



Diabetes Education and the Covid 19 Pandemic

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Abstract

Purpose: The purpose of this study was to evaluate the impact of the Covid 19 pandemic on diabetes education.

Methods: We assessed the data from our diabetes education department from 2017 to 2020 to compare the participation of patients with diabetes mellitus type 1 and type 2.

Results: Our results showed that the participants' return rate declined during 2020 (42%) when compared to 2017 (92.1%), 2018 (94.8%), and 2019 (93%). The patient satisfaction rate was 97.4% in 2017, 96.25% in 2018, 96.9% in 2019, 98.5% in 2020. The hemoglobin A1c improved by 15.99% in 2017, 18.28% in 2018, 18.27% in 2019 and 18.62% in 2020.

Conclusion: Our institution found that the Covid 19 pandemic negatively impacted the Diabetes education program participation. There was a total decrease of 26.82% in participants in the diabetes education program from 2017-2020; however, there was an overall decrease in A1c.

Keywords: Diabetics; Covid 19

Introduction

Diabetes is a metabolic disease that occurs due to abnormal glucose metabolism causing hyperglycemia [1,2]. Diabetes is a disease that impacts more than 420 million people worldwide [3] and the number of those who have diabetes is steadily increasing in prevalence. Diabetes poses a substantial financial burden to the U.S. The total annual cost is estimated at \$327 billion [4]. Within these estimated costs are indirect costs reflective of the loss of productivity associated with morbidity and mortality [5].

Diabetes can cause multiple complications, which can further be divided into microvascular (i.e., retinopathy, neuropathy, nephropathy) and macrovascular (i.e., myocardial infarction, cerebrovascular accident) complications [6]. Cardiovascular disease is the number one cause of mortality [7].

There are multiple ways to control diabetes and its effects. Some of the methods include lifestyle modifications and medications. Recently, cardiovascular and renal benefits have been considered the top priorities, along with weight loss and low risk of hypoglycemia when medical management is being considered. Therefore, GLP1 receptor agonists and SGLT2 inhibitors have gained significant popularity due to their cardiovascular and renal benefits, in addition to decreasing rates of hospitalizations associated with heart failure [8,9]. Lifestyle changes can entail a patient engaging in physical activity and eating healthy [10]. The foods you consume should limit carbohydrates and increase fiber-rich whole grains, lean meats, fruits, and vegetables.

The Diabetes Prevention Program Outcomes Study (DPPOS) was a randomized control trial that discovered that lifestyle intervention significantly reduced the development of diabetes over the 15-year trial [11]. Additionally, there was

a lower risk of those participants developing microvascular complications like retinopathy and nephrology, along with major cardiovascular events.

Diabetes management is getting complicated day by day due to new technology every year, new medications, continuous glucose monitor, and insulin pumps. As a result, a significant amount of information needs to be understood to manage this condition. Therefore, more than 20 years ago, the National Diabetes Education Program (NDEP) was initiated. The diabetes education program is typically run by licensed healthcare professionals [12]:

To aid patients in adequately managing their diabetes diagnosis, diabetes education implements the following:

- Basic information about diabetes and management
- Adopting healthy eating habits through nutrition education
- Instructing on how to use glucose meters, insulin pens, insulin pumps, and continuous glucose monitors
- Monitoring blood glucose and understanding how to read and interpret results.

Diabetes education is often delivered in an in-person setting with individual or group formatting [12], or it can be administered through telemedicine. With this method, participants can engage in online educational videos and teleconferences via video chat with Zoom or Google Meet, allowing them to discuss concerns and questions through telephone conversations [13].

The COVID-19 pandemic has been an experience that has impacted everyone exponentially. Unfortunately, many were unaware of the significance of the complications associated with it. In addition, the multiple restrictions put in place by state and federal governmental agencies at the start of the pandemic negatively impacted attendance to diabetes education programs. It might have been beneficial for patients to be educated on the ramifications of the pandemic, prevention management, and the importance of adhering to diabetes treatment and education throughout the pandemic [13].

Though not directly, there has been an impact on the glycemic control of many patients. Therefore, our study wanted to see how COVID-19 has impacted our patient population.

Methods

At our institution, we evaluated patients from 2017 to 2020 who received diabetes education at Ascension Lourdes Hospital. Inclusion criteria included patients diagnosed with diabetes mellitus type I or type II and participating in the surveys. Exclusion criteria included patients who received

diabetes education but did not have documented behavior goal outcomes.

The information was reviewed utilizing a secondary data analysis. The question was then posed as to the degree to which the COVID-19 pandemic has impacted participation in diabetes education. There was an evaluation of the number of participants in the program each year, participant satisfaction with the services/resources offered, the average A1c values throughout that time, and the desired goals of behavior changes.

Three categories were evaluated within the study data. They included Patient Satisfaction, Hemoglobin A1c Pre and Post Comprehensive Program, and Behavior Change Goals Achievement. Patient satisfaction included information detailing the sample size, return rate, and percentage of satisfaction with the program. This was measured using Outpatient Satisfaction Surveys consisting of eight questions that were ranked with the responses "Strongly Disagree," "Disagree," "Neither Agree nor Disagree," "Agree," and "Strongly Agree." Patient satisfaction was met with "Agree" and "Strongly Agree" responses. Those responses were given the values of 4 ("Agree") and 5 ("Strongly Agree"), which were then analyzed to assess patient satisfaction in a percentage value.

The mean A1c values included a lab value obtained 30 days before the commencement of the program and an A1c 6 months following the completion of the program. The sample size and the change in A1c values were also recorded.

For the year, patients were tasked with identifying behavior change goals they were interested in improving. Those goals included being active, healthy coping, healthy eating, monitoring, problem-solving, reducing risks, and taking medication. The selected behavior goals were self-assessed and assigned rankings of "Never," "Occasionally," "½ of the time," "Most of the time," and "All of the time." The latter options were assigned a value of 4 ("Most of the time") and 5 ("All of the time"). The behaviors that were found to have a rating of 4 or 5 were satisfactory.

Results

The total number of participants from each year were 723 (2017), 690 (2018), 659 (2019), and 552 (2020). There was a 23.65% decrease in the total number of participants from 2017 to 2020. The services offered were 1868 (2017), 1758 (2018), 1819 (2019), and 978 (2020). From 2017 to 2020, there was a drop in services offered by 47.64% (Table 1). In 2017, a total of 210 out of 228 participants responded. There was a 92.1% return rate and a 97.4% satisfaction rate with the services provided. The results from 2018 identified 200

of 211 participants who presented with a 94.8% return rate and a 96.25% satisfaction rate. 230 of the 248 participants in 2019 had a 93% return rate with 96.9% satisfaction. In 2020, the sample size was significantly smaller than in previous years, consisting of 44 of 105 participants. There was a return rate of 42%, yet a 98.5% satisfaction rate (Table 2).

Those 95 participants involved in the program in 2017 began with an average A1c of 7.94% and ended with an average of 6.67%. This implies a 15.99% change in A1c. In 2018, 98 participants began the year with an average A1c of 8.26% and completed the year with an average rate of 6.75%, indicating an 18.28% change in A1c. The 196 sample size in 2019 began with an average A1c of 8.65% and ended the year with an average of 7.07%. That shows an 18.27% improvement. The initial average A1c for a sample size of 55 in 2020 was 8.86%, and the ending A1c average rested at 7.21%, thus indicating an 18.62% decrease (Table 3).

Healthy eating and being active were the participants' most chosen evaluated behavior goals in 2017. However, more success was noted in those who desired to enhance their activity in taking their medications (84.6%). The participants in 2018 also more frequently evaluated being active and adopting healthy eating behaviors. At the same time, 86.7% of participants were successful at taking medications. Again, healthy eating and increased activity were the most evaluated behaviors, yet most successes were

noted in medication adherence (95.3%). The same behavior change goals were present in 2020, with healthy eating and being active being the most frequently evaluated. 90% of participants found themselves to be successful with taking their medications (Table 4).

	2017	2018	2019	2020
Total Participants	723	690	659	552
Number of Services Offered	1868	1758	1819	978

Table 1: Total Participants and Number of Services Offered.

	2017	2018	2019	2020
Sample size (n)	210	200	230	44
Return rate (%)	92.1	94.8	93	42
Percent satisfaction (%)	97.4	96.3	96.9	98.5

Table 2: Patient Satisfaction.

	2017	2018	2019	2020
Sample Size (n)	95	98	196	55
Initial A1c (%)	7.94	8.26	8.65	8.86
Last A1c (%)	6.67	6.75	7.07	7.21
Percent Change	-16	-18.3	-18.3	-18.6

Table 3: Average A1c Pre and Post Comprehensive Program.

Behavior Change	2017		2018		2019		2020	
	% Successful	Number of times rated 4 or 5**	% Successful	Number of times rated 4 or 5**	% Successful	Number of times rated 4 or 5**	% Successful	Number of times rated 4 or 5**
Being Active	51.3(189)*	97	51(151)*	77	61(244)*	149	53.6(140)*	75
Healthy Coping	58.3(12)*	12	66.7(6)*	4	84.6(13)*	11	78.6(14)*	11
Healthy Eating	70.7(423)*	299	71.9(327)*	235	80.5(451)*	363	79.4(291)*	231
Monitoring	67.2(64)*	43	71.2(59)*	42	80.4(56)*	45	84.6(39)*	33
Problem Solving	75(4)*	3	72.7(11)*	8	80(10)*	8	60(5)*	3
Reducing Risks	75(64)*	48	76.9(65)*	50	86(57)*	49	84.6(26)*	22
Taking Medication	84.6(39)*	33	86.7(30)*	26	95.3(64)*	61	90(40)*	36

* Number of times the behavior is measured

** 1 = goals not met, 5 = goals met or exceeded

Table 4: Behavior Change Goal Achievement.

Discussion

We have found that the onset of the COVID-19 pandemic has negatively impacted the level of participation in diabetes education services at our institution. For instance, it can be

noted that the satisfaction rate remained in the upper 90th percentile for the duration of the study (2017 to 2020). However, the number of participants notably decreased throughout the pandemic. The program began with 723 in 2017 and decreased to 552 by 2020 (-23.65%). There was

a significant decrease in the return rate as well. The starting return rate of 92.1% decreased to 42% in 2020 (-54.39%).

A1c is a valuable tool for monitoring diabetes management. The initial A1c for the participants was 7.94% in 2017. However, that was noted to have increased in 2020, with an initial A1c being 8.86% (+10.38%). There was also an increase in the final A1c values for the start and end of the study, 6.67% to 7.21% (+10.38%), but the most significant change in A1c was noted to be in 2020. So despite a decrease in participation in diabetes education services, we had an overall improvement in A1c values.

Diabetes education has proven beneficial to those who participate [14]. This is especially imperative in those who suffer from multiple socioeconomic factors. For example, people who live in low-income communities, lack education, and have occupational instability are more susceptible to diabetes complications and mortality [15]. However, with proper diabetes education, members of these communities can learn about appropriate behavior changes and managing hypoglycemia.

Information gathered from the Diabetes Control and Complications Trial identified the importance of glycemic control. It was discovered that with intensive blood glucose control, there was a significant reduction in micro vascular complications (retinopathy, neuropathy, and nephropathy) for both Type I and Type II diabetes [16]. Having access to all the information that stems from diabetic education assists patients with being able to manage their disease confidently. This, in turn, prevents and possibly prolongs the onset of some of the long-term sequelae accompanying diabetes.

It has been recognized that diabetes and its associated symptoms are primarily associated with emotional challenges [16]. Diabetes education offers patients the opportunity to develop a more in-depth understanding. This information has also been designed to include various cultural groups, age groups, and multiple languages. However, the COVID-19 pandemic has limited patients' access to diabetes education services. For instance, Ascension Lourdes diabetes educators discontinued group sessions due to COVID.

Though the pandemic is nearing a less severe period, the impacts continue to be felt. These impacts are largely associated with the self-management behaviors of patients. For instance, the pandemic has influenced eating and sleeping habits, altered moods resulting in increased anxiety and depression, and confidence in managing diabetes has decreased [17].

The question becomes centered on the role that diabetes education plays in managing diabetes and its complications

despite national disasters or emergencies like the pandemic. Some researchers have discovered that online education and resources were highly beneficial in promoting and enhancing the quality of life for diabetics during the pandemic [13]. However, face-to-face meetings were discouraged and, at times, not available to limit transmission of the COVID-19 virus. Online video conferences allowed patients to continue to have access to much-needed guidance on their diabetes management.

To mitigate the massive impact that the pandemic has had on adherence to and attendance at diabetes education, emphasis can be placed on increasing access to online self-management education programs, providing a point of contact for patient care in the event of a disaster/emergency, and the development of culturally adapted resources [18]. In utilizing this method of disease management, motivation and engagement must be maintained. This can be obtained through video, animation, text, pictures, and reinforcement of knowledge through quizzes [19].

Our population faces many barriers to adequately accessing these services, such as ineffective internet connection due to geographic terrain, a large geriatric population unfamiliar with how to utilize these services, and the presence of social determinants of health.

Limitations of our Study

There were several limitations associated with the study. For example, this is a retrospective study; the sample size does not reflect the entire population; we have utilized mean A1c values.

Various social determinants of health may have played in patients' abilities to participate in diabetes education were not accounted for. Also, many participants may not have had a detailed understanding of the pandemic, including but not limited to the availability of diabetes educational resources. Finally, information about factors contributing to the increasing A1c values before diabetes education was not gathered.

Conclusion

We found that Covid limited participation in diabetes education programs for many reasons, including but not limited to fear of contracting the virus, lack of knowledge of existence, and possible socioeconomic disparities (i.e., lack of transportation, loss of income, etc.). Implementing telemedicine and internet-based educational services can improve access to diabetes education, thus glycemic control. However, many challenges, like access to high-speed internet and patient-friendly telemedicine platforms, need to be

addressed.

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