Journal of Diabetes and Metabolism

Kapella-Mshigeni et al., J Diabetes Metab 2015, 6:11
DOI: 10.4172/2155-6156.1000622

Research Article

Open Access

Evidence Based Smoking Cessation Intervention Methods for Smokers with Diabetes in Nevada

Salome Kapella-Mshigeni[1]*, Eunice C Kimunai[2], Tam P Villar[1] and Marilyn K Mbi Feh[1]

[1]*Walden University, Minneapolis, MN 55401, USA*
[2]*Global Health Service Partnership Volunteer, Tanzania*

Abstract

Objective: Smoking and diabetes are two epidemics that could be prevented; yet, smokers with diabetes continue to smoke despite of its negative health consequences. The prevalence rate of smoking (22.2%) and that of diabetes (8.5%) in Nevada is slightly higher than the national average (20.6%) U.S smoking rate and (8.3%) US diabetes rate. The purpose of this study is to identify the most effective smoking cessation methods for smokers with diabetes and find their association with quitting outcomes.

Methods: This quantitative study involved secondary data from the State of Nevada Quitline (N= 720). Participants were smokers residing in Nevada, ages 18 years+, men and women, English and/or Spanish speakers, who received services from the Quitline.

Results: Descriptive statistics, logistic regression, and a test of two proportions were conducted. Sixty one percent of the participants received counseling only compared to 38.9% who received counseling and medication. The majority of the participants had not quit (67.5%) compared to those who had quit (32.5%). Age was a significant predictor, *p*=.038 indicating that for each increase of 1 year of age for those with diabetes, the likelihood of quitting increased 1.03 times. Also, Hispanic participants with diabetes was also a significant predictor, *p*=.002, indicating that Hispanic participants with diabetes were 7.50 times more likely to quit smoking compared to Caucasian.

Conclusion: Smokers with diabetes need to be provided with sufficient information pertaining to different smoking cessation options to reduce existing disparities and the fear of medical interference with their diabetes status. Promoting targeted interventions that take into account population-specific characteristics can improve quit rates among smokers with diabetes and subsequently reduce diabetes burden among disproportionally affected demographic and socioeconomic groups.

Keywords: Smoking cessation; Interventions; Diabetes; Counseling; Medication; Nevada

Introduction

According to the Centers for Disease Control and Prevention (CDC), diabetes is a disease that occurs when the blood glucose levels are above normal [1]. The CDC has listed diabetes as the seventh leading cause of mortality in the U.S. [2] whereby an average of 26 million people has the disease [3]. Consequently, 8.5% of Nevada residents were diagnosed with diabetes as of 2010 [4] out of the 2.7 million Nevada residents [5] producing a slightly higher prevalence rate as compared to that of the U.S. at 8.3% [6]. Cigarette smoking is another public health concern that commonly co-occurs among individuals with diabetes. The prevalence rate of smoking among people with diabetes (27.4%) is slightly higher than that of the general population (25.9%) [7-11] and hence this is a public health concern. Cigarette smoking is responsible for an average of 443,000 premature deaths annually in the United States alone [12], accounting for 1 out of every 5 deaths [8].

Smoking and diabetes are two preventable epidemics that have an impact on the burden of disease in the field of public health [13]. Yet, smokers with diabetes are not fully aware of their smoking cessation options. Research indicates that, poor life style choices such as smoking and diet have been recognized as the contributing risk factors that lead to the development of diabetes [13-16]. Smoking increases glucose abnormalities, and as a result, smokers with diabetes experience by far poorer health outcomes that result into shorter life expectancy as compared to the general population [17,18]. In addition, smokers with diabetes tend to be less physically active as compared to smokers without diabetes and hence it is vital to provide sufficient cessation education to this population [19]. Without the provision of smoking cessation intervention options, the prevalence of smoking and that of diabetes is expected to grow within the next two decades [20].

Research shows that smokers with diabetes are less motivated to quit when compared to the general population [21] and many times this population lack the knowledge, awareness, and understanding of smoking cessation options such as counseling and medications [22]. Healthcare professionals and clinicians thus should provide education about a combination therapy (e.g., counseling and medication) options to smokers with diabetes [23]. Although smokers with diabetes are likely to benefit from information about effective smoking cessation methods that work best for them, this population is not using many of these options as many lack awareness [24-26]. In addition, in recent years, few studies have assessed the efficacy of smoking cessation among smokers with diabetes [27,28]. In order to accomplish the mission

---

***Corresponding author:** Salome Kapella-Mshigeni, PhD, MPH, MPA, 100 S Washington Ave #900, Minneapolis, MN 55401, USA, Tel: 702-596-1915; E-mail: smshigeni@hotmail.com

Received October 05, 2015; **Accepted** October 29, 2015; **Published** November 02, 2015

Citation: Kapella-Mshigeni S, Kimunai EC, Villar TP, Mbi Feh MK (2015) Evidence Based Smoking Cessation Intervention Methods for Smokers with Diabetes in Nevada. J Diabetes Metab 6: 622. doi:10.4172/2155-6156.1000622

Copyright: © 2015 Kapella-Mshigeni S, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

of smoking cessation among smokers with diabetes, smoking should be treated like any other chronic diseases and perhaps interventions should be incorporated during diabetes self-management training programs to allow medical providers to deliver two services at once [29,30]. To date, the most effective smoking cessation method that is the best fit for smokers with diabetes is unknown [29]. It remains unclear if counseling alone or a combination of counseling and medication is the best fit for smokers with diabetes, leaving a gap in the literature that needs to be addressed. There are also other methods such as physician's advice that could potentially make a difference.

The purpose of this study is to identify smoking cessation methods utilized by smokers with diabetes and find their association with quitting. This quantitative study utilized secondary data from the State of Nevada Quitline (known as the Nevada Tobacco Users Helpline [NTUH] that was previously collected for counseling and treatment services. The study hypothesis is derived from one research question about quit rates and the most effective smoking cessation method for smokers with diabetes. The study described and compared the effectiveness of each method (e.g., counseling alone [Level II] or a combination of counseling and medications [Level III]).

Subjects and Methods

Data collection

This quantitative study used secondary data from the State of Nevada Quitline from January 1, 2010 to September 1, 2011 for intake and from July 1, 2010 to March 1, 2012 for the 6 months evaluation follow-up. The data was a segment of a larger dataset of 3,500 Quitline callers. Data was cleaned and tested and the final sample size for this research study was 720 callers with 613 completed surveys. Quitline services are provided by licensed counselors who had a baccalaureate or master's degree in an approved social science field and were licensed, certified, or certified interns with the State of Nevada Board of Examiners for Alcohol, Drug, and Gambling Counselors [26].

An Institutional Review Board (IRB) approval (#08-14-13-0137985) was secured prior to accessing the data. No personal identifying information was retrieved. The data collection instrument consisted of intake information and evaluation follow-up questions at 6 months for both Level II (counseling only) and Level III services (counseling and medications) [26]. The evaluation follow-up questions at 6 months, current tobacco usage, intent to quit, quit status at 7 or 30 days, and the last time an individual smoked even a puff were used. Furthermore, data pertaining to the type of intervention, types of medication, and one's readiness to quit were collected.

Ethical guidelines were followed that included: respect of human subject rights, understanding of their needs, values, and their desire to participate in the study [11, p.198]. In order to guarantee the highest level of confidentiality, all Quitline data collected is protected under confidentiality laws, including the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the Nevada Revised Statues (NRS). Quitline data is stored in a secured web application. Data code is written in SQL, and ASP.Net. SQL querie [26] reports generated from this data are also stored on the same web application.

Subjects

The sample characteristics were comprised of Nevada residents, ages 18 years and older, men and women who were enrolled during the study time frame for free smoking cessation services from the State of Nevada Quitline program. Data from study participants who spoke either English or Spanish languages was used. Participants had to be current or discharged smokers who received either Level II counseling or Level III counseling and medication services from the Quitline during the time of their enrollment. Also, included study participants must have self-disclosed having diagnosed diabetes for a period of 1 year or longer. All participants received counseling services to include individual therapy treatment from licensed or certified counselors trained in the behavioral health discipline. They also learned cognitive behavioral strategies including stress management and relapse management that helped them cope with smoking cessation. Some participants opted for pharmacotherapy interventions such as the use of smoking cessation medications in addition to receiving counseling.

Smoking cessation medications increase the odds of successful quitting when utilized properly as compared to non-medication cessation efforts [31]. The first seven recommended medications that increase the chances of long-term abstinence rates are: Nicotine gum, Bupropion, Nicotine lozenge, Nicotine inhaler, Nicotine patch, Nicotine nasal spray, and Varenicline [32,33]. A combination of medications is often recommended just as counseling and medication is recommended over either method alone [34-36]. For example, a combination of lozenges and gum is recommended for smokers with diabetes for a period of up to 12 weeks [33].

Studies have shown that counseling and medication are each effective alone in increasing the prevalence of smoking cessation and are even more effective when used together [7]. The use of medications for cessation is approximately five times more common than the use of counseling, which might be influenced, in part, by the widespread availability of over-the-counter cessation medications (e.g., nicotine patch, gum, and lozenge) [7]. Research shows that, one recent study analyzed quit rate among participants within 3 and 6 months of intervention of phone counseling and nicotine lozenges and reported significantly increased tobacco abstinence rates among participants who received a combined intervention of counseling and medication compared with either intervention alone, however, this study did not find varying quit rate among participants who received counseling versus those who received medication [30]. Another study has recently found out that, smoking rates pertaining to long-term abstinence are as poor at 20% to 35% for most intensive and widely accepted treatments [20]. This study followed subjects for 52 weeks and reported quit rate of at 12, 24, 36, and 52 weeks. When the study participants received a combined intervention of drugs and counseling, their quit rates were: 32%, 57%, 21%, and 56%, respectively [20]. Therefore, with the exception of quit rates at 36 weeks (21%), this study demonstrates how a combination therapy works best over one single intervention.

Statistical analysis

We used SPSS 22.0 statistical package for data analysis, including descriptive statistics, logistic regression, and a test of two proportions in order to answer the research questions. The p-value significance level was set at 0.05 and all values that were equal to or less than 0.05 were considered as statistically significant. Descriptive analyses were conducted in order to provide summaries about the sample characteristics. Statistical analyses of logistic regression and the test of two proportions were done in order to test hypotheses and find answers to the research questions.

Results

Descriptive statistics

The frequencies and percentages for the categorical demographic variables indicate that there were more females (56.8%) as compared to males (43.2%). In terms of race/ethnicity, the distribution was: Caucasian (66.1%), African American (15.8%), and Hispanics (14.4%). Many participants reported that it was very important for them to quit using tobacco (43.5%), with 40.3% of the participants reporting that they were very sure that that they would be able to quit using tobacco even in stressful situations. In addition, 40.9% of the study participants reported that they were very sure that they would be able to quit tobacco using the program, with about one-third of the participants reporting that they were somewhat committed to quit using tobacco (32.4%). More participants were very confident that they would be able to quit tobacco this time (36.4%) than participants who were somewhat confident (34.4%) and participants who were not sure (20.6%). Only 15.1% of participants reported calling due to physician advice to quit. Approximately 60% of the participants received counseling only (61.1%) compared to 38.9% who received both counseling and medication. Finally, 16.9% of the participants reported having diabetes. The mean age was 47.69 years (*SD*=13.48) with a minimum of 18 years and a maximum of 83 years.

Dependent variables

The frequencies and percentages for Quit status at last follow-up were computed. In terms of quit status, more study participants indicated "no" to Quitting (67.5%) in comparison to those who indicated "Yes" to Quitting (32.5%). The mean age was 47.69 years (*SD*=13.48) with a minimum of 18 years and a maximum of 83 years.

Research question

A logistic regression analysis was conducted only for those with diabetes to predict quit status from smoking cessation method in block 1. In block 2, the covariates of age, ethnicity, physician advice, and the 5 readiness to quit variables were added (Table 1). The overall model for block 1 was not significant, p=.616, Nagelkerke R^2=.003. When the covariates were added to the model in block 2, the model was significant, p=.042, Nagelkerke R^2=.213. In addition, the model change was significant, p=.029, Nagelkerke R^2=.210. Of all the predictor variables in block 2, age was a significant predictor, p=.038, and had an odds ratio of 1.03, indicating that for each increase of 1 year of age (for those with diabetes), the likelihood of quitting increased by 1.03 times. Hispanic participants with diabetes was also a significant predictor, p=.002, and had an odds ratio of 7.50, indicating that Hispanic participants with diabetes were 7.50 times more likely to quit smoking compared to Caucasian participants. None of the remaining predictors (e.g., ethnicity of African American diabetes participants, ethnicity of other diabetes participants, physician advice, or the readiness to quit items) were significant predictors of quit status (ps>.05).

A post hoc regression analysis was also conducted based on the findings revealed in the primary analysis. A logistic regression analysis was conducted only on those without diabetes to predict quit status from smoking cessation method in block 1. In block 2, the covariates of age, ethnicity, physician advice, and the 5 readiness to quit variables were added (Table 2). The overall model for block 1 was significant, p<.001, Nagelkerke R^2=.045. Level of service was a significant predictor, p<.001, and had a significant odds ratio of 2.202 indicating that those who got counseling and medication were more than twice as likely to quit compared to those who got counseling only. When the covariates were added to the model in block 2, the model remained significant, p=.006, Nagelkerke R^2=.062. However, the model change was not significant, p=.725, Nagelkerke R^2=.017, indicating that the covariates did not add a significant amount of information to the model. Of all the predictor variables in block 2, only level of service was a significant predictor of quit status again indicating that those without diabetes who got counseling and medication were more than twice as likely to quit compared to those who got counseling only.

Discussion

Age was a significant predictor, indicating that for each increase

	B	SE	Wald	OR	p
Block 1					
Level III: Counseling and Medication^a	.216	.43	.25	1.241	.615
Block 2					
Level III: Counseling and Medication^a	.247	.49	.26	1.281	.612
Age	.032	.02	4.32	1.032	.038
Hispanic^b	2.015	.64	9.94	7.504	.002
African American^b	.820	.61	1.81	2.271	.178
Other Ethnicity^b	1.585	.96	2.74	4.880	.098
Physician Advice^c	.105	.63	.03	1.111	.867
How important is it that you quit using tobacco? ^{d}	-.886	.58	2.35	.412	.125
How sure are you that you will be able to quit using tobacco even in stressful situations? ^{d}	.904	.52	3.06	2.469	.080
How sure are you that you will be able to quit tobacco, using our program? ^{d}	-.369	.51	.53	.692	.467
How committed are you to quit using tobacco? ^{d}	-.453	.47	.95	.636	.330
How confident are you that you will be able to quit tobacco this time? ^{d}	.143	.50	.08	1.154	.775

Note. Block 1: $\chi^2(1)$ = .25, p = .616, Nagelkerke R^2 = .003. Block 2: $\chi^2(11)$ = 20.25, p = .042, Nagelkerke R^2 = .213. Block change: $\chi^2(10)$ = 20.00, p = .029, Nagelkerke R^2 = .210; ^{a}compared to counseling only; ^{b}compared to Caucasian; ^{c}compared to no physician advise; ^{d}somewhat/very compared to not at all/not very/not sure.

Table 1: Logistic regression predicting quit status from smoking cessation method, and covariates for those with diabetes (n = 121).

	B	SE	Wald	OR	p
Block 1					
Level III: Counseling and Medication^a	.789	.18	18.87	2.202	< .001
Block 2					
Level III: Counseling and Medication^a	.769	.18	17.33	2.159	< .001
Age	.002	.01	.05	1.002	.818
Hispanic^b	-.346	.29	1.42	.708	.234
African American^b	.210	.25	.70	1.234	.401
Other Ethnicity^b	-.468	.60	.62	.626	.433
Physician Advice^c	-.351	.27	1.74	.704	.187
How important is it that you quit using tobacco? ^{d}	.216	.24	.83	1.241	.361
How sure are you that you will be able to quit using tobacco even in stressful situations? ^{d}	-.115	.23	.25	.891	.621
How sure are you that you will be able to quit tobacco, using our program? ^{d}	.053	.21	.07	1.055	.795
How committed are you to quit using tobacco? ^{d}	-.080	.20	.16	.923	.689
How confident are you that you will be able to quit tobacco this time? ^{d}	.171	.21	.65	1.187	.421

Note. Block 1: $\chi^2(1)$ = 19.04, p < .001, Nagelkerke R^2 = .045. Block 2: $\chi^2(11)$ = 26.05, p = .006, Nagelkerke R^2 = .062. Block change: $\chi^2(10)$ = 7.00, p = .725, Nagelkerke R^2 = .017; ^{a}compared to counseling only; ^{b}compared to Caucasian; ^{c}compared to no physician advise; ^{d}somewhat/very compared to not at all/not very/not sure.

Table 2: Logistic regression predicting quit status from smoking cessation method, and covariates for those without diabetes (n = 580).

of 1 year of age (for those with diabetes), the likelihood of quitting increased 1.03 times. Also, Hispanic participants with diabetes were 7.5 times more likely to quit smoking compared to Caucasian participants. Logistic regression analysis was used in order to test the hypothesis that was aimed at predicting quit status from the type of smoking cessation methods that the study participants utilized among only individuals with diabetes. From this model, the following lists of covariates were used: age, ethnicity, physician advice, and the levels of readiness. Readiness levels refers to the stages of change and quite often physician advice plays a major role in providing smokers with tools that will help them quit [37]. Since two blocks were set, Block 1 was not significant among only on those with diabetes to predict quit status from smoking cessation method used. On the other hand, when covariates were added to the model in Block 2, the model was significant. Age was a significant predictor, p=.038, and had an odds ratio of 1.03, indicating that for each increase of 1 year of age (for those with diabetes), the likelihood of quitting increased 1.03 times. Creating evidence based age appropriate smoking cessation intervention methods for smokers with diabetes is recommended in order to reduce quit rate disparities.

In terms of race/ethnicity, Hispanic ethnicity of participants with diabetes was also a significant predictor, p=.002, and had an odds ratio of 7.50, indicating that Hispanic participants with diabetes were 7.50 times more likely to quit smoking compared to Caucasian participants. These findings indicate that, disparities do exists among smokers with diabetes based on race/ethnicity and hence the need to create evidence based cultural competency smoking cessation programs remains to be a crucial part of public health work. A recent study that was conducted by the National Cancer Institute (NCI) suggests that, as of 2012, the majority of the Hispanic smokers expressed the desire to quit and at least 10% of them had reported to have quit within the past year [25]. Hence, cultural competency smoking cessation interventions should be implemented not only for Hispanics but also for other ethnic groups.

This study was conducted to evaluate the effectiveness of smoking cessation interventions for people with diabetes. Combined treatment of both counseling and medication was most effective in smoking cessation programs for people with or without diabetes. Therefore, it is important for healthcare providers to provide ample information and education among smokers with diabetes and help them understand that, despite of their diabetes status, with proper guidance and monitoring the use of counseling and medication is safe for their health. In addition, this study is important to public health for addressing smoking and diabetes, which are two major contributors to morbidity and mortality among adults in the United States. Implications for healthcare consist of better strategies for smoking cessation options for people with diabetes. Based on the study findings, healthcare practitioners have an opportunity to address issues surrounding smoking and diabetes by creating policies that support evidence-based interventions to promote the health of people with diabetes. This study contributes to expanding cessation knowledge to the existing body of literature with the goal of helping smokers with diabetes understand their cessation options. This study provides the information that will help smokers with diabetes choose the right cessation method, hence improve their quit attempts, maintain a quit status, and improve their overall health outcomes.

When a post-hoc regression analysis was conducted based on the findings revealed in the primary analysis, only level of service was a significant predictor of quit status indicating that those who got counseling and medication were more than twice as likely to quit compared to those who got counseling only. As reported in the literature, a combination of counseling and medication is highly recommended versus the use of one method alone [27-29]. Many clinical trial studies employs 6 months to 1 year follow-up as a measure for life-time smoking cessation [22] with an average of 2%-15% of the smokers relapsing each year after the 1st year of abstinence. Therefore, based on the findings, this study projects a range of 1%-5% of those who reported to have quit (32.5%) within 1 year to relapse back after discharge from the program when the intervention period ends.

Results of this study support the importance of collaborative efforts of the health care team including physicians, care manager nurses, and patients in smoking cessation efforts with patients being the most important members of the health care team [10]. The multidisciplinary approach in caring for patient help patients feel empowered to change their lifestyle, monitor their condition, comply with the treatment plan, build on self-management skills, sort through and effectively utilize information received [10] to manage their disease. Consequently, this helps to improve patients' health outcomes and also promote appropriate utilization of health resources and compliance of the smoking cessation program [10].

Recommendations

Future studies are highly recommended to explore current knowledge pertaining to different smoking cessation methods that are viable for smokers with diabetes. Studies should explore other possible variables that would tease out the differences in smoking cessation options, not only for smokers with diabetes, but also for people with other chronic conditions. Smokers diagnosed with diabetes along with other chronic conditions such as hypertension and high cholesterol are more likely to receive treatment modification according to physicians' performance improvement activity [2]. Future studies that assess the smoking cessation rate of such patients are highly recommended. In addition, a long-term cohort studies for data collection and the observation period would probably produce results that are more robust [34]. Furthermore, a collection of data and/or a review and analysis of secondary data from multiple settings is highly encouraged in order to capture information from a different perspective besides a Quitline service. This study adds recent data, knowledge, and ideas to the existing literature pertaining to effective smoking cessation methods for smokers with diabetes. In addition, the study brings to light, for many who have forgotten, the role of Quitlines in the United States. We recommend further studies to explore long-term Quitline data to tease out best practices for smoking cessation methods.

Furthermore, we recommend a qualitative study on this topic in order to dig deeper and find answers about effective smoking cessation methods for smokers with diabetes. Quite often, qualitative studies provide a broader understanding of views of the target groups during interventions [32]. A qualitative study that will incorporate all covariates such as: age, gender, race/ethnicity, education, health insurance status, disability, and physicians' advice to quit should be explored. Since age was found to be a significant predictor of quit status among smokers with diabetes, evidence based smoking cessation methods that are designed for different age groups (e.g., youth, young adults, and/or seniors) should be implemented in order to reduce disparities when it comes to age and quit rates. Overall, more studies are needed to explore the effectiveness of counseling and medications not only for smokers with diabetes but also for those who are suffering from other chronic conditions.

Limitations

This study had a few limitations. First, this study was limited to a short time frame (21 months for data collection and 6 months for the observation period) only. Longer study duration with multiple follow-up evaluations for a period of 1 year would potentially be beneficial in identifying statistically significant associations [34]. It is important to note that, the State of Nevada Quitline operated under constrained financial resources and hence funding to support annual observation period was a hindrance. Second, data was strictly self-reported and hence recall bias could influence the final reported information. Third, data were only used from one study site and hence this dataset is not a true representative of the demographics of the entire state. Further research opportunities that will utilize secondary data from multiple settings are highly recommended.

Conclusion

Overall, this study provides useful information pertaining to the most effective smoking cessation methods for smokers with diabetes. At the state of Nevada Quitline, the most effective smoking cessation method that was used during the study time frame was a combination of counseling and medication. However, not all smokers with diabetes are aware of the existing smoking cessation options that they have. In recent years, few studies have assessed the effectiveness of smoking cessation among smokers with diabetes [13,18,27,29,33,37,38]. The level of service was a significant predictor of quit status with an odds ratio of 2.202 indicating that those who received counseling and medication were about twice as likely to quit compared to those who received counseling only. A combination of counseling and medication therapy is more successful than counseling alone [16,17,27,38]. Given the addictive aspect of smoking that involve high relapse rate and high likelihood of morbidity and mortality, intensive and comprehensive interventions such as combining counseling and medication can improve treatment outcomes. More specifically, patients who attend smoking cessation program classes and support groups as well as use smoking cessation medications are more likely to abstain from relapsing [16]. Healthcare providers should invest more time during routine care and provide important information about smoking cessation methods to smokers with diabetes so that this population is more likely to quit by using the services available to them and hence reduce disparities i.e. lack of information, knowledge, and education pertaining to cessation options [23].

In conclusion, it is important for healthcare professionals to increase awareness to its patients about specific effective smoking cessation methods for diabetes patients [3,28]. Healthcare providers have an opportunity to assess for tobacco use among their diabetes patients during routine medical care without a negative impact on diabetes management [21]. As suggested by the Joint Commission, healthcare visits should constantly address tobacco use and answer all concerns that the patients may have during their routine check-ups [14]. Implementation of a broad range of evidence-based interventions among healthcare providers is also important in order to help them assist their patients quit smoking [28]. Programs that include a brief intervention program by physicians, along with ongoing counseling sessions by trained non-physician healthcare professionals have proven to be effective in increasing the smoking cessation rate among diabetic patients [31]. However, the execution of these evidence based smoking cessation programs continues to be a challenge in many healthcare facilities [38]. This study is important in reducing health disparities for smokers with diabetes because the findings of this study support that, promoting targeted interventions that take into account population-specific characteristics can improve quit rates among smokers with diabetes and subsequently reduce diabetes burden among disproportionally affected demographic and socioeconomic groups.

References

1. Hogan P, Dall T, Nikolov P; American Diabetes Association (2003) Economic costs of diabetes in the US in 2002. Diabetes Care 26: 917-932.
2. Baum HB, Cagliero E, Berry CA, Mencia WA, Stowell SA, et al. (2014) Continuing improvement in type 2 diabetes care through performance-based evaluations. J Prim Care Community Health 5: 107-111.
3. Bralic LV, Bergman MB, Vrdoljak D (2015) The association of lifestyle and stress with poor glycemic control in patients with diabetes mellitus type 2: a Croation nationwide primary care cross-sectional study. Croation Medical Journal 56: 357-65.
4. Centers for Disease Control and Prevention (CDC) (2011a) Nevada Diabetes Behavioral Risk Surveillance Data (BRFSS) Data.
5. Centers for Disease Control and Prevention (CDC) (2011b) Nevada Diabetes Behavioral Risk Surveillance Data (BRFSS) Data.
6. Centers for Disease Control and Prevention (CDC) (2011c) Diabetes Public Health Resource, 2011 National Diabetes Fact Sheet: Diagnosed and undiagnosed diabetes in the United States, all ages, 2010.
7. Centers for Disease Control and Prevention (CDC) (2011) Quitting smoking among adults-United States, 2001-2010. MMWR Morb Mortal Wkly Rep 60: 1513-1519.
8. Centers for Disease Control and Prevention (CDC) (2012) A Report from Surgeon General: Preventing tobacco use among youth and young adults.
9. Centers for Disease Control and Prevention (CDC) (2015) Basics about Diabetes: What is Diabetes?
10. Ciccone MM, Aquilino A, Cortese F, Scicchitano P, Sassara M, et al. (2010) Feasibility and effectiveness of a disease and care management model in the primary health care system for patients with heart failure and diabetes (Project Leonardo). Vasc Health Risk Manag 6: 297-305.
11. Creswell J (2009) Research Design: Qualitative, quantitative, and mixed methods approaches (3rd edtn). Thousand Oaks, Sage Publications, CA.
12. DiClemente C, Prochaska J, Fairhurst S, Velicer W, Velasquez M, et al. (1991) The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. Journal of Consulting and Clinical Psychology 59: 295-304.
13. Fagard RH, Nilsson PM (2009) Smoking and diabetes--the double health hazard! Prim Care Diabetes 3: 205-209.
14. Fiore MC, Goplerud E, Schroeder SA (2012) The Joint Commission's new tobacco-cessation measures--will hospitals do the right thing? N Engl J Med 366: 1172-1174.
15. Fiore M, Bailey W, Cohen S, Dorfman S, Goldstein M, et al. (2008) Treating tobacco use and dependence: Clinical practice guideline. Rockville, MD: U.S. Department of Health and Human Services.
16. Folan P, Savrin C, McDonald PE (2014) Characteristics of smokers with type 2 diabetes. Applied Nursing Research. 27: 72-77.
17. Gill GV, Morgan C, MacFarlane IA (2005) Awareness and use of smoking cessation treatments among diabetic patients. Diabet Med 22: 658-660.
18. Gritz ER, Vidrine DJ, Fingeret MC (2007) Smoking cessation a critical component of medical management in chronic disease populations. Am J Prev Med 33: S414-422.
19. Haire-Joshu D, Glasgow RE, Tibbs TL (1999) Smoking and diabetes. Diabetes Care 22: 1887-1898.
20. Hall SM1, Humfleet GL, Reus VI, Muñoz RF, Cullen J (2004) Extended nortriptyline and psychological treatment for cigarette smoking. Am J Psychiatry 161: 2100-2107.
21. Hokanson JM, Anderson RL, Hennrikus DJ, Lando HA, Kendall DM (2006) Integrated tobacco cessation counseling in a diabetes self-management training program: a randomized trial of diabetes and reduction of tobacco. Diabetes Educ 32: 562-570.
22. Hughes JR, Peters EN, Naud S (2008) Relapse to smoking after 1 year of abstinence: a meta-analysis. Addict Behav 33: 1516-1520.
23. Macaller T, Brown M, Black K, Greenwood D (2011) Collaborating with diabetes educators to promote smoking cessation for people with diabetes: the California experience. Diabetes Educ 37: 625-632.

24. Millett C, Gray J, Saxena S, Netuveli G, Majeed A (2007) Impact of a pay-for-performance incentive on support for smoking cessation and on smoking prevalence among people with diabetes. Canadian Medical Association Journal 176: 1705-1710.
25. National Cancer Institute (2012) A look at smoking among Hispanic Americans.
26. Nevada Tobacco Users Helpline Protocol (NTUH) State of Nevada, University of Nevada School of Medicine (UNSOM), Department of Psychiatry, Patient Protocols.
27. Selby P (2008) Smoking cessation and diabetes. Endocrinology Rounds 8.
28. Sherman J (2005) The impact of smoking and quitting smoking on patients with diabetes. Diabetes Spectrum 18: 202-208.
29. Steinberg MB, Schmelzer AC, Richardson DL, Foulds J (2008) The case for treating tobacco dependence as a chronic disease. Ann Intern Med 148: 554-556.
30. Severson HH, Danaher BG, Ebbert JO, van Meter N, Lichtenstein E, et al. (2015) Randomized trial of nicotine lozenges and phone counseling for smokeless tobacco cessation. Nicotine Tob Res 17: 309-315.
31. Thankappan KR, Mini GK, Daivadanam M, Vijayakumar G, Sarma PS, et al. (2013) Smoking cessation among diabetes patients: results of a pilot randomized controlled trial in Kerala, India. BMC Public Health, 13:47.
32. Thomas J, Harden A, Oakley A, Oliver S, Sutcliffe K, et al. (2004). Integrating Qualitative Research with trials in systematic reviews: an example review from public health shows how integration is possible and some potential benefits. British Medical Journal 328: 1010-1012.
33. Tonstad S (2009) Cigarette smoking, smoking cessation, and diabetes. Diabetes Res Clin Pract 85: 4-13.
34. Tortosa, Manresa, Martin-Cantera, Puigdomenech, Roura, et al. (2015) Continued smoking abstinence in diabetic patients in primary care: a cluster randomized controlled multicenter study. Diabetes Research and Clinical Practice 107: 94-103.
35. United States Census 2010, Nevada (2010) Nevada Population.
36. US Department of Health and Human Resources (2010) A Report of the Surgeon General, How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking Attributable Disease U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
37. Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J (2007) Active smoking and the risk of type 2 diabetes: a systematic review and meta-analysis. JAMA 298: 2654-2664.
38. Yeh HC, Duncan BB, Schmidt MI, Wang NY, Brancati FL (2010) Smoking, smoking cessation, and risk for type 2 diabetes mellitus: a cohort study. Ann Intern Med 152: 10-17.