

# A suicide attempt, or something else?

Caren J. Blacker, BMBCh, Michael M. Mbughuni, PhD, and Mark W. Olsen, MD



## How would you handle this case?

Answer the challenge questions at [MDedge.com/psychiatry](https://www.mdedge.com/psychiatry) and see how your colleagues responded

Ms. A, age 12, presents to the ED with altered mentation and life-threatening hypoglycemia. She has a past suicide attempt by overdose. Is this another suicide attempt?

### **CASE** Unexplained hypoglycemia

Ms. A, age 12, is brought to the emergency department (ED) via ambulance with altered mentation and life-threatening hypoglycemia for management of a hypoglycemic seizure. Earlier that day, Ms. A's parents had found her unresponsive and incontinent of urine. In the ED, Ms. A is minimally responsive. Her blood glucose level measurements are in the range of 30 to 39 mg/dL (reference range: 70 to 99 mg/dL), despite having received IV dextrose first from paramedics, and then in the ED. Ms. A has no history of hypoglycemia or diabetes. Her parents say that the night before coming to the ED, Ms. A had experienced flu-like symptoms, including nausea, vomiting, and diarrhea, that continued overnight and resulted in minimal food intake for 24 hours (*Table 1, page 45*).

A physical exam demonstrates left-sided weakness of face, arm, and leg, rightward gaze, and left-sided neglect. However, the results of CT angiography and an MRI of the brain rule out a stroke. An EEG shows right hemispheric slowing consistent with postictal paralysis, but no ongoing seizure activity. Ms. A is transferred to the pediatric intensive care unit (PICU).

Although Ms. A has no psychiatric diagnoses, she has a history of depressive symptoms,

self-harm by cutting, and a suicide attempt by ingestion of an over-the-counter (OTC) medication 1 year ago. She had reported the suicide attempt to her parents several months after the fact, and asked them to find her a therapist, which her parents arranged. She also has a history of asthma, which is well-controlled with montelukast, 5 mg/d.

### **EVALUATION** Elevated insulin levels

Subsequent investigations for organic causes of hypoglycemia are negative for adrenal insufficiency, fatty acid oxidation defect, and sepsis. Blood results demonstrate significantly elevated insulin levels of 92.4 mIU/mL (reference range: 2.6 to 24.9 mIU/mL) and a C-peptide level of 9.5 ng/mL (reference range: 1.1 to 4.4 ng/mL).

On Day 1 of admission to the PICU, Ms. A's blood glucose level normalizes, and her mentation improves. Her parents report that one of them has diabetes and takes oral hypoglycemic agents at home, including glipizide immediate



Discuss this article at [www.facebook.com/MDedgePsychiatry](https://www.facebook.com/MDedgePsychiatry)



Dr. Blacker is an Instructor, Department of Psychiatry and Psychology, Mayo Clinic, Rochester, Minnesota. Dr. Mbughuni is Clinical Chemistry and Toxicology Fellow, Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, Minnesota. Dr. Olsen is Assistant Professor, Department of Psychiatry and Psychology, Mayo Clinic, Rochester, Minnesota.

#### **Disclosures**

The authors report no financial relationships with any companies whose products are mentioned in this article, or with manufacturers of competing products.

Table 1

## Ms. A's presentation and hospitalization

Day before presentation	Day of admission	Day 1 of admission	Day 2 of admission
Febrile illness Mild confusion Decreased oral intake due to nausea	Conscious at 12 PM Unconscious, incontinent of urine at 2:30 PM Admitted to PICU Neurology and endocrinology consult	Toxicology sample drawn at 11 AM Mentation improves Transferred to pediatric medicine	Toxicology result returns positive for glipizide Psychiatry consulted

PICU: pediatric intensive care unit

release (IR) tablets, 10 mg, and long-acting insulin glargine. The treatment team suspects that Ms. A may have ingested one or both of these agents, and orders a toxicologic screening for oral hypoglycemic agents.

On Day 2, the toxicology results are returned and are positive for glipizide, which Ms. A had not been prescribed. Ms. A states that she had taken only her montelukast tablet on the day of admission and adamantly denies deliberately ingesting her parent's diabetes medications. Her parents check the home medications and state there are no missing glipizide IR tablets or insulin vials. They also report that Ms. A had no access to extended-release glipizide.

The treatment team discuss Ms. A's clinical condition and toxicology results with the pediatric endocrinology team. The endocrinology team states that with no history of hypoglycemic episodes, it is unlikely that Ms. A had an endogenous etiology that would present so catastrophically. In their experience, inexplicable hypoglycemia in a healthy individual who lives in a household with someone who has diabetes is due to ingestion of a hypoglycemic agent until proven otherwise.

**In the context of Ms. A's prior suicide attempt, self-harm, and medical findings, what conclusions may be drawn?**

- Ms. A ingested her parent's insulin and needs ongoing medical admission
- Ms. A deliberately ingested her parent's glipizide and needs psychiatric admission

- Ms. A ingested her parent's medication, but her parents are hiding the evidence and a child abuse report should be filed
- it is unclear whether this was a suicide attempt, and more information is needed

**The authors' observations**

In the context of Ms. A's prior suicide attempt and history of self-harm, the pediatric team was concerned that her presentation was consistent with a suicide attempt and consulted the psychiatry service.

Glipizide is a second-generation sulfonylurea used to treat type 2 diabetes. It lowers blood glucose by stimulating pancreatic insulin secretion. It is a rare drug of overdose.<sup>1</sup> Although pediatric glipizide overdoses have been documented, there are currently no pediatric or adolescent glipizide pharmacokinetic studies in the literature.<sup>1-4</sup> In adults, the immediate-release formulation has 100% oral bioavailability, with a maximum plasma concentration ( $T_{max}$ ) of approximately 2 hours.<sup>5</sup> The half-life typically ranges from 4 to 6 hours in adults.<sup>6</sup> Patients who do not have diabetes are much more susceptible to the hypoglycemic effects of glipizide because the medication stimulates their fully functional pancreas to produce a vigorous insulin response.

Ms. A's significantly elevated insulin was consistent with normal glipizide effects in a healthy child, while the elevated C-peptide

**Clinical Point**

**With no history of hypoglycemic episodes, it is unlikely that Ms. A had an endogenous etiology that would present so catastrophically**

### Clinical Point

Although hypoglycemia presents rapidly, in children glipizide IR can rarely cause delayed hypoglycemia

was consistent with insulin being endogenously produced, which ruled out ingestion of her parent's insulin. Importantly, the pediatric endocrinology team noted that, in their experience, a single 5- to 10-mg dose of glipizide IR was sufficient to lower blood glucose levels to the low 30s mg/dL in the context of a functional pancreas, which suggested that Ms. A might have accidentally ingested a single glipizide IR tablet, and might be telling the truth when she denies deliberately ingesting it to hurt herself.

#### The clinical value of pharmacokinetics

The screen of Ms. A's toxicology sample detected glipizide. The laboratory used a semi-quantitative serum screen of several hypoglycemic agents. A positive result for each agent is based on a quantitative cut-off value, which is 3 ng/mL for glipizide. The clinical chemist on call was asked to assist in interpreting the results. The serum specimen collected on Day 1 had a significantly positive glipizide result of 86 to 130 ng/mL. The maximum effective glipizide concentration for adult patients with diabetes is 100 ng/mL.<sup>7</sup> Thus, the glipizide level of 86 to 130 ng/mL (20.5 hours after initial symptoms) is consistent with the clinical presentation of persistent hypoglycemia requiring ongoing glucose replacement therapy.

Due to the lack of pediatric pharmacokinetic data for glipizide and only a single serum measurement, it is not possible to estimate the glipizide concentration at the time of maximal symptoms (loss of consciousness at 2:30 PM followed by a seizure on the day of presentation to the ED). In a prospective study of glipizide dose and hypoglycemia (blood glucose <60 mg/dL) in pediatric ingestion cases, a dose range of glipizide 0.05 to 0.58 mg/kg was reported to predict pediatric hypoglycemia with 95% confidence ( $N = 67$ ,  $P < .005$ ).<sup>1</sup> Because Ms. A weighed 51 kg, ingestion of a single glipizide IR 10-mg tablet (0.2 mg/kg) could induce hypoglycemia. If the 2-hour  $T_{max}$  and 4- to 6-hour half-life reported for adults

held true for Ms. A, a glipizide result of 86 to 130 ng/mL back-calculated to a serum glipizide of >1,000 ng/mL at the time she was discovered unconscious. This could be consistent with ingestion of at least 1 glipizide IR 10-mg tablet between 12:30 to 2:30 PM on the day before Ms. A was brought to the ED. This account would corroborate Ms. A's recollection of taking a single pill of what she thought was her montelukast. If only a single pill had been ingested, that also could explain why her parents had not noticed any tablets missing.

Clinicians need to be aware that although hypoglycemia usually presents rapidly, in children glipizide IR can rarely cause delayed hypoglycemia up to 16 hours after ingestion,<sup>2</sup> and a delay of 45 hours was reported in a case of ingestion of extended-release glipizide.<sup>8</sup> Hypoglycemia can last up to nearly 24 hours and is exacerbated if the patient has not eaten.<sup>1,2</sup> Importantly, Ms. A's parents reported that she had no access to extended-release glipizide. When detailed pharmacokinetic data are not available, the information provided by the patient and parents becomes extremely important, especially in distinguishing between single and multiple overdoses prior to presentation, or co-ingestions, or decreased food intake that could exacerbate hypoglycemia.

#### EVALUATION Safety assessment

On Day 2, Ms. A and her parents are interviewed separately, and they all are consistent in their recollection that Ms. A had been feverish with flu-like symptoms throughout the night before coming to the ED, and had still seemed mildly confused on the morning of admission.

During the interview, her parents wonder when Ms. A took her daily dose of a single montelukast tablet for asthma, and whether she had accidentally confused it with their glipizide. They report that on the morning of admission, both the glipizide and montelu-

kast medication vials were in the same room. The vials are the same color, the same size, and labeled from the same pharmacy, and contain white, scored, round tablets that look very similar.

During the interview, Ms. A consistently denies having thoughts of hurting or killing herself on the day of admission or before that. She says she is pleased with being alive. She denies wanting to hurt herself, describes ways she can maintain her safety at home, and lists adults she would contact if she became suicidal. Ms. A confirms that she's had long-standing depressive symptoms, but states she had asked her parents for help and has a scheduled appointment with a therapist. Her parents also confirm that they had heard no recent comments from their daughter about self-harm or suicide, nor had they seen behaviors that made them concerned for her safety.

#### What should you consider when assessing patient safety and medication?

- single-tablet ingestions are less frequently seen in suicide attempts than multiple-tablet ingestions
- a single-tablet ingestion may still be considered a suicide attempt if the patient believes it will be lethal
- a single dose of certain medications can be life-threatening, especially in children
- all of the above

#### The authors' observations

This case was ultimately an accidental ingestion of glipizide, rather than a suicide attempt. The initial suspicion for a suicide attempt had been reasonable in the context of Ms. A's depressive symptoms, remote history of a prior suicide attempt by ingesting an OTC medication, and toxicologic evidence of ingesting a drug not prescribed to her. Additionally, because of the life-threatening presentation, it was easy to make the erroneous assumption that the ingestion of glipizide must have involved

**Table 2**

### Potential negative consequences of pediatric psychiatric hospitalization following misdiagnosis of suicide attempt

Poor rapport with patient and/or family
Reduced willingness to seek future care
Missed school attendance
Unnecessary legal or social services interventions, especially if family resists admission
Financial issues (eg, cost of hospital stay, parental leave from work)
Career impact (eg, having a history of psychiatric hospitalization can prevent admission to certain military branches)
History of psychiatric hospitalization can adversely affect life insurance options

many tablets, and thus must have been deliberate. However, through multidisciplinary teamwork, we were able to demonstrate that this was likely an accidental ingestion by a patient who had an acute febrile illness. Her illness had caused confusion, which contributed to the accidental ingestion, and also caused reduced food intake, which enhanced the hypoglycemic effects of glipizide. Additionally, a lack of awareness of medication safety in the home had facilitated the confusion between the two medication vials.

A single tablet of glipizide IR is sufficient to produce profound clinical effects that could be mistaken by medical and psychiatric teams for a much larger and/or deliberate overdose, especially in patients with a psychiatric history. The inappropriate psychiatric hospitalization of a patient, especially a child, who has been mistakenly diagnosed as having attempted suicide, can have negative therapeutic consequences (*Table 2*). A psychiatric admission would have been misguided if it attempted to address safety and reduce suicidality when no such concerns were present. Additionally, it could have damaged relationships with the patient and the family,

### Clinical Point

**A single tablet of glipizide IR is sufficient to produce profound clinical effects that could be mistaken for a much larger and/or deliberate overdose**

## Clinical Point

When assessing for suicidality, consider accidental ingestion in the differential

## Related Resources

- Kidemergencies.com. Emergencies: One pill can kill. <http://kidemergencies.com/onepill1.html>.
- Safe Kids Worldwide. Medication safety. <https://www.safekids.org/medicinesafety>.
- American Association of Poison Control Centers. <http://www.aapcc.org/>.

### Drug Brand Names

Glipizide • Glucotrol                      Montelukast • Singulair  
Insulin glargine • Lantus

especially in a child who had historically not sought psychiatric care despite depressive symptoms and a previous suicide attempt. When assessing for suicidality, consider accidental ingestion in the differential and use specialty expertise and confirmatory testing in the evaluation, taking the pharmacokinetics of the suspected agent into account.

## OUTCOME Outpatient treatment

Ms. A's neurologic symptoms resolve within 24 hours of admission. She is offered psychiatric inpatient hospitalization to address her depressive symptoms; however, her parents prefer that she receive outpatient care. Ms. A's parents also state that after Ms. A's admission, they locked up all

household medications and will be more mindful with medication in the home. Because her parents are arranging appropriate outpatient treatment for Ms. A's depression and maintenance of her safety, an involuntary hospitalization is not deemed necessary.

On Day 2, Ms. A is eating normally, her blood glucose levels remain stable, and she is discharged home.

## References

1. Spiller HA, Villalobos D, Krenzelok EP, et al. Prospective multicenter study of sulfonylurea ingestion in children. *J Pediatr*. 1997;131(1):141-146.
2. Quadrani DA, Spiller HA, Widder P. Five year retrospective evaluation of sulfonylurea ingestion in children. *J Toxicol Clin Toxicol*. 1996;34(3):267-270.
3. Borowski H, Caraccio T, Mofenson H. Sulfonylurea ingestion in children: is an 8-hour observation period sufficient? *J Pediatr*. 1998;133(4):584-585.
4. Little GL, Boniface KS. Are one or two dangerous? Sulfonylurea exposure in toddlers. *J Emerg Med*. 2005;28(3):305-310.
5. Huupponen R, Seppala P, Iisalo E. Glipizide pharmacokinetics and response in diabetics. *Int J Clin Pharmacol Ther Toxicol*. 1982;20(9):417-422.
6. Baselt RC. Disposition of toxic drugs and chemicals in man. 10th ed. Seal Beach, California: Biomedical Publications; 2014.
7. Simonson DC, Kourides IA, Feinglos M, et al; the Glipizide Gastrointestinal Therapeutic System Study Group. Efficacy, safety, and dose-response characteristics of glipizide gastrointestinal therapeutic system on glycemic control and insulin secretion in NIDDM. Results of two multicenter, randomized, placebo-controlled clinical trials. *Diabetes Care*. 1997;20(4):597-606.
8. Pelavin PL, Abramson E, Pon S, et al. Extended-release glipizide overdose presenting with delayed hypoglycemia and treated with subcutaneous octreotide. *J Pediatr Endocrinol Metab*. 2009;22(2):171-175.

## Bottom Line

Oral hypoglycemic agents can cause life-threatening syndromes in healthy patients and can clinically mimic large, intentional overdoses. Clinicians must be aware of the differential of accidental ingestion when assessing for suicidality, and can use toxicology results in their assessment.