Assistive Technology

For Diabetics

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Assistive Technology for Diabetics

Diabetes mellitus, often simply referred to as diabetes, is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria (frequent urination) Polydipsia (increased thirst) and polyphagia (increased hunger).

There are three main types of diabetes

Type 1 – this results from the body’s failure to produce insulin and presently requires the person to inject insulin.

Type 2 – This results from insulin resistance, a condition in which cells fail to use insulin properly.

Gestational diabetes is when pregnant women, who have never had diabetes before, have a high blood glucose level during pregnancy.

Diabetes is a disease that can impact every facet of a person’s life, starting each day upon waking and lasting until bedtime. The constant battle to keep the glucose level in a healthy range throughout the day by balancing medication and diet is a daunting task. Diabetics know the only chance to coordinate daily activity and the diet/medication ratio is through constant monitoring.

Diabetes can result in also result in range of difficulties for the person, including increasing difficulties with their vision, with circulation and their general health.

It is however a disease that can be managed and often people with diabetes will use a range of Hi Tech and Low Tech Assistive Technologies to assist them in managing their condition on a day to day basis. It is a condition that requires constant attention from the person, but can be managed in such a way as to allow the person to enjoy a full and active life.
Assistive Technology Devices for Managing Diabetes

This factsheet will outline a range of common technology used for the management of Diabetes including the following:

- Visual Aids
- Electronic Prompting Aids
- Glucose Monitor
- Medication Administration
- Dietary Aids

Visual Aids
People with Diabetes often experience ongoing and degenerative problems with their vision, particularly if their Diabetes progresses or is not managed well.

The risk for cataracts is 2 to 4 times greater for those who are diabetic. Diabetes is a leading cause of blindness. The Diabetes Control and Complications Trial (DCCT) determined that control of a patient's blood sugar is critical in reducing the rate as well as progression of retinopathy. The earliest signs of diabetic retinopathy are observed when there are structural changes in the capillaries, making the flow of nutrients to the retina restricted. The lack of nutrients and oxygen to the tissue results in damage to the retina. Many diabetics have few, if any, visual symptoms in the early stages of diabetic retinopathy, which is why it's so critical to have regular, dilated eye exams every year.

http://www.eyesod.com/articles/diabetes_reeves.htm


However if a person’s eyesight has been effected by diabetes there are many assistive technologies available to help the vision impaired.

There are many portable and fixed Magnifiers on the market, including electronic magnifiers, such as those below that can be used to magnify text in a newspaper etc., or magnify far away items such as timetables or public information in an airport, railway or bus station.

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Portable magnifiers

Software magnification for computer use.
Please see factsheet for assistive technologies for vision impaired

Different colored bands around medicine bottles

There are many other assistive Living Aids for vision impaired such as talking microwaves, talking watches etc.

Electronic Prompting Aids
Electronic Voice Organizer: This allows for client to record (in your own voice) reminders for snacks, meals, and medication and insulin levels. Commands can be programmed to go off at the same time every day. The device is about the size of a pager and can be worn on a belt or placed in a pocket. When the device signals, the person

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can push play and listen to the message, this allows for the client to listen to the message when it is convenient for them.

Personal Digital Assistance – PDA can be programmed for auditory prompts, the client can read the message on the screen. There are many PDA’s with voice output for those whose vision has also been affected by diabetes.

Alarm watch reminder. The image above shows a Cadex Medical watch. This watch can not only be set to remind someone when to take their insulin or when to eat. It also has a data bank that can hold information such as:

--Name and phone number.
--Medical information (diabetes, asthma, epilepsy, aphasia, hemophiliac, Parkinson's, lupus etc.).
--Allergic reactions (penicillin, bee sting, peanuts etc.).
--Emergency contact and phone.
--List of medications, blood type, and date of birth.
--Doctor's name & phone.
--Insurance company & policy number.

**Glucose Monitor**
Monitoring glucose levels is essential for the diabetic person because it helps the person and healthcare providers decide what changes need to be made in their treatment program in order to meet the treatment
goals. Effective monitoring of glucose levels can help in avoiding some of the complications that arise from Diabetes.

A range of dedicated Glucose Monitors exist in the market that provide a range of functionality, for example many such as the Prodigy presented below contain a memory that stores up to 450 test results and gives averages of 7,14, 21, 28, 60 and 90 days.

Some also include voice output to assist, in particular those with visual problems reading the LED screens.

Picture of Prodigy voice output glucose monitor 1

Some more advanced systems link to a Doctor, Medical center or Health Care provider. For example the Advocate Redi-code Talking Blood Glucose Meter, the Accu-Chek and the Glucocare Meter reads out information from monitor can be downloaded onto a computer so your healthcare provider can know exactly what results you are getting, to modify your treatment program. This makes ongoing monitoring over long durations much easier to track.

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More recently, companies are taking advantage of Smartphone technology and are updating their devices to connect with iPhone and Android Apps to make access to such information even easier.

Many companies produce glucose and blood pressure monitors. No one monitoring system is ideal for everyone. Features, price, convenience and clarity of instructions vary. It is best to consult with your healthcare team before purchasing a monitoring system.

**Medication Administration**
Timing is important when taking medication for diabetes. There is a strong relationship between food intake and physical activity. Some insulin and diabetes medications are prescribed to be taken several times a day, and at different times for each medication. Following a strict medication schedule it can be difficult for those with memory problems or who have trouble balancing different medicines at once.

**Insulin Syringe magnifier:**
- Magnifies syringe for the full length of the syringe.
- Helps diabetics with impaired vision.
A Pill dispenser is simply a device that will make pills available to a person at the time that they need it. This decreases the chances for a person to take too many pills or medication at any particular time, thus avoiding complications relating to taking too much medication etc.

The pill dispenser can be set to go off on the hour or half hour for example, starting at 6. am until midnight.

**Label Magnifier:**
People can have problems deciphering the medication information and instructions printed on prescription pill bottles. Texts can be smudged, faded, irregular, and disorganized.

Some handheld magnifiers such as the Ruby by Freedom Scientific or the Sapphire Handheld Magnifier also allow you to read medicine bottles and other medical information that might be difficult to read otherwise.

**Dietary Aids**
Eating the appropriate amount of food is important for maintaining glucose levels, for example, eating too many carbohydrates can affect glucose levels as well. One Lo-tech solution is to use plates that guide the types of portions of food that you eat, to assist in balancing your meal.

Having portion plates allows the person with diabetes to visually see what their food intake is. There is also a cup that provides a measurement guide identifying the quantity of drink by ounce or milli-litre, allowing people to regulate their liquid intake of drinks, juices, and milk.
Summary
Self monitoring of blood glucose levels is an effective tool for the management of diabetes. Many companies produce glucose and blood pressure monitoring systems. There are many personal data management systems and electronic prompting aids that can facilitate people to manage and live with their diabetes effectively. However people with diabetes should work with their healthcare team to choose the appropriate technologies for their needs. They should also be trained to use them correctly and monitored at the start to make sure the assistive technologies are functioning optimally. In the case of a person with diabetes this could save their lives.

Technology is only one tool that assists in the management of Diabetes, and this Factsheet aims to provide a brief overview of how it can do this. It is important to consult regularly with your doctor or physician and to refer to your medical team.

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