Review Articl

Examining Prediabetes Comprehension with the Utilization of a Focused After-Visit Summary

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Abstract

Background: Prediabetes is a health condition that is increasingly prevalent which can result in potentially severe and costly complications if left untreated. The incidence of prediabetes has reached epidemic proportions affecting more than 548 million people worldwide, thus reversing prediabetes or halting the progression to type II diabetes is a public health imperative.

Purpose: The purpose of this project is to evaluate if newly diagnosed adults with prediabetes had an increased comprehension of the disease with the utilization of content-specific after-visit summary discharge teaching.

Methodology: Outpatients in a direct-to-employer clinic identified as meeting the criteria for the diagnosis of prediabetes were administered a pretest-posttest evaluation utilizing the KAP-PAQ tool that analyzes knowledge, attitude and practice change after receiving the intervention, which was an after-visit summary including comprehensive education on the topic of prediabetes.

Results: The project findings demonstrated that 75% of respondents had increased knowledge post-AVS integration, and 25% had no change. The mean KAP-PAQ scores were 10.50 (SD = 2.38) and 13.00 (SD = 0) for pre-AVS integration and post-AVS integration.

Conclusion: Though the sample size did not provide statistical significance, there was evidence of increased comprehension of the diagnosis of pre-diabetes through the utilization of focused education after-visit summary. A reproduction of this study on a larger sample size is indicated to further test the hypothesis that after-visit summary is an effective tool in treating patient diagnosed with pre-diabetes.

Implications: Early diagnosis of pre-diabetes and the implementation of diet and lifestyle changes has been shown to reverse prediabetes and in some cases prevent the evolution to type II diabetes. This study suggests that a focused patient education on the disease could be an option for reducing the epidemic of type II diabetes.

Keywords: After-visit summary, Pre-diabetes, Pre-diabetes comprehension, patient education

Introduction

The incidence of prediabetes is rising exponentially across the globe resulting in an epidemic. The current estimate of prediabetes in the world is 7.5% and is expected to rise to 8.4%, affecting 548 million people of the world's adult population by 2045 [1]. By comparison, in 2014 37% of the population in the United States had prediabetes [2]. The rising prevalence is multifactorial and 8 of 10 people are unaware they have this serious health condition (Chaitin et al.) [2]. Individuals with prediabetes are 5-15 times more likely to develop type II diabetes (T2D) resulting in increased complications such as cardiovascular disease, kidney disease, liver disease, obesity, cancer, or death [3]. Prediabetes affects an estimated 86 million people in the United States [3]. Individuals are often unaware of the condition due to the absence of physical symptoms resulting in delayed identification. Undiagnosed prediabetes prevalence is expected to rise from affecting every 8 in 1,000 individuals in 2008 to affecting every 15 in 1,000 individuals by 2050 [2].

Clinicians need to be astute in assessing risk factors for developing prediabetes in their patients. Liebman, Phillips, and VenHuizen [3,4,5] identify physical inactivity, poor diet, age 45 years or older, obstructive sleep apnea (OSA), smoking, gestational diabetes, and having a first-degree relative with diabetes as risk factors for developing T2D. Additional risk factors include conditions associated with obesity such as low high-density lipoprotein (HDL) cholesterol, elevated triglycerides above 250mg/dL, and hypertension [5]. Without obvious symptoms, patients may not ask their providers about screening. In fact, 75% of patients who fit the diagnostic criteria weren't diagnosed or treated for the condition [3].

With disease prevention and health promotion primary goals for patient care, this inquiry sought to evaluate whether implementing a standardized After-Visit Summary (AVS) could assist in addressing the global epidemic of prediabetes by providing patients with knowledge and tools to understand the diet and lifestyle modifications necessary to halt or reverse the progression of prediabetes to T2D.

After-visit Summary

After-visit summary at the conclusion of a clinical encounter gained popularity when the use became wide-spread due to the Medicare and Medicaid electronic health record (EHR) Meaningful Use (MU) program. The program aimed to improve the delivery of care and enhance patient-centeredness. Although the MU requirement ceased in 2016, AVS popularity remained and are now consistently being utilized to summarize an office visit and provide relevant and actionable information to patients. The AVS also acts as a method for communication to support continuity and care coordination [6].

Patient satisfaction with AVS is generally high with one study reported that 93% of those surveyed agreeing the printed AVS was helpful Emani, Neuberger et al [6,7] added that among those surveyed who received an AVS, 42% said they would keep the document without a specific intended purpose and 41% said they would review it at home or share it with their family members and healthcare providers. The remaining 17% indicated no perceived value with the intention to discard the document [6].

Laws et al. [8] report patients have difficulty adhering to treatment plans when they do not understand or recall instructions during an office visit. It is therefore essential to increase patient recall with the use of verbal instruction at the time of a patient encounter, followed by written instructional materials that can be referenced after the visit. Prediabetes has been shown to be reversible with lifestyle and behavior modification, which require the patient to implement these strategies. The initial hypothesis of this study then aimed to explore whether creating a focused patient education plan to be distributed in the AVS could increase patient knowledge and comprehension of strategies reversing prediabetes.

Methodology

The research question asks: Do newly diagnosed adults with prediabetes have an increased comprehension of the condition after providing teaching material in an after-visit summary (AVS) in their discharge information? The study tests this hypotheses by utilizing a pretest-post-test inquiry seeking to answer whether integrating this information in an AVS changes a patient's comprehension of prediabetes. The independent variable in this project was an AVS containing prediabetes information and guidelines while the dependent variable was prediabetes comprehension. This project was designed to utilize a single group and involved a pre-and post-test design. Pre-and post-data points assisted in determining if integrating an AVS was an effective approach to increase comprehension among patients with the same diagnosis.

Institutional Review Board (IRB) approval for research with human participants was obtained from Aspen University and written informed consent was obtained from each of the patients enrolled. For this investigation, the definition of prediabetes by the American Diabetes Association (ADA) is utilized. This parameter categorized prediabetes as a hemoglobin A1c (HbA1c) of 5.7% to 6.4% or impaired fasting glucose (IFG) of 100 to 125mg/dL [9].

The project setting included urban, outpatient, primary care patients enrolled in a direct-to-employer health membership. The project population was selected based on the following strict inclusion: 18 years of age or older, prediabetes diagnosis within 6 months of the project, the absence of glucose-lowering medication use, and English as their primary language. The exclusion criteria included children, those taking a glucose-lowering medication, those previously diagnosed with prediabetes (>6 months), a primary language other than English, and those who could not read.

There were 20 eligible participants identified for this project. Four participants (N = 4, 20%) gave their consent to participate in this project. (Table 1) presents the demographics of the respondents of this study. Figures 4-10 visualizes the information in (Table 1). The majority of the respondents were 25-34 years old (75%) and female (75%). All respondents (100%) had a college degree or some college level of education. English was the primary language for all participants (100%). Half of the respondents (50%) were diagnosed with prediabetes less than 1 month ago, and half of the respondents (50%) were diagnosed with prediabetes 1-6 months ago. No respondents (100%) took medications to lower their blood glucose.

	N	%
Age		
18-24 years	0	0
25-34 years	3	75
35-44 years	0	0
55-64 years	1	25
> 64 years	0	0
Gender		
Female	3	75
Male	1	25
Highest level of education		
College or some college	4	100
Primary language		
English	4	100
Date diagnosed with prediabetes		
<1 month ago	2	50
1-6 months ago	2	50
Medication use		
No	4	100
AVS preference		
Email	4	100

Table 1: Demographics.

Recruitment of potential individuals took place with an email invitation. The email letter described the project in detail, how participants' health information would be protected, and a consent form. Two recruitment attempts were made for those who met eligibility criteria, 1-2 weeks apart. Once the consent form was electronically returned, the baseline modified KAP-PAQ was sent via email to the project population. Demographic data were collected at that time, along with inquiry regarding their preference for receiving the AVS. After the consent and baseline questionnaire were received for each, the integrated AVS was distributed containing essential information through the patient portal, email, or mail. A repeat modified KAP-PAQ was administered within 1 week of handout distribution. Two attempts to retrieve responses were made, 2-3 days apart for those who had not yet returned the repeat questionnaire.

The instrument utilized to measure comprehension was the Knowledge Attitude Practice-Prediabetes Assessment Questionnaire (KAP-PAQ) developed by Hyder et al. [10] The KAP-PAQ, a validated tool that analyzes knowledge, attitude, and practice, was administered at the point of contact, which consists of multiple-choice questions to determine baseline comprehension. The original KAP-PAQ consisted of 30 multiple-choice questions with 10 questions for each category: knowledge, attitudes, and practice. For this inquiry, only the knowledge portion was administered.

The knowledge portion of the questionnaire had 10 questions specific to prediabetes including detection, etiology, consequences, and recommendations. Integration and delivery of prediabetes information obtained from ADA guidelines was provided to the patients via an AVS. To initiate the data collection, the project population completed an electronic comprehension check with the KAP-PAQ, a validated tool that explores prediabetes comprehension. After a baseline knowledge assessment was obtained, standardized information was provided utilizing an AVS. Guidelines for the standardized materials were obtained from the ADA and American Medical Association (AMA). After completion of AVS integration, a repeat KAP-PAQ was administered. Following data collection of the pre-and post-test KAP-PAQ, statistical analysis occurred.

Data Analysis

Data were imported and analyzed using SPSS version 23 for Windows by IBM Corp., Armonk, NY. Frequency tables for categorical variables and descriptive statistics for continuous variables were used to summarize the demographics of those enrolled, the survey responses for the modified KAP-PAQ, and the prediabetes comprehension measured by the knowledge questions of KAP-PAQ.

A paired t-test Field [11] was used to determine if there is a difference in prediabetes comprehension, measured by the knowledge questions of KAP-PAQ, before and after the integration of the AVS. The null hypothesis was that there is no statistically significant difference in prediabetes comprehension before and after the AVS integration. The alternative hypothesis was that there was a statistically significant difference in prediabetes comprehension before and after the AVS integration.

In a paired t-test, the observations (i.e., the dependent variable) are defined as the differences between two sets of values, and each assumption for the paired t-test refers to these differences, not the original data values. The following assumptions need to be satisfied for the paired sample t-test [11]

As the scores for prediabetes comprehension are on a continuous scale, the observations (i.e., the dependent variable) of the paired t-test defined as the differences between two sets of values are on a continuous scale. Thus, the first assumption for the paired t-test is satisfied. The independence assumption was satisfied as each participant was an independent individual and hence the observations are independent of one another. The normality assumption was checked via skewness and kurtosis. As suggested by Kim, Mishra et al. [12,13] (Table 2, 3), an absolute skewness value ≤ 2 and an absolute kurtosis (excess) ≤ 4 for the data may be used as reference values for determining considerable normality. If the normality assumption was not satisfied, then the non-parametric alternative of the paired t-test, the Wilcoxon signed-rank test, would be performed to validate the results of the paired t-tests. For any tests, a p-value less than 0.05 indicated significance. All p-values were two-sided.

Question	Respondent 1	Respondent 2	Respondent 3	Respondent 4	M	SD
Pre-AVS integration						
1	1	1	0	1	0.75	0.43
2	1	0	0	1	0.5	0.5
3	3	3	3	0	2.25	1.3
4	2	2	2	2	2	0
5	2	2	0	0	1	1
6	1	1	1	1	1	0
7	1	1	1	1	1	0
8	1	1	1	1	1	0
9	1	1	1	1	1	0
Total	13	12	9	8	10.5	2.38
Post-AVS integration						
1	1	1	1	1	1	0
2	1	1	1	1	1	0
3	3	3	3	3	3	0
4	2	2	2	2	2	0
5	2	2	2	2	2	0
6	1	1	1	1	1	0
7	1	1	1	1	1	0
8	1	1	1	1	1	0
9	1	1	1	1	1	0
Total	13	13	13	13	13	0
Note. For Questions 1, 2, and 6-9: each correct answer = 1 point. For Questions 3: correct answer = 3 points. For Questions 4 and 5: each correct answer = 2 points.						

Table 2: Summary of KAP-PAQ Results before and After AVS Integration.

	M	SD	t	df	p
Pre-AVS score - Post-AVS score	-2.5	2.38	-2.1	3	0.124
Note. Skewness = 0 and kurtosis = -4 for the difference in KAP-PAQ score. As suggested by Kim, Mishra et al. [13], an absolute skewness value ≤ 2 and an absolute kurtosis (excess) ≤ 4 for the data may be used as reference values for determining considerable normality. Thus, it was concluded that the normality assumption for the paired t-test was satisfied.					

Table 3: Results of Paired t-test.

Conclusions and Implications

The current number of individuals diagnosed with prediabetes is projected to rise. The cost and complications associated with untreated prediabetes are not only detrimental to one's quality of life but also to health systems that are already overtaxed. Providing written materials is a cost-effective way to assist patients with their understanding of the prediabetes disease process, instructions, guidelines, and resources to facilitate necessary lifestyle and behavior modifications when diagnosed with prediabetes.

Newly diagnosed prediabetic adults' comprehension of the medical condition pre-and post-AVS integration were compared in this project. The conclusion demonstrated that the AVS is one vehicle to increase the knowledge and comprehension for newly diagnosed prediabetics. As this study was implemented with a small sample size, and all participants had college level education, reproducing this study with a more diverse sample population is indicated before the results can be generalized.

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