

# Exorcising the Specter of Nighttime Hypos

By Gary Scheiner MS, CDE

For millions of people with diabetes who take insulin or pancreas-stimulating medications, hypoglycemia (low blood sugar) is an ever-present threat lurking in the shadows. And few things instill more fear in parents of children with diabetes and partners of adults with diabetes, not to mention people with diabetes themselves, than hypoglycemia that occurs in the middle of the night.

Most people feel confident in their ability to deal with lows that occur while they are awake. The symptoms, even if subtle, can usually be recognized in time to down some rapid-acting carbohydrates and fix the problem. But very thought of dropping low while sleeping gives many a feeling of complete helplessness. Will the symptoms be strong enough to wake me? Will I have the ability to get up and treat it? Or will I just lie there, unable to do anything about it?

Sometimes, people are completely oblivious to low blood sugars that occurred while they were sleeping. The only clues left behind might be sheets or pajamas that are soaked with sweat, or a rebound “high” the following morning.

Although rare, there have been deaths reported as a result of hypoglycemia that occurred while sleeping. The reason it is rare is that the body usually reacts to the low by producing adrenaline, which causes profuse sweating, shaking, and a strong/rapid heartbeat. This will almost always wake a person who is experiencing hypoglycemia, or alert their partner. Adrenaline also stimulates the liver to release some of its stored-up sugar into the bloodstream. When a low blood sugar continues over an extended period of time, a seizure may occur. The seizure will often alert family members, roommates or housemates of the situation so that glucagon can be administered and emergency personnel can be summoned.

Nevertheless, the specter of nighttime hypoglycemia continues to be a source of fear and anxiety for most people with diabetes and their loved ones. The good news is that nighttime hypoglycemia is both preventable and manageable. By understanding the causes of nighttime lows, we can apply appropriate preventive strategies to minimize their occurrence. And by being adequately prepared for treating nighttime lows, their impact and severity can be diminished.

## Causes of Hypoglycemia While Sleeping

Hypoglycemia is always caused by an imbalance of the factors that raise blood sugar (food, stress hormones) and the factors that lower blood sugar (physical activity, insulin, and diabetes medications). Most diabetes medications cannot cause hypoglycemia. But certain ones can because they stimulate the pancreas to produce extra insulin regardless of the blood sugar level. These include sulfonylureas (glyburide, glipizide, glimepiride) and meglitinides (repaglinide, nateglinide). If you are not taking insulin or one of these medications, it is highly unlikely that you will experience hypoglycemia.

That said, the most common causes of hypoglycemia while sleeping include the following:

**\* Use of NPH (or premixed insulin containing NPH) in the evening.** NPH Insulin peaks 4-8 hours after injection, and causes a rapid blood sugar drop during this time. If it is peaking at a time when you are sleeping, hypoglycemia is likely to occur.

\* **Taking too high a dose of basal insulin by injection or through a pump.** Basal insulin doses should keep your blood steady while you sleep. If the dose is set too high, your blood sugar will tend to drop.

\* **Taking too much rapid-acting insulin to cover bedtime snacks.** Over-counting carbs or using an insulin-to-carb ratio that is too high can result in a blood sugar drop 2-4 hours after taking insulin to cover a bedtime snack.

\* **Taking too much rapid-acting insulin to correct high blood sugar at bedtime or during the night.** For many people, each unit of rapid-acting insulin can lower the blood sugar more at night than during the day. Failure to account for “insulin-on-board” from previous insulin doses can also result in hypoglycemia when giving correction doses before bed.

\* **Extra physical activity earlier in the day or evening.** After particularly long or intense bouts of exercise or physical labor, blood sugar levels may drop for many hours. This can produce what is known as “delayed onset hypoglycemia” while you sleep.

\* **Alcohol consumption.** The liver tends to secrete less sugar than usual when alcohol is in the bloodstream. Alcohol also masks the symptoms of hypoglycemia and might fool those around you into thinking

you’re drunk when you’re really low.

\* **Failure to check blood sugar at bedtime.** Not knowing whether your blood sugar is approaching a low range before you go to sleep leaves you susceptible to lows. Even a slight drop while sleeping can result in hypoglycemia.

\* **Use of long-acting oral medications.** Sulfonylureas such as glyburide and glipizide cause the pancreas to secrete extra insulin virtually all the time, including while you sleep.

### **Preventing Low Blood Sugar While Sleeping**

There are a number of effective ways to ward off the specter of nighttime lows (other than calling “HypoBusters”):

1. If you use NPH (or premixed insulin) at night, talk to your physician about lowering or eliminating the dose and switching to a peakless “basal” insulin such as glargine or detemir, or an insulin pump. If you must continue to use NPH, moving the dose from dinnertime to bedtime may prove to be beneficial.

2. Regardless of the type of basal insulin you use, make sure it holds your blood sugar steady while you sleep. If your glucose drops more than 30

mg/dl (2 mmol/l) from bedtime to wake-up, talk to your physician about reducing your dose.

3. If you use a long-acting oral medication, ask your physician about switching to a short-acting version or to an oral medication that does not cause hypoglycemia. Meglitinides work the same as sulfonylureas (they stimulate the pancreas to produce extra insulin), but they do so for just a few hours right around mealtimes.

4. Set an appropriate target blood sugar at bedtime, leaving enough margin for error in case you drop a little bit while you sleep. Make sure your sensitivity factor for correcting nighttime highs is right for you. Remember, sensitivity factors at night are often higher than during the day.

5. Don’t forget the insulin-on-board! Even rapid-acting insulin can take four hours or more to finish working. If you still have insulin “working” at bedtime, deduct it from any correction doses that you would ordinarily give yourself. If you have a great deal of insulin on board and have not eaten for the past several hours, you may need a snack to prevent a drop – depending, of course, on your blood sugar level.

6. Manage your nighttime carbs. “Grazing” at night is asking for trouble. Limit snacks to just one at night, count the carbs accurately, and

use an insulin:carb formula that produces normal glucose levels 3-4 hours later. Grazing (with frequent shots or boluses) causes stacking of insulin and may produce a significant drop after you go to bed.

7. Adjust for prior physical activity. Exhaustive exercise earlier in the day can make your body very sensitive to insulin for up to 24 hours. It also causes your muscles to absorb extra glucose to replace their glycogen stores. The same can happen when you travel (if you do a lot of extra walking) or when the weather warms up considerably. Consider having an extra snack (without insulin) at bedtime or lowering your dose of basal insulin if you have been much more active than usual.

8. Think when you drink. Because alcohol can suppress the liver's normal secretion of glucose, consider having an extra snack (without insulin) at bedtime or lowering your dose of basal insulin after drinking.

9. Don't forget to check. Knowing your blood sugar at bedtime every night puts you in position to prevent a potential low. If your blood sugar is approaching the hypoglycemic range, a modest snack (without insulin) can restore it to a normal, safer level.

10. Consider a CGM. Continuous glucose monitors have the ability to alert the user when the blood sugar is

*approaching* a low level. Regular use of CGM is associated with reduced frequency, severity and duration of hypoglycemia in adults as well as children. They provide insight into the direction the blood sugar is headed at bedtime and provide insight into blood sugar patterns that occur while we sleep. Although they may not detect every low, CGMs will provide an early warning for the vast majority – and much earlier than most people can detect them on our own.

### Preparation Dex

Having a low blood sugar during the night is not like having one during the day. It's dark. You are likely to be groggy. And your coordination and equilibrium may be off. It's like trying to find your way through a carnival fun house after drinking a couple of six-packs. So think ahead: Make treating a sleeptime low as *easy* as humanly possible.

1. Stick with dextrose for treating the low. Nothing works faster. Save the "treats" for snack times when you're not in need of rapid treatment.

2. It may be difficult to chew when you're half asleep and hypoglycemic. Consider keeping a liquid treatment at your bedside – such as a glucose gel or bottle of liquid dextrose. Whatever you use,

remove the wrappers and loosen the cap ahead of time so that it is very easy to access when you need it.

3. In case you are unable to eat or drink, make sure that someone who lives with you is trained on how to administer glucagon. Keep the glucagon kit where they will be able to find it easily, and replenish the kit before the contents expire.

### Know the Signs

The nighttime hypo specter may show up from time to time, but that doesn't mean you can't handle him with relative ease.

Research has shown that "severe" hypoglycemia – loss of consciousness/inability to wake up, seizure, coma or death – takes some time to develop. Dropping suddenly to a very low blood sugar does not usually lead to these types of severe states. However, even a mild low that goes untreated for several hours or more can cause the brain to malfunction significantly and lead to a severe low. So the key to preventing severe lows (day or night) is early detection and rapid treatment.

Frequent glucose monitoring and use of a continuous glucose monitor can be very helpful in this regard. However, you and your partner should be aware of even the most subtle signs of hypoglycemia while you are

sleeping. Symptoms can vary greatly from person to person, so take the time to think about it and talk it over with your partner. Do you have unusual dreams? An urge to urinate? Do you twitch or talk in your sleep? Do you start to perspire? Become more restless than usual?

At the moment you or your partner notice symptoms, commit to check your blood sugar and act on the reading using the treatment strategies listed above. And once the nighttime hypo specter has vanished, think about what might have brought him into your bedroom in the first place.

Between you and your healthcare team, you should be able to figure out a way to exorcise him for good.

Editor's note: Gary Scheiner MS, CDE is Owner and Clinical Director of Integrated Diabetes Services, a private practice specializing in intensive insulin therapy. He is author of several books, including *Think Like A Pancreas: A Practical Guide to Managing Diabetes With Insulin*. He and his team of Certified Diabetes Educators work with people throughout the world via phone and the internet. Gary has had Type-1 diabetes for 25 and has been free of severe nighttime lows since starting pump therapy in 1995.

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