Lack of Access to Diabetes Technology and its Effect on Sociological Groups

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Abstract

Evolving technologies to help Type 1 Diabetics learn how to live with their condition are out of reach for many due to the price point set on the products by large pharmaceutical organizations, otherwise known as Big Pharma. To explore this, I researched the sociological demographics of youth, low-income patients, and minorities. Through this, I confirmed that minority groups of Non-Hispanic Blacks and American Indians not only had the highest prevalence of Type 1 Diabetes, but they also had the lowest use rates for glucose monitors and insulin pumps. Similarly, the youth prevalence of Type 1 Diabetes is incredibly high since the disease is commonly diagnosed in juveniles. However, students that do not have the means to access these technologies are at a disadvantage in the school setting as it relates to accommodation measures. For low-income patients, the price of products resulted in insulin rationing, a method taken to lower the frequency of prescription payments. The results of my research established that there is a wide gap in sociological disparities amongst Type 1 Diabetics; However, there are many potential steps that can be taken to narrow it.

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Lack of Access to Diabetes Technology and its Effect on Sociological Groups

Throughout the world, there are unjust inequities surrounding access to physicians, medications, and healthcare technology for many. These inequities are rooted in differences in ethnicities, ages, and socioeconomic groups. One of the largest conditions that inequities are seen in relation to is Type 1 Diabetes. For some patients with Type 1 Diabetes, they do not have the same access to healthcare or technology due to financial incapability or because of a lack of resources. One of the biggest reasons that having Type 1 Diabetes is such a financial burden is because of large pharmaceutical organizations and the price point that they apply to medications and technology. Large pharmaceutical organizations are unjust in that they fail to recognize healthcare inequalities and deny access to healthcare technology in clients with irreversible Type I Diabetes. Throughout this paper, I will be arguing that large organizations, referred to as Big Pharma, limit diabetes technology to groups such as low-income patients, youth, and some racial and ethnic groups.

Type 1 Diabetes

Anatomy and Physiology

Type 1 Diabetes is a subtype of diabetes mellitus in which the pancreas produces insufficient insulin in the body. The condition is chronic in nature and is usually diagnosed in juveniles. In the human body, the pancreas’ function is to produce the hormone insulin. After being produced, insulin is then put into the bloodstream and then travels to cells to allow glucose into them. As a result, insulin lowers the amount of glucose (sugar) that is in the bloodstream. This is a negative feedback system in which the pancreas then stops putting insulin into the bloodstream as the body seemingly has enough. However, because the pancreas in a Type 1

Diabetic does not produce insulin efficiently, glucose levels elevate in the bloodstream and can lead to serious, life-threatening complications.

Many complications can stem from Type 1 Diabetes. For example, heart and blood vessel disease, high blood pressure, nerve damage (neuropathy), kidney damage (nephropathy), eye damage, skin and mouth conditions, ketoacidosis, high HB1Ac levels, and even pregnancy complications. Ketoacidosis, often referred to as Diabetic Ketoacidosis (DKA), is a complication of diabetes in which your liver breaks down fat for fuel and leads to an increase of the byproduct called ketones building up in your body. According to the Centers for Disease Control and Prevention (CDC) (2022), there are ways to treat or prevent DKA. However, the most successful way to prevent it is to keep up with regular insulin administration and try not to miss a dose. Another alarming side effect mentioned is high HbA1c levels. HbA1c stands for hemoglobin A1C, which is a test that measures the level of glucose attached to your hemoglobin, which is part of your red blood cells. HbA1c tests are a strong way to see how well your diabetes is being controlled. So, patients that do not have good control over this condition, are likely to have high HbA1c levels from this test, especially if they do not test their blood glucose levels frequently enough. Additionally, if the body has too high blood sugar levels, the patients can suffer from hyperglycemia, commonly referred to as high blood sugar. Because there is no known way to prevent Type 1 Diabetes, the best thing for patients to do is to control its symptoms and effects on the body as it manifests.

To control Type 1 Diabetes, patients should go in for regular check-ups with their specialist, live a healthy lifestyle, learn how to cope with stressful activities, and regularly monitor their glucose statuses. To manage blood sugar, patients can take frequent readings using a manual finger-pricking method or via a continuous monitoring device. When readings show that blood sugar is elevated from the baseline, patients then need to administer dose of artificial insulin. This synthetic insulin will provide the patient with the insulin that the pancreas is not able to produce on its own.

Prevalence

An important aspect of Type 1 Diabetes is its prevalence in different sociological groups. As this paper continues, I will provide data that support the groups of youth, minorities, and low-income. Because Type 1 Diabetes is diagnosed at a young age, there is a lot of data that shows just how it affects this group of people. For example, between the years 2001 and 2017, the number of patients with Type 1 Diabetes under the age of 20 increased by 45% (CDC, 2021). Additionally, the peak years of diagnosis in youth is around age 14 in both males and females. For ethnicity prevalence, it is also very common that minorities have a higher rate of diagnosis than Non-Hispanic (NH) white patients. In research by the American Diabetes Association, they reported that 14.5% of American Indian/Alaskan Natives have Type 1 Diabetes, along with 12.1% NH Blacks, 11.8% Hispanics, 9.5% of Asian Americans, and, lastly, only 7.4% NH whites. As it relates to low-income Type 1 Diabetic patients, there is not a lot of data to support this demographic. Because patients need to attend an appointment with a physician to obtain a diagnosis, and a lot of low socioeconomic patients don’t regularly see a physician due to out-of-pocket and insurance restraints, there is not accurate data regarding the group. These groups will be later discussed in my capstone. However, I wanted to frame the social groups before discussing additional arguments.

Technology

In recent years, there has been an evolution of diabetes technology which provides patients with continuous reading and pumps to administer insulin as opposed to manual injections. According to the Endocrine Society, insulin pumps mimic the physiology and functions of the human pancreas. Throughout the day, the pump administers a steady dose of insulin, called a basal rate. And then around mealtimes, due to the intake of glucose in food, the pump administers a bolus dose (Endocrine Society, 2020). The insulin administered via this pump is synthetic and was designed by Sir Frederick G Banting, Charles H Best, and JJR Macleod in 1921. After years of research and trials in 1923, they sold the patents to the University of Toronto for $1 acknowledging that he wanted everyone to be able to access this product that needed it (The British Diabetic Association, 2022). There are many advantages to having an insulin pump such as consistent delivery of insulin, flexibility to adjust dosages, precise administration of dosages, and less needle-sticking. Similarly, Continuous Glucose Monitors also provide constant, accurate data for clients. These meters test the liquid between cells, intracellular fluid, every few minutes and then send the information to a database on your phone or in the machine itself to record your glucose levels. Therefore, instead of having to manually take blood glucose levels throughout the day and around mealtimes, Type 1 Diabetics can rely on technology to accurately warn them if they are low in insulin or high in blood glucose. By doing this, diabetics can prevent blood glucose attacks in which blood sugar levels are too high.

Blood glucose monitoring and insulin administration using a pump run on an automated insulin delivery system. This meant that they are set on a loop, just as the pancreas does in a non-diabetic body: the continuous reading will cause the pump to adjust its insulin dosages based on the blood glucose reading. This is incredibly important for those who are actively working or do not have the financial means to test their glucose levels as often as recommended. Additionally, there are insulin pens and smartphone applications that work similarly to this as well.

However, as I have stated, continuous readers and pumps are not always financially attainable by all Type 1 Diabetics. Patients with Type 1 Diabetes must not only obtain a diagnosis from their physician, but they must have a prescription and access to insulin products. To obtain a diagnosis, physicians must take a blood sample when you are fasting (not eating overnight beforehand). If you fall less than 100mg/dL, it is healthy. Between 100mg/dL and 125mg/dL, it is considered prediabetic. And if you test at 126 mg/dL or higher on two different tests, your physician will diagnose you with diabetes.

Effects on Sociological Groups

Lower Income Patients

One of the sociological groups affected by the unjust lack of access to diabetes technology is low-income clients. Patients diagnosed with Type 1 Diabetes who are of lower socioeconomic status are more likely to result in less-successful outcomes, according to Diabetes Digital Health, Elsevier (2020). Because technological advances have not made efforts to be distributed to the audience of lower socioeconomic statuses, there is a growing gap in disparities between socioeconomic groups that will continue to widen if not resolved now. It is also true that patients who have private healthcare insurance coverage also have higher rates of insulin pump and continuous glucose monitor use (Barry-Menkhause, et. al., 2020). This is disturbing to hear as the type of insurance plan that you have, if any, should not be the deciding factor as to whether you should have access to glucose monitors and insulin pumps that could potentially save the lives of Type 1 Diabetics.

Another major concern for those with diabetes who have low income is insulin rationing. Data shows that some patients with Type 1 Diabetes will ration their insulin prescriptions as a means of making it last longer so that they do not have to pay as often for their treatment. In a volume of The Lancet: Diabetes and Endocrinology, Fiona Conner and others write that "dangerous and fatal insulin rationing is widespread, with 18% (253/1408) of all respondents and nearly 26% (162/627) of US respondents reportedly having rationed insulin at least once in the previous year" (Conner et. al., 2019). This is an incredibly disturbing statistic to sit with as, for Type 1 Diabetics, they need adequately prescribed insulin to survive. Therefore, if they continue to ration their prescriptions and dosages, they could potentially put themselves at risk of suffering from ketoacidosis.

A snapshot about a patient named Alec Smith by S. Vincent Rajkumar tells the story of a Type 1 Diabetic whose health insurance offered him a $7600 deductible and a monthly premium of approximately $440. However, because this was too expensive for him to afford, the patient decided to temporarily forego insurance coverage and purchase insulin with cash (Rajkumar, 2020). After this, though, he was still unable to pay cash due to its expense for his prescription, so he chose to ration the amount of insulin he took until he had enough savings to purchase insurance. But, after a while of this suffering, he ended up passing away from ketoacidosis and was found dead in his apartment. This case gives a real-life example of how low-income patients must make decisions about their life-dependent medications. Because large pharmaceutical organizations unjustly raise the price of their products, patients, like Alec, must ration their prescriptions and risk their health.

Youth

Another group that is directly affected by the lack of access to diabetes technology is children and young adults. Since Type 1 Diabetes affects about 1 in 400 children, adolescents, and young adults, this is an incredibly important group to draw focus on (American Academy of Pediatrics, 2019). Likewise, since the diagnosis and early signs of Type 1 Diabetes are usually at the pediatric age, it makes it one of the most common chronic diseases in juveniles. (Lawrence et. al, 2015). In a study about provider bias, employees of the Department of Pediatrics, Division of Endocrinology at Stanford University completed a biased assessment of physicians who treat diabetic patients. Per this study, provider bias was defined as physicians either recommending more technology for those on private insurance versus public insurance or providers ranking insurance in the top 2 of 7 reasons to offer technology (Addala et. al., 2021). After the study was completed, it was concluded that provider bias increased in frequency when the provider had been practicing for more years. This means that not only is it newer, more recently graduated physicians making these decisions, but it is more so the physicians who are older and have been practicing their profession for years. This is incredibly important as we begin to discuss diabetes technology in youth as, according to this, not only is it evident, but it continues to worsen due to provider bias.

Another aspect of Type 1 Diabetes in youth is how they are accommodated in a school setting. Because children in school spend close to 35 hours a week in the setting, it is imperative to manage their diabetes conditions while in that setting (Lawrence et. al, 2015). This is something that most do not often think about. However, when young patients do not have access to technology that can continuously track their blood glucose levels, this can make them susceptible to blood glucose attacks, especially at school if their teachers and faculty do not know how to accommodate them. For children with Type 1 Diabetes, it is recommended that they check their blood glucose levels at least four times a day: before each meal and before bedtime. However, more checks could be recommended for patients with worse conditions. Therefore, the school must require initial education and periodic updates about diabetes in children in general for their staff members. The school nurse and staff teams also need to compose individual care plans that are specific to each student's needs. For young patients that do not yet understand their condition and their needs, it is vital that they can have staff that will accommodate and advocate for their needs while at school and out of the direct care of their parents. Additionally, it is important that their lifestyle changes at school are accounted for such as having regularly scheduled meals and snacks, being able to adjust either food intake or insulin doses for increased physical activity such as physical education class, having a clean setting for blood glucose checks, where hands can be cleaned and with a sharps container. Lastly, the school should create and have ready access to an emergency kit with items such as glucose meters, fast-acting sugar sources, and extra snacks. While these changes may seem like a lot for a young patient, accommodations, and reminders such as these are imperative for their safety while at school, especially if they do not have access to healthcare technology due to income or insurance reasons. Children who do not have the financial ability to support themselves do not deserve to be at a disadvantage because the technology they need is out of their reach because of large pharmaceutical companies, also known as Big Pharma, and their greed.

Ethnic and Racial Groups

The last sociological group that is greatly affected by the lack of access to diabetes technology is ethnic-racial groups. Across the board, those of minority ethnicities have lower accessibility and use rates for diabetes technology such as insulin pumps and continuous glucose monitors. In a commentary piece written by physicians and researchers from across the United States called "Addressing type 1 diabetes health inequities in the United States: Approaches from the T1D Exchange QI Collaborative", it was determined that "NHB [non-Hispanic Black] patients also had the lowest rate of CGM use (NHB 17%; Hispanic 37%; NHW 40%) and insulin pump use (NHB 41%; Hispanic 56%; NHW 60%)" (Ebekozien et. al., 2022). Based on this, Black patients had the lowest rates of both continuous glucose monitors and insulin pumps, both of which are proven to be the best forms of diabetes control and attack prevention with technology.

In a study conducted by the Type 1 Diabetes exchange and published by The Journal of Clinical Endocrinology & Metabolism, they examined the prevalence of diabetes and diabetes complications in different groups of ethnicities. From this, it was discovered that of the patients with diabetic ketoacidosis both Non-Hispanic (NH) Black and Hispanic patients were more likely to be female, on public insurance, and had higher HbA1c levels than white patients (Ebekozien, et. al, 2020). This, along with the fact that Non-Hispanic Black and Hispanic Patients have the lowest levels of monitor and pump use, is extremely shocking and alarming as they, too, deserve the same level of access to healthcare as any other race or gender. As it relates to complications, it was also found that NH Blacks had about four times greater odds when it came to presenting with Diabetic Ketoacidosis (DKA) than NH whites. Additionally, overall, it was found that Hispanics were almost double the chance of presenting with DKA. This, too, is alarming as not only are these patients not receiving the same access to healthcare as others, but they are having worse complications because of it, too. If Big Pharma's price points were not placed as high as they are, products such as continuous glucose monitors and insulin pumps would be more accessible and beneficial for the aforementioned minorities with Type 1 Diabetes.

Response to the Opposition

Some may see that large pharmaceutical companies are just in that they are legally allowed to make and aim to increase revenue from selling diabetes medications and technology. For large corporate organizations, one of their main intentions is to increase revenue and become more profitable. To some, they believe this is true even if it outweighs the negative effect that it may have on those who cannot afford their product. It is believed by them if their business acts are legal and profitable, that their corporate pursuit is morally correct (Gabaldon, 2018). Additionally, per this view, moral principles should not be a part of the corporate calculus. Therefore, the view of beneficence, which is the moral principle to do good, does not have to play into corporate's initiatives towards increase of revenue.

Around the world, it is evident that this increase of revenue is not only widening the gap for disparities, but it is also growing the pharmaceutical sector. In fact, according to Sorin-George Toma and Stefan Catana, "in numerous developed countries, the healthcare sector accounts for 8 to 15% or more of the gross domestic product (GDP), making it one of the largest in their economies" (Catana & Toma, 2021). For reference, "the worldwide pharmaceutical market was worth nearly $1.3 trillion in 2019 and the top 10 pharma companies accounted for around a third of sales ($392.5 billion)" (Barton, 2020). And with this, the largest, most profitable corporations are given the title "Big Pharma". Big Pharma has expanded due to the growing elderly demographics and an increase in the need for healthcare products and services. (Catana & Toma, 2021). As a result of this, Big Pharma is described as a risky business and is often criticized for its manipulation of public opinion and how it increases its revenue. This directly correlates with my thesis that large pharmaceutical organizations, also referred to as big pharma, are unjust. Because they focus only on revenue and manipulation of consumers, they fail to recognize healthcare inequalities and deny access to healthcare technology especially for clients with irreversible Type I Diabetes.

As I have stated, this is an incredible injustice simply due to how accurate and potentially lifesaving diabetes technology is. According to Daniel Flanagan of the Endocrine Department of Derriford Hospital in Plymouth, there is a danger that those who have their Type 1 Diabetes under control are also the first to be offered the technology; meaning that those who need the products the most are the also the patients that are left out to dry (Flanagan, 2022). And because companies have their priority interest in achieving value of money, we are therefore penalizing patients who need the most help\. Flanagan not only recognizes that those who are struggling with their diabetes care are denied access to products, but he recognizes that this denial is due to large pharmaceutical companies, big pharma, valuing revenue first.

With this rise in revenue, it is also worth investigating what exactly large corporations do with the money that they make off their patients and their necessary purchases. According to America's Health Insurances plans, seven out of ten drug manufacturers that they investigated "spent more on selling and marketing expenses than they did on research and development" (R&D) and that for these companies, "selling and marketing expenses exceeded R&D spending by $36 billion, or 37%" (America's Health Insurance Plans, 2021). After making this discovery, it is painfully obvious that Big Pharma prioritizes their growth strategy over creating new groundbreaking products that could deliver better healthcare to more patients. This is disgusting to note since not only do these companies monopolize and take money from those who need their products to save their lives, but they do not use said money on continuing to research and develop within their product fields. This only further reinforces my claim that large pharmaceutical organizations are incredibly unjust and fail to recognize the inequities that the patients they "serve" suffer from.

Conclusion

Healthcare inequities surrounding Type 1 Diabetes as it relates to youth, lower income clients, and ethnic groups are a gap that is being worsened by large pharmaceutical organizations. Big Pharma systemically denies patients from receiving the best form of diabetes technology. Whether it is the price due to revenue goals, or the connotation that physicians can only offer these therapies to those with insurance, the moral principles of beneficence and non-maleficence are severely lacking. Beneficence and non-maleficence advocate that we should act for the better of people, and, in healthcare, prevent harm to patients. In this case, the pharmaceutical companies are doing quite the opposite. Instead of preventing harm, they are inducing it. Whether it is directly or not, these organizations are systemically catalyzing a ripple that denies access to diabetes technology to the ones who need it the most. But this is not just the case for Type 1 Diabetics. Patients all around the world suffering from chronic and acute conditions also fall victim to the villain that is Big Pharma.

This systemic issue of lack of access to healthcare is brutally painful to not only those who are the direct victim but also those who are trying to correct behaviors and advocate for those who cannot advocate for themselves. As I aforementioned, if these behaviors and inequity gaps are not resolved now, the systemic issue is only going to continue to grow stronger and affect more patients not just in the United States but around the world. And while the issue may be systemic, I believe that there are ways to recognize and advocate for the inequities on a smaller level. Whether it be in hospitals or private practices, I believe that more needs to be done so that physicians can recognize the inequities in their local community before it becomes widespread.

Creating a system or a visualization for physicians to use can allow for public health and administration to report the inequities to the state or local governments. By starting this small across the nation, it will be easier to fight the issue systemically. I believe that as we become more aware of it, there will soon be changes to legislature and policies for pharmaceutical companies. For there to be a legitimate change in the pharmaceutical organizations, especially those named “Big Pharma”, there needs to be laws and regulations for corporate to be able to follow that prevent the pricing and access to their products from being denied to some. I believe that on this governmental level, there should be an agency that oversees the pricing of products and recommends to insurance companies on the maximum price that they should be able to set products at; this would include not only insulin but also products such as continuous glucose monitors and automatic synthetic insulin pumps.

Additionally, similarly to how the United Kingdom’s National Healthcare Services does, I believe that every one that is diagnosed with Type 1 Diabetes should be offered a choice of monitoring or continuous glucose monitoring regardless of their income or insurance plan. Also in the United Kingdom, if you take a medication for Type 1 Diabetes, there is no price associated with it. According to the British Diabetic Association, all patients with Type 1 Diabetes have the legal right to free prescriptions for their medication and under the Canadian Charter of Rights and Freedoms, every citizen has the right to equal protection and benefits without discrimination (Lawrence, 2015). So regardless of income, age, or ethnicity, all their citizens have equal opportunity. I believe that if the United States wrote legislation and enforced policies such as these for healthcare services, we would be able to narrow the gap in disparities across the nation, especially as they relate to those with Type 1 Diabetes.

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