

ELEVATED BLOOD GLUCOSE LEVELS IN THE EMERGENCY DEPARTMENT: MISSED OPPORTUNITIES

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Introduction: Prediabetes is an important public health issue. In 2011, 79 million Americans had prediabetes, and 7 million were undiagnosed. By 2025, the number of persons with prediabetes is projected to increase to 472 million globally. For many, the emergency department may be the only source of medical care or interaction with a health care provider. This makes the emergency department an ideal place to identify individuals with elevated random blood glucose levels, inform them of the elevation, and refer them for follow-up.

Methods: This was a descriptive, correlational, cross-sectional study using retrospective data from 2 emergency departments in north San Diego County to determine the incidence of elevated blood glucose levels and the disposition of these individuals. Descriptive and correlational statistical analyses were completed with SPSS software (IBM, Armonk, NY).

Results: Patients (N = 106) with random blood glucose levels of 150 mg/dL or greater, without a prior diagnosis of

diabetes, were identified over a 9-day period. The mean glucose level was 181.53 mg/dL. Of the patients, 45 (42%) were discharged. Only 1 of these 45 patients (2.2%) was informed about the elevated blood glucose level and referred for follow-up.

Discussion: Emergency nurses and providers care for patients with elevated blood glucose levels who may have undiagnosed prediabetes. The finding that only 1 patient with an elevated glucose level was informed and referred for follow-up indicates opportunities to address this population of patients who are being missed. Failing to inform and provide referral minimizes patients' abilities to make relevant lifestyle changes to help prevent or delay progression to type 2 diabetes.

Key words: Prediabetes; Hyperglycemia; Elevated blood glucose

Prediabetes is prevalent, continues to increase in prevalence, and costs the United States over \$25 billion annually.¹ A patient may have prediabetes and its adverse microvascular and macrovascular complications

for up to 7 years before type 2 diabetes is diagnosed.^{2,3} Early identification and treatment of patients who may have undiagnosed prediabetes are essential in preventing or delaying progression to type 2 diabetes.^{4,5} In 2011, 79 million Americans had prediabetes, and 7 million were undiagnosed.⁶ The incidence is expected to increase to 472 million persons worldwide by 2025.⁷ Mitigating this global public health issue requires identifying individuals with undiagnosed prediabetes and initiating measures to help stop or delay progression to type 2 diabetes.⁸

The National Diabetes Data Group originated the concept of impaired glucose tolerance (IGT),⁹ a condition exemplified by an elevated blood glucose level that was not diabetes but increased a person's risk for type 2 diabetes.¹⁰ In 1997 the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus included another category called impaired fasting glucose (IFG). They argued that an elevated IGT or IFG level, or both, indicated an increased risk for type 2 diabetes mellitus and constituted prediabetes.^{10,11}

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Prediabetes mellitus, a term coined over a decade ago by the US Department of Health and Human Services and the American Diabetes Association (ADA),⁷ is defined as a state in which cells no longer respond appropriately to insulin.¹² Prediabetes is sometimes considered a diagnosis; however, it is also a risk state that warrants lifestyle changes and possibly medication to reduce the risk of progression to type 2 diabetes.¹³

Significance

For many persons, the emergency department may be the only source of medical care or interaction with a health care provider. This makes the emergency department an ideal place to identify individuals with elevated random blood glucose levels and refer them for more specific testing for prediabetes and diabetes.¹⁴ The reason for and importance of follow-up should be explained to patients. Patients may have had oral intake before arriving in the emergency department, so the serum blood glucose level derived is considered random.¹⁵

In 2004 the ADA recommended early detection of prediabetes.¹⁶ This suggests that screening of the general population for prediabetes would be beneficial. Norris et al¹⁷ found a lack of evidence to support universal screening. In 2011 the ADA revisited the issue and recommended standardized protocols for screening. Unfortunately, screening for prediabetes is not routinely performed. The intent of our study was not to encourage screening but to promote recognition of and attention to blood glucose level elevations detected in the evaluation of a non-diabetes-related complaint in the emergency department.

Health care professionals regularly encounter patients with the phenomenon of elevated random blood glucose levels in a variety of settings, including hospitals, emergency departments, doctor's offices, and clinics. In 2008 the American Association of Clinical Endocrinologists urged physicians to identify prediabetes and begin treatment, such as lifestyle changes, including diet and exercise, and possible medication use. Lifestyle modification has been shown to prevent or delay progression from prediabetes to type 2 diabetes by up to 58%.^{18,19}

The Affordable Care Act addressed the need for prevention, including the need to identify and prevent diseases.²⁰ It is recommended that patients with an elevated blood glucose level be informed and referred for follow-up.^{4,5} Early identification of elevated blood glucose levels will give patients the opportunity to make choices to prevent or delay progression to type 2 diabetes, thus preventing the negative impact on the individual, society, health care costs, and the health care system.²¹

The emergency department is an opportune location for identifying persons with elevated random blood glucose levels and possible prediabetes.²² Although there have been several studies, there are conflicting findings regarding the percentage of patients presenting to the emergency department with blood glucose levels suggesting prediabetes.

Synthesis of Relevant Literature

A review of the literature related to elevated blood glucose levels and prediabetes finds variation in glucose threshold levels for prediabetes. Variability has also been found in provider attitudes and practices related to informing patients about their elevated blood glucose levels and referring them for follow-up. There is evidence in the literature on patient attitudes, preferences to be informed, and intentions to follow up on an elevated blood glucose level.

There is a lack of definitional clarity on what constitutes an elevated glucose level. This poses challenges in the identification of persons at risk for the development of diabetes. However, the ADA defines hyperglycemia in the hospital setting, which includes the emergency department, as any blood glucose level greater than 140 mg/dL.²³ Prediabetes has been defined by some authors as an IFG level between 100 and 125 mg/dL.¹⁰ Other authors note that an IFG level greater than 90 mg/dL puts a patient at risk and should be considered to indicate prediabetes.²⁴ IGT levels between 140 and 200 mg/dL or elevated IFG and IGT levels are considered indicative of prediabetes.^{1,25} Although specific parameters for elevated blood glucose levels vary, a random blood glucose value of 150 mg/dL or greater was considered elevated for this study.

Early identification is a first step in preventing prediabetes from progressing to type 2 diabetes.²⁶ Previous studies have indicated that the emergency department is an ideal place to identify, inform, and refer patients for follow-up care, and patients are receptive to this information and want to be notified.²² Although 95% of ED patients said that they would want to be informed if they had an elevated blood glucose level, Ginde et al²⁷ found fewer than 10% of patients with glucose elevations were informed and referred for follow-up and Graffeo and Holland²⁸ reported that 20% were informed and referred for follow-up.

Ginde et al¹⁴ conducted another study of 152 emergency physicians' prediabetes screening practices and glucose thresholds thought to warrant treatment and referral. More than half of the physicians (53%) supported screening, and 92% endorsed informing nondiabetic patients about an elevated blood glucose level. Respondents indicated that blood glucose levels of 125 to 200 mg/dL

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