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Abstract

Objective: To assess the correlation of free health screenings in community pharmacies on patient perceptions of free health screenings and diabetes knowledge.

Methods: The study design was a pre-post observational study using surveys, blood sugar screenings, and patient education on diabetes. Participants were voluntary patients from four REM Corporation pharmacies in Ohio who were 18 or older, not recently tested for diabetes, non-diabetic, not pregnant, and without disorders that could hinder survey responses and education. Pre- and post-surveys assessed both patient perceptions on free health screenings in community pharmacies and on diabetes knowledge.

Results: Among the 26 participants there was no statistically significant difference between patient perception pre- and post-surveys (all p -values ≥ 0.05), however there was a statistically significant difference between pre and post diabetes knowledge surveys ($p < 0.001$).

Conclusion: Patients have positive opinions on free health screenings in community pharmacies and these screenings can help patients understand disease states and be more aware of their health.

Keywords: Free health screenings, community pharmacy, diabetes, patient perceptions

Introduction

Healthcare professionals can utilize health screenings to detect diseases early on in order to treat them more easily.¹ Screenings can be valuable in revealing health problems while minimizing unclear results and can be done routinely as a preventive measure or when there is reason to suspect a health problem exists.^{2,a} Many easily-accessible community pharmacies hold free health screenings where walk-ins are welcome and screenings are convenient because no appointment is needed. Patients are recommended to follow-up with a healthcare professional immediately when problems are identified during screenings.³ Free community health screenings that are available include blood glucose, blood pressure, and cholesterol.

Extensive use of health screenings, specifically blood glucose checks, in a community setting could be beneficial. Diabetes is one of the most significant health issues Americans face today. Approximately 21 million individuals have been diagnosed with diabetes in the United States.⁴ An estimated 8.1 million more may be currently undiagnosed.⁴ Another concern is pre-diabetes, as there are nearly 79 million people that are at greater risk for developing diabetes.⁵ Hyperglycemic events due to diabetes killed 2,361 in 2010 alone.⁴ Individuals who

suffer from this condition are subject to a wide array of other potential health problems, including being two to four times more likely to have heart disease and or a stroke.⁵ It is also the leading cause of blindness and kidney failure.⁵ Uncontrolled diabetes may also result in neuropathy and amputation if it continually goes unchecked.⁵ Blood glucose measurements are crucial given the aforementioned issues and need to be further explored due to the prevalence of diabetes.

Previous literature has shown most studies regarding community pharmacy health screenings have been conducted on blood pressure and heart health related subjects. There has not been extensive research performed regarding patient knowledge of diabetes, as well as the correlation of health screenings. Assessments of risk factors for diabetes along with blood glucose screening measurements have been the main focus of many studies examining diabetes. Referral to a physician and the adherence of follow-up with a physician are crucial aspects of diabetes care.^{6,7} Some studies also explore individuals' awareness of their risks for developing certain diseases.⁸ Research dealing with perceptions of free health screenings is limited, especially related to blood glucose health screenings and patient education and counseling. Researchers have examined satisfaction with the services provided during the health screenings, showing the majority of people believe pharmacies are convenient settings for health screenings and are satisfied with the services provided.^{3,9}

Research shows patients are receptive and willing to engage in free health screenings at community pharmacies, however,

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more information is needed regarding diabetes-related health screenings. Most large studies to date on diabetes have focused only on risk factors. Patient education and knowledge or patient perceptions on blood glucose screenings have not been fully explored. This study will close the gaps in the previous research by assessing the correlation of free health screenings on patient knowledge.

Objective

The objective of this study was to assess the correlation of free health screenings in community pharmacies on patient perceptions of free health screenings and diabetes knowledge. The null hypothesis was blood glucose screenings and patient education on diabetes do not increase patient knowledge of diabetes or improve patient perceptions of health screenings.

Methods

This pre-post observational study began in October 2013 and ended in March 2016. Approval from the IRB at Cedarville University and permission from the American Diabetes Association to utilize information were granted in the fall of 2014. Data collection began in March 2015 and ended in April 2015. Data was analyzed in the spring of 2016. Funding was provided through Cedarville University School of Pharmacy research grants. Those providing research grants did not oversee or participate in the study.

Setting

Four REM Corporation pharmacies located in southern Ohio were used for this study to administer testing. Consent was given by the CEO of REM Corporation pharmacies as well as the pharmacy manager of each location. Pharmacies included were: Fayette Pharmacy, Fairfield Pharmacy, Lukas Pharmacy, and Town Drug. The study was conducted at two pharmacies each month. Each pharmacy was visited for three hours weekly for one month, making four total visits at each site.

Study population

Participants were selected based on purposive sampling. Those included in the study had to be age 18 or above, not previously diagnosed with diabetes, and not recently tested for diabetes. Participants were excluded if they were pregnant or had a learning disability that could hinder survey responses.

Data collection

Consent was obtained by each participant before taking part in the study. General patient information was recorded on a patient data form, including: full name, date of birth, sex, address, phone number, email address, medical history, weight, and current medications. Surveys, education, and blood glucose screenings were administered at each pharmacy. The surveys were created by the researchers of the study. Pre-surveys were administered after patient consent was obtained. The pre-surveys assessed both patient opinions of health screenings and knowledge on diabetes. The survey

assessing patient perceptions used a 4-level agreement Likert-type, with questions shown in Figure 1. Knowledge on diabetes was assessed using ten questions on diabetes as shown in Figure 2. Questions were created from information given by the American Diabetes Association. All information used to educate patients on diabetes came from an identical patient education sheet at each site made from information gathered from the American Diabetes Association to limit variability and bias. Patients also had blood sugar screened upon baseline assessment. It was recorded whether or not the patient had eaten or drunk anything except water in the past 8 hours. Blood glucose was then tested and recorded on the patient data form. A fasting blood glucose level above 100 mg/dL was considered high. If they had eaten or drunk anything except water in the past 8 hours, random blood glucose levels above 140 mg/dL were regarded as high. Patients were referred to the emergency department immediately if blood glucose levels were above 400 mg/dL with two consecutive tests. Identical post-surveys were sent to participants one month after their baseline screening either through mail or email. Patients had two weeks to fill out post-surveys and return them in the pre-stamped envelopes provided. Incentives were offered to patients who participated in the study based on the discretion of each individual REM Corporation pharmacy.

Data Analysis

A significance value of 0.05 was used for analyses. Power was set at 0.8. The Cohen's *d* effect size was used to estimate the number of paired responses needed to reach power. A moderate difference between paired results was assumed, leading to a medium effect size assumption. Thirty-four paired responses were needed to reach power.

Descriptive statistics were assessed for the study population. The descriptive statistics focused on location, sex, history of cardiovascular issues, and family history of diabetes. A Wilcoxon signed-rank test was used to analyze paired patient perception surveys. Paired diabetes knowledge surveys were analyzed using a McNemar test. Total correct responses to diabetes knowledge surveys between pre- and post-assessments were analyzed using a paired *t*-test. Analyses were adjusted to exclude missing data. Statistical analyses were performed with the SPSS software version 23.0.

Results

Forty-six patients completed pre-surveys at the four pharmacies where research was conducted. However, one patient had to be excluded from data analysis since they had diabetes, resulting in a total of 45 participants being included. Twenty-six of the 45 responded to post-surveys either mailed or emailed to them a month later, giving a response rate of 57.8%. Only 22 of the 26 post-survey respondents had completed both the patient perceptions of free health screenings and diabetes knowledge surveys. A flowchart of the patients included and survey responses are shown in Figure 3.

Descriptive statistics of the original 45 participants expressed differences in gender, comorbidities, and family history of diabetes, as shown in Table 1. The majority were female (64.4%) and 71.7% of participants had diseases other than diabetes, such as: heart disease, high blood pressure, kidney disease, depression, and anxiety. Related to cardiovascular issues, 60% had a history of heart disease, high blood pressure, or stroke.

There were a total of 45 pre-surveys responses and 26 post-survey responses. The number of answers to each question varied due to some questions being skipped by various participants. The percentages given were based on 45 pre-survey and 26 post-survey participants and p-values were adjusted for missing pairs. A large majority of participants selected “agree” or “strongly agree” on both pre- and post-surveys, meaning opinions were mostly positive overall. However, there was some variation for questions 6 and 8 on the pre-surveys. Exact percentages of responses for pre-surveys and post-surveys are shown in Table 2 and Table 3, respectively. There were no statistically significant differences when comparing pre-survey and post-survey answers for each of the 8 questions. All p-values were greater than 0.05 and p-values for each question can be seen in Table 4.

There was a total of 45 respondents for the pre-surveys and a total of 22 for post-surveys. The percentages given were based on 45 pre-survey and 22 post-survey participants and p-values were adjusted for missing pairs. Results of the diabetes knowledge survey are shown in Table 5. Each question had a higher percentage of correct answers in post-survey than in pre-survey responses. However, there were only five questions that had statistically significant results between pre- and post-surveys. Questions 1, 6, and 8-10 had a significantly higher number of correct answers in post-survey results ($p=0.008$, 0.031 , 0.031 , 0.006 , and 0.021 , respectively). All other questions had p-values greater than 0.05. However, there was a statistically significant difference between total pre-knowledge and post-knowledge surveys with $p<0.001$.

Each patient who participated had blood glucose tested to measure if they had abnormally high or low blood sugar levels. None of the patients tested for abnormally high or low blood sugar.

Discussion

The goal of this study was to determine the correlation of free community health screenings on both patient perceptions of free health screenings and diabetes knowledge. The majority of respondents agreed or strongly agreed in both pre- and post-surveys that health screenings in community pharmacies are beneficial, they were comfortable participating in free health screenings in community pharmacies, they are more aware of their health due to health screenings, and they would recommend family and/or friends to attend health screenings.

However, a few respondents disagreed that community pharmacies are great locations for health screenings and that pharmacists are adequately qualified to administer screenings. Several of the participants also believe they are not more aware of their health due to health screenings. Due to these beliefs, they would not participate regularly in health screenings.

Results of pre- and post-survey comparison regarding patient perceptions showed little change in patient opinions of such services. This can primarily be explained by the relatively positive outlook toward free health screenings shown in the pre-surveys. With highly positive baseline opinions of free screenings there was little opportunity for a statistically significant difference to be shown between the pre- and post-surveys. This is encouraging for health professionals looking to participate in these types of activities in the future, as patients appeared receptive to participating.

Limitations

Data from this study must be interpreted with limitations being considered. One main limitation was the study not being adequately powered. Thirty-four paired responses were needed in order to reach power, but only 22 complete pre- and post-survey responses were received. Another limitation was there was no certain way to determine patients had not been diagnosed with diabetes or had recently been tested. This could have possibly skewed results by affecting the blood glucose testing and patient education. Recording the names of medications patients were taking helped reduce the risk of these threats to validity, since antidiabetic medications could easily be identified. There may also be an issue with lack of generalizability due to both the small sample size and small number of locations used in the study. Although the screenings were done in the pharmacies, there was also the issue of confidentiality. The screenings were done in an open area of the pharmacy and not in a private location. Providing coverings such as cubicles or screens may have helped put participants at ease and assure confidentiality. Studies have shown that participants are more likely to participate in screening or deliver health information to health care providers if there is respect and confidentiality.¹⁰

Improvements could be made in the future to help strengthen the study. Future research could use a broader range of locations in order to maximize generalizability. More time to collect data would also be beneficial for future studies in order to get a larger sample size for better results. Future research should focus on improving patient knowledge of disease states and the correlation of patient education on overall health outcomes.

Conclusion

This study demonstrates that patients are receptive to the idea of free health screenings in community pharmacies and see a

benefit of the services that could be offered. The research also showed that knowledge can be gained through administering education during health screenings. Overall, free health screenings in community pharmacies can help patients understand disease states and be more aware of their health.

Footnotes

^a FAQs.ORG. Health screening.

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Conflict of Interest: We declare no conflicts of interest or financial interests that the authors or members of their immediate families have in any product or service discussed in the manuscript, including grants (pending or received), employment, gifts, stock holdings or options, honoraria, consultancies, expert testimony, patents and royalties.

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