

# The Hormone Foundation's Patient Guide to Managing Hyperglycemia (High Blood Sugar) in the Hospital

*Hyperglycemia* is the medical term for blood glucose (sugar) that is too high. High blood glucose (HBG) is a common problem for people with diabetes. Blood glucose can also rise too high for patients in the hospital, even if they do not have diabetes. This patient guide explains why some patients develop HBG when they are hospitalized and how their HBG is treated.

Until about 10 years ago, doctors thought that HBG in hospital patients was not harmful as long as their blood sugar stayed at or below 200 milligrams per deciliter (mg/dL). Recent research studies show that HBG above 180 increases the risk of complications in hospital patients. Keeping blood sugar below this level with insulin treatment lowers the risk for these problems.

Most doctors agree that controlling blood sugar so it stays below 180 mg/dl is best for very ill patients in intensive care units (ICU). Less clear is what the best target blood sugar should be for inpatients who are admitted for general surgery or non-critical medical conditions.

In some patients, insulin treatment can cause low blood sugar, called *hypoglycemia*. Just like blood sugar levels that are too high, blood sugars that are too low are not safe and should be avoided.

This patient guide for glucose control in the hospital is based on The Endocrine Society's practice guideline for health care providers on preventing and treating HBG. This guide applies just to patients on a regular hospital floor, not those who are in an ICU.

## What causes HBG in the hospital?

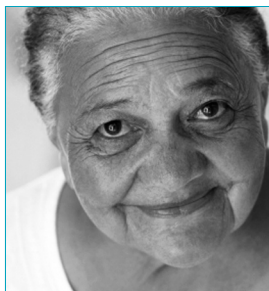
Many conditions can cause or worsen HBG in hospital patients. These include:

- Physical stress of illness, trauma, or surgery
- Inability to move around
- Steroids like prednisone and some other medicines
- Skipping diabetes medicines
- Liquid food given through a feeding tube or nutrition given intravenously.

## Why is HBG unsafe?

Patients with HBG have more problems in the hospital, including:

- Longer hospital stay
- Slower wound healing
- More infections
- More disability after discharge from the hospital
- Higher risk of death



Blood sugar can rise too high for patients in the hospital, even if they do not have diabetes.

## How is HBG found?

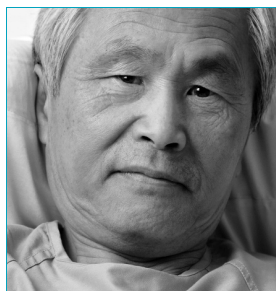
Health care providers find HBG by doing a simple blood test. Blood sugar is usually measured by pricking the finger and testing a drop of blood with a glucose meter.

Your blood sugar should be measured when you are admitted to the hospital. You may need this test more than once if you are at high risk for HBG. For example, you have a higher risk if you have diabetes, are treated with medications that increase your blood sugar, or are receiving tube feeding or intravenous (IV) feeding.



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In-hospital HBG is defined as a pre-meal blood sugar above 140 mg/dL. After finding HBG, your care providers will check your blood sugar before meals and at bedtime. You may need more testing in some cases. This includes if you are not eating, are receiving IV insulin, have a medication change that could affect blood sugar, or have frequent bouts of low blood sugar (hypoglycemia).



**Insulin is the best treatment for HBG in the hospital, even if you do not have diabetes or do not use insulin at home.**

### What are the blood sugar targets in the hospital?

Health care providers want most ICU patients to have a blood sugar between 110 and 180 mg/dl. Outside the ICU, most providers aim to keep blood sugar between 100 and 140 before meals and below 180 at other times.

### What is the treatment of HBG?

Insulin is the best treatment for HBG in the hospital. This is true *even if you do not have diabetes or if you do not use insulin at home*. Insulin injection is the most effective way to control blood sugar. Also, some diabetes pills can cause low blood sugar or other health problems while you are sick. For these reasons, you may have to stop taking your non-insulin diabetes medicines during your hospital stay.

Hospital patients with HBG should receive insulin shots under the skin (*subcutaneous* injections). You should get *basal* (long- or intermediate-acting) insulin once or twice a day to keep blood sugar levels steady. Before meals, getting *bolus* (rapid-acting) insulin helps prevent blood sugar levels from going too high after eating. Besides mealtime insulin, some patients with HBG may need additional insulin injections. This constant treatment prevents HBG or, in some patients, a dangerous health problem called diabetic *ketoacidosis* (when acids and substances called ketones build up in the blood due to lack of insulin).

For all patients with HBG, good nutrition is important to help control blood sugar. A dietitian should work with you to plan your meals. The point is to make sure you get enough calories and eat the right amount and types of sugars or *carbohydrates*. These include whole grains, fruits, vegetables, and low-fat milk.

### How should patients with diabetes who are having surgery be treated?

Before surgery, patients who take insulin should continue to receive insulin. If you do not take insulin, your care providers usually will stop non-insulin medicines and advise you to receive insulin if you develop HBG while in the hospital.

Before and after surgery, all patients with type 1 diabetes and most patients with type 2 diabetes should receive insulin to prevent HBG. Insulin can be given through an IV or by multiple injections under the skin. When you can eat again, you should get mealtime (bolus or rapid-acting) insulin before meals.

### Is there a risk for low blood sugar?

Low blood sugar (defined as a blood sugar below 70 mg/dL) can occur with insulin treatment, if you are not eating, or after a sudden stop to tube or IV feedings. If you receive insulin or other diabetes medicines, your care providers will check your blood sugar often to make sure it does not drop too low. They may need to change the dose or timing of your insulin to prevent low blood sugar.

### What can you do to help with your hospital care?

If you have diabetes, let your nurse and doctor know when you go into the hospital. Ask your doctor to make sure this information goes into your patient chart. You will need to have your blood sugar checked at least four times a day (before each meal and at bedtime if you are eating regular meals or every six hours if you are not eating). So that your care providers know your usual blood sugar control, you should have a hemoglobin A1c test (blood test that shows your average blood sugar over the past three months). If you do not have diabetes but your blood sugar is above 140 mg/dL, you will need to have this test.

If your hospital provider diagnoses you with diabetes, you will need to learn how to do home glucose testing and how to recognize and treat high and low blood glucose levels. In some cases, you may also need to learn how to inject insulin.

When you leave the hospital, you will receive a written care plan. If you had HBG or low blood sugar in the hospital, your care plan should include how to control your blood sugar and when to see your doctor next. It also should explain how and when to take your diabetes medications. By following this advice, you will have the best chance of a good recovery after your hospital stay.

#### EDITORS

Mary Korytkowski MD  
Marie E. McDonnell, MD  
Guillermo E. Umpierrez, MD  
Joel Zonszein, MD

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