The Dangers of Hyperosmolar Hyperglycemic Nonketotic Syndrome

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HHNS and Diabetes

As a certified diabetes educator (CDE), I often am called to see people in the acute inpatient setting. On certain occasions, I am called to ICU to see a newly diagnosed patient. They may have presented with diabetic ketoacidosis (DKA). This is much more common in patients with type 1 diabetes who are either newly diagnosed, are ill, or have had a complication with their insulin management.

It is possible for someone with type 2 diabetes to present with DKA, but it much more likely for them to present with a different condition if their blood glucose levels become acutely elevated.

For the newly diagnosed patient with type 2 diabetes, hyperosmolar hyperglycemic nonketotic syndrome (HHNS) – or sometimes just called HHS for hyperosmolar hyperglycemic syndrome.

What Is Hyperosmolar Hyperglycemic Nonketotic Syndrome?

HHNS is a serious medical condition caused by blood glucose levels that are dangerously high. An illness or infection typically triggers it. Often (but not always!) it occurs in people with type 2 diabetes and in those who have been undiagnosed.

DKA and HHNS may seem very similar – both cause the blood glucose levels to rise to high numbers. Symptoms are similar (symptoms of HHNS will be discussed shortly). Although there are differences in labs, which is beyond the scope of this article, the primary difference between HHNS and DKA is the presence of ketones – DKA causes the body to break down fat for energy as there is a lack of insulin. This causes there to be a presence of ketones. HHNS results in high blood glucose levels *without the presence of ketones.*

Symptoms of HHNS

The symptoms of HHNS may take several days or even weeks to develop. These symptoms include:

- Blood glucose levels of 600 mg/dl (33.3 mmol/l) or higher
- Excessive thirst, accompanied by a dry mouth and increased urination
- Warm, dry skin
- Fever
- Drowsiness
- Confusion
- Hallucinations
- Vision loss
- Convulsions
- Coma

As you can see, HHNS can be fatal if left untreated.

Causes and Risk Factors of HHNS

So, what is most likely to bring about HHNS? After all, not everyone who develops type 2 diabetes goes on to develop blood glucose levels of 800 mg/dl and earns an admission to ICU, right?

This is true. Often, there are multiple factors at play. Undiagnosed diabetes often is the biggest “player” as it is untreated diabetes. Then, this untreated diabetes may be coupled with an illness or infection, and blood glucose levels increase rapidly – causing HHNS to develop.

Causes and risk factors for HHNS include:

- Undiagnosed diabetes.
- Untreated diabetes.
- Not following the diabetes treatment plan or an inadequate plan.
- Illness or infection, such as pneumonia, a urinary tract infection, or a virus, all of which can cause blood glucose levels to rise.
- Being prescribed certain medications, such as diuretics, corticosteroids (prednisone), and anti-seizure medications (Dilantin).
- Having other health conditions, such as heart failure or kidney disease.

Treatment of HHNS

Immediate treatment of HHNS will involve intravenous fluids to replace fluids that have been lost and to counter dehydration, intravenous potassium and sodium phosphate, as it is likely that your electrolytes are out of balance – this will ensure that your cells are functioning properly – and intravenous insulin to reduce your blood glucose levels.

Once fluid balance, electrolytes, and blood glucose levels are stabilized, education begins.

This is when you must begin to learn how to manage your blood glucose levels in preparation to live with your disease at home. This will likely mean learning about things:

- Checking/Testing blood glucose levels.
- Eating a carbohydrate-balanced diet.
- Taking oral medications and/or administering insulin.
- Learning about other “safety” things that may be necessary for you, depending on your treatment plan; for example, if you are going home on insulin, it will be necessary to learn how to detect and treat hypoglycemia.

Often this education *begins* in the hospital but is continued on an outpatient basis. Why? Because learning about a new condition can be overwhelming!

When I see a patient newly diagnosed with type 2 diabetes, I attempt to set them up for a follow-up appointment with a CDE after hospital discharge – and guess what? Much of the information that was learned in the hospital has been forgotten or skewed because of the stress of hospitalization.

Tips for Preventing HHNS

How can you avoid HHNS?

The easiest way to avoid HHNS is to control your blood glucose levels. It typically occurs when blood glucose levels are uncontrolled.

The easiest way to do this, regardless of how your diabetes is controlled (medications or insulin), is to check your blood glucose levels routinely. If you notice that your blood glucose levels are increasing, notify your physician. It may be time for an adjustment to your regimen.