Fall 2020

Comparison of Hemoglobin A1C Levels Between Married and Single Hispanic Women with Type 2 Diabetes

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Submitted as Partial Fulfillment for the Doctor of Nursing Degree

Regis University

December 28, 2020

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Executive Summary

Problem. According to the CDC (2019), 34.2 million Americans were diagnosed with Diabetes Mellitus at the end of 2019. Rising rates of diabetes (especially Type 2 Diabetes) among Hispanic and Latino populations in the U.S is of concern.

Purpose. The purpose of this study was to analyze if marital status impacted Hispanic women with T2D with regard to their mean HgbA1C scores.

Goals. Determine if there was a difference in HgbA1C levels within the study population (Hispanic women) with T2D based on marital status. Identify additional factors that may impact results: age, percent poverty, agricultural worker status and employment status.

Objective. Compare differences in the mean HgbA1C for married Hispanic women with T2D and single Hispanic women with T2D.

Plan. Retrospective chart review of the target group over a 2-year period.

Outcomes and Results. Results showed a statistically significant relationship between marital status and HgbA1C values ($F=2.456$, $p<.05$). Single women had the largest percent change in HgbA1C overall (14.3%). Percent of poverty ($F=3.379$, $p=.010$), employment ($F=2.456$, $p=0.025$) and age ($F=1.190$, $p=.147$) were statistically significant for changes to HgbA1C levels.

Analysis of findings and interpretation of results. Marital status impacts the mean HgbA1C value for Hispanic women with T2D. Level of poverty, employment and age impact their HgbA1C values.

Acknowledgements

I would like to offer my deep appreciation to my father Ronald Paul Fattibene who encouraged and supported both my transition to the field of nursing but also the pursuit of higher education in our family. His passing this year is particularly poignant as I reach this personal achievement and milestone.

I would like to express my love and appreciation for my husband, Dave Faunce who supported me through this personal journey and was there when I needed help the most.

I would also like to express my gratitude to my children, Emily, Jus and Julia who are my North Star when it comes to "doing the right thing" and finding my full potential as a mother, mentor, teacher and guide for them.

Lastly, I would like to give a special thanks to Dr. Lynn Wimett, EdD, RN, CNS, APRN-C, Professor at Rueckert-Hartman College for Health Professions and my capstone chair for her expert guidance throughout this project. I am very grateful for all that she has done to help me refine and execute my doctoral work.

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Problem Recognition

The prevalence of diabetes in the U.S. grew at an exponential rate over the past decade. According to the CDC (2020), an unprecedented 34.2 million (10.5%) of all Americans have been diagnosed with Diabetes Mellitus (DM), which is calculated to one out of every ten people in the U.S. Of these, 90-95 percent had type two diabetes (T2D) and were over the age of 45. By the age of 65 and older, nearly half the U.S. population (48.3%) had prediabetes and of those, over three quarters (84%) were unaware they had a diagnosis that put them at greater risk for developing T2D if left untreated.

Diabetes Mellitus has a pathology of impaired glucose regulation resulting in uncontrolled hyperglycemia that causes micro- and macrovascular damage leading to multiple pathologies including cardiac, renal and vascular disease. This chronic condition can result in amputations, blindness and early death. Diabetes Mellitus is the seventh leading cause of death in the US (CDC, 2020). Early recognition and treatment of this potentially deadly chronic disease is essential.

Diabetes Mellitus

Impaired Glucose Regulation

Those who develop T2D inherit a genetic predisposition from their parents that makes their tissue resistant to insulin. In the liver this insulin resistance is characterized by an overproduction of glucose despite the presence of fasting hyperinsulinemia. In addition, there exists an impaired suppression of hepatic glucose production in response to the circulating insulin that occurs following a meal. In time these β-cells begin to fail. The postprandial plasma glucose levels rise and subsequently the fasting plasma glucose concentration also begins to rise, leading to the onset of overt diabetes and the onset of damage to the blood vessels (Remedi & Emfinger, 2016).

In the muscle, insulin resistance is characterized by impaired glucose uptake following the ingestion of a high carbohydrate meal and also results in postprandial hyperglycemia. These physiologic changes can be tracked by monitoring the patient's hemoglobin A1C (HgbA1C) levels at specific intervals (generally every three months). This pattern of dysfunction can lead to an even greater hyperglycemic state due to a number of additional factors including brain neurotransmitter dysfunction, GI tract incretin deficiency and kidney dysfunction. The components of this cycle of dysfunction are labeled parts of the "ominous octet" (Defranzo, 2009).

HgbA1C Measure

Levels of HgbA1C are not influenced by daily fluctuations in the blood glucose concentration but reflect the average glucose levels over the prior 6 to 8 weeks. Measurement of HgbA1C is a useful indicator of how well the blood glucose level has been controlled in the recent past and may be used to monitor the effects of diet, exercise, and drug therapy on blood glucose in patients with diabetes. In healthy people without diabetes, the HbA1C level is less than 7 percent of total hemoglobin.

According to the CDC (2018), the clinical parameters for HgbAIC for prediabetes is 5.7%-6.4% and for Diabetes Mellitus 6.5% or above. Anything above 7.9% is considered poorly controlled Diabetes.

Epigenetics and Diabetes

While the root causes of insulin resistance can be traced to a patient's genetic makeup, the epidemic of diabetes has ravaged westernized countries. This appears to be related to a lifestyle of inactivity and unhealthy eating habits that result in fundamental epigenetic changes that lead to risk factors for diabetes such as obesity.

Type one diabetes (T1D) and T2D have different etiologies. Two factors are important in both: an inherited predisposition for the disease and a trigger in the environment that activates the genes. Although the triggers are not always known, identical twin studies strongly suggest that inherited genes alone are not enough to predetermine a diagnosis of diabetes. When one twin develops T1D, the other twin will also develop T1D, at most, half the time. When one twin has T2D, the other's risk is, at most, three in one (Vaag & Poulsen, 2007).

T2D has a stronger genetic link to family history and lineage than T1D. Lifestyle also has a particularly strong influence on the development of T2D. Risk factors include obesity (also with its own genetic risk), poor eating habits (a diet of highly processed foods and high sugar intake) as well as limited daily exercise.

A family lifestyle that includes a high carbohydrate diet and limited activity often leads to obesity. Although this research field is still young, these comprehensive data support not only a role for epigenetics in disease development, but also epigenetic responses to promote lifestyle changes (Heard & Martienssen, 2014)**.** Epigenetics are an important genetic aspect to consider especially with regard to obesity and T2D, which are intrinsically linked. Genetic predisposition contribute to epigenetic variability along with extrinsic factors such as exercise and diet.

Research continued to support the correlation of epigenetic changes resulting from lifestyle choices when they interact with the human genome. Given the unprecedented increase in T2D in a predominantly Hispanic community in Southeastern Pennsylvania (where the clinical study setting was located) as well as nationally, this study was both timely and needed to add to the dearth of data on this topic. Epigenetic changes are reversable and hold promise for future therapeutic strategies for the treatment of both obesity and T2D, especially in Hispanic communities.

While there were some studies regarding chronic illness outcomes for men based on marital status (Heard & Martienssen, 2014; Ikeda et al., 2007; Nilsson, et al., 2004, Whisman et al., 2014) there is very little information regarding long term effects on women with a chronic illness such as T2D. It was with this disparity in mind that this project was developed to better understand how marital status may affect Hispanic women with T2D by tracking their HgbA1C levels over time.

Project Question

Do single Hispanic women with Type 2 Diabetes (T2D) in a Federally Qualified Health Center (FQHC) have an average HgbA1C lower than married Hispanic women with T2D?

PICO Statements

Population. Hispanic women receiving treatment for T2D in a FQHC in Southeastern Pennsylvania.

Intervention. Two-year retrospective chart review of Hispanic women with T2D to identify factors that may impact their mean HgbA1C numbers including marital status, percent poverty, age, employment status and agricultural work status.

C**omparison**. Mean HgbA1C in single Hispanic women compared to the mean HgbA1C in married Hispanic women over a 2-year period.

Outcome. Percent change of HgbA1C levels for married and single Hispanic women over a 2-year period. Identify other factors that may impact HgbA1C mean value changes for Hispanic women.

Project Significance, Scope and Rationale

The clinical site for this project was located in southeastern Pennsylvania. Over the past 20 years, this area has seen an increase in its Hispanic residents. According to 2017 data from

DataUSA, Hispanic/Latinos make up 48.1% of the population in the city of Kennett Square, Pennsylvania (project site location). Of note, only 68% of the population are citizens who are also non-English speakers.

For many years, this area was considered the "Mushroom Capital of the World" (NPR broadcast, 2012) and has attracted migrants (particularly from Mexico and Central America) to work seasonally on the mushroom farms. Many of the workers on the local farms have stayed on, started families and settled down permanently.

Given the increased population growth over the past 10 years, there will undoubtedly be an increasing number of patients diagnosed with T2D in this FQHC in the future. As of 2019, this clinical site also had a high rate of prediabetes (7.9% of the total unduplicated patient population) which means that the T2D rates will likely continue to rise in the future.

Theoretical Foundation

Orem's Self-Care Model (SCM)

This model was developed by Dorthea Orem and provided the theoretical foundation for this project. Orem's SCM (1983) included three interrelated theories. the theory of self-care, 2) self-care deficit theory and 3) the theory of nursing systems. Orem believed that people have a natural ability for self-care, and nursing should focus on affecting and promoting that ability in patients. The goal of this study was to identify a self-care deficit among the patients studied (married and single Hispanic women with T2D) based on their HgbA1C levels. In this instance, we are looking at the self-care activities that a patient can perform as opposed to the self-care activities that may be needed to achieve optimal health.

Orem's model was used to address the self-care deficits in this cohort by looking at their HgbA1C levels over a period of time. This was accomplished by identifying self-care activities

that patients actually perform (e.g., attention to diet) vs. the self-care activities needed in order to improve their health (e.g., reduction in weight, decrease consumption of simple sugars and carbohydrates). This information was obtained anecdotally by the Medical Assistant or Nurse who brought patients in to see a provider for regularly scheduled diabetic or chronic illness visits.

Lewin's Change Model

Lewin's Change model (Shirey, 2013) was chosen as the change model for this project as it represents a path forward for creating and sustaining a clinical practice that will benefit the target population. Kurt Lewin's concept for driving change is still widely used by organizations to institute change and is a good choice here to create sustained change over time.

According to Lewin, three steps are essential to make change successful. Recognition of these distinct stages of change enables others to effectively plan for the execution of the desired change. The first step is to unfreeze the old way of doing things helping to ensuring readiness for change by preparing the organization (or person) to both understand and accept the criticality of the need for change. The second step is transitions when the change agent communicates methodically and consistently why change is needed. During this transition stage, leadership (or someone in a leadership position) needs to clearly articulate and share the influence, effects, and benefits of transformation across the organization, and prepare everyone for the future. The final step is to refreeze that is plan to sustain the change, provide support and celebrate success.

Review of Literature

Scope of Evidence

A review of the literature was done using the search engines CINAHL, PubMed, HHS Public Access, and MEDLINE. The initial search with the key words 'diabetes in women'

yielded 6,847 articles. This search was then further refined to include diabetes, Hispanic and gender differences, which narrowed the search down to 104 peer-reviewed articles. A final literature review adding the criteria Type 2 Diabetes, marital status and Hispanic, narrowed this down further to 81 articles of which 24 were ultimately applied toward the development of this project.

Levels of Evidence Supporting Project

Using the seven levels of evidence (Winona State University, 2019), there were one level-one, three level-two, four level-four, four level-five, nine level-six and none in level seven that met the criteria for this project. Level six was best represented with single descriptive and qualitative studies (Ackley et al, 2008).

Table 1

Levels of Evidence

Levels of Evidence	**Description**	**Articles**
Level 1	Systematic Review, Randomized Controlled Trial (RCT)	1
Level 2	Well Designed RCT	3
Level 3	Well-designed w/o randomization	0
Level 4	Well-designed case or cohort study	4
Level 5	Systematic Review: Descriptive and qualitative studies (meta-synthesis)	4
Level 6	Single Descriptive or Qualitative	9

Level 7	Expert Opinion or Report	0

Reference 1: (Ackley et al., 2008)

Systematic Review of Literature

Globally, chronic illnesses (such as diabetes, hypertension and heart disease) have increasingly become an international concern as the numbers of cases have grown exponentially in the past 10 years (Healthy People, 2020). Countries such as Mexico, Iran and Sweden found similar trends and challenges regarding gender differences and chronic illness management in each of their populations (I. Ai, 2007; R. C. Correa-de-Araujo2004; A. Ramezankhani, 2019; E., M. Siddiqui, 2013; M. Whisman, 2014.)

Marital Status, Gender and Chronic Illness

One theme often found in the literature with regard to chronic illness was that married men seemed to do better overall with their chronic health issues than unmarried men (Gallo, L.C., Fortmann, A.L., McCurley, J.L. et. al./2015, A. Ramezankhani, 2019, Mansyur, C.L., Rustvld, L.O., Nash, S.G., Jibaja-Weiss, M.L., 2015; Hawkins, J.M. & Mitchell, J, 2017).

While there was little in the literature about the differences between married and unmarried women and outcomes for chronic disease management, one article was particularly insightful regarding marital status and chronic disease management for both men and women (Ramezankhani, A, Azizi F, Hadaegh, F. (2019). This was one of the only articles in the literature review that specifically addressed the relationship between marital status and health outcomes by gender. Never married or single men tended to be at higher risk for mortality overall. There also appeared to be a lower risk for T2D for widowed women compared to married women in this study.

Market and Risk Analysis

Strengths

There was access to over 400 unduplicated medical charts to review for this project. An analysis of the data led to a recommendation that further research was needed to individualize care plans to support Hispanic female T2D patients lower their HgbA1C numbers. The Primary Care and Population Health Directors were available for logistical support as well as data collection.

Weaknesses

A new clinic CEO was hired in 2019. This change seemed to decrease support for the project. There was resistance from the practice to provide time or assistance with both data collection and its analysis after this leadership change.

It was difficult to establish reliability and validity using a retrospective chart review (Wickson-Griffiths et al, 2014). Defining variables, inclusion, and exclusion criteria can establish a weak level for evaluating validity as there were limited descriptions of measures used for evaluating validity and especially the reliability when doing a retrospective chart review due to potential limitations within the chart. Therefore, results should be viewed with some caution.

The short time period for the project to be completed (4-5 weeks) due to factors outside the control of the Principal Investigator (PI) was also a weakness.

Opportunities

The use of evidence-based practice success with current T2D patients could attract more patients to the practice as many of the referrals are “word of mouth” through family and friends. There is also the opportunity to bring these data to both local and national conferences to present these findings. Interest in this project has already been shown by the President of the National Hispanic Nurses Association as well as the local Hispanic Nursing Organization in Pennsylvania.

Threats

One potential threat was the possibility of decreased funding from HHS (Health and Human Services) that could have threatened overall clinical operations resulting in loss of staff or outright closure. Staff attrition occurred during the project due to changes in leadership. Lastly, the strong presence of ICE (Immigration and Customs Enforcement) in the community could have driven patients away from the clinic and from receiving needed health care services.

Driving Forces

One driving force for this project was the potential benefit for Hispanic women with T2D to improve outcomes in both management and control of this chronic disease. There was a strong interest in the project outcomes as clinical staff, many of whom are Hispanic, have family members that use this clinical site as their main source of primary care. There are a limited number of healthcare facilities in this area that offer access to Spanish speaking providers.

Lastly, there was the existing gap in the literature for Hispanic women with T2D and whether or not marital status affected their clinical outcomes making this project particularly poignant and timely.

Restraining Forces

One of the restraining forces was the lack of enthusiasm and support of the project by the new clinic CEO. An attempt was made to mitigate this by inviting the CEO into the process, and sharing the data. Unfortunately, the CEO was unresponsive.

Additionally, the short time frame around data collection was a restraining force beyond the control of the PI as well as the method (retrospective chart review), which were both restraining forces.

Costs and Benefits

Costs

While the costs for this study to be completed are negligible, Table 1 provides an overview of each line item (and its average cost) if the study were to be repeated. The actual cost for each item during the course of the project is listed in the final column.

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Table 2

Costs for Project

Item	Cost to Repeat Project	Actual Project Cost
Medical Director (consultation)	**$125/hr. x 4 hrs.=$500**	**$0 (Donated)**
Population Health Director (consultation)	**$55/hr. x 4 hrs.=$220**	**$0 (Donated)**
Nutritionist (consultation)	**$41/hr. x 4 hrs.=$164**	**$0 (Donated)**
Educational Room Cost (for data collection/research)	**$50/hr. x 10 hrs.=$500**	**$0 (Donated)**
Supplies (e.g., computer, copy paper)	**$100**	**$0 (Donated)**
Principle Investigator (time)	**$55 hr. x 40 hrs.=$2,200**	**$0 (Donated)**
Costs	**Projected= $3,684.00**	**Actual= $0**

Benefits

Individualized and personalized care plans would benefit patients with T2D. While the cost of treating patient complications due to T2D would be difficult to measure, estimates are between that $47-124K is spent (or more) over one patient's lifetime with this chronic illness

Zhuo, X., Zhang, P, Hoerger, T. J. (2013). Controlling hyperglycemia could keep those costs at the lower end of that estimate. The improved quality of life for patients with T2D, while difficult to measure, was one of the greatest potential benefits of this project.

Project Objectives

Vision

The vision for this project was to contribute to the recognition of intervening variables that impact treatment plans to lower blood sugar to near normal levels for all T2DM patients.

Mission

The mission was to explore to determine if there were differences in blood glucose levels between married and single Hispanic women with T2D and if other variables (such as percent poverty level, employment status, work status and age) impacted outcomes.

Project Goals and Objectives

Project goal. Determine if there was a difference in HgbA1C levels within the study population of female Hispanic women (married/single) with T2D.

Secondary goal. Understand why a difference in outcomes exists and how that could impact or change clinical practice for female Hispanic patients with T2D (beyond the scope of this project).

Objective. The objective of this project was to compare for differences in the mean HgbA1C for married Hispanic women with T2D and single Hispanic women with T2D over a two-year time period.

Secondary Objective. A secondary objective of this project was to determine if additional variables play a role in changes to the mean Hgb A1C for Hispanic women with T2D,

age, agricultural worker status, percent of poverty and employment status. If a difference in HgbA1C levels for female T2D diabetics in this practice were found based on marital status or other factors, adjustments could be made to both the educational and support plans for these patients in the future.

Methodology

Research Design

The methodology used for this study was a two-year retrospective chart review. The retrospective chart review itself had two important criteria: 1) defining the important variables, and 2) identifying inclusion and exclusion criteria, which largely demonstrates validity. However, the criteria used to demonstrate the reliability of the method, especially data abstractors' monitoring and blinding, and testing for inter-rater reliability, have not been addressed well in the literature. This project does not generalize beyond the study population.

Stakeholders

Stakeholders for this project included the following: female patients at the clinical site with T2D, clinical providers (Nurse Practitioners, Nurses, Physicians) and Medical Assistants (MAs) that provided support to both clinicians and patients. The project team included the Primary Investigator (PI), Medical Director, Population Health Director, Doctor of Nursing Practice (DNP) mentor and the CEO.

Primary Investigator. The PI was a board-certified Family Nurse Practitioner with 30 years of experience in family practice. Also, as a Nurse Executive, the PI worked with national nursing initiatives and organizations to advance policy and team-based care over the past 10 years. She has a Master's of Nursing and a Master's of Public Health, both from Yale. **Subjects.** The charts that were chosen for data collection were female Hispanic women in this clinical

practice with T2D whose charts contained all of the data points required for analysis who received care from January 1, 2018 through December 31, 2019.

Data Sampling. Inclusion criteria for data collection included female gender, employment status, marital status, agricultural work status, percent poverty, age and HgbA1C values to identify strengths of association in the final data set.

Definition of Variables

HgbA1C. Using the CDC guidelines (2018) for T2D, only female patients identified with a HgbA1C>6.5% were included in the data set. The HgbA1C values were listed from lowest to highest for each chart that met the selection criteria.

Percent of poverty. Percent of Poverty was calculated using the Federal Poverty Guidelines (FPG) available from the Department of Health and Human services website (2020) and recorded in the chart.

Protection of Human Subjects

With the approval and support of the practice (including the Medical Director and the Population Health Director), data were collected and analyzed for this study (see Appendix B, Letter of Agreement). A request was submitted to the IRB review board at Regis University prior to both data collection and analysis. The IRB approval letter can be found in Appendix C. All data were de-identified using random number sets for each variable, then entered into SPSS. Raw data will be stored for five years in a locked cabinet to which only the PI and Medical Director have access for five years.

Project Findings

The data set was initially generated by the Population Health Director at the health center in April, 2020 and delivered as an Excel spreadsheet to the PI for analysis. Statistical analyses were performed using the IBM SPSS Statistics package 26 provided through Regis University.

Only complete data sets were analyzed. All missing data were handled within the lists through deletion prior to analysis. The data collected included gender, marital status, Hispanic ethnicity, agricultural worker status and percent of poverty (nominal level data), as well as HgbA1C values (interval data) using the two data points of first recorded and last recorded chronologically.

While only marital status, ethnicity, gender and HgbA1C data were requested initially, the additional variables of employment status, agricultural work status, percent poverty and age were included in the final data set by the Population Health Director as they were of interest to the practice for further analysis. There was a belief in the practice that these additional factors impacted women's ability to modulate their HgbA1C levels and overall T2D control.

Reliability and Validity

The retrospective chart review method has limitations for evaluating and measuring the validity and reliability of data obtained as found in the palliative care literature (Wickson-Griffiths, 2014). Reliability and validity with this methodology are often difficult to establish.

Once the data were coded, they were entered into SPSS by the PI for analysis. An initial overview of the data collected determined that one-way ANOVA testing would provide important descriptive statistics for this data set. In addition, a Pearson Correlation was done to identify correlated data that may not have been obvious from the ANOVA testing alone. Results from the statistical testing can be found in the data analysis and results section of this paper (see Appendix D).

Data from the study showed a statistically significant relationship between marital status and HgbA1C values ($F=2.456$, $p<.05$) (see Appendix D, Table 4). Single women had the largest percent change in their HgbA1C (14.3%) compared to married women with the lowest percent change in mean scores (5.3%) (see Appendix D, Table 5). Of the additional variables studied,

employment status, percent of poverty and age were shown to be correlated with HgbA1C values. A more thorough analysis can be found in the data analysis and results section. These data were included in the SPSS analysis as they could help to deepen our understanding of the project findings. Inferential tests used for data analysis were One-Way ANOVA testing as well as the Pearson Correlation Test.

Data Analysis

Demographic Variables

Since the final data set contained only female patients, the gender column (M/F) was deleted as all data were for Hispanic female patients only. These female patients were then divided by marital status categories (see Appendix D, Table 3) in the initial dataset. All data were assigned sequential numeric designations (1-3, 1-6 for example) for coding in SPSS and analysis. Fields that were either unpopulated or listed as "unknown" in any category were coded as zero.

Percent of poverty. Percent of poverty was one of the descriptive variables identified for data collection. Percent of poverty was calculated using the Federal Poverty Guidelines (FPG) available from the Department of Health and Human Services website (2020), which are used during an initial patient intake evaluation and updated annually. Each patient is asked to present a pay stub or proof of income at each visit along with declaring their family size (determined by the number of individuals residing in the home residence), and their percent of poverty is calculated which determines visit cost and potential co-pays owed to the practice.

Data Results

The primary objective of this study was to compare differences in the mean HgbA1C values for married Hispanic women with T2D and single Hispanic women with T2D over a two-

year time period. One-way ANOVA testing was chosen for the initial data testing to look for correlations. A secondary objective was to see if there were other variables that could be correlated with changes to the Hgb A1C over time. These additional variables (agricultural worker status, employment status, percent of poverty and age) were analyzed using Pearson's Correlation Testing. An analysis of each of these correlations follows.

HgbA1C and marital status. The mean HgbA1C for married Hispanic women with T2D was 9.997 (N=154, SD=1.7070) while the mean HgbA1C for single Hispanic women with T2D was 10.557 (N=42, SD=2.1609) (see Appendix, Table 3). The HgbA1C difference between the two groups was statistically significant, and showed that marital status has an effect on the HgbA1C of Hispanic women with T2D.

Single or separated women had the largest percent change to the mean score of their HgbA1C overall (14.3%). Married women had the lowest percent change to the mean score of their HgbA1C overall at 5.3% (see Appendix D, Table 5).

value and employment status (F=2.456, p=0.025). There was a correlation of HgbA1C and employment status for Hispanic women with T2D whether their employment status be unknown, unemployed, employed or retired (see Appendix D, Table 6).

HgbA1C and percent of poverty. There was a relationship between the percent of poverty level for those in this data set and their HgbA1C values (F=3.379, p=.010) (Appendix D, Table 7). Greater detail on these findings included:

- Overall, there was a 1.5% mean percent rate change increase for those at 100+ percent below poverty level to over 200% below poverty level.
- There was an increase in the HgbA1C numbers overall when there was an increase in the percent poverty level. In other words, HgbA1C numbers go up when income drops

- One outlier data point was for those over 200% below the poverty level (the poorest people in this category) showing an improvement in the maximum HgbA1c number from 15.0 to 14.2.

HgbA1C and agricultural worker status. There was no relationship between work type and HgbA1C values (see Appendix D, Table 8). The community health center from which these data are derived is in a part of Southeastern Pennsylvania where most employment is agricultural work. Agricultural worker status was divided into the following categories by the health center: Unknown, non-agricultural, Employed year-round, Retired Farm Worker, Migrant and Seasonal. The last two categories are often held by undocumented persons from Mexico and Central America.

HgbA1C and age. There was no association between age and HgbA1C value. The age range for those in this data set ran from 19-73 years of age (see Appendix D, Table 9).

Pearson Correlation Testing

A decision was made after doing the one-way ANOVA testing to look for additional correlations in the data. Correlation was an effective technique for investigating relationships between the quantitative continuous variables found in this study. The correlation information provided by the Pearson's correlation coefficient (r) was used to measure the strength of the association between these variables. These additional data were helpful to deepen the understanding of the challenges facing Hispanic women with T2D to maintain their HgbA1C levels due to factors that may be out of their control. Percent poverty yielded no pertinent data of value and was therefore left off this correlation table (see Appendix D, Table 10).

Correlation Findings

Employment status/Marital status (Pearson C=.642, p=.000). There was a correlation between

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employment status and marital status. As employment status changes, marital status changes.

Work status. HgbA1C value (Pearson C.=-.130, p=.026). There was an inverse relationship between work status and HgbA1C value. As work status improves, HgbA1C decreases.

Age. HgbA1C value (Pearson C.=-.158, p=.007). There was an inverse relationship between age and HgbA1C value: as age increases, HgbA1C decreases.

Discussion

The results of this study were consistent with a review of the literature in that marital status does affect chronic illness. In this study, single Hispanic women with T2D were more likely to have a higher HgbA1C value overall than their married counterparts. In the project population, being single with a diagnosis of T2D potentially puts you at risk for a worse outcome over time.

As employment status changes (working/not working), marital status appears to change. Further study would be needed to better understand this phenomenon. Also, of interest was the finding that as work status improves (as women become employed), their HgbA1C decreases. This may suggest a reflection of additional resources being available (better food choices for instance), which may improve HgbA1C values over time.

Lastly, as age increases, HgbA1C tends to be lower. This may reflect a social norm where women who remain married (into older age) have access to better food, medical resources and support within their families (e.g., children helping to care for them as they age).

Conclusions

Marital status made a difference for Hispanic women with T2D with regard to their HgbA1C levels in the study population. Single Hispanic women, in this study, with T2D did not

have an average HgbA1C lower than their married counterparts but appeared to be at increased risk for poorer outcomes due to being single. This was consistent with the literature regarding marital status and chronic illness.

Marital status and employment were correlated for Hispanic women with T2D. Working women had lower HgbA1C levels than those who did not work. Further research would be warranted to determine if the findings in this study apply to other predominantly Hispanic communities of women with T2D. Age appeared to have an impact on Hispanic women and their HgbA1C levels decreased as they got older. There may be a socioeconomic trend that would warrant further study to better understand this inverse correlation but was beyond the scope of this study.

Limitations

Limitations of this study included the lack of validity and reliability of a retrospective chart review for data collection, a single location study, short time allowed for the study and changes in leadership at the clinical location that made access to data and support difficult at times.

Recommendations

The relationship between marital status and T2D needs further study particularly for women in Hispanic communities. Also, further study on the relationship between T2D and income (especially in low-income communities where the percent of poverty is highest) is recommended. Poverty levels affected diet which impacts chronic illness, especially T2D. This suggested additional research should be conducted to assess if those with T2D should be connected with social service agencies to help address food access and other food issues for them and their family members.

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Appendix A

Logic Model

Resources: *In order to accomplish our set of activities we will need the following:*	**Activities:** *In order to address our problem or asset we will accomplish the following activities:*	**Outputs:** *expect that once accomplished these activities will produce the following evidence of service delivery*:	**Short/long term outcomes:** *If accomplished these activities will lead to the following changes in 1-3 then 4-6 years:*	**Impact:** *If accomplished these activities will lead to the following changes in 7-10 years*
Federally Qualified Health Center site (predominantly Hispanic population) Pop Health Director ● Medical Director DNP mentor (onsite) EHR/access to data ● Access to patient information Institutional Review Board Review (IRB)and approval	● Interviews w/Dir. Population Health, Medical Director Bi-weekly meetings with the Pop. Health Director to discuss project and data needs Monthly meetings with the Medical Director and the DNP mentor to discuss data needed and parameters of the project ● Data collection and tracking of HgbA1C numbers for all female Hispanic patients with T2D in the practice ● Determine optimal length of time for the data capture (e.g., 1-2 years)	Track A1C changes for female patients over time Data collected for the parameters "married" and "unmarried" Compare and contrast mean HgbA1C numbers for married and single female T2D patients at LCH Identify available resources at LCH to improve T2D outcomes overall (eg.CDC program, nutritionist, use of team-based care model)	● Track/Trend data collected on targeted interventions for all patients with DM based on gender and stage of DM for optimum results ● Integrated DM education (as needed) using a team-based approach to improve outcomes as measured by optimal HgbA1C levels over time Decreased disparity between T2D patients based on marital status using their HgbA1C levels to track progress; Further study of disparities in compliance within the female T2D population with identified solutions for improved compliance.	Overall improvement in all DM patient A1C metrics using an integrated care model for all patients Decrease in comorbid sequalae due to improvements in A1C metrics ● Intensive case management for those with T2D (Male and Female)

Appendix B

Letter of Agreement

LCH
LIFE CHANGES HERE
La Comunidad Hispana

Letter of Agreement

April 2, 2020

To Regis University Institutional Review Board (IRB):

I am familiar with Cheryl Fattibene's research project entitled "Comparison of HgbA1c levels between Married and Single Hispanic women with Type 2 Diabetes (T2D) in a Federally Qualified Health Center: Does marital status matter?" I understand the involvement of La Comunidad Hispana (LCH) to provide the data and support needed to conduct this retrospective chart review for this research project.

I understand that this research will be carried out following sound ethical principles and that participant involvement in this research project is strictly voluntary and provides confidentiality of research data, as described in the proposal.

Therefore, as a representative of La Comunidad Hispana, I agree that Cheryl Fattibene's research project may be conducted at our agency/institution.

Sincerely,

Federico A. Ceppa, MD
Primary Care Medical Director

LA COMUNIDAD HISPANA
KENNETT SQUARE HEALTH AND COMMUNITY SERVICES
OXFORD COMMUNITY HEALTH CENTER

731 West Cypress Street · Kennett Square, PA 19348 / Phone: 610.444.7550 · Fax: 610.444.6407 / LaComunidadHispana.org

Appendix C

IRB Approval

REGIS UNIVERSITY

Institutional Review Board

DATE: June 22, 2020
TO: Cheryl Fattibene, MSN, MPH
FROM: Regis University Human Subjects IRB
PROJECT TITLE: (1613721-1) Comparison of Hemoglobin A1C levels for Hispanic Women with Type 2 Diabetes: Does marital status matter?

SUBMISSION TYPE: New Project
ACTION: DETERMINATION OF NOT RESEARCH
DECISION DATE: June 22, 2020
Thank you for your submission of New Project materials for this project. The Regis University Human Subjects IRB has determined this project does not meet the definition of human subject research under the purview of the IRB according to federal regulations.
The project may proceed as written.
*We w*ill retain a copy of this correspondence within our records.
If you have any questions, please contact the Institutional Review Board at irb@regis.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Regis University Human Subjects IRB's records.

Appendix D
Statistical Tests

Table 3
Frequency Test: Highest/Lowest HgbA1C for Hispanic Women by Marital Status

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	64	10.159	1.9394	.2424	9.675	10.644	7.6	15.0
1	42	10.557	2.1609	.3334	9.884	11.231	7.7	15.0
2	2	9.250	1.9092	1.3500	-7.903	26.403	7.9	10.6
3	10	9.840	2.1355	.6753	8.312	11.368	7.8	14.0
4	154	9.997	1.7070	.1376	9.726	10.269	7.7	15.0
5	14	11.571	2.3444	.6266	10.218	12.925	7.7	15.0
6	8	9.038	1.1526	.4075	8.074	10.001	7.9	10.9
Total	294	10.151	1.8939	.1105	9.934	10.368	7.6	15.0

0=Unknown, 1=Single, 2=Divorced, 3=Widow, 4=Married, 5=Domestic Partner, 6=Separated

Table 4
One-Way ANOVA: Value A1C by Marital Status

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	51.322	6	8.554	2.456	.025
Within Groups	999.633	287	3.483		
Total	1050.955	293			

Table 5
Percent Change Mean HgbA1C Values: Compare Marital Status to Single Status

Married/Single	5.3%
Divorced/Single	12.4%
Widowed/Single	6.8%
Domestic Partner/Single	9.6%
Separated/Single	14.3%

One Way ANOVA: Value A1C by Employment Status

Table 6
HgbA1C by Employment Status

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	51.322	6	8.554	2.456	.025
Within Groups	999.633	287	3.483		
Total	1050.955	293			

Table 7
One Way ANOVA: ValueA1C by Percent Poverty

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	46.956	4	11.739	3.379	.010
Within Groups	1003.999	289	3.474		
Total	1050.955	293			

Table 8
One Way ANOVA: Value A1C by Agricultural Work Status

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	46.956	4	11.739	3.379	.010
Within Groups	1003.999	289	3.474		
Total	1050.955	293			

Table 9
One Way ANOVA: Value A1C by Age

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	25.154	5	5.031	1.412	.220
Within Groups	1025.800	288	3.562		
Total	1050.955	293			

Table 10
Pearson Correlations

		EmpStat	Marital	Percpov	Workstat	agejan1	valuea1c
EmpStat	Pearson Correlation	1	.642**	.026	.074	-.068	.022
	Sig. (2-tailed)		.000	.656	.207	.247	.705
	N	294	294	294	294	294	294
Marital	Pearson Correlation	.642**	1	.043	.059	.084	-.043
	Sig. (2-tailed)	.000		.465	.311	.152	.460
	N	294	294	294	294	294	294
Percpov	Pearson Correlation	.026	.043	1	.094	-.111	.074
	Sig. (2-tailed)	.656	.465		.107	.058	.206
	N	294	294	294	294	294	294
Workstat	Pearson Correlation	.074	.059	.094	1	.065	-.130*
	Sig. (2-tailed)	.207	.311	.107		.266	.026
	N	294	294	294	294	294	294
agejan1	Pearson Correlation	-.068	.084	-.111	.065	1	-.158**
	Sig. (2-tailed)	.247	.152	.058	.266		.007
	N	294	294	294	294	294	294
valuea1c	Pearson Correlation	.022	-.043	.074	-.130*	-.158**	1
	Sig. (2-tailed)	.705	.460	.206	.026	.007	
	N	294	294	294	294	294	294

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).