

DIGITAL PILLS: IN IMPROVING HEALTH CARE

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INTRODUCTION

According to the World Health Organization (WHO), “about half of all [chronically ill] patients fail to take their medicine correctly” to overcome this the FDA has approved the first ingestible sensor i.e The Ingestion Event Marker (IEM), by Proteus Health in 2012, represents a new category of medical device for influencing medication adherence and significantly aid chronic disease management.

These ingestible microchips are basically minute sensors stuffed inside pills. It is a digital health feedback system that combines an ingestible sensor of the size of a grain of sand placed inside the pill, with a wearable sensor on an adhesive patch, and a mobile application to display data on a smartphone. They are composed of the ingredients commonly found in food and are activated when they come into contact with stomach fluids. This pill is swallowed with water like a normal pill. The pill contains a tiny silicon wafer separating tiny quantities of copper and magnesium, which effectively forms a microscopic battery that generates an electric current when immersed in the acidic environment of the stomach. These electric currents, which can be given individual signatures to match the drug taken with the edible sensor, are detected passively by an intelligent patch stuck to the patient's skin, in much the same way that electrocardiogram (ECG) skin patches can record the electric currents within the heart.



This disposable patch is worn on the body to capture and relay the body's physiological response and behaviors. In addition to recording information from the sensor, the patch records heart rate, temperature, activity, and rest patterns. The patch lasts approximately 7 days and is operated by a battery, which also lasts approximately 7 days. A mobile device is then carried in the pocket or purse to display data in context and support care.

HOW DOES THE TECHNOLOGY WORKS :

THE PILL:

Healthcare professionals will prescribe sensor enabled pills .These contain an ingestible sensor which sends a signal to the patch after it reaches the stomach. Patients and their healthcare teams can see when a medication has been taken using the ingestible sensor.

THE PATCH:

A comfortable patch with a sensor inside records the time a patient swallows each sensor-enabled pill as well as their rest and activity patterns. This information is recorded and relayed to the patient and with their permission, to their healthcare team.

DISCOVER APP:

The discover app helps patient keep track of their medications, steps, activity ,rest, heart rate, blood pressure, and weight. Patients can also set multiple medication taking schedules and receive medication reminders.

DISCOVER PORTAL:

The discover portal allows healthcare professionals to drill down into an individual patient's data and allocate resources to those who need it most. The information in the portal provides insight that helps healthcare professionals select the best treatment for the individual patient.

The sensor passes through the body similar to fiber. The IEM does not contain a battery. Instead, the fluids in the stomach power the sensor, and the body transmits the digital signal generated by the sensor. This technology has been used by the researchers for thousands of days by patients in clinical trials without serious adverse events and does not appear to interfere with other medical devices. Proteus Digital Health does not quantify the price, but rather states on their Web site that, "The cost will depend on the context in which the system is being used."



ROLE OF DIGITAL PILLS :

- This can be especially helpful for patients on regular medicine, or people with conditions, such as diabetes, that require regular monitoring, as well as for health professionals to customize and improve patient care
- This system also allows users to set up alarms to remind them to take medicines.
- Ultimately, the plan is for every one of the many pills taken each day by some of the most chronically-ill patients, especially those with mental health problems, to be digitally time-stamped as they are digested within the body.
- The mobile phone of health carer can record details collected by the skin patch via a bluetooth connection . The phone app can calculate how closely the patient is conforming to the drug regimen and what further steps may be necessary.

- It will also keep a record of a drug's effects – whether it's the right dosage or not working
- These digital pills are used to ensure to administer the right medicines at the right time.
- This system provides useful information for individualized treatment decisions regarding dose adjustments ,the addition or discontinuation of medication, medication use review including adherence counseling to improve blood pressure.

CONCLUSION:

In the future the goal is a fully integrated system that creates an information product that helps patients to meet the demands of complex pharmacy. Since the data accumulated using ingestible sensors is both reliable and accurate, it can be used as a single procedure to measure and test physiological reactions that chronic disease patients have to their drugs, removing the need for multiple, unreliable tests and guiding treatment through a confident diagnosis.

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