behaviors (avoidance of excess simple carbohydrates and calories) and adherence to pharmacologic therapy to decrease the future risk of diabetic microvascular complications, heart attack, or stroke. Patients who have symptomatic improvement after treatment for hyperglycemia with hydration and/or insulin may be motivated to improve glucose control at home and intervention may have been worthwhile. We, therefore, propose involving patients in the decision whether to provide insulin and/or IV hydration.

Glucose Management in Special Cases

Patients with known insulin-treated or -dependent DM (type 1 DM, post pancreatectomy, chronic pancreatitis, cystic fibrosis and other causes) are a special case. Exclusion of diabetic ketoacidosis (DKA) can be a consideration regardless of BG level. Ketoacidosis can be detected clinically (fruity odor on the breath, Kussmaul's respiration) with serum ketones (betahydroxybutyrate is preferred) and a basic chemistry panel (metabolic acidosis will be present). Treatment of diabetic ketoacidosis is beyond the scope of this article and often requires hospital admission, unless it is mild. In some circumstances, it may be reasonable to treat adults with mild to moderate DKA in an urgent care center. We recommend a low threshold for hospital admission in children with DKA with known Type 1 DM, unless the condition is mild, because they are at increased risk of cerebral edema. Providers should inquire about the timing of last

insulin administration and dose and type of insulin being used and that information should be factored in to treatment decisions. Patients with insulin infusion pumps should be well-informed about glucose management and should participate in insulin treatment decisions acutely (unless there are reasons to suggest impaired DM self-care decision-making capacity.) In patients with insulin pumps there may be problems with the infusion tubing or insertion sites that led to hyperglycemia and it may be preferable to use SQ insulin in the urgent care setting as the default. The authors suggest that BG levels should be checked hourly or at a minimum, every 2 hours, in any patient given insulin in an urgent care center. Patients with Type 1 DM who have taken basal insulin within 24 hours, those using an insulin pump or who have recently taken a bolus of rapidly acting insulin likely will require frequent blood glucose monitoring, too.

If insulin is given, then a BG level should be checked prior to discharge to minimize risk of hypoglycemia shortly after discharge, especially in patients who will be driving their own vehicles. Patients treated with insulin may have knowledge of an adjustment algorithm for management of hyperglycemia. In insulin-sensitive patients, BG levels may fall 100 mg/dL (or more) with each 1 unit of rapid-acting insulin used. For example 2 extra units of rapid-acting insulin would be predicted to lower the glucose from 350 mg/dL to 150 mg/dL. At the other extreme, in an insulin-resistant patient, BG levels may fall 5 to 10 mg/dL per unit of rapid-acting insulin can be used. Higher insulin doses may be needed with marked hyperglycemia due to underlying glucose toxicity. Assuming a drop of 10 mg/dL per unit of rapid-acting insulin, that would predict the need for a bolus of 20 units of rapid-acting insulin to lower a BG level of 350 to 150 mg/dL.

Goals of therapy in an insulin-treated patient are exclusion of a metabolic emergency; detection, treatment or prevention of marked hyperglycemia or hypoglycemia; and possibly detection of patients with poor control to encourage suitable follow up after discharge. If the "correction factor" for glucose lowering is known to the patient, an urgent care provider can use that correction factor as a reference point for dosing. If an urgent care provider is uncertain about the degree of a patient's insulin resistance, a correction dose of 0.1 to 0.15 units/kg of rapid-acting insulin given SQ should be sufficient to return the glucose to a more acceptable range.

Management of children is another special case. Modest stress-induced hyperglycemia is common in pediatric

ERs but BG levels above 300 mg/dL are considered unusual and may be a marker of severity of illness and poorer outcome.²⁰ Underlying DM may not be present in the majority of cases. However, marked hyperglycemia in a child could reflect underlying type 1 DM. Also, with the current epidemic of obesity, children with new-onset DM may have underlying obesity and insulin resistance-related DM (Type 2 DM). The authors recommend a very low threshold for hospital admission for children with marked hyperglycemia. On the other hand, children with known type 1 DM (or type 2 DM) with good support and/or self-management skills and suitable short-term follow up may not require hospital admission simply for hyperglycemia, as long as diabetic ketoacidosis, a metabolic urgency or dehydration is not present.

Pregnant patients are another special category of patients who present to urgent care with hyperglycemia. Their hyperglycemia may be stress-induced, underlying pre-existing DM (type 1, type 2 or other) or gestational. Detailed information on diagnosis and management of hyperglycemia in the context of pregnancy is beyond the scope of this article. However, insulin remain the medication of choice if acute treatment is needed. It would be prudent to have a low threshold for hospital admission, in general, in pregnant patients.

Acute Management of Hyperglycemia

How should elevated blood glucose levels be treated acutely if treatment is provided? Insulin is the logical choice for acute management. Rapid-acting insulin analogs (glulisine [Apidra, Sanofi-Aventis U.S. LLC]), insulin aspart (NovoLog, Novo Nordisk Pharmaceuticals Inc.) and insulin lispro (Humalog, Eli Lilly and Co.) have superior insulin kinetics to regular insulin. Regular insulin, when given SQ, requires at least 30 minutes for onset of action, therefore, use of rapid-acting analogs may be preferable. The available rapid-acting insulin agents are sufficiently similar that all are reasonable choices. Each facility will presumably decide based on economic or other practical considerations (**Table 1**) Use of long-acting insulin such as NPH, detemir (Levemir, Novo Nordisk), glargine (Lantus, Sanofi) will likely be done less often and selectively. Long-acting insulin preparations are used by patients with type 1 and insulin-deficient type 2 DM to provide a low level of background insulin to suppress hepatic gluconeogenesis and prevent hyperglycemia due to excess endogenous glucose production. These insulin preparations will likely have a limited role in management of acute hyperglycemia but may be needed in cases of newly diagnosed DM where glucose toxicity is present.

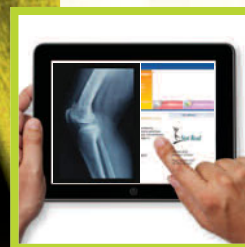
A suggested protocol for marked hyperglycemia (above 400 mg/dL) in patients without known insulin-deficient DM such as type 2 DM is to provide a SQ bolus of rapid-acting insulin, starting with 0.1 to 0.15 units/kg. The precise dose selected can be modified based on the possible predicted degree of underlying insulin sensitivity or possibly based on a history of the patient's insulin doses or

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Table 1. Pharmacokinetics of SQ insulin preparations*			
Insulin	Onset	Peak	Duration
Rapid-acting analogs	5-15 min	1-2 hours	4-6 hours
Regular	30-60 min	2-3 hours	6-10 hours
NPH	2-4 hours	4-10 hours	12-18 hours
Glargine	2 hours	No peak	20-24 hours
Detemir	2 hours	No peak	12-24 hours

*Renal failure leads to prolonged insulin action and altered kinetics

Premixed insulins available include 70/30, Humalog 75/25 and Novolog 70/30 mix, Humalog 50/50. Specialized highly concentrated insulin preparations also are available, such as Lilly U-500.

response to insulin, if he or she is already on an insulin regimen. Factors requiring consideration of lower insulin dosing include low body weight, known insulin sensitivity, and underlying renal and liver disease. Factors suggesting a need for higher insulin dosing than the starting protocol would be high body mass index (BMI > 35), features of insulin resistance (acanthosis nigricans on skin examination, known PCOS, steroid treatment, significant stress). A follow-up BG level should be done 2 to 4 hours after the bolus. If needed, the insulin can be rebolused, with or without dose adjustment based on the response. If repeated insulin boluses are used, insulin need may be decreased as glucose toxicity is reversed and there may be “stacking” or the residual effects of the prior insulin administrations, depending on the dosing insulin and individual insulin clearance. An urgent care provider should always be encouraged to add his or her own clinical judgment and experience to the insulin protocol being used. We recommend a treatment goal of 150 mg/dL (120-180 mg/dL).

BG levels in excess of 600 mg/dL will likely require a higher initial insulin dose. We therefore suggest an initial insulin bolus of 0.3 u/kg. There should also be consideration for IV hydration, exclusion of a metabolic urgency, and possibly hospitalization. BG levels should be rechecked 1 to 2 hours after the insulin bolus is provided. The rate of fall of BG can be factored into the decision about whether a repeat insulin bolus (or boluses) is needed and how much to provide. IV hydration is required for all patients with a glucose levels >600 with symptoms, signs or laboratory features of significant dehydration. For more marked hyperglycemia and if IV access is being used, IV boluses of insulin (regular insulin or rapid-acting analog insulin) can be considered or used. IV insulin has rapid onset of action and shorter total duration versus SQ rapid-acting and certainly versus SQ regular insulin.

Management of acute hyperglycemia emergencies is beyond the scope of this article.²¹ However, it is very important in the urgent care arena to recognize patients with hyperglycemic metabolic emergencies, that is, DKA and non-ketotic hyperosmolar syndrome. Simple clinical signs can be helpful.²² Patients at low risk of an acute glucose metabolism disturbance will have BG levels below 400 mg/dL, systolic blood pressure greater than 100,

pulse less than 90/minute and respiratory rate less than 20/minute. Patients with BG levels above 400 mg/dL or systolic blood pressure less than 100 may be at higher risk of DKA. Tachycardia may be present due to dehydration or associated conditions (infection, electrolyte disturbance). Tachypnea or Kussmaul’s respiration (deep and labored breathing due to underlying metabolic acidosis and a compensatory respiratory alkalosis drive) may reflect underlying acidosis. Significant changes in orthostatic pulse and/or blood pressure may provide evidence of volume depletion. Ketones can be detected by their characteristic odor on the breath. Patients with more marked hyperglycemia may have potassium shifts with insulin therapy (and may have underlying potassium depletion). We therefore recommend checking a basic chemistry panel that includes sodium, potassium, urea and creatinine in all patients with marked hyperglycemia (>400 mg/dL), especially those taking diuretics, patients with evidence of volume depletion and those with a history of renal dysfunction. A urinalysis may also be helpful because a high urine specific gravity may indicate volume depletion and strongly positive urine ketones may indicate the presence of DKA.

Patients should be educated that the use of insulin acutely does not necessarily imply that insulin will be required long term or even that DM is present (in the event of stress-induced hyperglycemia). However, any patient with blood glucose elevations sufficiently elevated to require acute treatment will require suitable short-term follow up after discharge. In patients likely to have stress-induced hyperglycemia, short-term follow up by the urgent care facility or the primary care physician may be a consideration. The goal is to confirm that the patient’s hyperglycemia has resolved, and if not, to provide information to allow suitable follow up of the newly diagnosed DM. An HbA1c level may be helpful in this regard.

Consideration can be given to providing a limited prescription (on the order of 7 days) to patients who have run out of their oral DM medications and/or insulin, were previously stable on these agents, have no contraindications to the previously prescribed therapy, and have ongoing access to follow up with the prescribing facility (or follow up elsewhere). These patients should understand that they need to promptly follow up with their DM care providers to obtain an ongoing supply of medications under supervision and the decision to prescribe can be individualized.

When would an urgent care provider initiate DM therapy? One approach is to never initiate DM therapy because there will be limited or no opportunity to provide suitable follow up. However, assuming that a patient does not fulfill criteria for hospital admission and there is clear evidence of new onset or newly diagnosed type 2 DM, then initiating treatment with clear documentation of a plan for suitable short-term follow up is a consideration. The authors suggest avoiding initiation of insulin therapy in the urgent care setting. If insulin is likely to be needed, then a patient likely should be hospitalized. If a patient who likely needs insulin treatment refuses hospital admission, then prescribing insulin without a mechanism for follow up with the prescribing provider or facility would likely present an unwarranted medico-legal risk.

Metformin is considered the first-line agent for type 2 DM per American Diabetes Association and other guidelines.²³ This agent has effective glucose-lowering properties, an intrinsically low risk of hypoglycemia, is available generically and cost effectively and has an excellent overall safety profile. Contraindications include risk of lactic acidosis, such as in patients with renal insufficiency, liver disease, advanced heart failure, alcohol abuse and exposure within 48 hours to IV computed tomography contrast material. The most common side effect is gastrointestinal (GI) disturbance. GI side-effects can be limited by taking the medication with food and titrating the dose upward over time. The starting dose is 500 mg daily. The maximum effective dose is 2 g daily. We, therefore, suggest starting generic metformin or metformin extended release with 500 mg with dinner and deferring further management to the follow-up facility. A reasonable starting quantity would be sufficient for 1 week. Initiation of a sulfonylurea such as glipizide or glimepiride is also a consideration. The authors recommend avoiding use of glyburide because that agent may be associated with adverse cardiovascular outcomes and can cause prolonged hypoglycemia (especially in the elderly).

However, hypoglycemia can occur with sulfonylureas, therefore, patient education is required about detection and management of hypoglycemia. Other classes of non-insulin glucose-lowering agents such as DDP-4 inhibitors or TZD's (pioglitazone) are likely best not started in the urgent care setting because of cost, complexity, and side-effect issues.

Another consideration is whether an urgent care facility should provide a prescription for blood glucose monitoring (or even provide a meter sample and a short supply of testing strips, if available

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to the facility). That decision can be individualized. However, the provision of testing supplies is usually best deferred to facilities that can provide longitudinal care.

Screening for Diabetes

Diabetes is common, often unrecognized and associated with important adverse outcomes. There is a growing literature on screening for diabetes or prediabetes in the acute care setting.²⁴⁻²⁷ Urgent care facilities may be well suited to perform diabetes screening, provide basic diabetes education (such as suitable discharge handouts), and assist patients with suitable referrals for longitudinal care. Part 2 of this article will discuss screening for diabetes, including guidelines for estimated average glucose and the role of oral agents in urgent care.

Conclusion

Acute hyperglycemia (above 400 mg/dL) is a common problem in the urgent care setting. Providers need to place the level in the appropriate context (probable stress hyperglycemia, known type 2 DM, known insulin-treated or type 1 DM, known alternative cause of DM [steroids, post pancreatic surgery, chronic pancreatitis, etc.], probable new onset or undiagnosed DM (type 2, type 1 or other) or confirmed new-onset or newly diagnosed DM. The purpose of treatment is to reverse the marked hyperglycemia (potentially to prevent dehydration or electrolyte disturbance); identify patients at high risk for adverse outcomes (marked stress hyperglycemia, major co-morbid event (stroke, myocardial infarction, severe infection) and potentially identify high-risk patients with poorly controlled DM or new-onset DM who warrant arrangements for appropriate follow up.

Patients who are stable need to be involved in the decision about whether to treat hyperglycemia with IV hydration and/or insulin and the associated increased time likely to be spent in the facility. If treatment is initiated, we propose likely safe and user-friendly insulin-treatment algorithms (weight-based or based on predicted fall in BG per unit of rapid-acting insulin given Clear documentation of short-term follow-up plans after discharge is critical. The lack of specific evidence-based guidelines for management of acute hyperglycemia in the urgent care arena, specifically, suggests an important area for development of suitable studies and guidelines. ■

Conflicts of Interest: David L. Pick has no conflicts of interest to report.

Anthony J. Pick is on the Speakers' Bureaus for Takeda (pioglitazone), Novo Nordisk (liraglutide, analog insulins) and Eli Lilly (linagliptin, analog insulins). Lowell R. Schmelz is on the Speakers' Bureaus for Sanofi-Aventis, Merck, Eli-Lilly, and Boehringer Ingelheim.

REFERENCES

- Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2011.
- Kosiborod M, Inzucchi SE, Spertus JA, et al. Elevated admission glucose and mortality in elderly patients hospitalized with heart failure. *Circulation*. 2009;119:1899-1907.
- Umpierrez GU, Hellman R, Korytskowsky MT, et al. Management of Hyperglycemia in Hospitalized Patients in Non-Critical Care Setting: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2012;97:16-38.
- Levetan CS, Passaro M, Jablonski K, et al. Unrecognized diabetes among hospitalized patients. *Diabetes Care*. 1998;21:246-249.
- Golovchenko I, Goalstone ML, Watson P, et al. Hyperinsulinemia enhances transcriptional activity of nuclear factor- κ B induced by angiotensin II, hyperglycemia, and advanced glycosylation end products in vascular smooth muscle cells. *Circ Res*. 2000;87(9):746-752.
- Luna B, Feinglos MN. Drug-induced hyperglycemia. *JAMA*. 2001;286(16):1945-1948.
- Hollingsdal M, Juhl CB, Dall R, et al. Glucocorticoid induced insulin resistance impairs basal but not glucose entrained high-frequency insulin pulsatility in humans. *Diabetologia*. 2002;45(1):49-55.
- Bernard JB, Munoz C, Harper J, et al. Treatment of Inpatient Hyperglycemia Beginning in the Emergency Department: A Randomized Trial Using Insulin Aspart and Detemir Compared with Usual Care. *J Hosp Med*. 2011;6:279-284.
- Unger J. Insulin initiation and intensification in patients with T2DM for the primary care physician. *Diabetes Metab Syndr Obes*. 2011;4:4253-4261.
- Armor B, Harrison D, Rawler F. Assessment of the Clinical Outcome of a Symptom-Based Outpatient Hyperglycemia Protocol. *Diabetes Ther*. 2011;2(2):67-80.
- DiNardo M, Donihi AC, Forte P, et al. Standardized Glycemic Management and Perioperative Glycemic Outcomes in Patients with diabetes mellitus who undergo same-day surgery. *Endocr Pract*. 2011;17(3):404-411.
- Maerz LL, Akhtar S. Perioperative glycemic management in 2011: paradigm shifts. *Curr Opin Crit Care*. 2011;17:370-375.
- Murad MH, et al. Glycemic Control in non-critically ill hospitalized patients: a systematic review and meta-analysis. *J Clin Endocrinol Metab*. 2012;97:49-58.
- Gerstein HC, Miller ME, et al. Effects of Intensive Glucose Lowering in Type 2 Diabetes (The Action to Control Cardiovascular Risk in Diabetes Study Group (ACCORD)). *N Engl J Med*. 2008;358:2545-2559.
- Duckworth W, Abraira C, Moritz T, et al. Glucose Control and Vascular Complications in Veterans with Type 2 Diabetes. (VADT). *N Engl J Med*. 2009;360:129-130.
- NICE study investigators, Finfer S, Chitlock DR, et al. Intensive versus Conventional Glucose Control in Critically Ill Patients. *N Engl J Med*. 2009;360:1283-1297.
- Malmberg K. Prospective randomised study of intensive insulin treatment on long term survival after acute myocardial infarction in patients with diabetes mellitus. DIGAMI (Diabetes Mellitus, Insulin Glucose Infusion in Acute Myocardial Infarction) Study Group. *BMJ*. 1997;314(7093):1512-1515.
- Mesotten D, Van den Bergh G. Glycemic targets and approaches to management of the patient with critical illness. *Curr Diab Rep*. 2012;12(1):101-107.
- Baker L, Juneja R, Bruno A. Management of Hyperglycemia in Acute Ischemic Stroke. *Curr Treat Opt Neurol*. 2011;3:616-628.
- International Expert Committee, Nathan DM. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. *Diabetes Care*. 2009;32(7):1327-1334.
- Weiss SL, Alexander J, Agus MS. Extreme Stress Hyperglycemia During Acute Illness in a Pediatric Emergency Department. *Pediatr Emerg Care*. 2010;26:626-632.
- Kitabchi AE, Umpierrez GE, Murphy MB, et al. Management of Hyperglycemic Crises in Patients With Diabetes. *Diabetes Care*. 2001;24(1):131-153.
- Tokuda Y, Omata F, Tsugawa Y, et al. Vital Sign triage to rule out diabetic ketoacidosis and non-ketotic hyperosmolar syndrome in hyperglycemic patients. *Diabetes Res Clin Pract*. 2010;87:366-371.
- Inzucchi RM, Bergenstal JB, Buse, et al. Management of hyperglycemia in type 2 diabetes: a patient-centered approach. Position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*. DOI 10.1007/s00125-012-2534-0
- Charfen MA, Ipp E, Kaji AH, et al. Detection of Undiagnosed Diabetes and Prediabetes States in High-Risk Emergency Department Patients. *Acad Emerg Med*. 2009;16:394-402
- Silverman RA, Thakker U, Ellman T, et al. Hemoglobin A1c as a Screen for Previously Undiagnosed Prediabetes and Diabetes in an Acute-care Setting. *Diabetes Care*. 2011;34:1908-1912.
- Ginde AA, Cagliero E, Nathan DM, Carnargo CA Jr. Point-of-care Glucose and Hemoglobin A1c in Emergency Department Patients without Known Diabetes: Implications for Opportunistic Screening. *Acad Emerg Med*. 2008;15:1241-1247.