

# Evaluation of 8point-of-care glucose testing devices in administration of diabete...

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The aim of this study is to evaluate as well as compare 8point-of-care glucose testing devices in administration of diabetes using certain criteria (like Cost of the device, Turn-around-time, Detection method, Enzyme/Co-factor used, sample volume and Range) to ascertain their strength and weaknesses in informing the choice of glucometer and in the management of Diabetes Mellitus. There are solid contentions for the utilization of POC in administration of diabetes as it utilizes productive work process. Such testing is performed at the bedside or in close proximity to the location of patient care. The technological evolution of POCT in the last 2 decades provides reasonably impressive management tools for the management of diabetes mellitus. The turnaround time, availability and most importantly its ease of chunking out result faster than any known laboratory device out there makes it a novel in the effective administration of the metabolic disease.

## **Introduction**

To understand the background and driving force for this elusive technology, it is necessary to understand the nature and impact of the disease that created it. Diabetes is a condition in which the body's natural control of blood sugar (glucose) has been lost. Whether it's termed type 1 (previously known as "juvenile-onset"), type 2 ("adult onset"), or the gestational diabetes that is a complication of pregnancy, the end result is the same — glucose may be present in the blood in dangerously low ("hypoglycemia") or high ("hyperglycemia") amounts, and without a means of measuring glucose, treatment is a dangerous guessing game of taking pills, injecting insulin, or deciding how much and what kind of food to eat. Since diabetes touches almost every family at some time, most people are familiar with the

long-term complications of the disease: eye damage, kidney damage, loss of feeling in the extremities, slow healing of wounds and frequently, amputations of toes, feet or legs; and often most seriously, cardiovascular disease. If patients adhere strictly to a proper diet, exercise, medication and make frequent measurements of blood glucose to adjust medication dosages and make themselves aware of the results of these efforts, they are able to maintain their health, and indeed, lead relatively normal lives. If simple, inexpensive, and reliable tests were available, they could make those measurements as well and as often as required.

## **Diabetes Mellitus**

Diabetes mellitus is a metabolic disorder characterized by increased blood glucose level. It represents major public health issue, not only due to its high prevalence and incidence, but also because it is associated with high morbidity and mortality rate in nearly all countries of the world. It continues to increase in numbers and significance, as changing lifestyles lead to reduced physical activity, and increased obesity. Insulin is a hormone that monitors blood sugar level.

Hyperglycemia is a common effect based on uncontrolled diabetes over time leads into serious damage towards many of body system. 347million people worldwide have diabetes. In 2004, an estimated 3. 4million people died from consequences of high blood sugar. A similar number of deaths have been estimated for 2010. More than 80% of diabetes death occurs in low as well as middle income nations. Overtime, diabetes can harm heart, blood vessels, eyes, kidneys, as well as nerves. A similar number of deaths have been

estimated for 2010. More than 80% of diabetes death occurs in low as well as middle income nations. Overtime, diabetes can harm heart, blood vessels, eyes, kidneys, as well as nerves. Early diagnosis may be accomplished through relatively inexpensive blood testing. Administration of diabetes involves lowering blood glucose level along with other known risk factors. Prevention as well as treatment involves maintaining a healthy diet, regular physical workout, a normal body weight, and avoiding using tobacco. Control of blood pressure along with keeping up appropriate foot care over individual with the disease. Type 1 DM must be managed with insulin injections. Type 2 DM can be treated with drugs with or without insulin. Insulin and some oral medications can cause low blood sugar. Weight loss surgery in those with obesity is consistently an adequate part in patients with type 2 DM. Gestational diabetes usually goes after the baby is delivered.

### **Point-of-care-testing**

Point-of-care-testing (POCT) is also referred to as extra-laboratory, alternate or near patient testing. It typically refers to performance of diagnostic laboratory test outside of a traditional central laboratory test outside of a traditional central laboratory and near the site of patient care, whether inpatient settings in other words outpatient clinics. Much of the time, effortlessness was not feasible before innovative advancement not exclusively to make a test conceivable at everything except then additionally to cover its multifaceted nature. The driving thought behind POCT is to pass on the test beneficially and speedily to the patient. It improve electrifying probability in which patient's doctor and healthcare group desire to get

outcome faster that takes into account improved quick clinical administration choice to be made. The use of mobile devices in the health care setting also enable the health care provider to quickly access patient test results sent from a POCT device. A reduction in morbidity and mortality has been associated with such rapid turnaround times.

## **Glucometer**

A glucometer is used to determine the concentration of glucose in blood. It is a key element of home blood glucose monitoring (HBGM) by people with diabetes mellitus. A small drop of blood obtained by pricking the skin with a lancet is placed on a disposable test strip that the meter reads and uses to calculate the blood glucose level. Results are displayed in mg/dl or mmol/L. Many glucometers employ the oxidation of glucose to gluconolactone catalyzed by glucose oxidase (GOx). Others use a similar reaction catalyzed instead by another enzyme, glucose dehydrogenase (GDH). This has the advantage of sensitivity over glucose oxidase but is more susceptible to interfering reactions with other substances. The types that will be studied are discussed below. Noninvasive glucose monitoring refers to the measurement of blood glucose levels without drawing blood, puncturing the skin, or causing pain or trauma. In the blood glucose monitoring industry, it is well accepted that there are three “C” terms that drive people’s willingness to test: Cost, Comfort and Convenience. The comfort advantage of a noninvasive technology is easily understood. Freestyle LitePatients and individuals living with diabetes mellitus can utilize Abbott Freestyle Lite glucometer to manage their metabolic condition. Apart from being simple

and smaller than the usual types of glucometer Abbott's FreeStyle Lite requires no coding. This simplicity makes it possible to hold it comfortably on the palm of even a kid. Abbott's FreeStyle lite has a Clear and backlit display. The display screen is very organized and can easily be understood without stress. There are two distinct features of Abbott's FreeStyle lite. One is its quick turnaround time of just 5 second and the other is its ability to use 0.3 microliter of fresh capillary blood sample taken from the tip of the thumb with a lancing device. It's furthermore fine to utilize with elective location testing. Configuration highlights incorporate the opening you put the test strip in is supportively signposted with a dash of yellow so it's anything but difficult to get the strip into the opportune place, besides an elastic surface means the FreeStyle Lite is likewise truly simple to get to grasps with. With no coding required, diabetics can utilize the FreeStyle Lite test strip to get a quick, precise blood glucose result. The FreeStyle Lite test strip is perfect with both the FreeStyle Lite and FreeStyle Freedom Lite meter. The Abbott FreeStyle Lite incorporates bigger numbers, making the display straightforward to interpret and elastic grasps make it less demanding to hold.

### **Accu-chek Aviva**

This slim and fragile glucometer is design to be user-friendly and a comfortable choice for diabetes patients who will like to constantly know their sugar level. With an easy to handle elastic gasp, the Accu-Chek Aviva can easily be used. It needs only a little volume of blood sample to accurately run blood glucose test. The test strips are utilized to restore a

quick and solid blood sugar level. The most current version of this device passes the 2013 ISO benchmarks for blood glucose meter precision and also incorporates test updates. Four different updates can be configured for various occasions to help in recalling when to test blood sugar level. This device has embedded in it an extra battery that is able to hold time and memory for as long as 72 hours in case the main battery is removed or come short of control, this can be likened to battery reinforcement. The Accu-Chek Aviva framework currently accompanies the Accu-Chek FastClix finger pricker with lancets that are kept in a 6 lancet drum, hence replacing the lancets is basic, agreeable and beyond the danger of accidental pricking of the fingers while disposing of the lancets. When each of the 6 lancets has been utilized the drum can be discarded with normal family unit squander.

## **OneTouch Verio IQ**

This glucometer spots examples of high and low outcomes, assisting individuals who self-alter their own insulin measurements to settle on informed choices. The Verio IQ's colour screen and a spotless, white complete give the meter a cutting edge hope to coordinate its savvy innovation. The meter surpasses the 2013 ISO blood glucose meter precision guidelines with more than 99% of results falling inside the accuracy boundaries. A principle highlight of the OneTouch Verio IQ is that it advises you of high and low examples in your outcomes which are exceptionally convenient for any individual who self-modifies their own insulin. Let's assume you have had two or three low glucose levels before breakfast on 2 out of the most recent 3 days, the Verio IQ will really give you a 'heads up'

and let you know. This enables you to observe and roll out any proper improvements to your sugar or insulin to help keep another morning low reading to take place. Testing in a dark room is made substantially less demanding because when a test strip is inserted, the Verio IQ illuminates its screen and the test strip and also flaunting a 750 result memory. The Verio IQ gives average more than 7, 14, 30 and 90 days. The meter demonstrates to you how frequently you had high and low result. The Verio IQ gives extremely precise outcomes on the grounds that each blood test is broke down 500 times ahead of when the result is delivered and the meter makes up for meddling variables, for example, vitamin C and pain relievers. The Verio IQ battery can be energized and will keep going for a normal 1 to about fourteen days between each recharging. The OneTouch Verio test strips emerge among other test strips because of their gold shading, however they likewise have a scope of different points of interest. The test strips require a little blood test of only 0.4 microliters and blood can be connected to either the left or right half of the test strip, which makes it simpler to apply blood from fingers on either hand.

## **OneTouch Ultrasmart**

Aside being a glucometer, One Touch Ultrasmart incorporate electronic logbook. It is more than just a glucometer and with the electronic book, individuals living with diabetes mellitus can use informations recorded to track progresses in their use of insulin to manage the condition. With this combine feature, OneTouch Ultrasmart becomes the very first glucose monitoring device to successfully combine glucometer function with a



logbook hence making blood glucose results easily understood. The device can also be used to track individual general health, exercise, medication and diet to better know their effect on diabetes. With all this consideration, this glucometer provides a wide range of management option and methods. The display screen is easy to use and understood with clear cut buttons.

Individual living with diabetes can input factors that could affect their result such as diet, exercise, medication and other varying health condition. With this device, there is no need to download or write down out results because the result has already been programmed to be viewed in charts, graph or a simple logbook. You'll get the sort of data your doctor may converse with you about as far as understanding, estimating and dealing with your diabetes making you a very much educated manager of your own condition.

## **TrueTrack**

TrueTrack is an in vitro quantitative system that is used for self-testing and point-of-care testing of human whole blood only. TrueTrack is recommended for testing of human capillary whole blood only and it is not recommended for use with venous sample. It displays result as plasma values. Only TrueTrack test strips and TrueTrack control is recommended for the glucometer. TrueTrack is not use for diagnosis of diabetes or for testing blood glucose in newborns. Before operating the TrueTrack glucometer for the first time, a quality control testing is performed. The Meter turns on automatically when a Test strip contact end is inserted into the test port. The meter turns off automatically after the test strip is removed from the test port or after 2minutes of non-use. To assure you are getting accurate and

reliable results, TrueTrack offers two kinds of quality control tests. These tests let you know that your TrueTrack System is working properly and your testing technique is good. An Automatic Self-Test is performed by the Meter each time a Test Strip is inserted correctly into the Test Port.

## **Ascensia Contour USB**

This is earliest glucometer that provide an attachment straight to a computer thereby making it possible for users to gain access to data and also share with a health care provider for advice. This is a significant improvement when it comes to management of diabetes mellitus. The device can stockpile about 2, 000 test results. It employ a plug and play approach makes getting to and surveying the glucose patterns less demanding than any time in recent time. Contour USB is equipped with knowledge about patterns and trends in the patient's blood glucose level which makes it possible to ' Plug in, know more, take action'. With a smaller, gorgeous outline conveying ground-breaking innovation, similarity and administration programming, the Ascensia contour USB is really a cutting edge glucometer. The Contour USB meter makes data organization less complex, which can prompt changing blood test results into important knowledge. Bayer's Contour USB incorporates various propelled highlights to empower individuals with diabetes to be able to properly deal with their blood glucose levels. These highlights incorporate pre and post-meal alerts and usefulness to isolate before meal and after meal readings. The Contour USB comes fitted with built in diabetes data management software. Simply connect to the Contour

USB to an compute USB port to begin utilizing Glucofacts Deluxe software, no compelling reason to download programming or utilize links to associate.

### **Omnitest 3**

This glucometer is a product of Bbraun, an entrenched German medical company. It was launched in 2011. The meter is perfect for individuals who wish to possess a blood glucose display screen that is basic, fast and simple to utilize. The Omnitest 3 passes the 2013 ISO blood glucose meter accuracy standard. Omnitest 3 requires insignificant blood and is one of the quickest blood glucose monitoring devices. Omnitest 3 conveys result with no coding, requires a minor blood test size of 0.3 microliters and takes just 3 seconds to show result. The glucometer has an easy to use navigation, an extensive LCD display show and elastic grasps for easy handling. The device has a memory capacity of 500 test results with different markers to distinguish between results (pre-meal, post meal, after taking medication and control tests). There are likewise 5 adaptable alarms which can help with keeping up a relentless treatment administration. Different highlights of the meter include Auto control on with strip addition, Auto off with strip discharge, 5 alerts can be set, Rubber hold for no slip on surfaces, and Pre/post meal and control marking function for better glucose analysis.

### **iHealth Align**

iHealth Align is a portable glucometer that works exclusively with iHealth test strips which are sold separately. It is about the size of a quarter and fit easily into pocket. It is attached directly to a smartphone or tablet for fast and accurate reading whenever and wherever. The measuring method in use

is the Amperometric technology using glucose oxidase. The package comes with the meter, lancing device, lancets, four colored cases, clear cap.