

Should Stable Long-term Home Parenteral Nutrition Patients be Evaluated for Risk of Complications of Diabetes?

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Introduction

Patients who receive home parenteral nutrition (HPN) often receive a dextrose infusion of 300 grams or greater daily as part of the overall nutrient containing solution. For individuals consuming an oral diet, a fasting blood glucose level in the range of 100 – 125 mg/dl or an elevation of glucose between 140 and 199 mg/dl two hours after ingestion of 75 gms oral glucose is deemed an increased risk. These elevations are now termed a “category of increased risk for diabetes”, formerly known as prediabetes within the 2010 Clinical Practice Guidelines of the American Diabetes Association. A HgbA1c (A1C) range of 5.7 to 6.4 percent is included as a category of increased risk for future diabetes. For patients who receive long-term HPN (>6 months to lifetime), home glucose monitoring during and after disconnect of HPN infusion may not be routinely done. As there is an established clear benefit of glucose lowering to prevent or retard the progression of microvascular complications (retinopathy, neuropathy and nephropathy) and cardiovascular disease associated with the prediabetic state in individuals who do not receive HPN, glucose tolerance was evaluated in a long-term patient receiving HPN.

American Diabetes Association	Non-Diabetes	Increased Risk for Diabetes	Diabetes Type 2
Fasting glucose	60–99 mg/dl (3.3–5.5 mmol/l)	100–125 mg/dl (5.6–6.9 mmol/l)	>126 mg/dl (7.0 mmol/l)
2 hours post-prandial after 75 gm glucose	<140 mg/dl	140–199 mg/dl (7.8–11.0 mmol/l)	>200 mg/dl (11.1 mmol/l)
A1c	<5.7% without risk factors	5.7–6.4%	>6.4%

Methods

A 61-year-old male dependent on HPN for 25 years with short bowel syndrome secondary to an anti-coagulant disorder without history of diabetes demonstrated elevated home glucose readings during infusion. His BMI is 24 and he receives 320 grams of dextrose daily over eight hours. Infusion included a one hour up and down ramp. Routine fasting chemistries provided no indication of glucose impairment although home blood glucose monitoring two hours after initiation of infusion were outside of goal range (80-140 mg/dl fasting and during infusion per IV pharmaceutical home care provider protocol) indicating impaired glucose tolerance. The corresponding A1C value was 5.7 percent.

J.R. (BMI: 24)	4/10/10	4/17/10	5/13/10	7/27/10
Dextrose solution – gms	320	320	260 (260 gms dextrose as of 4/30/10)	260
Glucose during infusion – mg/dl	174	118	140	
Glucose 15” post disconnect – mg/dl	82	101		
Glucose 3 hour post disconnect – mg/dl	119			
A1c			5.7%	5.4%

Results

In this case, the Home Nutrition Support Team (HNST) recommended a change in the macronutrient mix to decrease dextrose and increase lipid content (while remaining well below 0.11g/kg per hour, McCowen, et al, NCP, 2004) within a similar caloric provision as opposed to insulin administration. Following the new HPN formulation, glucose values during infusion decreased to within normal range with an A1C of 5.4 percent three months subsequent.

Conclusions

This patient’s initial glucose values during infusion fell within the category of increased risk for diabetes, thus calling for intervention from the HNST to improve glucose tolerance. This case study demonstrates the use of follow-up home blood glucose monitoring with glycated hemoglobin levels to determine if further intervention to sustain glycemic control is required. It should be noted that A1C levels do not always correspond with measured glucoses due to increased red blood cell turnover amongst the chronically ill population, thus a falsely lowered HbgA1c level may occur. Currently data is not available as to the number of long-term patients that require insulin administration in HPN over time nor is there a consensus on appropriate targets for blood glucose values in patients receiving HPN. Certainly patients receiving HPN are provided direct dextrose infusion daily and how this relates specifically to the development of diabetes is not clear. Further study is warranted. Clinical monitoring by the home nutrition support team assists in achieving euglycemia, minimizing the risk for potential diabetes and its resultant complications. Managing HPN macronutrient content, blood glucose, A1C values and body weight over time is important as patients may receive HPN for 40 or more years.