

MD3B4: Digital Technology and Health

Digital Pills Blog

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What are digital pills?

Digital pills (DP's) are orally administered pills which contain a medication. These pills are different to commonly prescribed pills, because they are also capable of alerting a smartphone app when a patient has ingested the medication. DP's allow you, as members of the patients' support team, to monitor the patients treatment more effectively (Martani et al., 2020).

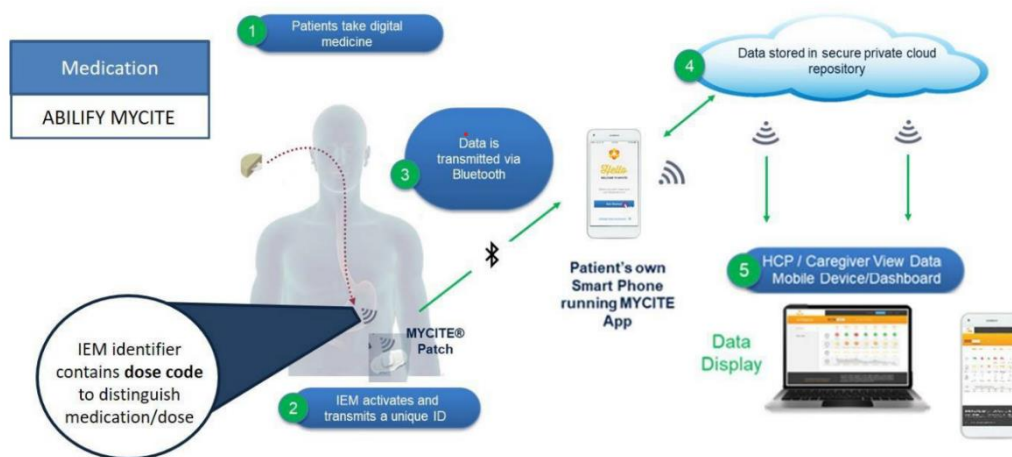


(Abilify MyCite, 2017)

How do digital pills work?

The components associated with the digital pill are: the medication found within the pill, a 1mm sensor, a patch which is worn on the patients rib cage and a smartphone app where the patients' data is recorded. Once ingested, the pill releases the medication into the body as normal. The pill also releases the 1mm sized sensor which is composed of copper, magnesium and silicon. When this sensor encounters stomach acid, it transmits an electrical signal which triggers the patients' patch (Flore, 2021). The sensor sends a secure digital code to the patch. The patch, if within 9 feet of the smartphone, will alert the smartphone app that the patient has ingested the medication via Bluetooth (Plowman, Peters-Strickland and Savage, 2018). Click [here](#) for a video which further explains the function of DP's.

The first FDA approved digital pill was [Abilify MyCite](#) – a pill containing aripiprazole, which was used in the treatment of schizophrenia and bipolar disorder. The FDA approval of a digital ingestion tracking system in 2012 has meant that this treatment is available for use by those suffering from schizophrenia and bipolar disorder. It can also be used as an add-on treatment for depression in adults (FDA, 2018). Since 2012, various more conditions, besides just psychological disorders, have been tested using DP's. An example is HIV/AIDS. Abilify MyCite is becoming more available in western countries.



The image above represents the function of the digital pill, Abilify MyCite. Other brands of digital pills function in a similar manner to Abilify MyCite (European Medicines Agency, 2020).

Success of digital pills in Clinical practice:

A literature review conducted by Chai et al. (2022) has provided promising results in regard to the success of digital pills. The findings stated that for pilot studies, the accuracy of medication ingestion detection ranged from 68-100%. In clinical practice, the results ranged from 68-90%. The lower accuracy in clinical practice was associated with improper use of the health technology by patients. Therefore, it is important to discuss the appropriate methods of using the digital pills with your patients. The review concluded that the digital pill is effective with a number of disorders, including: HIV, hepatitis C, tuberculosis and cardiovascular disease. Failure to adhere to the medication plan of these disorders can significantly increase a patient's risk of mortality. As a healthcare provider, digital pills provide you with an opportunity to obtain instant confirmation of medication ingestion, allowing you to monitor patient adherence to a treatment plan.

Poor adherence to medication is also detrimental to the healthcare industry and the economy in general. According to [NICE](#), between a third and half of patients with long-term illnesses fail to adhere to their medication regimen. In the USA, inappropriate adherence to medication led to an estimated cost of \$528.4 billion in 2016. This was 16% of their total health expenditure for that year (De Miguel Beriain and Morla González, 2020). The NHS loses upward of £930 million per year due to non-adherence of just five illnesses (asthma, diabetes, high cholesterol, schizophrenia and hypertension) (Elliott, 2013). Digital pills could provide a solution to this costly problem.

Evaluation of Digital Pills:

One of the major issues associated with digital pills are the ethics, especially in respect to the data security of patients. Sensitive information, including patient prescription information, is stored in DP apps. The patch is also capable of collecting lifestyle and behavioural data. The data is deemed secure by Abilify MyCite, as it is encrypted. Nevertheless, data breaches are still possible. The more parties that the data is accessible by, the greater the risk of unintentional data disclosure (Martani et al., 2020). It has also been found that the close monitoring of patients can lead to paranoia. This must be further researched as DP's are used in the treatment of many psychological disorders. If

paranoia is a side effect of DP's, this treatment could be unsuitable to patients with psychological disorders (Kane et al., 2013).

Another major issue is the functionality of digital pills – in particular, the size of the wearable patches. This device is relatively large and can be uncomfortable to wear, which lowers the likelihood of a patient wearing it and it also reduces the quality of life of a user. Past users have suggested improving the technology by altering the patch into a wearable watchband or phone case (Chai et al., 2022).

Recommendations for digital pills:

Digital pills are still a relatively novel concept and require further research before they will become more widely trusted in clinical settings. Further research will recommend whether this technology should be avoided in the treatment of certain disorders, such as psychological disorders. Patients may be more willing to use the patch if research is conducted to make it more practical to wear. Instead of replacing conventional treatment methods, digital tablets should be used as a supplement to traditional treatments.

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Hyperlinks:

<https://www.youtube.com/watch?v=jYkcXm74LAs>.

<https://www.fda.gov/news-events/press-announcements/fda-approves-pill-sensor-digitally-tracks-if-patients-have-ingested-their-medication>

<https://www.nice.org.uk/guidance/cg76/chapter/introduction>