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The Effect of Pharmacist Intervention on Diabetes Screening Promotion and Education in a Geriatric Population

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Background

Type two diabetes mellitus is a chronic disease that is becoming more common in the United States. Since 1980, the number of cases of diabetes in the U.S. has more than tripled, from 5.6 million to 20.9 million.¹ The incidence of diabetes in the senior population is approximately 26.9% which translates to roughly 10.9 million people aged 65 or older with either diagnosed or undiagnosed diabetes.² By 2050 the number of elderly patients with diabetes is expected to reach epidemic proportions.³ Projections from 2000 estimate that the number of diagnosed diabetes cases will rise by 252% in women aged 65 to 74 and by 537% in men aged 75 and older.^{2,3} Current data also shows that up to 50% of the US population aged 65 and older has pre-diabetes (a hemoglobin A_{1c} of 5.7 – 6.4%).²

Age is not only an important risk factor for the development of diabetes; it is also a confounder of diagnosis and an indicator of increased risk of complications. Commonly, elderly patients will lack the typical signs and symptoms of hyperglycemia. Specifically, due to the aging process, polydipsia is often absent in these patients due to impaired thirst mechanisms and glucosuria is not present secondary to increased renal thresholds for glucose.^{4,5} These issues were a catalyst for the American Diabetes Association to recommend routine screening for diabetes in patients over the age of 45 every three years if they have never been diagnosed with prediabetes.⁶ Additionally, it is known that elderly persons with diabetes are at an increased risk for many complications from diabetes such as falls, functional disabilities, hypertension, cardiovascular disease, stroke, and premature death.^{7,8}

While there are many programs available that promote diabetes screening and education, it has been postulated that up to half of the elderly population with diabetes are not even aware that they have the disease.⁹ There is an apparent need for greater access and exposure to this population. Pharmacists have a long history of patient education as well as ample opportunity to reach the elderly population through

community engagement and partnerships. Community pharmacists are one of the most accessible health care providers and can make simple and significant contributions to increasing the awareness and use of free diabetes screening benefits. Additionally, partnerships with senior care groups provide another avenue for pharmacists to provide educational interventions to promote awareness of diabetes and screening.

The purpose of this study is to measure the effectiveness of a pharmacist-led educational intervention in three ways by: 1) assessing if elderly participants know they should participate in diabetes screening activities and the availability of a free screening benefit offered through Medicare; 2) determining the level of understanding on the part of an elderly population regarding diabetes, risk factors, signs and symptoms, and long term complications of the disease; and 3) measuring the willingness of this population to adopt lifestyle modifications based on perceived risk of the future development of diabetes.

Experimental Design and Methods

The community partner for this educational intervention was a local non-profit organization whose mission is to help older community members live independently and remain so as long as possible in their own homes¹⁰ The organization is part of a national alliance called the National Senior Corps Association. Similar groups can be found throughout the United States. Senior members within this organization meet monthly for lunch at a local church as a part of a volunteer program. The approximately 125 senior volunteers from this non-profit organization were selected for the study population and any willing volunteer present at the lunch meeting could participate in the study.

Each participant was given a numbered envelope containing two sheets of paper that were marked with a unique identification number. The first of these was a pre-presentation survey (Figure 1). The pre-survey was used to collect unidentifiable demographic information such as age, gender, weight, height and ethnicity. Additionally, the pre-survey was used to determine the participant's baseline knowledge level of diabetes.

Once the participants completed the pre-presentation survey, there was a short 25 minute educational intervention conducted by a pharmacist. This presentation included the definition and pathophysiology of the disease, risk factors,

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signs and symptoms, and diagnosis information. The presentation also covered management of the disease, long term complications, and information about a free Medicare covered screening benefit.

The specific screening benefit discussed in this study is the free Medicare diabetes screening benefit. The benefit offers up to two free diabetes screenings per year for any Medicare beneficiary over the age of 65 with one of the following risk factors: hypertension, family history of diabetes, obesity, history of gestational diabetes, hyperglycemia, or hyperlipidemia/hypertriglyceridemia. With the prevalence of chronic disease states in the elderly, a large proportion of seniors would qualify for this benefit.

After the pharmacist-led educational intervention, the participants completed the post-presentation survey form (Figure 2). The data from the post-survey was compared to the data from the pre-survey for each participant to determine the difference in diabetes education level after the presentation. All statistical analysis was completed with SAS statistical software program. Descriptive statistics were used to determine group demographics and improvements in awareness and future use of the free screening benefit. Improvements in diabetes knowledge were assessed through the use of descriptive statistics and the Wilcoxon Signed Ranks test.

Results

A total of 82 seniors participated in the surveys and pharmacist-led educational intervention. Participants' demographic information can be found in Table 3. The group consisted of a much larger number of women than men (87.7% vs. 7.3%) with an average of 1.48 risk factors for the development of diabetes.

Forty-three participants (52.4 %) were not previously aware of the screening benefit, and of these, 29 stated that they would speak with their physician about utilization of the benefit in the future. Of the 48 (58.5 %) participants without a diagnosis of pre-diabetes or diabetes, 35 were unaware of the screening benefit and 30 stated that they would speak with their physician about utilization of the benefit in the future.

Participants significantly improved their identification of risk factors for the development of diabetes with an average of 3.32 (\pm 2.150) identified before the intervention and an average of 4.38 (\pm 2.696) after the intervention (p -value \leq 0.001). There were significant improvements in participants' awareness of signs and symptoms of diabetes after the educational intervention, 4.04 (\pm 2.786) at baseline and 4.73 (\pm 2.770) post-intervention (p -value = 0.001).

Additionally, there were significant improvements in participants' identification of the long-term complications associated with diabetes with 3.59 (\pm 2.398) identified before the intervention and 4.09 (\pm 2.462) identified after the intervention (p -value = 0.001).

A total of 25 (30.5 %) participants were not aware of their personal risk for the development of diabetes before the educational intervention. There were 43 (52.4 %) participants who agreed they would be willing to adopt healthier lifestyle practices accounting for their personal risk for the development of diabetes.

Discussion

Traditionally, clinic and hospital settings have been the main locations for diabetes education in the elderly. Most of these programs, and most of the research surrounding diabetes education in the elderly, has focused on the education of diabetes self-management.¹¹⁻¹⁷ These types of interventions are beneficial to elderly patients aware of and living with diabetes, however, as seen in this analysis, slightly over 30% of typical community-dwelling older adults are not aware of their risk for diabetes. This data indicates that there is a large population of seniors in the community that may not be getting the appropriate screening for diabetes or gain benefit from the current model of education.

Pharmacists are perfectly positioned to bridge this gap with community-based educational interventions. These interventions can be simple and meaningful and occur outside the hospital or clinic setting. Community pharmacists are highly accessible health care professionals. They have access to medication records and can easily identify medications that indicate increased risk for diabetes (anti-hypertensive agents, lipid-lowering agents, etc). When dispensing medications to these "at risk" senior patients, pharmacists can have a quick conversation about diabetes risk and screening. In addition to consulting patients with un-diagnosed diabetes, pharmacists can also speak with those already diagnosed about the screening benefit to monitor and control the disease. Community pharmacists often help senior patients select their Medicare part D plan. An additional piece of this conversation could include discussing the free diabetes screening for Medicare beneficiaries. Pharmacists fill prescriptions for many long-term care facilities, assisted living homes and independent living senior communities. These populations could easily be targeted for group pharmacist-led educational interventions as there is an existing relationship in place. Finally, as modeled by our study, pharmacists can partner with a variety of community senior organizations to provide educational interventions. This type of activity could be performed in many different settings such as community

centers, churches and retirement communities. In addition to providing group educational interventions or simply having a conversation with a patient, there are free promotional materials such as risk assessment checklists, senior brochures, and church bulletins that can be ordered through the Medicare Diabetes Screening Project. These materials are available in both English and Spanish and can easily be distributed to target populations by pharmacists through the above stated avenues.¹⁸

Our analysis suggests that these types of pharmacist-led educational interventions can increase the awareness of free screening benefits and lead to significant improvements in senior's ability to identify risk factors, signs and symptoms, and long-term complications of diabetes. Additionally, pharmacist-led educational interventions may increase the willingness of the senior population to adopt lifestyle modifications based on perceived risk of the future development of diabetes.

While the results of the surveys did show significant improvements in knowledge levels, there were several limitations. The disparity between the number of possible surveys completed and the number included in the results was due to participants who completed the pre-survey, but did not complete the post-survey. These data points were omitted and only matched data was analyzed. The response rate for questions that measured improvements in knowledge were as follows: 84.7% for risk factors, 87.5% for signs and symptoms, and 87% for long-term complications.

The survey design assessed knowledge of the categories through 'circle all that apply' questions. Within each bank of options, one incorrect option was included. Many of the participants circled all of the options for each category, including the incorrect answer on both the pre- and post-survey. The data was tabulated for each survey as a maximum correct score, as all the correct options were identified. This could result in data that suggests a falsely high level of knowledge on both the pre- and post-surveys. However, some of the false elevation was accounted for as the participants who answered in this way tended to do it on both the pre- and post-surveys, which would lead to no improvements in their scores. For risk factors, nine participants circled all answers on the pre-survey and 78% did the same on the post-survey. For signs and symptoms, 25 participants circled all answers on the pre-survey and 72% did the same on the post-survey. For long term complications, one participant circled all the answers on the pre-survey but did not on the post-survey.

Another limitation of the design of this study was that the long-term retention of the knowledge was not measured.

Having the participants complete the post-survey at a later date, rather than directly after the presentation, could have highlighted better retention of the material. However, this option was not feasible for the particular cohort being studied.

Conclusions

This study shows that there are many seniors in the community that are not aware of their risk for developing diabetes, and are not taking advantage of their Medicare benefit for free screening. Pharmacists are in the ideal position to reach this population and provide an intervention. Pharmacist-led educational interventions and discussions can provide simple, significant contributions to the knowledge of diabetes risk and awareness of free screening benefits to the elderly living in the community.

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Figure 1: Pre-Survey Used To Assess Participants Baseline Knowledge

Gender: _____ Male _____ Female

Age: _____ Height: ___ ft ___ in Weight: _____ pounds Ethnicity: _____

Have you previously been diagnosed with pre-diabetes or diabetes? _____ Yes _____ No

How would you define diabetes?

Which of the following are risk factors for the development of diabetes and pre-diabetes? (Circle all that apply)

- Overweight/Obesity
- Family History of Diabetes
- American Indian, African American, Hispanic/Latino or Asian American background
- Female gender
- Inactive Lifestyle
- Older than 45 years of age
- Giving birth to a baby that weighed over 9 pounds
- A history of Polycystic Ovarian Syndrome (PCOS)

Would you adopt healthier lifestyle choices if you knew you were at high risk for the development of diabetes? Healthier lifestyle choices include, but are not limited to, eating whole grains, eating a diet high in fiber, getting purposeful exercise most days of the week, not smoking, watching sodium intake in diet, and consuming alcohol in small amounts. _____ Yes _____ No

Which of the following are signs and symptom of diabetes? (Circle all that apply)

- Frequent urination
- Extreme thirst/hunger
- Extreme fatigue and irritability
- Frequent infections
- Constipation
- Blurred vision
- Cuts/bruises that are slow to heal
- Tingling/numbness in hands/feet

Which of the following are long term complications of diabetes? (Circle all that apply)

- Heart Disease
- Nerve Damage (neuropathy)
- Eye Damage (including blindness)
- Hearing loss
- Stroke
- Kidney Damage (nephropathy)
- Foot complications that can lead to amputation

Do you have any of the following?

Inactive lifestyle: _____

Unhealthy eating habits: _____

Family history of Type 2 Diabetes: _____

Personal history of high blood pressure: _____

Personal history of high cholesterol: _____

Personal history of diabetes during pregnancy: _____

Personal history of polycystic ovarian syndrome: _____

Figure 2: Post-Survey Used to Assess Participants Improvements in Knowledge

Were you previously aware of the free diabetes screening provided through the Medicare Health Benefit?

Yes No

How would you define diabetes?

Which of the following are risk factors for the development of diabetes and pre-diabetes? (Circle all that apply)

- Overweight/Obesity
- Family History of Diabetes
- American Indian, African American, Hispanic/Latino or Asian American background
- Female gender
- Inactive Lifestyle
- Older than 45 years of age
- Giving birth to a baby that weighed over 9 pounds
- A history of Polycystic Ovarian Syndrome (PCOS)

Did you know what your risk of diabetes was before this presentation? Yes No

Do you think that you will use the free diabetes screening benefit at your physician's office in the future?

Yes No

Which of the following are signs and symptom of diabetes? (Circle all that apply)

- Frequent urination
- Extreme thirst/hunger
- Extreme fatigue and irritability
- Frequent infections
- Constipation
- Blurred vision
- Cuts/bruises that are slow to heal
- Tingling/numbness in hands/feet

Which of the following are long term complications of diabetes are? (Circle all that apply)

- Heart Disease
- Nerve Damage (neuropathy)
- Eye Damage (including blindness)
- Hearing loss
- Stroke
- Kidney Damage (nephropathy)
- Foot complications that can lead to amputation

Table 3: Group Demographics

Group Demographics of Participants for Diabetes Educational Intervention	
Gender	Females 72 (87.8 %); Males 6 (7.3%)
Mean Age and Range	73 years (55 – 84)
Mean Body Mass Index and Range	30.9 kg/m ² (19.9 – 45.2)
Previously Diagnosed with Pre-diabetes or Diabetes	28 (34.1 %)
Mean Risk Factors Present for the Development of Diabetes	1.48 (0-5)
Race	African American: 22 (27.5%) Caucasian: 17 (21.3%) Hispanic: 1 (1.25%) No response: 40 (50%)