

Literature review on Diabetes
Treatment technology

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A: Diabetes treatment technology (DTT)

Diabetes has emerged out as one of the most of threatening health crisis in all over the world. The rapid urbanization, conversion of nutrition and the continuous increase of the sedentary lifestyles has caused the disease to be epidemically spreading all across the world. With the rapid increase of the disease, there has been also rapid increase for the treatment of the disease. Like most of the medicine, the treatment of diabetes has changed a lot over the years due to the advancement in technology. Though it has been difficult to predict the future of the impact of this technology over the treatment of this disease, still the there has been various exciting developments regarding the developments of the diabetes care treatment. According to Chao, & Henry, (2010) the glucometre and the various types of insulin delivery are the top most priority for the advanced technological treatment for the diabetes care. The glucometre consists of numerous strips of glucose paper which can be dipped into a metre and thereby measures the glucose chart. A small drop of blood which is obtained by pricking the skin with a lancet and then that metre is placed on a disposable test strip that is read by the meter and uses to calculate the blood glucose level. A patient suffering from the diabetes can easily detect his blood sugar level in a much faster way through this blood sugar metre. As diabetes have been spread in a wider level, so the people rather the parents of the concerned family must acquire about the necessary steps to use this glucometre. It must be taken into account that the glucometre comprises of a needle for the collection of the human blood which should be used for a single patient and not for the multipurpose use. If the needle used for a particular person is used for pricking blood for numerous persons, then there can arise for a risk of contamination of blood. Moreover, people also must be aware of the fact that the glucometre is not always right for the determination of the blood sugar levels in an individual. So, he must keep monitoring his blood sugar level through the constant blood test at the laboratory. Though there are various technical challenges faced by the parents regarding the glucometre. First is the reliability of the results which are basically affected by the environmental effects. Asche *et al.*, (2011) stated that the condition of the patient, his various medications can also affect the results of the blood sugar monitoring. Though the various glucometre which is used in the present day world, are quite sophisticated in their features, still the patients with critical conditions whose homeostasis have been strictly negotiated can come across extreme physiologic conditions which can put up a challenge to the limitations of the glucometre and thereby complicating the analysis of the results. In terms of price, accuracy and easy to use by the patients, there are some companies which manufactures blood sugar monitor. These are Free Style Lite, Bayer Contour Next, Bayer

Breeze, Accu- Check Aviva Plus etc. CGM or Continuous Glucose Monitoring is denoted as a small wearable device which helps to track the level of glucose in a person's blood throughout the day and thereby reducing the guesswork. CGM helps to determine more informed decisions for the treatment of diabetes and can also help a person for better glycemic control. The CGM is useful for the patients who need a tight control over the glucose levels and the patient can manage their diets , physical activities as well as schedules of medication regarding the interpreted data according to the CGM. However the usefulness as well as the efficacy of the CGM is less known by an individual and also the phenomenon is potentially controversial. The CGM's are however more expensive than the normal glucose metres and therefore it has been in many instances that many of the patient parties have not transferred to the CGM from the glucometre regarding the flexibility of the use of the product as well as its price. Companies like Abott, Dexcom, and Medtronic manufactures the CGM. According to Miller *et al.*, (2015) another technological advancement in the treatment of diabetes is the insulin delivery systems. This system is found in the form of syringes, pen and pump. The insulin syringes is chosen because of its flexibility features as well as cost saving characteristics. But the real problem with this type of this syringe is that it takes a lot of time for the procedures to draw the correct dosage of the insulin in the syringe. Moreover there can also a chance of mistakes in the dosage as the process is done manually. The insulin pens are more or less like the syringe. The easy and more convenient usage of this particular machine attracts the consumers as well as the insulin pen comes with the service of memory storage which helps to make the patient remind of the amount of insulin taken by him. The insulin pens are much more costly than the syringes and there is also lack of options available in the pen form. The insulin pump is a device of a size of a pager which a patient has to wear constantly for 24 hrs constant monitoring of his blood sugar level. According to Jacobson *et al.*, 2013) the main advantage of the pump is related to its nature which secretes a small amount of insulin all the time and during the mealtime the dosage is boosted. In spite of its efficient productivity, there is a certain amount of risk. While using an insulin pump, one has to take care of the changing of the needles within couple of days for the risk of infection or certain drop in the blood sugar levels. Moreover the pumps are relatively higher in cost for about \$9,000 with the cost to be bore for the various ongoing supplies like batteries and sensors.

B: Diabetes information Technology

As diabetes has evolved out as a thwarting phenomenon for the current society of all age groups, so advanced technologies have been integrated into the self-management regarding the diabetes control among the children who has been suffering from the Type1 Diabetes Mellitus (T1DM). With the invent of the social media and many other social sites, it has become easy for the parents to get thorough information about the various guidance regarding the diabetes related solving issue. In some cases it has been also observed by Kohei, (2010) that some self management technologies like automated phone systems, educational resources from various websites, electronic diary tools, peer support groups also serve the purpose for the parents to get well informed about the diabetes related issues and challenges. There have been any technologies which offer enthusiastically accessible means for obtaining information on requirement, communicating with parents and others, as well as obtaining feedback on blood glucose prototype. The use of technologies by the parents for the diabetes care is significant as the use of the technology is often analytical of the parallel behaviour of the adolescents. The penetration of various digital channels of communication and technologies help in determining the parents to be properly informed about the care to be taken for the T1D adolescents and managment as well. According to Behloul, & Wu, (2013) the main objective of this diabetes information technology not only helps to improve the healthcare outcome of a child, but also helps the parents to have a more control management over the child's diabetes management. The diabetes information technology is a complex process, still it is seen that many families have adopted both proficient and limited technology skills. It should be taken into account that in spite of various technological information regarding the diabetes are offered through various websites, still there also has to be awareness camps by the health care providers for the successive creation of the awareness among the parents of the children suffering from T1DM.

C: How can technology and awareness techniques assist a parents of youth type one diabetics

It has been seen that the adoption of the diabetes information technologies by the parents create an awareness among the particular community. The parents of the children suffering from T1DM also get aware of the various technological equipments of monitoring the blood sugar level in their children. The CGMS, various types of insulin pumps, syringe, pen are the various phenomenon which the parents come to know through the networking surfing or from

the health care provider. The technological information which the parents get from these, assists the parents to be well informed about their child's health procedure. The time has come, when the parents do not have to depend only on the laboratorial results of the glucose tests, but these technological information also assists them in every single aspect of the disease as well as about the prevention and precautions about the disease. According to Redaniel et al., (2012) the parents are also able to know about the fact that with the adolescent children, the nutrition also serves as an effective diabetes management. Therefore the families are also assisted to take care about the proper diet of their children like providing them to understand nutritional principles, meal plans as well as creating strategies for eating outside the home. Websites like Calorie Count provides information to the parents regarding the nutritional balance in their child's daily diets.

D: Medical actors in managing T1D in children and adolescents and influencing parents' awareness and knowledge or information

The self management support can be given to the diabetes patient specially the adolescent and the youths by the diabetes educators, endocrinologist, and dietitian roles. They play an important part in giving the parents of the suffering child about their supportive role regarding the issue. All these personalities are skilled in their art of collaboration. An endocrinologist will help in determining the proper dosage of the insulin given to the patients as well as aware the parents of the children to be more focussed about the grave outcomes of the disease. According to Moser *et al.*, (2012) referral, the parents are guided to visit the diabetic educators and dietician who develops a plan for the children whom the parents must follow to prevent the spread of the disease as well as make sure of the fact that the particular disease does not create a future threat for the child. Moreover the parent must also understand the fact that proper guidance, and routine maintenance and proper dietary meal can be the main formula for the control of diabetes. In some cases it has also seen that the parents' faces challenges regarding the co-ordination of the different proposals by the diabetes educators, endocrinologist, and dietician roles. According to Herman, (2013) the various diabetic information technologies also help the parents to guide with appropriate information needed to become aware of the diabetic youths. It has also seen that many of the insulin company also create awareness for the parents like this. They indulge more in the use of insulin pump therapy for the parents, so that there can be regular monitoring of the blood glucose level among the child and the youths and the parents can consult to the respective health care

providers according to their necessities or measurements of the glucometre. Therefore, it can be said that the role of the parent's diabetes education is a much needed factor for the day to day care of their children's life. The diabetes education in this case entails the awareness of the day to day nutrition, and exercise and identification of the signs of diabetes. This should be among basic parenting information due to the high occurrence of the diabetes among the children. It creates awareness among the parents of the suffering child and also helps to make other parents understand the necessity of taking measures against such grave diseases.

E: Methodological consecrations for using actor network theory (ANT) in chronic disease, parents, diabetes

According to LeRouge *et al.*, (2013) the increase demand for computerization in modern healthcare, there arise a need for the more sophisticated view of relationships between humans and objects. In this background, ANT or Actor Network Theory with its essential approach conceptualizes agency and relationship between the individuals and objects. The ANT is comprised of a framework to investigate that the how the technical artefacts comes into existence and deal with the role of technology in the social settings. The use of the ANT in the treatment of the chronic diseases and pervasive technological expertise solution for facilitating superior self-care is the concept that helps by the mobile technology aspect of the ANT where the additional self care guideline and support is provided. The overall scope of the ANT in the diabetes as it is one of the most prominent chronic diseases provide lifestyle guidelines and suggestions or activities as the identified actors of the disease causing other secondary issues are pointed out and prevented by the information and indirect medical support.

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