



The Impact of Food Insecurity Screenings and Community Food Resource Referrals for Patients with Type 2 Diabetes

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Abstract:

ABSTRACT

Approximately 50 million people in the United States are food insecure, which makes food insecurity (FI) one of the country's most prevalent health issues. Food insecurity has been shown to be a contributing factor to uncontrolled Type 2 Diabetes (T2D), which affects about 34.1 million adults in the United States. The purpose of this study was to evaluate the effectiveness of integration of an electronic social determinants of health screening and community referral process for adult patients with T2D and FI. The aim was to determine if Hemoglobin A1c (HbA1c) levels are reduced in adult patients with T2D by improved access to food. The study site was a Federally Qualified Health Center that serves a large population of Hispanic patients. All adult patients over the age of 18 years who had a diagnosis of T2D and presented to the clinic for a routine office visit were screened for FI using the *Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences* risk assessment tool. Patients who screened positive for FI were referred to community food resources via the Community Resource Network. At the end of the 12-week study period, data regarding utilization of resources and HbA1c levels were obtained. A total of 42 patients with T2D identified as having FI participated in the study, and all of them (100%) were referred to a community food resource. Of those 42 patients, 40 (95%) completed the follow-up questionnaire, and 39 (97%) of the respondents reported utilizing the food resources. There was a statistically significant difference in the pre- and post-intervention HbA1c levels ($M = 0.45$, $SD = 0.68$) ($t_{(41)} = 4.32$, $p <$

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Keywords:

Type 2 Diabetes, Food Insecurity, Social Determinants of Health, Community Food Resource Referral

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ABSTRACT

Approximately 50 million people in the United States are food insecure, which makes food insecurity (FI) one of the country's most prevalent health issues. Food insecurity has been shown to be a contributing factor to uncontrolled Type 2 Diabetes (T2D), which affects about 34.1 million adults in the United States. The purpose of this study was to evaluate the effectiveness of integration of an electronic social determinants of health screening and community referral process for adult patients with T2D and FI. The aim was to determine if Hemoglobin A1c (HbA1c) levels are reduced in adult patients with T2D by improved access to food. The study site was a Federally Qualified Health Center that serves a large population of Hispanic patients. All adult patients over the age of 18 years who had a diagnosis of T2D and presented to the clinic for a routine office visit were screened for FI using the *Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences* risk assessment tool. Patients who screened positive for FI were referred to community food resources via the Community Resource Network. At the end of the 12-week study period, data regarding utilization of resources and HbA1c levels were obtained. A total of 42 patients with T2D identified as having FI participated in the study, and all of them (100%) were referred to a community food resource. Of those 42 patients, 40 (95%) completed the follow-up questionnaire, and 39 (97%) of the respondents reported utilizing the food resources. There was a statistically significant difference in the pre- and post-intervention HbA1c levels ($M = 0.45$, $SD = 0.68$) ($t_{(41)} = 4.32$, $p < 0.001$, 95% CI = 0.24 – 0.66).

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INTRODUCTION

The United States (U.S.) Department of Agriculture (USDA, 2019) defines food insecurity (FI) as not being able to obtain adequate food for the household because of insufficient money or

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other resources. Food insecurity affected approximately 11.1% of U.S. families in 2018 (USDA, 2019). The prevalence of FI in 2018 was highest among American Indians or Alaska Natives (29.8%), followed by Blacks or African Americans (21.2%) and Hispanics or Latinos (16.2%) (United States Department of Health and Human Services (HHS), Healthy People 2020, 2020). One of the Healthy People 2030 objectives for the social determinants of health (SDH) is to decrease FI to 6% in families across the United States (HHS, Healthy People 2030, 2020).

Approximately 34.1 million U.S. adults aged 18 and above suffer from diabetes, which is 13.0% of the country's adult population (National Diabetes Statistics Report 2020, 2020). Latinos from agricultural communities, in particular, are at increased risk for diabetes and suffer from high rates of FI (Moreno et al., 2015). The American Diabetes Association (ADA) stresses that healthcare professionals should strive to refer all patients with diabetes and FI to appropriate resources to improve health outcomes (ADA, 2016).

Food insecurity is a contributing factor to poor health outcomes (De Marchis et al., 2019; Gunderson & Ziliak, 2015; Smith et al., 2016) and screening takes little time, but this SDH is not addressed on a routine basis in clinical settings (Smith et al., 2016). Even when clinics do screen for FI, not much data is available on how effective community food referrals are for the patients who are referred (Marpadga et al., 2019).

Food Insecurity and Diabetes

Research has shown a link between FI and diabetes (Bermúdez-Millán et al., 2019; Gunderson & Ziliak, 2015; Heerman et al., 2016; Moreno et al., 2015; Shalowitz et al., 2017). Three of the studies discussed here either focus on or report a high percentage of Hispanic or Latino populations with diabetes and FI. For example, Moreno et al. (2015) did a cross-sectional survey consisting of 250 Latino adults with diabetes from a large migrant healthcare system in an agricultural community to examine diabetes and FI. Results of the study revealed that 52% of the patients were food insecure. The patients with FI had a higher probability of having uncontrolled HbA1c levels compared to their food secure counterparts. In addition, cost-related underuse of diabetes medication and lower involvement in foot care and dilated eye exams, when compared to individuals with food security, was reported (Moreno et al., 2015).

Similar results were reported by Heerman et al. (2016) in a study consisting of 401 low-income patients with Type 2 Diabetes (T2D) from safety net primary care clinics, although only 95 (24%) of the sample was classified as Hispanic. Results of this study showed that there was a high prevalence of FI (73%) among the participants. Results also showed that food insecurity was significantly associated with poor self-care behaviors including decreased adherence to recommended diet and calorie restriction, decreased physical activity, a higher rate of medication non-compliance, and worse blood sugar control (Heerman et al., 2016).

Adding to this body of knowledge, Shalowitz et al. (2017) conducted a study on FI and adults with T2D from a multi-site safety net primary care clinic, specifically a Federally Qualified Health Center (FQHC). Of the enrolled 336 patients, 187 (56%) were food insecure, and more than half of them (60%) were Hispanic. Results revealed that the patients with lower food security, as compared to those with higher food security, had a greater likelihood of having more elevated baseline HbA1c levels and be on insulin. In addition, worse glucose control was seen 24 months later (Shalowitz et al., 2017).

In a more recent study, Bermúdez-Millán et al. (2019) used a cross-sectional design to examine the relationship between household FI and inflammation and stress biomarkers on insulin

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resistance among 121 low-income Latinos with T2D. These researchers found that, when compared to food secure individuals, the food insecure individuals had significantly higher high-sensitivity C-reactive protein, total cholesterol, glucose, cortisol, insulin, and insulin resistance levels. Results of matching multiple mediations showed that household FI had a significant direct effect on cortisol and high-sensitivity C-reactive protein levels. Results also revealed a direct effect of household FI, high-sensitivity C-reactive protein, and cortisol on insulin resistance (Bermúdez-Millán et al., 2019).

Food Resource Referrals for Food Insecurity

Recent studies have focused on food resource referrals to assist patients with FI. Two of the studies discussed here were completed at clinics where low income Hispanic or Latino patients made up a large percentage of the population. For example, Smith et al. (2016) did a cross-sectional study on implementation of a FI screening and referral program in three student-run free clinics. Of the 430 patients who were screened for FI, 420 (97.7%) were Latino. Results of the study showed that there was a high prevalence of FI needs in patients with diabetes (82.7%) compared to those who did not have diabetes (65.7%). Results also showed that after one year of initiating the program, 77% of the participants were successfully assisted with food needs (Smith et al., 2016).

Nguyen et al. (2016) conducted a pilot study in a university-related FQHC to assist elderly, low-income Hispanic patients find and access community resources to improve diabetes self-management. Food assistance was identified as the second most common need in the study population. At the 3-month follow up, there were no significant differences in diabetes self-management from baseline. However, 50% of the participants had contacted the agencies in which they were referred (Nguyen et al., 2016).

Marpadga et al. (2019) conducted a qualitative study that examined challenges and successes with FI resource referrals at a diabetes clinic connected to a safety net hospital. Results of the study showed that 60% of the participants had FI. Results also showed that if FI screening programs are to be effective, clinic personnel must assist patients with the enrollment process as well as distribute food resource information to them (Marpadga et al., 2019).

In addition, De Marchis et al. (2019) conducted a systemic review of 23 peer-studies to evaluate the effects of healthcare-based interventions on reducing FI. Process outcomes were included in all of studies that were food resource referral based (n = 12, 52%). Patient referral rates ranged from 30% to 75% after implementation of the intervention. In two randomized control studies that were included in the review, healthcare providers were reported to be more apt to offer food referrals to patients who were screened for social needs compared with patients who were not screened (De Marchis et al., 2019).

Barriers and Facilitators to Community Referral Utilization

Barriers and facilitators to the utilization of community referrals for FI have been identified. For example, Marpadga et al. (2019) reported that when participants were contacted by phone 30 days after referral, most of them had not successfully used the food resources. Participants who did not use the food resources reported the barriers as being inaccessibility (e.g., location, long wait time, and hours of operation), competing priorities (e.g., housing and employment), forgetfulness, perceived stability of food support, stigma, inability to cook, and perceived ineligibility. However, accessibility (e.g., delivery options, no wait in line, and location)

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and assistance with enrollment to the referred resources were listed as facilitators to use of the food resources (Marpadga et al., 2019).

In a longitudinal, repeated measure quasi-experimental study, Cohen et al. (2017) evaluated the effect that a brief verbal waiting room-based healthy food education initiative had on low-income patient consumption of produce and utilization of a statewide healthy food incentive called the *Double Up Food Bucks* (DUFB) program. Out of the 177 patients who enrolled in the study, 127 (72%) completed it. The study revealed a significant increase in the use of the DUFB program from baseline (AOR = 19.2, 95% CI = 10.3, 35.5, $p < 0.001$), with 69% of the participants using the program at least once and 34% using it three or more times. Results also revealed that the intervention was associated with statistically and clinically significant increases in the consumption of produce (Cohen et al., 2017). Cohen et al. (2019) conducted a follow-up study to examine barriers and facilitators to the DUFB program use. Results showed that insufficient market locations, limited hours of operation, misunderstanding of program use, and lack of transportation were barriers to referral utilization. However, first-time participants reported that the intervention was the main contributing factor in their success of using the DUFB program (Cohen et al., 2019).

Electronic Referrals for Food Insecurity

Research shows that integration of a screening tool into the Electronic Health Record (EHR) is associated with a higher number of referrals (Martel, Klein, Hager, & Cutts, 2018; Smith et al., 2016) and can help healthcare providers deliver better care to patients with diabetes and FI (Thomas, Fitzpatrick, Sidani, & Gucciardi et al., 2018). For example, Martel et al. (2018) conducted a retrospective, observational study to evaluate the effects of integrating an EHR order for food resource referrals in an urban county hospital after it partnered with a local food bank. The study revealed that food resource referrals for patients identified with FI increased from 1,003 to 1,519 one year after implementation. In addition, the food bank successfully contacted 1,129 (74%) of the patients, and 954 (63%) of them reported receiving food aid (Martel et al., 2018). Smith et al. (2016) reported that referral to appropriate community resources increases when a FI screening tool is incorporated into a clinic's EHR and made standard of practice.

Further, Thomas et al. (2018) developed and incorporated a FI screening initiative for adults with T2D into the EHR of a diabetes care clinic. Results of the study revealed that FI screenings help healthcare providers feel better prepared to assist food insecure adult patients with their diabetes self-care management. One healthcare provider who participated in the study reported that being able to access the screening questions in the EHR provides for continuity of care because the patients do not always see the same practitioner (Thomas et al., 2018).

Needs Assessment

The literature reflects a growing body of knowledge that there is an association between FI and T2D. The literature also supports implementation of a screening and community food referral program for FI in patients with T2D, which could lead to improved HbA1c levels. In addition, the literature reinforces the need to address barriers to food resource utilization to improve patient outcomes, including those related to T2D.

The study site serves a large population of Hispanic patients. About 80% of the patients are uninsured. Patients pay out of pocket based on a discounted or sliding fee schedule rate. Most of the patients are from low-income immigrant families. Many of them do not qualify for Medicaid services and have difficulty affording medications and follow-up care. Approximately 60% to 70%

of the adult patients have T2D or prediabetes. Until January 2, 2020, the clinic did not screen patients for FI and, thus, did not refer them to a community resource for food. Factors such as these (e.g., poverty, uninsured status, a high chronic disease prevalence, and lack of resources) contribute to poor patient outcomes.

The clinic had been using the Community Referral Network (CRN) platform to refer patients to medical specialists, but it had not been using it to refer patients with FI because screening for social needs was not being done. On January 2, 2020 (prior to the study), the clinic integrated an electronic SDH tool into its EHR to screen for FI and began using the CRN to refer patients with FI to community food resources as a strategy to improve patient outcomes. The clinic selected the electronic *PRAPARE: Protocol for Responding to and Assessing Patients' Assets, Risks, and Experience* tool because it contains national core measures for community priorities. Thus, the tool would allow the clinic to identify and address a variety of patients' social health needs. It was not known at that time if integration of the screening tool and referral process would be effective in improving patient outcomes at the clinic.

Purpose

The purpose of this study was to evaluate the effectiveness of integration of an electronic SDH screening and community referral process for adult patients with T2D and FI. The aim was to determine if HbA1c levels were reduced in adult patients with T2D by improved access to food. For purposes of this study, improved access to food was defined as participant utilization of the food resource at least once during a 12-week time period. The objectives were to (a) evaluate the effectiveness of the screening and referral process (e.g., number of adult patients with T2D identified as having FI, number of community resource referrals made for FI, number of patients with FI who followed up with the community resource in which they were referred, and pre- and post-intervention HbA1c levels) and (b) identify patients' utilization and barriers of the community food resource.

METHODS

Design, Study Site, and Sample

A prospective design was used to evaluate the effectiveness of integration of an electronic SDH screening and community referral process after a 12-week time period. This study was conducted at a single-site FQHC in Southern California. All adult patients over the age of 18 years with a diagnosis of T2D and FI were recruited for participation during the month of February 2020. Patients under the age of 18 and those without a diagnosis of T2D were excluded. Data were collected during the months of March through May 2020. The University of Alabama Institutional Review Board approved the study.

Electronic Tools Integrated at the Study Site and Used for Data Collection

A. PRAPARE: Protocol for Responding to and Assessing Patients' Assets, Risks, and Experience:

The *PRAPARE: Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences* original paper version is a 21-item questionnaire that collects data on SDH needs (National Association of Community Health Centers [(NACHC), 2019a). Healthcare organizations can now collect the data electronically by using the EHR template. The tool uses a preventative medical approach to address socioeconomic factors that impact health behaviors, access, health outcomes, and healthcare cost. Several analyses of the tool showed good to excellent

validity. The greatest lower bound was rated as excellent with a score of 0.935, and the Cronbach's Alpha was rated as good with a score of 0.86 (NACHC, 2019b). The tool is evidence based and aligns with national initiatives, like Healthy People 2030, to address SDH in communities.

B. Community Referral Network:

The Community Referral Network (CRN) is a web-based software platform that represents a collaboration of agencies working together to facilitate and provide medical, dental, and social service referrals for safety net patients in Southern California (Community Referral Network, n. d.). Healthcare organizations may use the platform free of charge to connect patients to needed community services. When a patient is referred electronically via the CRN, the appropriate agency close in proximity contacts the patient within one week regarding the needed service.

Intervention

All adult patients over the age of 18 years who had a diagnosis of T2D and presented to the clinic for a routine office visit were screened for FI using the PRAPARE tool. Patients who screened positive for FI were referred to a community food resource, such as a food bank or food pantry, electronically via the CRN application by the health care provider. Clinic staff followed up with the patients via phone within two weeks of the referral to confirm they had been contacted by the community food resource in which they were referred. These processes were implemented as the standard of care in January 2020. Food insecurity was determined by the patients' selection of "Food" to the question as shown in Table 1.

Table 1. PRAPARE Food Insecurity Screening Question

In the past year, have you or any family members you live with been *unable* to get any of the following when it was *really needed*? Check all that apply.

Food←

Clothing

Utilities

Childcare

Medicine or any healthcare (medical, dental, mental health or vision)

Phone

Other (please write in notes)

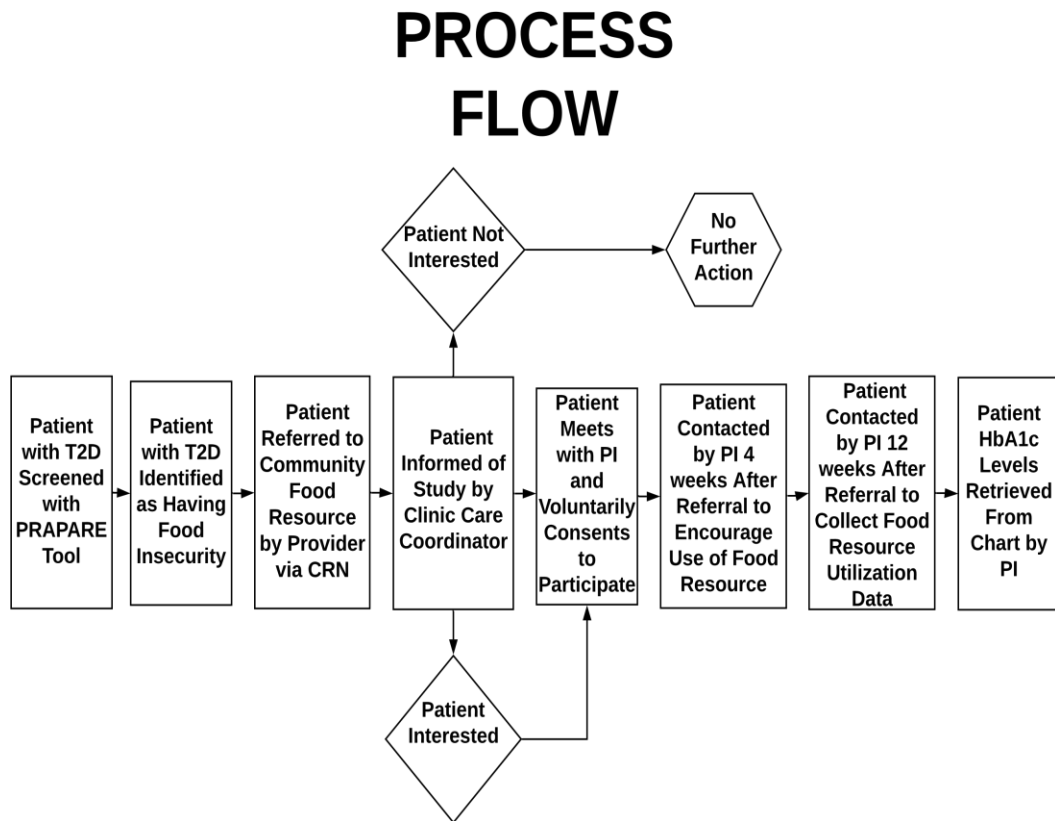
I do not have problems meeting my needs

I choose not to answer this question

During the month of February 2020, on the same day of the patients' office visits, the care coordinator met briefly with the patients with T2D who screened positive for FI to let them know about the study (e.g., to evaluate effectiveness of the electronic SDH screening and community resource referral process that had recently been implemented by the clinic). The patients who expressed a potential interest were asked for permission to share their contact information with the principal investigator (PI). The care coordinator generated a list of interested patients for the PI on a weekly basis. The PI called the patients on the list to share additional study information and arranged to meet with them within one week after their office visit if they were still interested. During this meeting, the PI reviewed the informed consent with them. Patients who voluntarily agreed to participate in the study signed the informed consent form at that time. The PI contacted

the patients via phone 4 weeks after enrollment to encourage use of the food resource. Figure 1 depicts the study processes.

Figure 1. Study Process Flow Diagram



Note. PRAPARE = Protocol for Responding to and Assessing Patients' Assets, Risks, and Experience; T2D = Type 2 Diabetes; CRN = Community Referral Network; PI = Principal Investigator; HbA1c = Hemoglobin A1c

Data Sources

Several data sources were used in this study. The number of adult patients with T2D identified as having FI was obtained from a report generated by the electronic PRAPARE tool. The number of food resource referrals was obtained from a report generated by the CRN application. The pre- and post-intervention HbA1c levels and patient demographic data were obtained from the EHR. Additional quantitative and qualitative data were obtained via phone from the patients.

Data Collection

The data were collected by the PI and included (a) the number of adult patients with T2D identified as having FI, (b) the number of community resource referrals made for FI, (c) the number of patients with FI who followed up with the community resource in which they were referred, and (d) pre- and post-intervention HbA1c levels. Demographic data (age, gender, and race) was also

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collected. The PI contacted the patients via phone 12 weeks after enrollment to determine utilization of the community food resource and assess for barriers. The questions contained in the *Community Food Resource Utilization Questionnaire*, which was created by the PI, are displayed in Table 2. Data were tracked by the PI on a paper data collection sheet that was stored in a locked cabinet inside a locked room in the study site to ensure confidentiality.

Table 2. Community Food Resource Utilization Questions

1. Did you use the community food resource in which you were referred? (Yes/No) If yes, proceed with questions 2 through 4. If no, skip to question 5.
2. How many times did you use the community food resource?
3. If you did not return to the community food resource after your initial visit, what was the reason?
4. Were you satisfied with the services provided by the community food resource? (Yes/No)
5. What was the reason you did not use the community food resource?

Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 25 was used to analyze the pre-/post-intervention data at the end of the 12-week time period. Descriptive statistics were used to provide the demographic characteristics of study participants. A paired t-test was used to calculate the differences in the pre- and post-intervention HbA1c levels. The P-value of $< .05$ was used to determine statistical significance. The number of times that the patients used the community food resource was calculated using the information reported on the *Community Food Resource Utilization Questionnaire*.

RESULTS

Demographics of Study Participants

Out of 67 patients with T2D, 51 (76%) screened positive for FI. Of those 51 patients who screened positive for FI, 42 of them consented to participate in the study. The mean age of participants was 55.8 years (SD = ± 12.1), with ages ranging from 38 to 90 years. Most of the participants were in the following three age groups: above 65 years (21.4%, $n = 9$), between ages 60 to 64 (19%, $n = 8$), and 40 to 44 years (19%, $n = 8$). More than half (61.9%, $n = 26$) of the participants were female, and the majority (90.5%, $n = 38$) of them were Hispanic (see Table 3).

Table 3. Demographics of Study Participants (N = 42)

Characteristics	Number	Percent (%)
Age (yr) ^a 55.8 (±12.1)		
Age Category		
35-39	3	7.1
40-44	8	19.0
45-49	4	9.5
50-54	4	9.5
55-59	6	14.3
60-64	8	19.0
65+	9	21.4
Sex		
Male	16	38.1
Female	26	61.9
Race		
Black or African American	3	7.1
Hispanic	38	90.5
Pacific Islander	1	2.4

Note. ^aExpressed as mean ± SD

Access to and Utilization of Community Food Resource

Of the 42 participants, 40 (95%) responded to the 12-week follow-up questionnaire. Table 4 shows the respondent utilization of the community food resource. Of the 40 respondents who completed the follow-up questionnaire, almost all of them (97.5%, n =39) used the resource. The majority (80%) of the respondents used the resource from 1 to 15 times. All the respondents who utilized the resource were satisfied with the services provided. The one respondent who did not use the resource reported the reason as, “I got a second job, no time.”

Table 4. Respondent Utilization of Community Food Resource

Characteristics	Number	Percent
Respondent used the referred community food resource		
.		
Yes	39	97.5
No	1	2.5
The number of times respondent used the community food resource		
+		
1-5	11	28.2
6-10	9	23.1
11-15	11	28.2
16 – 20	2	5.1
> 21	6	15.4
Respondents satisfied with services provided at the community food resource		
Yes	39	100
No	0	0
Barriers to community food resource use		
Got a second job, no time	1	100

Effects of the Community Food Resource on the Pre- and Post-HbA1c Levels

Results from the pre- and post-intervention HbA1c levels in the 12-week study period revealed that the mean pre-intervention HbA1c level was 10.03 (SD = ± 1.42), and the mean post-intervention HbA1c level was 9.58 (SD = ± 1.39). As shown in Table 5, results also revealed that there was a statistically significant difference in the pre- and post-intervention HbA1c levels ($M = 0.45$, $SD = 0.68$) ($t_{(41)} = 4.32$, $p < 0.001$, 95% CI = 0.24 - 0.66).

Table 5. Pre- and Post-Intervention HbA1c Paired Samples Test

	Mean	SD	SE	95% CI		t	DF	Sig.
			Mean	Lower	Upper			
Pair: Pre HbA1c								
and Post HbA1c	.45	.68	.10	.24	.66	4.315	41	<.001

Note. CI = Confidence Interval; DF = Degrees of Freedom; SD = Standard Deviation; SE = Standard Error; sig = Significance; t = t Statistic

DISCUSSION

Studies have shown that a high prevalence of FI exists among patients with diabetes (Heerman et al., 2015; Marpadga et al., 2019; Moreno, et al., 2015; Nguyen et al., 2016; Shalowitz et al., 2017; Smith et al., 2016). The current study revealed that 76% (51/67) of adult patients with T2D were food insecure, which aligns with the findings of these studies. Studies have also shown worse diabetes control in patients with FI as compared to those who are food secure (Bermúdez-Millán et al., 2019; Heerman et al., 2016; Moreno et al., 2015; Shalowitz et al., 2017). Implementation of a FI screening and referral program has been shown to be successful in assisting low-income patients with diabetes who have food needs (Smith et al., 2016).

Results of this study suggest that improved access to food was associated with improved HbA1c levels in low-income patients with T2D and FI. Integration of the electronic SDH screening and community referral process demonstrated positive results. Specifically, 100% of the patients with T2D were screened for FI, and 100% of the patients with T2D identified as having FI were referred to a community food resource during the 12-week study period. Almost all the patients (97.5%, n = 39) used the resource, and most of them used it more than once. Moreover, there was a statistically significant reduction in the mean HbA1c level from baseline.

It is likely that integration of the referral process into the EHR at the study site contributed to the 100% referral rate. This likelihood is supported by findings from other studies such as those by Martel et al. (2018) and Smith et al. (2016). The electronic referral process reduced the likelihood of misplaced paperwork, was cost-effective, and saved time for both the patient and the healthcare providers. The healthcare providers were able to refer the patients to a community food resource by simply clicking the referral button during their routine office visit. Thus, the patients did not have to wait to be contacted or return to the clinic at a later date/time for the referral.

Findings from the *Community Food Resource Utilization Questionnaire* revealed that all (100%) of the patients who used the food resource returned to the same community agency in which they were referred after their initial visit. The patients were referred to an agency in close proximity to their homes or places of work. This factor may have decreased potential transportation and time issues for the patients thereby increasing the likelihood that they would return. Given the positive outcomes revealed in this study, the clinic decided to continue with the processes currently in place.

Limitations

This study has several limitations. First, a small convenience sample of patients with T2D who presented to the clinic for a routine office visit over a 4-week time period was used. Recruiting patients for a longer time period may have yielded a larger sample size. Second, participants were followed for only a 12-week time period. Following participants over time may have yielded different results. Third, FI was determined by patients' selection of 'food' to a single question in the PRAPARE tool. Use of a more robust screening tool to measure FI may have led to identification of an increased number of food insecure individuals. Last, the study took place at a single site, and most of the participants were Hispanic. The lack of geographic and racial/ethnic diversity would decrease generalizability of the results.

CONCLUSION

Food insecurity is one of the most prominent health issues facing the nation today, and it has been shown to be a contributing factor to uncontrolled diabetes. Many low-income patients, particularly those of a Hispanic or Latino descent, are susceptible to uncontrolled diabetes and FI. This problem was addressed at the current study site by incorporating an electronic SDH screening tool and community referral process as the standard of care to improve access to food for patients with T2D and FI. Federally Qualified Health Centers and other healthcare agencies across the country that serve low-income patient populations should consider implementing routine FI screenings and food resource referral programs to improve HbA1c levels in patients with diabetes. Additional studies encompassing larger, more diverse populations are recommended to better understand the long-term effects of FI screenings and food resource referrals on patient outcomes.

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