

# Diabetes at Camp: Overnight Diabetes Management

*Module 11 of 12*

**Special thanks to the team below and everyone who contributed to this work.**

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# Objectives

**At the end of this module, the participant should be able to:**

- List the increased risk for hypoglycemia during sleep for diabetes
- Describe risks for overnight hypoglycemia post exercise
- State the medical urgency of ketosis
- State situations that may require diabetes management decisions overnight



# Exercise Induced Hypoglycemia

## During Exercise

- Muscles are using more glucose (if there is insulin present)
- Person with diabetes cannot compensate by lowering insulin production

## After Exercise

- Muscles continue to use more glucose
- Person with diabetes cannot lower insulin production
- Study of kids with type 1 diabetes showed that when they exercised in late p.m., 48% had blood glucose less than 60 between 10:00 p.m. and 6:00 a.m. (J Pediatr 2005;147(4):528-534)

# Why is Hypoglycemia More Likely at Night?

## Sleep obscures low blood glucose symptoms

- Studies of people with diabetes show most episodes of hypoglycemia overnight are unrecognized (Diabetes Research and Clinical Practice 2017;133:30-39)
- Do **NOT** accept assurance from parent or camper that they “always” wake up if low overnight

## Person with diabetes has faulty counter-regulation

- In type 1 diabetes there is defective production of glucagon and other hormones in response to hypoglycemia. This means the liver doesn't adequately stimulate input of glucose into the bloodstream in response to dropping glucose (Diabetes Care 1999;22(7):1144-1150)



# Avoiding Overnight Low Blood Glucose

## SAMPLE PROTOCOL

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### Bedtime blood glucose check every night before snack

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- Assumes there is routinely an evening snack
  - Optimal composition of snack is not established by existing research
  - Camper with a blood glucose in goal range 15g or less
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### Blood glucose below 100 mg/dl before snack

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- Camper should have increased carb at snack time
  - Glucose should be rechecked around midnight
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### Low blood glucose between snack and going to sleep

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- Treat low glucose with usual approach
  - Glucose should be rechecked 2-3 hours after the camper returns
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### High blood glucose before snack

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- Need for fast acting insulin correction will depend on presence of ketones, details of camper's management plan
  - If fast acting insulin is given, glucose should be rechecked in 2-3 hours
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### Midnight (or later) rechecks

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- Glucose over 120-no further action required
  - Glucose under 120-give a snack with carb and protein, recheck again in 2 hours
  - Glucose over 300, check for ketones and treat per details of camper's management
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# Ketones at Night

- Person with diabetes who has ketones in urine or blood may be at risk for DKA
- DKA can develop over several hours so ketones at night can **NOT** be left untreated until morning
- Situations that could result in ketosis:
  - Pump site out or not functioning
  - Missed insulin
  - Heat-damaged insulin
  - Camper has other illness





# Summary

- The risk of low blood glucose is increased at night
- Most episodes of low blood glucose overnight are unrecognized
- Pump problems that occur at night must be addressed urgently to avoid DKA



# Assessment

**1. Evening activity (7-8 pm) tonight was all-camp Capture the Flag**

**Camper's blood glucose at snack time is 72**

**1. What should the evening snack be?**

- A. The usual amount of food, since the activity is finished
- B. More carb than usual, to avoid low blood glucose later
- C. Based on what the camper is hungry to eat

**2. When should the glucose should be rechecked?**

- A. In about 2 hours
- B. At the end of snack
- C. Before breakfast tomorrow

**3. At 11 pm, glucose is 68. Camper is given juice followed by a snack with carb and protein. When should the blood glucose be checked again?**

- A. In the morning
- B. After the snack is eaten
- C. In 15 minutes and again in 2 hours

**4. At 1 am, blood glucose is 265. Which action is appropriate for the camper?**

- A. Recheck glucose in the morning
- B. Take a correction dose of fast acting insulin
- C. Check ketones



# Assessment (Cont.)

**5. A counselor brings a camper to the health lodge at 1 a.m. because the camper's pump site is out. They don't know when it came out. Blood glucose is 321 and urine ketones are moderate. Camper should**

- A. Replace the pump site and go back to bed
- B. Replace the pump site and take a correction bolus dose
- C. Recheck glucose and ketones in 2 hours
- D. A and C
- E. B and C

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