Compendium Paper: Diabetes

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Abstract

Just over 1 in 10 Americans have diabetes. Diabetes is the leading cause of kidney failure, lower limb amputations, and adult blindness. As the rate if diagnosis continues to double throughout decades, it is critical that advancements in treatment continue to improve. With that said, prevention is also of great importance. Education plays a large role in this, as many individuals are unaware of lifestyle changes that can be made to lower their risk of developing the disease. In teaching signs and symptoms, risk factors, and diagnostics, we may be able to see a decrease in the prevalence of diabetes of all types. In general, there are a plethora of medical advances, tools and treatments that have become available in the fight again diabetes, and because of this those with this disease have been able to live a longer, more fulfilling life than before.

Diabetes mellitus, often just referred to as diabetes, is a serious condition that impairs how the body is able to process and produce blood glucose, is a disease that can have potentially catastrophic effects. While there have been many strides to decrease its prevalence, there continues to be an increase in diagnoses in both young and old around the world. Although there are many factors, both modifiable and nonmodifiable, because diabetes is such a problem it is important to continue to identify treatment options. The article *Advances in Type 2 Diabetes: Focus on Basal Insulin/ Glucagon-Like Peptide-1 Receptor Agonist Combination Therapy* written by Jay H. Shubrook states, “Despite a greater understanding of pathophysiologic processes of type 2 diabetes mellitus (T2DM) and new classes of medications targeting these processes, the treatment of persons with T2DM remains a formidable challenge. Recent evidence suggests that one-third to one-half of patients with T2DM have not achieved target glycemic control, that is, a glycated hemoglobin (A1c)” (Shubrook, 2018). For some, an advancement in treatment options may range from simple things such as access to fitness, meal planning, and blood glucose meters to research trials, medications, and combination therapies. Overall, one must understand that there are many pieces to the progression of combatting this disease, including but not limited to basic education in regard to types, risk factors, preventative practices, and signs and symptoms. In knowing this, education is an important aspect, in addition to continued advancements in available treatment options.

While many of us may know some information about diabetes, there are numerous aspects to the disease. One is that there are multiple types. Diabetes type 1, known as juvenile diabetes or insulin dependent diabetes occurs when the body’s immune system, which is needed to fight infection, instead destroys the cells necessary for the pancreas to make insulin. This is

the reasoning behind Diabetes mellitus type 1 being known as an autoimmune disorder. On the other hand, diabetes type 2 occurs when the body does not respond to insulin in the way it should and is generally referred to as insulin resistance. In addition, there is also another type named gestational diabetes. This type arises during pregnancy in a woman who was not diabetic previous to the gestational period. Although gestational diabetes usually goes away after delivery, it does increase the chance of developing type 2 diabetes later on in life. Conductive to research it is integral to be aware that as the literary piece *Blood Glucose in Diabetes: Rationale and Procedure* by Charlotte Gordon states, “There are several subtypes of diabetes outside these three, including but not limited to genetic defects leading to diabetes, idiopathic diabetes (presenting with no underlying autoimmune cause), endocrinopathies, or drug- and chemical-induced diabetes. For these reasons, and the potentially mixed picture of diagnosis, it is less important to label the type of diabetes than it is to understand the mechanisms and importance of hyper- and hypoglycemia and treat accordingly (American Diabetes Association, 2013) (Gordon, 2019). Understanding that while there may be different types of the disease, they are all encompassed around the lack of or improper function of insulin is integral to understanding the need for continued growth in treatment practices.

Risk factors, behaviors or characteristics that increase the likelihood of getting a disease play a large role. In type 1 family history and age are the two main factors, however in type 2 and gestational while family history may play a part, there are many more elements. Obesity, inactivity, race, age, and preexisting conditions such as hypertension and high cholesterol contribute to the chances of a diabetes diagnosis. It is important that individuals understand that the disease can be prevented so that treatment is not something that has to be a concern. Because of this it is important to know what preventative practices can be put into place. As mentioned

above obesity is a risk factor, so in knowing this making sure to exercise and consume a healthy diet is essential to addressing this modifiable risk factor as it also has an effect on preventing hypertension and high cholesterol. The scholarly article *Diabetes & Prediabetes Can We Reverse the Epidemic* written by Bonnie Liebman conducted a study to see if altering the diet of individuals who were either prediabetic or diabetic would reverse their diabetic status. Diets consisted of salads, vegetables, and liquid meals. The results illustrated that "In the intervention arm of the study at one year, 46 percent of people were free of diabetes, off all their tablets. At two years, 36 percent were still free of diabetes, off all their tablets," said Taylor. "We demonstrated that, yes, type 2 diabetes can be made to go away" (Liebman, 2019). In contrast, only 3 percent of the control group were free of diabetes and off meds after two years." Once again this shows us that with the right lifestyle diabetes can not only be prevented, but possibly reversed. On the other hand, race and age fall into nonmodifiable risk factors and because of this it is important to tackle changes that are possible in the modifiable category. In addition, it is also important to be aware of signs and symptoms of the disease. These include, but are not limited to excessive thirst, hunger, frequent urination, and fatigue. With that said it is also of importance to mention that there may be no symptoms so annual physicals are necessary.

Diagnostic measures include blood tests such as metabolic panels and complete blood count. In someone with diabetes the hematocrit may be elevated as a result of dehydration. Testing of the Glycosylated hemoglobin (HbA1C) is the main test used for diagnosis of diabetes. The test evaluates glucose control within the past 8 to 12 weeks, with the most recent 2 weeks being weighted the heaviest. While a result greater than 5.9 is indicative of prediabetes, 7 above will land you with a diagnosis of diabetes. Overall, the goal is to stay below 5.9, away from the prediabetic range. Serum insulin may also be tested in order to evaluate if there is any insulin

insufficiency or improper utilization. As far as urinalysis, results may yield the presence of glucose and ketones.

Although the hope is that diabetes can and will be prevented, treatment is necessary for those that do develop the disease. Currently, some of the most commonly used diabetic drugs include different types of insulin (regular, short acting, intermediate acting, and long acting) metformin, and glipizide. while it may be easy to think of an advancement in treatment as a new study like the ones that focus on targeting the incretin system and basal insulin, which will be discussed, individuals should also recognize that there are advancements being made in new diet approaches or new fitness programs. With that said, one advancement in treatment has been injectable medications also known as insulin. Although it is not new to many of us, the development of being able to use insulin in all types of diabetes was a major step in terms of progression. One of the great things is that even if insulin is not the primary medication it can be used in combination if there is still difficulty with regulating blood sugar levels.

Another aspect of treatment is targeting the incretin system. The incretin system refers to a group of hormones that are responsible for the stimulation of blood glucose levels. the relation is that the effect that incretin has is either severely reduced or absent altogether. The scholarly article *Targeting the Incretin System: Novel Advances in the Treatment of Diabetes* written by Kristan L. Williams and Lalita Prasad-Reddy they explain that “Despite effective antihyperglycemic therapies for the treatment of type 2 diabetes, decreased pancreatic islet cell mass and function limit the longevity of the mainstay therapies, such as sulfonylureas and thiazolidinediones (TZDs). Although metformin, a biguanide, generally has more longevity secondary to their mechanism of action, they are often insufficient in achieving the desired A1C” (Williams, Prasad-Reddy, 2012). It is believed that the action of these medications are linked to

the incretin system and because of this, advanced treatments focusing on incretin based therapies are being researched with hopes of providing therapeutic effects that last longer.

Basal insulin is yet another possible advancement in treatment. This refers to insulin that acts in the body for up to 24 hours. This treatment is designed in a way where the focus is to stabilize blood sugar levels throughout the day regardless of lifestyle. This meaning that whether a patient is sick, eats, or exercises hyperglycemia will more so be avoided. The downfall is that this form of treatment increases the chances of clients experiencing hypoglycemia, especially if they don't eat enough, or at all for that matter. The article *Advances in Type 2 Diabetes: Focus on Basal Insulin/ Glucagon-Like Peptide-1 Receptor Agonist Combination Therapy* explains that

> "In patients treated with basal insulin, markers indicating the need to consider additional therapy include (1) an elevated A1c and persistent postprandial hyperglycemia despite a normal or near-normal fasting plasma glucose (FPG) concentration; (2) a total daily dose of basal insulin >0.5 units/kg; (3) severe, nocturnal, or frequent symptomatic hypoglycemia; and (4) persistent difference between bedtime and before-breakfast blood glucose >55 mg/dL.8,9 An even lower total daily dose of basal insulin as a marker for dose intensification has been suggested by a post hoc analysis of 3 insulin glargine titration studies of at least 24 weeks' duration (N=458).10 The analysis found that reduction in the FPG begins to slow at ~0.3 units/kg, leveling at ~0.5 units/kg. These findings are a concern and emphasize the importance of staying ahead of this progressive disease through timely, individualized treatment intensification" (Shubrook, 2018).

The research data above reiterates that there are pros and cons to everything, however this medication format is incredibly helpful to those struggling with blood sugars that run along the higher scale. Basal insulin is surely an advancement in treatment in terms of not having to stick yourself multiple times a day.

Additionally, another treatment advancement focuses on stem cell therapy, helping to initiate the growth of new healthy insulin producing cells. The drawback with this is that because

many diabetic patients already have comorbid diseases, many of the clients are at risk in terms of not making it through the surgery required for the stem cell transplantations. Though possible, much of the information is inconsistent as it is still being researched.

In addition to treatment, nursing management is also of great importance, but in order to manage clients and their symptoms you must first assess. When it comes to diabetes assessment may exhibit signs of fatigue, polydipsia, polyphagia and polyuria. It is necessary to inquire about symptoms as well as the onset of when they began. Assessing a diabetic is more than just blood sugar checks, it also requires evaluation of other body organs such as the kidneys, eyes, and skin as they can also be affected by the disease. Checking for breaks in skin and assessing the feet is imperative to the prevention of infection and even possible amputation. Overall it is essential to understand the disease process so that you know how fast things can progress and therefore what things to assess, correlating with nursing management. Management of the patient includes education. By educating the patient in reference to topics such as medications and how to administer and adhere, and lifestyle including diet & exercise, they are being taught ways to prevent worsening of their condition or an additional comorbid illness. Explaining that blood glucose levels should be checked throughout the day, along with the effects that uncontrolled blood sugar can have on organs is critical to really getting clients to understand that their health and therefore lives are really in their hand.

Generally speaking, the advancement in treatment types has surely progressed when it comes to finding better ways to manage and treat diabetes of all types. In many cases one does not fit all, and this surely relates to finding a treatment that works for each client, however educating individuals about ways to prevent the disease is extremely important as prevention is

better than cure. Overall while there has been an advancement in understanding the many factors that play a part in diabetes, there are still many more aspects to be understood and researched.

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