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How Effective is a Simple Pre-Diabetes Screen for Clinical Practice?

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Abstract

Background: Diabetes is a global problem. According to WHO (2014) the global prevalence of diabetes was estimated to be 9% among adults aged 18+ years. In 2012, an estimated 1.5 million deaths were directly caused by diabetes. Of note, more than 80% of diabetes deaths occur in low- and middle-income countries. It is predicted that diabetes will be the 7th leading cause of death in 2030. Of concern is the vast majority of people living with pre diabetes are unaware they have it. Without lifestyle changes to improve their health, an estimated 15% to 30% of people with pre diabetes will develop type 2 diabetes within 5 years. Simple screening methods may identify risk and facilitate conversations with patients to identify specific barriers to making healthy lifestyle choices to decrease risk for diabetes.

Purpose of the study: To examine the use of the CDC 7 item Pre-Diabetes Screening Test (PST) to identify "at risk" patients and their response to lifestyle education.

Methods: A cross-sectional design with purposive sampling of overweight men and women attending a weight loss clinic located in Southern California. Using venipuncture, A1C was examined when patients were identified high risk based on the Pre Diabetes Screening Test. Follow up consultation was provided and data were collected at four months.

Results: All participants (N=70) screened "high risk" PST >9,70.5% (49) were pre diabetic based on A1C levels. At 4 months follow-up findings indicated patient weight changes of 6-30 pounds, reductions in A1C levels, and increased physical activity.

Significance: Realizing the predictability of simple screening abilities can help reinforce the ease in assessing, increase awareness of prediabetes risk in adults, and start a conversation for healthy behaviors.

Keywords: Diabetes; Diabetes screening; Health promotion; Obesity; Prediabetes

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Introduction

Diabetes is a global problem. According to WHO the global prevalence of diabetes was estimated to be 9% among adults aged 18+ years [1]. In 2012, an estimated 1.5 million deaths were directly caused by diabetes and it is predicted diabetes will be the 7th leading cause of death in 2030. Notably, more than 80% of diabetes deaths occur in low and middle-income countries. The condition is highest among adults of color, with half of Pacific Islanders, American Indians, and African-Americans estimated to have prediabetes.

Not only is diabetes of concern but also the precursor-pre-diabetes is epidemic. Although 37% of adults have prediabetes, only 11% are aware of it. The Centers for Disease Control and Prevention (CDC) estimated 1 of every 3 adults in the U.S. (86 million Americans) had prediabetes in 2010; alarmingly 1 out of 3 young adults (18-39 years) had prediabetes. Although 37% of adults have prediabetes, it is estimated 9 out of 10 are unaware they are living with the condition [2, 3]. Consequently without lifestyle changes to improve their health, an estimated 15% to 30% of people with prediabetes will develop type 2 diabetes within 5 years. If this epidemic is not reversed, health

care providers will be overwhelmed with patients with chronic conditions leading to amputation, blindness, and kidney failure resulting in skyrocketing health insurance costs [1, 2].

According to Tuomilehto et al. [4], strategies need to be in place to identify high risk individuals. The current recommendation by the American Diabetes Association is to screen adults 45 years or older, and earlier screening in people with multiple risk factors for type 2 diabetes [5]. A number of other health groups recommend screening for type 2 diabetes only in people who have risk factors, for instance the U.S. Preventive Services Task Force (USPSTF) latest guidelines recommend screening overweight and obese adults between 40 and 70 years old [6]. Considering many people are unaware of their prediabetes status, a public health priority is to increase awareness of the recommendation. Identification may be accomplished in several ways–2 hour fasting glucose, fasting blood sugar or A1C, which measures average blood sugar over three months and doesn't require fasting. In the Diabetes Prevention Program, the CDC risk assessment (Pre-Diabetes Screening Test) accurately identified 27-50% of prediabetics based on a 2-hour glucose test, fasting blood glucose, or an A1C [7].

This study focused on the utility of the 7-item CDC Pre-Diabetes Screening Test to identify "at risk" patients and the association with an abnormal A1C that would classify the patient as pre-diabetic [8]. Specifically, the aims of this study were 1) to assess the ease of implementing the screen with the initial clinical assessment, 2) to evaluate the effectiveness of the screen to identify prediabetic patients with a confirmatory A1C, and 3) to evaluate patient responses to the diagnosis.

Background/literature review

It has been recognized there are multiple lifestyle risk habits that increase or decrease the development of diabetes. Extant studies, for example the seminal Diabetes Prevention Program (DPP), have demonstrated long term benefits of mild weight reduction (7% of body weight) and moderate exercise (150 minutes per week) on diabetes prevention by reducing the risk of diabetes by 58% [7]. Nonetheless, transferring clinical trial results to daily practice is noted to be difficult. Challenges to clinicians include not being trained in lifestyle change theory, how to motivate patients, and the need to conduct research to learn what works best with diverse societies and cultures given this is a worldwide problem [5]. Using simple, but reliable, screening methods may increase the providers wiliness to assess patient risk, patients' awareness of their risk for a very common chronic, progressive disease, and perhaps increase the patients motivation to change lifestyle behaviors that may contribute to the increased health risk of developing diabetes.

Method Description

A cross-sectional design with purposive sampling of 70 overweight or obese patient volunteers recruited and enrolled from a community based weight clinic located in southern California. The clinic is a walk in, fee for service clinic operated by an internal medicine physician, adult and family nurse practitioners, and two medical assistants. Patients signed consent for treatment which involved meeting with the nurse practitioner for a physical exam, body fat composition, dietary plan, and risk screening via blood work that included a complete blood count, lipid panel, and chemistry panel. Patients were offered lifestyle education on a weekly basis as they come in for a weight and blood pressure check by the medical assistant. Every six weeks, patients have a follow up visit with the nurse or physician to evaluate their progress. Some patients continue care up to a year, others drop out at any given time, and or restart when they are again motivated.

Procedures

Upon receipt of IRB approval from the University, clinic patients were invited to be screened for prediabetes risk with the CDC Pre-Diabetes Screening Test (PST) **(Table 1)**. If the patients scored ≥ 9, they were identified as "high risk for prediabetes" and were offered a free A1C with their usual comprehensive labs completed for patients signing up for weight management services. The overweight and obesity criteria were based on the CDC definitions. Using venipuncture, A1C was assessed as patients were identified at high risk based on the PST. Waist measures were obtained as part of the screening process as an additional risk factor for metabolic syndrome based on NCEP ATP III criteria. Follow up consultations were carried out the following week to personally review results of laboratory tests.

Results

Participants (89.1 % women; 25% overweight, 75% obese) mean age was 45.5 ± 10.4. The mean BMI was 34.4 ± 5.44 **(Table 2)** and mean waist circumference was 40 ± 5.5 inches. Approximately 77% of the women had a waist circumference >35 inches, and 83% of the men had a waist circumference greater than the recommended 40 inches. Prediabetes mean risk score was 12.8 ± 2.51 with all participants classified in the "at risk" category. Mean A1C was 6.13 ± 1.30. Based on A1C results, 70.5% of the participants were in the pre-diabetes/diabetes group.

Risk scores and A1C were positively correlated (rho=0.273, p<0.001). Overweight and obese patients did not differ in elevated A1C (Fisher's exact test, p=0.785). Preliminary follow up at 4 months indicated early A1C changes (7.1 decreasing to 6.4,

Table 1 CDC Pre-Diabetes Screening Test (PST).

Take The Test–Know Your Score!
You may have prediabetes and be at risk for type 2 diabetes if you:
1. Are you a woman who has had a baby weight more than 9 pounds at birth? (1 pt)
2. Do you have a sister or brother with diabetes? (1 pt)
3. Do you have a parent with diabetes? (1pt)
4. Find your height on the chart. Do you weigh as much as or more than the weight listed for your height? (5 pts)
5. Are you younger than 65 years and get little or no exercise in a typical day? (5 pts)
6. Are you between 45 and 64 years of age? (5 pts)
7. Are you 65 years of age or older? (9 pts)
Total points for all "yes" responses:_____

Table 2 Total sample descriptives.

	Mean	SD	Minimum	Maximum
Age, years	45.50	10.40	26.00	68.00
BMI	34.40	5.44	25.80	55.60
Waist circumference, inches	40.00	5.50	31.50	55.00
Prediabetes risk score (from CDC survey)	12.80	2.51	10.00	17.00
HgbA1c, %	6.13	1.30	4.40	12.70

7.2 decreasing to 5.9, 6.4 decreasing to 5.9, and 8.2 decreasing to 7.8). Two patients lost more than 30 pounds, 1 patient lost more than 20 pounds, and 21 patients lost 10-19 pounds.

Discussion

The CDC PST correctly identified abnormal A1C's, but overestimated the risk for pre-diabetes in our participants. Specifically, all patients (N=70) were diagnosed as "high risk" with the PST, in contrast to 75% being diagnosed as prediabetic based upon the elevated A1C levels. Realizing the predictability of simple screening abilities can help reinforce the ease in assessing and increasing awareness of prediabetes risk in adults. If screening leads to increased awareness and possible motivation, preventing further development of diabetes is a possibility, which is a real risk reducer in clinical practice.

Limitations

This study is based on a small sample of volunteers. High attrition was evident at the 4-month follow up and is attributed to patients quit coming in to the clinic before they reached goal weight or goal A1C.

Conclusions

Tuomilehto et al. [4] stated "Type 2 diabetes can be delayed or prevented among people who have Insulin Glucose Tolerance with lifestyle interventions or medication, as shown by major clinical trials of diabetes prevention, but it is a completely different issue to translate this message derived from the lifestyle trials to clinical practice." A minute of screening provides valuable patient information. Use of the PST offers a non-threatening approach for assessing risk and initiating discussions with patients while addressing obesity implicated health problems.

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