

Nutrition and Wound Care:

The Importance of Investigating the Presence of Hyperglycemia in Individuals with Wounds



by Chris Fraser

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Individuals with diabetes exhibit significantly impaired wound healing and increased complication rates, including infection, compared with individuals who do not have diabetes.^{1,2,3}

When a wound occurs, gluconeogenesis is initiated in the liver in response to a surge in catecholamines and cortisol. This process may result in the production of excess glucose, which can impair wound healing, particularly in individuals with diabetes and poor glycemic control.³ Infection is a metabolic stressor that contributes further to hyperglycemia; a vicious cycle occurs that results in a wound that does not respond to otherwise effective treatment modalities.

Multiple proposed factors impair wound healing in the presence of diabetes, and these include vascular, neuropathologic, cellular, immune system and biochemical abnormalities.^{2,4}

Increased Risk for Infection

Individuals with diabetes are at greater risk for and have higher incidence of infection because of decreased host resistance.³ When blood glucose levels are persistently elevated, chemotaxis and phagocytosis are compromised.^{1,4} Defects in leukocyte function and other impairments prolong the inflammatory phase of wound healing and delay the resolution of infection in individuals with diabetes.^{1,2,5}

For an individual with diabetes, medication management in conjunction with diet, activity and lifestyle education can be provided to achieve optimal glycemic control to promote wound healing and minimize risk for wound

and other infections. Individuals with hyperglycemia who have not been screened for diabetes are at increased risk for chronic, non-healing wounds and infection, as the hyperglycemia is unidentified and therefore unmanaged.

Achieving Optimal Glucose Control

The achievement of optimal glucose control is the most important factor affecting wound healing in patients with diabetes. It is crucial that clinicians routinely assess for the presence of diabetes and address the issues early.³

The Canadian Diabetes Association Guidelines for the diagnosis of diabetes are as follows:⁶

Fasting plasma glucose (FPG) ≥ 7.0 mmol/L
(fasting = no caloric intake for at least eight hours)
OR
Random (casual) plasma glucose (PG)
 ≥ 11.1 mmol/L
+ symptoms of diabetes
(random [casual] = any time of the day,
without regard to the interval since the last meal)
(classic symptoms of diabetes =
polyuria, polydipsia and unexplained weight loss)
OR
Two-hour PG following a 75 gram oral glucose
tolerance test (OGTT) ≥ 11.1 mmol/L

A confirmatory laboratory glucose test (an FPG, random PG or a two-hour PG in a 75 gram OGTT) must be done in all cases on another day in the absence of

unequivocal hyperglycemia accompanied by acute metabolic decompensation.⁶

It is this clinician's experience that the aforementioned physical signs and symptoms of diabetes do not always accompany the hyperglycemia that is identified by blood tests. The absence of these symptoms should neither be considered evidence of normal blood glucose levels nor preclude appropriate diagnostic tests. A neurogenic bladder as the result of a neurological injury or disease, urinary incontinence, indwelling urinary catheters, decreased thirst response in older adults, cognitive impairment and other factors may contribute to the lack of identification or reporting of these symptoms.

Identifying Prediabetes

Prediabetes is a term for impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT), which are elevated blood glucose levels that are below the threshold for diabetes but which have clinical consequences. Prediabetes places individuals at risk for developing diabetes and its complications. It is important to note that not all individuals with prediabetes will necessarily progress to diabetes. Early identification is therefore essential to ensure the timely provision of lifestyle intervention education, which has been shown to be highly effective in delaying or preventing diabetes. Plasma glucose levels for the diagnosis of IFG, IGT and diabetes are as follows:

	FPG (mmol/L)		Two-hour PG in a 75 gram OGTT (mmol/L)
IFG	6.1–6.9		NA
IFG (isolated)	6.1–6.9	and	< 7.8
IGT (isolated)	< 6.1	and	7.8–11.0
IFG and IGT	6.1–6.9	and	7.8–11.0
Diabetes	≥ 7.0	or	≥ 11.1

A fasting plasma glucose result of 5.7–6.9 mmol/L in an individual with risk factors for diabetes mellitus warrants an oral glucose tolerance test to rule out prediabetes and diabetes.

Recommended targets for glycemic control for people with diabetes are 4.0–7.0 mmol/L following a period of fasting or prior to consuming a meal, and 5.0–10.0

mmol/L two hours following a meal.

While glycosylated hemoglobin (Hgb A1C) is not a diagnostic tool for diabetes, it is a valuable measure of treatment effectiveness and should be conducted approximately every three months to ensure that blood glucose targets are being met. Hgb A1C levels > 7.0% (0.070) are associated with a significantly increased risk for both microvascular and macrovascular complications.⁶

Referral to a comprehensive diabetes education program, if available, or referral to a registered dietitian and initiation of appropriate medications (oral antihyperglycemic agents and/or insulin) are imperative in order to achieve optimal blood glucose control for wound management and reduction of risks associated with diabetes mellitus.

Effective Management

Treating ulcers is more effective when clinicians understand and implement measures to manage both the wound and underlying factors—such as uncontrolled HgbA1C levels—that may impede successful outcomes. Use of adjunctive and expensive therapies is best initiated after these factors have been addressed.⁷ Controlling serum glucose levels in people with diabetes at the time of injury, surgery and wound healing cannot be overemphasized.³

Assessing for the presence of hyperglycemia in individuals with wounds is imperative and must be considered as an integral component of wound management. ⁴

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