Wearable pharmaceuticals and their impact on healthcare

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Reading time 12 mins

Key Points

- Wearable pharmaceuticals allow both healthcare providers and patients to benefit from better treatment outcomes, e.g. targeted treatments with fewer side effects than

conventional drugs
- By 2025, the majority of clinical trials will use wearable technology such as biosensors
- Wearables can reduce costs in clinical trials and have shown success in treating mental health disorders
- They can be synchronised with an app to provide patients with reminders on when to take medication, facilitate payments and receive deliveries faster
- The pharmaceutical industry is now able to use wearable technology to drive innovation and analytics, e.g. to capture a diverse array of data remotely and speed up the drug development process without compromising efficacy or safety

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Wearable devices in the sports and fitness sector have become so commonplace that it’s no surprise

to see them making their way into the pharmaceutical industry. Medical pharmaceuticals can help doctors to monitor their patient's health, provide diagnostics, and administer medication more effectively than ever before. At the same time, they offer users more autonomy, control, and agency over their health.

Wearables are also revolutionising clinical trials by making drug development faster and more effective. In a study conducted for Intel, Kaiser Associates projected that up to 70% of clinical trials will incorporate sensors by 2025. [1]

How are wearable technologies and biomedical devices used?

Wearable technology, also known as 'wearables', are electronic devices designed to be worn on the user's body. They can come in the form of an accessory such as a smartwatch, woven into clothing such as e-textiles, or even 'smart tattoos' embedded directly onto the skin. These technologies can also include biomedical devices which provide diagnostics, monitoring, and treatment services.

Wearables are typically used to collect data and track health information, but they can also monitor environmental conditions and social factors. Other wearables include clothing that monitors posture or your body's temperature.

Some devices have gone beyond simply monitoring movement or heart rate. They've been designed specifically to help treat depression and anxiety disorders by assisting users in identifying their triggers so they can learn how to cope with them better over time (and hopefully avoid them altogether). This type of technology has already been proven effective for some patients in clinical trials—and it could become available on prescription soon if further studies show similar results across broader populations [2].

Will wearable pharmaceuticals become mainstream?

The global market for wearable medical devices is predicted to grow at an annual rate of 28.1% from 2022 to 2030 [3]. This growth is fueled by technological advances and increasing consumer demand for digital health products.

Here are some ways wearable medical devices are transforming healthcare:

- Helping patients manage chronic conditions
- Providing access to non-emergency care for those who need it most but lack insurance

or public healthcare
- Reducing medication errors due to miscommunication between patients and doctors

Pharmaceutical companies are already integrating wearable pharmaceuticals into their marketing strategies. For example, inhaled medication can be a life-saving treatment for people with chronic respiratory conditions like asthma. Still, patients often aren't as consistent with following a prescribed treatment as they should be.

"Such designs require expertise in chronic illness care, surgical outcomes, post-discharge care, neurology, and emotional well-being. The goal is to shift to more personalised care that empowers patients to be engaged in self-care, helps caregivers better support their loved ones, and allows providers to continue providing high quality care for the patient's needs at a lower cost," explains Dr Bijan Najafi, director of the Interdisciplinary Consortium on Advanced Motion Performance (iCAMP) at Baylor and co-director of the Center to Stream HealthCare in Place [4].

Several companies have been developing inhalers with GPS tracking capabilities built in so that healthcare providers know whether or not the patient has taken their meds on schedule. Propeller Health's inhaler goes one step further by sending data about each dose directly back to physicians through a specialised smartphone app [5].

If patients can track their inhaler usage, they are better equipped to identify what triggers asthma attacks. This allows asthmatics to be more proactive, have more agency over their health, and hopefully, less illness-related anxiety.

Medical wearables improve decision making

The ability of wearable pharmaceuticals and biomedical devices to track and record data (e.g. a patient's drug history, allergic reactions, side effects, and dosage) makes them a powerful tool for physicians. In addition to providing information that improves clinical decision-making processes (e.g. whether to decrease the dosage of one medication due to the severity of symptoms), wearables like the Apple Watch also provide other valuable insights into patients' overall health care. For example:

- Drug usage patterns over time could help point out whether or not medications are taken regularly or if they're being used at all (some patients may forget their meds if they aren't in any pain).
- Drug usage patterns in relation to other drugs could reveal which medications are interacting negatively with each other. The same goes for environmental factors such as stress levels. If you're taking a new medication but also have anxiety because of issues at work, those two factors might lead to adverse side effects such as headaches or nausea. Your doctor would need to have this information to reevaluate the available

treatment options (if necessary) for you to get better quicker [6].

The role of wearables in clinical trials

Wearables have been used in clinical trials for years, but technology has advanced so quickly that they've become more accessible and affordable for people to buy themselves. This means that researchers can access more data than ever before – and use that data to make better decisions about treating illnesses.

For example, Nutromics smart patch device helps users manage the risk of developing diabetes. It combines a sensing platform and stretchable electronics to attach to the user's arm and fit on the skin. It then assesses dietary biomarkers. The patch sends information to an app that allows wearers to see how they react to certain foods. By giving wearers nutritional modifications, these wearable pharmaceuticals help users to avoid lifestyle-related diseases. For those with prediabetes, it is a potentially life-saving device.

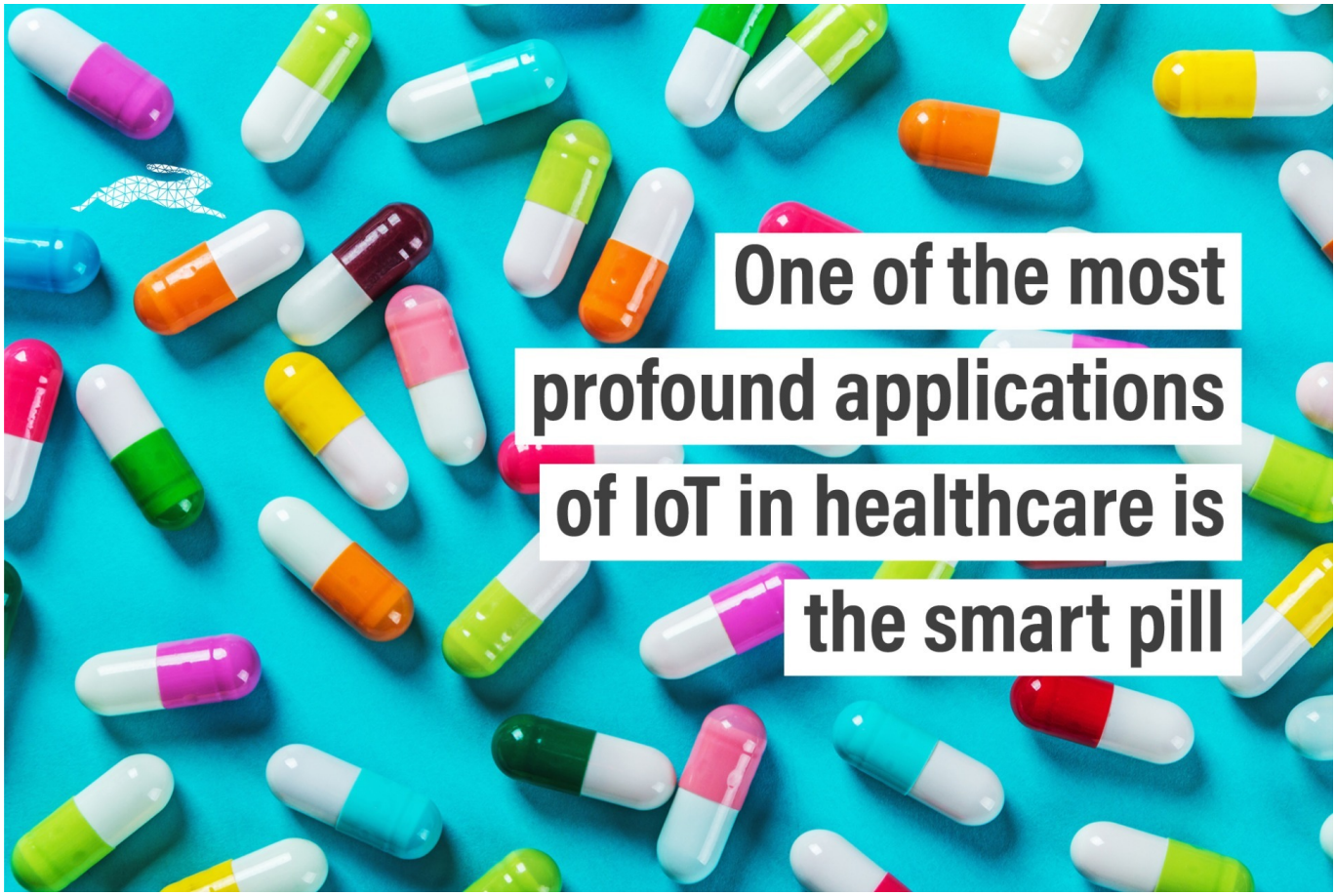
Clinical trials can be an expensive and time-consuming process, but the use of wearables has the potential to reduce costs associated with management [7]. Wearables allow patients to track their own data without relying on doctors or nurses to collect it. This also means they don't have to visit the doctor's office often, reducing travel time and expenses.

Electronic and remote patient monitoring improves the treatment process

Wearables are changing the treatment process in significant ways. For example, patients can wear smartwatches that track what they eat and how much they exercise. Patients can also wear activity trackers to capture their movements (e.g. steps per day). Additionally, wearable devices can monitor vital signs such as blood pressure, heart rate, and temperature.

Wearables can also help doctors make sense of data collected from other sources, including medical records or biosensors. For example, suppose a patient has a specific condition (e.g. diabetes) that requires them to maintain a particular diet. In this case, a doctor may want to know if they are following the prescribed regimen by looking at their food log from the previous week (assuming they use an app on their smartphone).

Wearable devices present opportunities for medical professionals. They provide real-time information about what's happening with each patient during every step of their journey through the healthcare system: from diagnosis to routine checkups – and even into retirement, where health problems are more prevalent [8].



Smart pills have created an Internet of Bodies (IoB)

One of the most profound applications of IoT in healthcare is the smart pill.

Smart pills are edible electronics that monitor patients' bodies, sending data to their doctors and caregivers. The tiny devices can be ingested by patients and give doctors access to information about their conditions that they would otherwise have to wait months or even years to receive.

In 2017, the FDA approved the first smart pill [9]. It's a digital ingestion tracking system with an ingestible sensor that tracks when medication is taken and is used in specific treatments of schizophrenia, depression, and bipolar disorder. This kind of technology could transform the pharmaceutical industry by allowing doctors to prescribe drugs more precisely, reducing side effects and increasing patient compliance.

A final word on pharmaceutical medical

wearables

Technology, the 'smart revolution' and wearable devices certainly have a vital role in healthcare. It is undeniable that pharmaceutical wearables can have an impactful and meaningful effect on how medical treatments are developed, administered and received. That said, users are wise to retain a level of caution regarding privacy and ethics when dealing with any kind of data-capturing device that shares their personal information or administers medication.

We would love to hear your thoughts on wearable medical devices and where you think their future lies. Feel free to leave us a comment or get in touch!

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