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Supporting Positive Lifestyle Changes Among Patients with Diabetes Mellitus Type 2

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Abstract

The following thesis is a compilation of literature reviewed to formulate background research for a pilot study. The literature reviewed pertains to the potential benefit of added case management for patients with diabetes mellitus type 2. A proposed pilot study, based off of this research, aims to identify topics, tools, facts, and changes that can be made to case management to improve not just the biological aspects, like HbA1c levels, but the mental and emotional as well to allow for whole person care.

The primary question being asked is “what types of support do people with diabetes mellitus type 2 need in order to sustain positive lifestyle changes?” This research paper will attempt to provide evidence towards an answer by gathering information from people who have diabetes mellitus type 2. They will be asked a series of questions which will be analyzed for themes and commonalities.

Table of Contents

Introduction

Problem Statement

Diabetes Mellitus is a disease that can affect and complicate other systems of the body such as the kidneys, brain, nerves, heart, and eyes ("Type 2 Diabetes Mellitus," 2018). When a person's diabetes is not well managed their health can be majorly affected and lead to worsening conditions such as heart attack, limb amputations, blindness, and even death. Health issues can often compound and exacerbate each other ("Type 2 diabetes," 2019). The goal of this thesis is to provide and bring to light tools for those struggling with diabetes and investigate what actually works for people and what doesn't. When people feel supported and empowered, they are more likely to take charge of their health.

My primary objectives are to examine diabetes mellitus (DM) care management and explore ways to improve outpatient services and connect people with additional resources that will help them optimally manage their diabetes. This pilot study aims to collect and analyse desires of support and management verbalized by the patients themselves.

Background

In accordance with Harvard Health articles, type 2 diabetes is a chronic disease characterized by high levels of sugar in the blood (blood glucose levels) (2018). It was also known as adult-onset diabetes because it almost always started in mid to late-adulthood. However, in recent years, an increasing number of children and teens have been diagnosed with this condition. Type 2 diabetes is not only much more common than type 1 DM, but it is also quite different from type 1 ("Type 2 Diabetes Mellitus," 2018).

During digestion, food is broken down into simple sugars like glucose. To provide the body with energy, glucose needs to leave the blood and enter the cells. Insulin, a hormone

produced by the pancreas, traveling in the blood signals the cells to take in glucose. When levels of glucose in the blood rises, the pancreas produces more insulin. In people with type 2 DM, the body's cells either cannot keep up with the amount of glucose being put into the body or resist the normal effect of insulin, also known as insulin resistance (“Type 2 diabetes,” 2019). This causes glucose to build up in the blood.

In people with insulin resistance, the pancreas recognizes that the blood glucose level is rising and generates more insulin in response in order to regulate. Over time, the body's insulin resistance increases causing the pancreas increase the amount of insulin released until the pancreas finally gets overwhelmed and can no longer keep up with the body's demands (“Type 2 Diabetes Mellitus,” 2018). When this eventually happens, the blood glucose becomes unregulated which can lead to serious and life treating conditions such as nerve damage, heart and blood vessel disease, strokes, eye damage, impaired healing, skin conditions, and kidney damage to name a few (“Type 2 diabetes,” 2019).

This paper will research and review articles of studies done on different methods of care and case management for people diagnosed with type 2 DM beyond normal levels of care including text messaging programs, group information programs, and automated phone calls.

It is important to increase and improve diabetes care management because with steadily rising numbers in those diagnosed with type 2 DM as well as deaths and illness/injury related to the illness it is evident that more needs to be done (“Diabetes,” n.d.). The number of people with diabetes “has risen from 108 million in 1980 to 422 million in 2014” (“Diabetes,” n.d.). The WHO also reports that “an estimated 1.6 million deaths were directly caused by diabetes” across the world (“Diabetes,” n.d.). Many of these deaths could have been avoided if there were more case management options available to keep people on track. And as nurses, it is our duty to

integrate the newest evidence-based practice into our work to improve the lives of as many people as possible. And if additional support in case management is shown to improve outcomes, it is our responsibility to implement it.

Literature Review

Research Question

The following literature review (full table attached as Appendix A) aims to draw conclusions as to whether or not there are more effective ways methods of diabetes care management than currently being provided to patients. This topic is important because the rise in not only morbidity but mortality as well (“Diabetes,” n.d.). And with these numbers on the rise, there needs to be more done to manage the rise in addition to the growing prevention and awareness programs.

Search Strategy and Road Map

When researching this topic on Google Scholar and Dominican University of California online library, search terms including “diabetes case management,” “diabetes care and management,” “diabetes mellitus type 2,” and “quality of care management” which yielded over 2.3 million and 286,000 results respectively. After examining the title and abstracts of a multitude of research articles, around 30 were selected and looked at more carefully from which eight were ultimately chosen. They were chosen on the basis that they pertained to the topic, were primary research articles, had authors with advanced degrees, revolved around outpatient care, had a sample size of greater than 25, and had an application of an additional care management being compared to routine diabetes care or compared the effectiveness of case managers . Included was a qualitative article pertaining to patient views on care and what they thought was important and lacking from care. A qualitative study of patients' perceptions of care and desires for possible implementations was also included to round out the literature review. Country of origin was not factored in article selection.

The chosen articles will be divided based type of care application, whether there was a change in the case management, an implementation of a program to hold patients accountable, or generalized extra management than usual care, and a qualitative article pertaining to patient perceptions.

Change in Case Management

The following research articles are primary articles that compared the use of different healthcare personnel as case managers to see if there were personnel who were better qualified at delivering DM type 2 information than others.

In the article "Proactive Case Management of High-risk Patients With Type 2 Diabetes Mellitus by a Clinical Pharmacist: A Randomized Controlled Trial," Hae Mi Choe, PharmD; Sonya Mitrovich, MD; Daniel Dubay, MD; Rodney A. Hayward, MD; Sarah L. Krein, PhD, RN; and Sandeep Vijan, MD aimed to see if pharmacists are effective case managers in glycemic control and preventative measures in 80 patients with poorly controlled DM type 2. There were 41 patients randomly assigned to the intervention group, of which three were lost to follow-up and two were transferred to a different healthcare provider (36 by the end), and 39 randomly assigned to the control group, of which one died, six were lost to follow-up, and three were transferred to a different healthcare provider (29 by the end).

The "mean decrease in HbA1c levels in the intervention group was −2.1% (from 10.1%-8.0%) and in the control group was −0.9% (from 10.2%-9.3%)" (Choe, et al., 2005). The mean difference in HbA1c level change between the two groups "was 1.2% (P = .03)," and the "mean difference in final HbA1c values was 1.3% (P = .01)" (Choe, et al., 2005). The intervention group had a slightly shorter length of time between the first and last measure of HbA1c (13.6 months compared to 14.9 months for the control group) which was accounted for in the statistical

analysis of linear regression analysis and sensitivity analysis. And “when it was assumed that there was no change in HbA1c level among those who were lost to follow-up,” the mean change difference in HbA1c scores between groups was 1.2% with P = .01” (Choe, et al., 2005).

Kim B. Kim, PhD, Miyong T. Kim, RN, PhD, Hochang B. Lee, MD, Tam Nguyen, RN, PhD, Lee R. Bone, MPH, BSN, and David Levine, MD wrote the article titled “Community Health Workers Versus Nurses as Counselors or Case Managers in a Self-Help Diabetes Management Program” in which they conducted a study to find evidence of whether registered nurses (RN) or community health workers were more effective case managers among Korean Americans. Their study consisted of 209 Korean Americans with uncontrolled DM type 2 in the Baltimore-Washington metropolitan area between the ages of 35 and 80. There were 54 participants assigned to the community health workers, 51 assigned to the RNs, and 104 assigned to the control group where their physiological (namely HbA1c) and psychobehavioral health outcomes were measured and analyzed (Kim, K. B., 2016).

The demographics of the three groups were relatively identical at baseline but the average HbA1c levels were only relatively similar. The trend of reduction in the community health worker–counseled group ($P < .001$) was steeper than that in the RN-counseled group ($P < .001$) or the control group ($P < .001$) groups, yet all were statistically significant. Reduction trends were also “statistically different between the community health worker–counseled and control groups” ($P < .001$) (Kim, K. B., 2016). There was not a statistically significant difference in the reduction trends between the community health worker and the RN groups ($P < .07$) (Kim, K. B., 2016). In terms of psychobehavioral health status, the community health worker–counseled group started the program with a lower quality of life score than did the RN-counseled group because of a slightly lower baseline. Yet, both produced a statistically significant rise in quality

of life (P < .001). The control group (P = .24), did not. Both the community health worker and RN cousciled groups had similar scores on Self-Efficacy and ended with the same result (community health worker P<.001; RN P<.001; control P<.23) (Kim, K. B., 2016).

In “Long-term glycemic control by a diabetes case-management program and the challenges of diabetes care in Taiwan,” a primary research article by Chih-Cheng Hsu, MD, Dr.P.H. and Tong-Yuan Tai, MD, PhD, aimed to “evaluate the long-term effects on glycemic control of a diabetes care program focusing on case management and to discuss challenges in the quality of diabetes care in Taiwan” (2014). In this article, Hsu and Tai randomized 1,060 study subjects into either the intervention group with specific National Health Research Institute sponsored case managers (789 participants from 27 clinics) or the control group with normal care (271 participants from 7 clinics), all of whom were recruited from the Diabetes Management through an Integrated Delivery System project in 2003–2005. A multivariate mixed model analysis was used to analyze the effects on glycemic control during the 3.5-year intervention. They were further subdivided into one of three groups based on HbA1c levels at the start of the study (<7%, 7-9%, and >9%) (Hsu & Tai, 2014).

The intervention group followed standardized practice and recommendations from the National Health Institute (NHI) administration. The HbA1c levels in the intervention group were significantly lower than that in the control group starting six months after the program initiation and lasted for at least 3 years. In general, glycemic control of the intervention groups, regardless of baseline status, was better than the control group. Significant change in HbA1C was "sustained for 2.5 and 3 years for those with a baseline HbA1c level >9% and 7–9%, respectively” (p = 0.004) (Hsu & Tai, 2014). But, "for those with good glycemic control at

recruitment (HbA1c level <7%), the intervention did not seem to improve glycemic control, except for a significantly lower HbA1c level seen in month 36" (Hsu & Tai, 2014).

The findings in the research article by PharmD Choe et al. implies based on the changes in HbA1c that pharmacist intervention and assistance in case management can be successful and valuable. Pharmacists play a critical role in the management of patients with chronic disease who require multiple medications and/or frequent medication adjustments and now DM type 2 can be included in that list. The findings in the research article by PhD Kim, HS et al. shows that the use of community health workers or RNs as case managers for patients with uncontrolled DM type 2 is more effective than standard procedure. It also showed that there was no statistically significant difference in physiological or psychobehavioral levels between assignment to a community health worker or RN. The findings by Hsu and Tai further support the notion of use of case managers by providing significant evidence showing that having specialist case workers supervising care beyond the normal care provided is beneficial for diabetic patients and can help them lower their HbA1C levels.

Implementation of Program

In the following articles, author's attempted to add in additional care management through technology-based sources such as text messages, phone calls, and added support groups to evaluate if the add reminders and information had an improvement on overall health and HbA1c levels, specifically.

In “Improved Diabetes Care Management Through a Text-Message Intervention for Low-Income Patients: Mixed-Methods Pilot Study” written by Jessica L Watterson, MPH, PhD; Hector P Rodriguez, MPH, PhD; Stephen M Shortell, MBA, MPH, PhD; and Adrian Aguilera, MA, PhD, the authors studied the impact of diabetes text-messaging program. The program

targeted participants who were low-income Latino patients that received care from two specific federally qualified health centers. The participants included 50 patients in the intervention group along with 160 eligible patients in the control group.

The intervention group was enrolled in a 12-week, bidirectional text-messaging program that consisted of three to four interactive messages per week. Some messages were bidirectional requiring response to multiple choice or true/false questions and other messages were unidirectional health tips or reminders in addition to routine care. The control group got just routine care.

The intervention group average had a decrease in HbA2c that was not significantly significant (P=.06), but those from the intervention group that were highly involved and engaged in the program did have a statistically significant decrease in HbA2c levels (P<.001) when compared to those who were less engaged.

In the article titled “Impact of Automated Calls With Nurse Follow-Up on Diabetes Treatment Outcomes in a Department of Veterans Affairs Health Care System” the authors John D. Piette, PhD; Fredric B. Kraemer, MD; Morris Weinberger, PhD; and Stephen J. McPhee, MD evaluated the effectiveness of telephone nurse follow-up “as a strategy for improving diabetes treatment processes and outcomes in Department of Veterans Affairs (VA) clinics” as well as comparing “the results with those of a prior [automated telephone disease management] ATDM trial conducted in a county health care system” (2001). Their study included 272 VA patients with diabetes mellitus under the age of 75 with an active prescription of a hypoglycemic agent. They were randomly assigned to either the control group (140 patients) or intervention group (132 patients).

The intervention group received automated calls that consisted of hierarchically structured messages including statements and queries that were pre-recorded by an actual person. All calls were outbound and lasted between five and eight minutes. During each ATDM assessment, "patients used their touch-tone keypad to report information about their self-monitored blood glucose (SMBG) read- ings, other self-care activities, perceived glycemic control, symptoms, and use of guideline-recommended medical care" (Piette, et al., 2001). At the end of each assessment the patients were given the opportunity to listen to health promotion messages. Then, after the calls were reviewed, a nurse would call the patient on average of once a month to follow up and discuss information received, discuss issues, answer questions, and give advice or recommendations. A variety of measures were compared at the start of the trial and 12 months later, including blood glucose levels, HbA1c, self-care behavior, symptoms, and perceptions of care.

Patients in the intervention groups were more likely to be seen in podiatry clinics (P=.003), diabetes specialty clinics (P=.03), have their cholesterol checked (P=.05), have their feet checked for cuts and sores (P=.0002), and had more clinician visits (P=.006) than the control group (Piette, et al., 2001). There was also a statistically significant decrease in HbA1c levels (P=.04) compared to the control group as well as overall satisfaction with care (Piette, et al., 2001).

Hee-Seung Kim, PhD and Jeong-Ah Oh, PhD wrote the article titled "Adherence to diabetes control recommendations: impact of nurse telephone calls" where they aimed to investigate the effect of telephone calls from nurses on the HbA1c levels, steady blood glucose (BG) levels within normal range, and adherence to recommendations in patients with type 2 DM through a randomized control trial (2003). Kim and Oh's study included a total of 36 patients, 20

in the intervention and 16 in the control group, a tertiary care outpatient hospital in South Korea. To be included in the study, patients had to be able to perform blood glucose tests, self-injection of medication, understand methods and procedures, and HbA1c >7% (Kim & Oh, 2003).

Telephone intervention was for 12 weeks consisting of continuing education, reinforcement of diet and exercise, and medication adjustment recommendations. The researcher contacted intervention group members at least twice a week for the first month and then once a week for the second and third month. Each participant got an average of 16 phone calls for an average of 25 minutes, which were scheduled based on convenience. A "registered dietician analysed subjects' daily food intake" and made "recommendations for appropriate diabetic dietary control" based on the diet and exercise patterns which were then mailed to the participant along with alterations to medications from a PhD nursing student which were communicated to the participants doctor (Kim & Oh, 2003).

At the start of the study, there were no significant differences found in HbA1c between the groups. There was "a significant percentage change in HbA1c for the intervention group ($P<.05$)" with an average HbA1c percentage decrease of 1.2% (Kim & Oh, 2003). The percentage change in the control group was also significant ($P<.05$) except the HbA1c level increased by 0.8% instead of decreasing as desired (Kim & Oh, 2003).

C. Barr Taylor, MD; Nancy Houston Miller, RN, BSN; Kelly R Reilly, MSN, CDE; George Greenwald, MD; Darby Cunning, MA; Allison Deeter, MA; and Liana Abascal, MA wrote the article "Evaluation of a Nurse-Care Management System to Improve Outcomes in Patients With Complicated Diabetes" where they performed a study designed to "evaluated the efficacy of a nurse-care management system" to improve patient outcomes for those with complicated diabetes (2003). Their study was conducted in a Santa Clara Kaiser Permanente

Medical center where computerized databases identified patients with an HbA1c level of >10% along with a diagnosis of diabetes compounded by hypertension, dyslipidemia, or cardiovascular disease. Eligible patients (169 total) were assigned to either the intervention group (84 participants) or the control group (85 participants), but not told which group, and met for a baseline assessment as well as a follow-up assessment one year later (Taylor, et al., 2003). The control group got generalized, usual care while the intervention group had a 90 minute consultation with a nurse at the start of care, met once a week for four weeks for a group class, and received telephone calls at the initiation of the program as well as at 5, 8, 12, 16, 20, 28, 36, and 44 weeks into the program. The phone calls averaged 15 minutes each (Taylor, et al., 2003).

At one year, there was a statistically significant mean change in HbAlc and total and LDL cholesterol for the intervention group but not the control group (Taylor, et al., 2003). In addition, "significantly more patients in the intervention group met the goals for HbA1c" ($P<.03$) than the control group (Taylor, et al., 2003). There were no significant difference between groups for any of the self-care or psychosocial variables, utilization of the ER, physician visits, or hospitalizations.

These articles provided supporting evidence to the idea that implementation of additional programs that hold patients accountable are beneficial to the overall health both short and long term. In the articles by Watterson, et al., Piette, et al., Kim, H.S. & Tai, and Taylor, et al., the authors showed that there was statistically significant evidence that telephone calls with nurse follow-up was effective in increasing satisfaction with care, use of specialty care, decreasing HbA1c levels, and adherence to diet and blood glucose testing. But, Watterson, et al. showed that even if programs were widely made available, it is up to the patient to be involved and take charge of their care in order for it to be effective.

Qualitative Review of Care

The following article discusses patient perceptions on psychosocial impacts on the lives of people diagnosed with DM type 2 and their views on what could assist with those complications.

B. Rasmussen RN, MEdSt, PhD; H. Terkildsen Maindal RN, MPH, PhD; P. Livingston BA, PhD; T. Dunning RN, MEd, PhD; and V. Lorentzen RN, PhD wrote the article titled "Psychosocial factors impacting on life transitions among young adults with type 2 diabetes: an Australian – Danish qualitative study" where they "aimed to explore similarities and differences in how psychosocial factors impact on Australian and Danish young adults with T2DM and to identify unmet support needs during life transitions" (2016). This study was comprised of 26 people between the ages of 19 and 42, 12 of which were Austrailians and 14 were Danes.

Data were collected through semi-structured face-to-face interviews in a location of the participants choosing. The interviews, lasting between 40 and 80 minutes, were tape-recorded and transcribed verbatim (Rasmussen, et al., 2016). Data analysis was done concurrently in Australia and Denmark. Rasmussen, et al. noted emerging themes and issues and categorized them based on main themes such as "family and social network, economy, diabetes education, work/study, health services and psychological issues (cognitive abilities, mental stage, perspective on life)" (2016).

In general, participants reported that DM management was increasingly difficult to transition to and they often had to alter normal routines and self-care to conform to their changing lifestyles. It was also noted that this can cause a spiral of negative feelings and guilt resulted in low self-worth, anxiety, and depression "which in turn had a negative impact on social and professional relationships" (Rasmussen, et al., 2016). Participants in Rasmussen, et

al.'s study also highlighted a desire for connectedness not only between health care systems/networks, but also between other DM type 2 peers. Australian participants were also noted to be "more concerned than Danish participants about the cost associated with diabetes care" and ability to maintain employment causing them to be reluctant to disclose their diagnosis in profession settings (Rasmussen, et al. 2016).

There were a variety of similarities pertaining to impacts on quality of life and transitions between both the Danes and the Australians interviewed as well as desires for interconnectivity. This suggests that current health care systems would benefit from incorporating whole person care and assistance with managing life changes. The diagnosis of diabetes as well as the new lifestyle changes and hardships that come with it are a major part of the patients life and therefore should be included in care management. 'Standard care' needs to be expanded to include all needs of patients.

Overall Discussion of Literature

This collection of work provides strong evidence that current practice for diabetes care in outpatient settings across the world is not supportive or encompassing enough. Standard of care needs to be improved and enlarged to cover the whole person and interject preventative measures so that patients feel supported on a more normal basis, not just when they are ill and hospitalized.

Most of the articles used in this literature review (Kim,K et al.; Watterson et al.; Piette et al.; Kim, H.S. & Oh; Hsu & Tai; and Taylor et al.) had a similar limitation that they were done in specific subpopulations and because of that, they may not be generalizable to broader populations. A limitation discussed in the article by Choe et al. was that the study was conducted as "a quality improvement project aimed at measuring effectiveness in a real-world clinical

setting rather than as a strict protocol-driven randomized trial of efficacy" (2005). Not all of the articles were statistically significant at the P<.01 level, but all had P<.05 for HbA1c levels. And with limited sized sample groups, and some studies being pilot studies, this research is still important as a base for further understanding.

There are hundreds of thousands of articles pertaining to the topic of diabetes care management, and with just these eight, there is strong evidence that general care is not enough. And though general care may be defined and encompass different elements in different areas of the world, it is obvious that there is still more that can be done for sufferers across the globe.

Proposal of Further Study

Research Question and Rationale

This research proposal aims to investigate the personal experience and perception of intervention in usual care management. The articles above spoke to the positive benefits of extra case management and intervention as well as a qualitative review of desires for care. This pilot study will survey persons with diabetes mellitus type 2 on their perceptions of their care and attempt to compile recommendations for future case managers to use to create the most effective and beneficial care possible. Although it is validating to see decreases in HbA1c and blood glucose levels, there is not nearly as much research into patients perceptions on the effectiveness and sustainability.

Patients may have a decreasing HbA1c and blood glucose levels during and shortly after programs or education, but if they do not fully understand the information given or it's importance, patients will not sustain the positive changes. Performing a qualitative pilot study on patients' perceptions will also allow for them to tell us what they think has been useful or irrelevant, what they want more information on, and what they think will be useful for other people who share their diagnosis. And when case managers, nurses, and doctors have a better idea of types of personalization that people want, a stronger connection and better care can be foraged.

Theoretical Framework

The theoretical framework for this pilot study is Dorothy E. Johnson's "Behavioral System Model" created in 1968. In her theory, Johnson states that nursing can be defined as "an external regulatory force which acts to preserve the organization and integration of the patient's behaviors at an optimum level under those conditions in which the behavior constitutes a threat

to the physical or social health, or in which illness is found' " (Johnson's Behavior, n.d.). In this theory, health is seen as "a purposeful adaptive response to internal and external stimuli in order to maintain stability and control" in any or all physical, mental, emotional, and social realms (Johnson's Behavior, n.d.). Johnson's Behavioral System Model advocates for efficient and effective behavioral functioning of patients to prevent illnesses. An imbalance in behavioral systems results in disequilibrium and it's the nurses job to help return the patient to a state of equilibrium.

This theory was chosen for the pilot study because it acknowledges that the whole person has to be involved in care management; without taking into account personal behavior and mental/emotional factors, the illness afflicting the patient will not be resolved. And nurses need to help assess and change behaviors into beneficial modes which will allow them to keep up with healthy habits. In the proposed study, patients will be surveyed on what they found worked well for them as well as recommendations they have for improvements in diabetes care management.

Primary Research Aims

- What management techniques and lifestyle changes have been recommended for you?
- Do participants feel they can maintain lifestyle/habit changes?
- What has made it easier/helped you to stick to your management plan?
- What do you think would help you stick to your management plan? Where is your current care lacking?

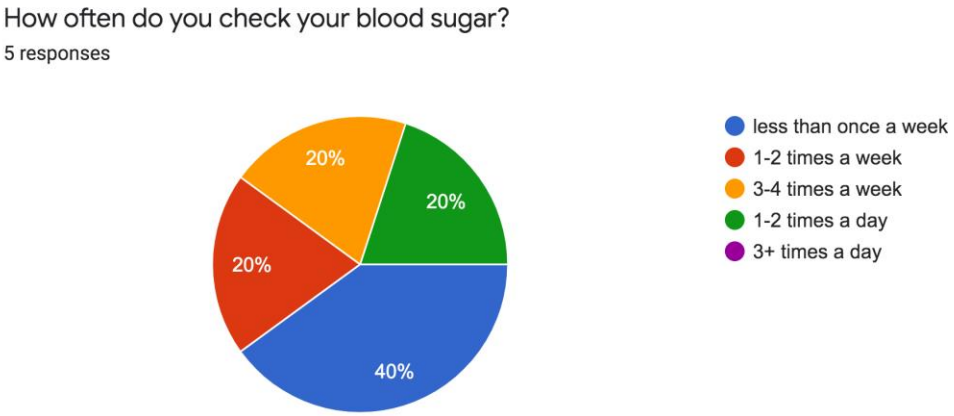
Ethical Considerations

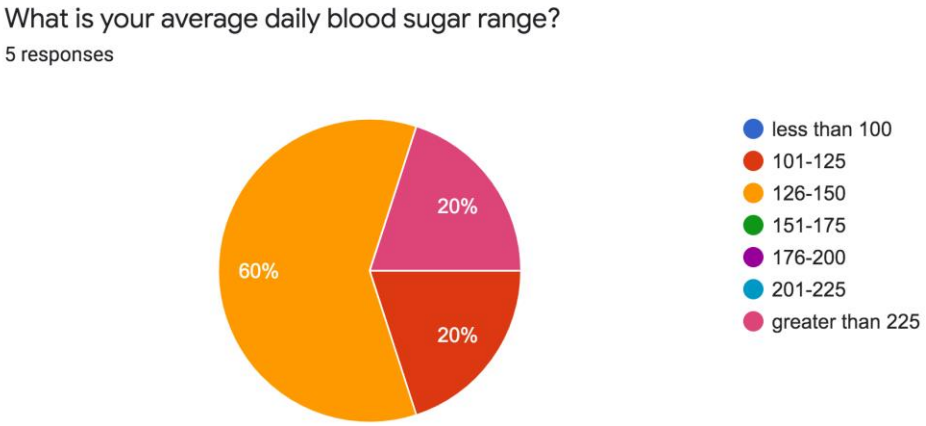
Because this study is based on a low risk survey consent can be implied through submission of the survey. There are statements in the description of the survey that state by submitting the survey they are giving consent to their data to be used. The survey is collected through Google forms and remains confidential. There is also a statement about having the right to withdraw and stop the survey at any time. The information being gathered will be subjective and based on what the patients want to share. This study was also approved by the Dominican Institutional Review Board.

Research Methods

- **Study Type:** Qualitative Pilot Study
- **Population:** adults, aged 18+ years or older, with type 2 Diabetes Mellitus who live in the San Francisco Bay Area
- **Sample Size:** 5 people.
- **Recruitment Strategy:** The researcher will post recruitment posts on social media (Instagram and Facebook) attempting to recruit participants with type 2 Diabetes.
- **Ethics:** There will be implied consent for the survey. The survey description will also state the purpose of the survey and its use in this thesis. The survey and its description are attached in Appendix B.
- **Data Collection:** Data was collected through Google Forms. The data is confidential and no identifying information was collected.
- **Results:** Most participants reported that they manage their diabetes with medication and diet regulation. Two of the five participants also reported using exercise as part of their routine maintenance along with dietitian/nutritionist support. When asked about what barriers they had in their personal life that have made it harder to stick to their

management plans, physical injury and arthritis, compounding diagnoses, and inconsistent schedules were reported.





- **Data Analysis: Content Analysis:** A common request among participants was for education. Participants thought that having proper education was key to managing their diabetes and would recommend asking clarifying questions, having frequent follow-up appointments, and trying classes to see what format you best absorb the information. Diabetes is a lifelong condition that can be managed. A common thing that participants reported was that support from family and spouses helped a lot. When they felt that they

could lean on a close family member who knows about their diagnosis and how to help, they found it easier to stick to their management plan.

- **Findings:** Many people from this study have said that compounding diagnoses and physical barriers have made it more difficult to stick to their management plan. Barriers, often out of their control, are holding them back. And if their primary doctor doesn't ask about this, they will not know that the patient is unable to exercise and needs to focus more on diet or medication.

Conclusion

Based on the literature collected and reviewed, researchers have shown that additional case management outside of usual care such as inpatient care and regular doctors' appointments have the ability to significantly assist people with diabetes mellitus type 2 in decreasing HbA1c and blood glucose levels. This information should be applied to current practice in the form of added case management and additional services being offered to everyone with the diagnosis. The literature reviewed provides scientifically significant evidence that the current practices for diabetes care across the world are neither supportive nor encompassing enough.

Standard of care needs to be advanced and enhanced to encompass the person as a whole. By introducing early intervention and case management as preventative measures, people with diabetes will feel supported on a more normal basis, not just when they are ill and hospitalized. It is understood that added management works, and this pilot study brings some answers in as to what people with diabetes themselves actually want. They want education and teaching about the disease itself and how their medication works within their bodies, they want family or friends to keep them held accountable, and they want their doctors to know and care about barriers they face at home.

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Literature Review Table

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Choe, H. M., Mitrovich, S., Dubay, D., Hayward, R. A., Krein, S. L., & Vijan, S. (2005, April). Proactive Case Management of High-risk Patients With Type 2 Diabetes Mellitus by a Clinical Pharmacist: A Randomized Controlled Trial. Retrieved from http://drtedwilliams.net/cop/727/diabetes disease management 3.pdf	-To "evaluate the effect of case management by a clinical pharmacist on glycemic control and preventive measures in patients with type 2 diabetes mellitus"	-80 patients with poorly controlled type 2 DM	-Design: Randomized control trial -IV: Patient teaching on DM management from pharmacist clinicalist -DV: Hb1c levels	-Clinical pharmacist provided pharmacotherapy, self-management education, and reinforcement through clinic visits and telephone follow-ups and measured hemoglobin A1c (HbA1c) levels to look for changes	-"Patients who received case management by the clinical pharmacist achieved greater reduction in HbA1c levels than those in the control group (2.1% vs 0.9%, P = .03)." -Significantly significant decreases in HbA1c and increase in glycemic control in patients in the intervention group	-Strengths: Casework with pharmacist provides patients with increased medication knowledge and information -Limitations: Small sample (only 80 participants); the study was conducted as "a quality improvement project aimed at measuring effectiveness in a real-world clinical setting rather than as a strict protocol-driven randomized trial of efficacy"

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Kim, K. B., Kim, M. T., Lee, H. B., Nguyen, T., Bone, L. R., & Lavine, D. (2016, June). Community Health Workers Versus Nurses as Counselors or Case Managers in a Self-Help Diabetes Management Program. Retrieved from https://eds-b-ebscohost-com.dominican.idm.oclc.org/eds/pdfviewer/pdfviewer?vid=1&sid=7d0bb685-00ce-420d-90eb-996a42f64205@sessionmgr103	-To "confirm the effectiveness of community health workers' involvement as counselors or case managers in a self-help diabetes management program" in comparison to RNs	-Korean Americans with uncontrolled type 2 diabetes, as measured by a hemoglobin A1C level of 7.0% or higher -Control Group: 104 participants -Intervention Group: 105 participants (54 community health worker, 51 RN)	-Study Design: Randomized control trial -IV: Community health worker or Nurse as caseworker -DV: HbA1c levels in participants	-Both physiological and psychobehavioral health outcomes were measured at months three, six, nine, and 12 -Included hemoglobin A1C and blood glucose, self-efficacy, quality of life, diabetes knowledge, attitudes, and depression	-Community health workers' performance was comparable to that of the RNs for both psychobehavioral outcomes and physiological outcomes. -Community health worker group showed hemoglobin A1C reductions greater than RN-counseled and the control groups	-Strengths: Shows statistically significant reduction in blood glucose levels in community health worker group -Limitations: Only done with Korean-American patients, may not be generalizable to broader population

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Watterson, J. L., Rodriguez, H. P., Shortell, S. M., & Aguilera, A. (2018, October 30). Improved Diabetes Care Management Through a Text-Message Intervention for Low-Income Patients: Mixed-Methods Pilot Study. Retrieved from https://www-ncbi-nlm-nih-gov.dominican.idm.oclc.org/pmc/articles/PMC6238849/	-To "examine the implementation and impact of a diabetes text-messaging program targeted primarily for low-income Latino patients receiving care at 2 federally qualified health centers (FQHCs)"	-50 Spanish or English-speaking adult patients with diabetes attending 2 FQHC sites in LA, CA -Comparison groups of 160 eligible patients	-Study Design: Mixed-methods, quasi-experimental -I.V.: Text message program -D.V.: HbA2c and blood glucose levels	-12-week, bidirectional text-messaging program consisting of 3-4 interactive messages per week (some bidirectional requiring response to multiple choice or true/false question as well as unidirectional health tips or reminders)	-Intervention group average decrease in HbA2c was not significantly significant but those highly involved in the program had a statistically significant decrease in HbA2c levels compared to those less engaged -Program improvements hold potential for improving patient engagement and therefore improved clinical outcomes	-Strengths: Statistically significant evidence that program works for those highly/actively engaged in program -Limitations: Small sample group; specific subpopulation, may not be generalizable to broader population; still kinks in linkage to care and assurance of engagement

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Hsu, C.-C., & Tai, T.-Y. (2014, December). Long-term glycemic control by a diabetes case-management program and the challenges of diabetes care in Taiwan. Retrieved from https://www.diabetesresearchclinicalpractice.com/article/S0168-8227(14)70738-7/pdf	-To "evaluate the long-term effects on glycemic control of a diabetes care program focusing on case management and to discuss challenges in the quality of diabetes care in Taiwan"	-Randomized 1,060 participants from the *Diabetes Management through an Integrated Delivery System* -Intervention Group: 789 from 27 clinics -Control Group: 271 from seven clinics	-Study Design: Randomized control trial -I.V.: Care deliverance and supervision -D.V.: Blood glucose and HbA1c	-Intervention group was cared for/supervised by National Health Research Institute approved case managers, and standard care was provided to the control group	-HbA1c level in the intervention group was significantly lower than that in the control group beginning at the sixth month after recruitment and lasting for at least three years -significant intervention effects were sustained for those with a baseline HbA1c level >9% and 7–9%, -those with good glycemic control didn't seem to improve glycemic control, except a significantly lower HbA1c level at month 36	-Strengths: Large sample group; statistically significant increase in glycemic control and decrease in HbA1c levels -Limitations: Single country study, may not be generalizable to broader population

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Piette, J. D., Weinberger, M., Kraemer, F. B., & McPhee, S. J. (2001, February 2). Impact of Automated Calls With Nurse Follow-Up on Diabetes Treatment Outcomes in a Department of Veterans Affairs Health Care System. Retrieved from https://care.diabetesjournals.org/content/diacare/24/2/202.full.pdf	-To evaluate the effectiveness of "telephone nurse follow-up as a strategy for improving diabetes treatment processes and outcomes in Department of Veterans Affairs (VA) clinics"	-272 VA patients with diabetes using hypoglycemic medications	-Study Design: Mixed methods, Randomized control trial and Qualitative interviews -I.V.: Phone calls from nurse -D.V.: HbA1c levels and blood glucose levels	-One year study period -Intervention patients received biweekly automated telephone calls, health assessment, and self-care education calls. -Glycemic control measured by HbA1c and serum glucose testing. -Qualitative interviews on peoples perceptions of care	-At 12 months, intervention: patients reported more frequent glucose self-monitoring and foot inspections -Intervention patients with baseline HbA1c levels >8% were lower among intervention (P = 0.04) -Intervention patients with baseline values >9% were lower (P = 0.04 -Intervention patients reported fewer symptoms of poor glycemic greater satisfaction with care	-Strengths: Large study; qualitative interviews as well as statistically significant data -Limitations: Data significant at P=0.04 but not 0.01; specific subpopulation, may not be generalizable to broader population

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Taylor, C. B., Houston Miller, N., Reilly, K. R., Greenwald, G., Cunning, D., Deeter, A., & Abrascal, L. (2003, April 4). Evaluation of a Nurse-Care Management System to Improve Outcomes in Patients With Complicated Diabetes. Retrieved from https://care.diabetesjournals.org/content/diacare/26/4/1058.full.pdf	-To assess "the efficacy of a nurse-care management system designed to improve outcomes in patients with complicated diabetes"	-169 patients with longstanding diabetes in a Kaiser medical center in Santa Clara, CA -HbA1c levels >10% -84 in intervention -85 in control (usual medical care)	-Study Design: Randomized control trial -I.V.: Guidance and education nurse care managers phone calls and meetings -D.V.: HbA1c levels	-Intervention group met with a nurse-care manager to establish goals, attended group sessions once a week for up to four weeks, and received telephone calls to manage -HbAlc, LDL, HDL, and total cholesterol, triglycerides, fasting glucose, systolic and diastolic blood pressure, BMI, and psychosocial factors were measured at baseline and one year later	-At one year: mean reductions in HbAlc, total cholesterol, and LDL cholesterol significantly greater for the intervention group -Significantly more in the intervention group met the goals for HbA1c (<7.5%) (P<0.03 -No significant differences in psychosocial variables or physician visits	-Strengths: Large study; statistically significant reduction in HbA1c -Limitations: Sample from only one medical center, may not be generalizable to broader population

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Rasmussen, B., Terkildsen Maindal, H., Livingston, P., Dunning, T., & Lorentzen, V. (2016). Psychosocial factors impacting on life transitions among young adults with type 2 diabetes: an Australian – Danish qualitative study. Retrieved September 24, 2019, from https://eds-b-ebscohost-com.dominican.idm.oclc.org/eds/pdfviewer/pdfviewer?vid=1&sid=6bab132e-94ae-4ccd-9299-3bf33f4528fe@pdc-v-sessmgr06.	-To "explore similarities and differences in how psychosocial factors impact on Australian and Danish young adults with T2DM and to identify unmet support needs during life transitions"	-26 people with type 2 diabetes for >10 months between ages 19 and 42 -12 from Australia -14 from Denmark	-Study Design: Qualitative Study	-Goal of capturing the participants' knowledge and experiences -Data collected through semi-structured interviews and later underwent inductive descriptive content analysis	-Emerging themes/issues: family and social network, economy, diabetes education, work/study, health services and psychological issues -Psychosocial support needs are complex and need to be individualized -Participants noted that more flexibility in accessing health professionals was desired -Desire for integration of technology and communication via social media or online	-Strengths: First study to identify differences and similarities in psychosocial needs of young adults during life transitions -Limitations: No limitations

Citation	Objective/ Purpose	Sample	Study Design; I.V. & D.V.	Methods/ Interventions	Results/ Analysis	Strengths & Limitations
Kim, H.-S., & Oh, J.-A. (2003, July 16). Adherence to diabetes control recommendations: impact of nurse telephone calls. Retrieved from https://onlinelibrary-wiley-com.dominican.idm.oclc.org/doi/epdf/10.1046/j.1365-2648.2003.02800.x	-To "investigate the effect of nurse telephone calls on glycosylated hemoglobin (HbA1c) levels and adherence to diabetes control recommendations"	-36 total participants from the endocrinology outpatient department of a tertiary care hospital South Korea -Able to perform blood glucose test, self-injection of medication, understand the goals, methods and procedures, and HbA1c >7%-20 participants in the intervention -20 participants in the intervention group -16 participants in the control group	-Study Design: Randomized control trial -I.V.: Nurse phone calls for 12 weeks with continued education and reinforcement -D.V.: HbA1c levels	-Control group got routine care. -Intervention got 12-weeks of phone calls consisted of education and reinforcement of diet, exercise and medication and were asked to log blood glucose levels more than twice and keep logs -The calls were twice a week for the first month and then weekly for the rest.	-Intervention group had a mean decrease of 1.2% in HbA1c levels ($P<0.05$) and those in the control group had a mean increase of 0.6% in HbA1c levels ($P<0.05$) -Intervention group had greater diet and blood glucose testing adherence than the control group	-Strengths: Statistically significantly evidence that intervention reduced HbA1c levels -Limitations: Small group; specific subpopulation may not be generalizable to broader population; not all that started study completed it