Think Biosolution

Technology Review: The effect of wearables in pre-hospital care, preoperative care, acute care and alternative care

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Since the mass production of wearable technology started in the 1970s, wearable devices have become crucial in multiple industries (Scet.berkeley.edu, 2018). With the advent of wearable devices embedded with medical grade biometric sensors, the medical industry started to slowly shift to these new technological advancements. In 2017 the value of wearable technology in the medical industry was US$ 0.86 Billion, and is projected to be worth US$ 17 Trillion by 2021 (Statista, 2018).

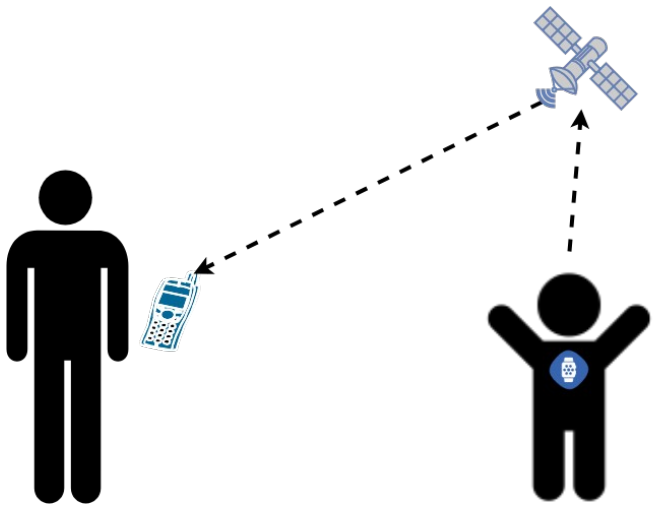
When it comes to pre-hospital care, wearable technology has the potential to revolutionize how medical staff interacts with patients. For example with AR technologies like Google Glass, doctors can prepare for surgery and keep up to date on the patient's electronic health record (EHR) while still talking to them during appointments (Vaughn, 2018). This product decreases the amount of time that the medical staff needs to take to look up the patient's data and increases the amount of time that staff can interact with the patient and discuss their needs. When it comes to the comfort of the patients with regards to the use of Google Glass during their treatment, it was said that "No patient has yet objected to us using it. If anything, they are really intrigued, they're like, 'What's that on your face?". "More importantly, they are appreciative that we do not have to interrupt our conversation. They can say, 'Oh I am on this medication,' and I'll say, 'Oh, you're on metoprolol,' and they'll ask, 'Oh, did you read that off your little screen?' And I'll say, 'Yes.' " (Vaughn, 2018). In an emergency room, doctors are often interrupted when they are in with a patient so this time saved by the Google Glass is invaluable.

Wearable technology is widely used in both pre- and post-operative care while the patient is still admitted in the hospital. Companies like Snap40, CloudDX and Foracare are building wearable healthcare platforms to address the challenges in continuous biometric monitoring of patients both in clinics and at home. For example, Snap40 allows medical staff to monitor patients (wearing a device on the arm) through a phone application that stores and displays biometric information (Snap40.com, 2018). This is important since it means that the nurses are able to check on the patient's vitals without disturbing the patients every three hours, which in turn allows the patients to achieve undisturbed sleep. The information for Snap40 can also be directly integrated with with the hospital's EHR for future use. In case of an emergency, Snap40 device will notify the medical staff so that they can respond quickly (Snap40.com, 2018). Wearable technologies like Snap40 hold the key to rapid recovery of patients and help medical staff achieve a faster response time.

As with preoperative and pre-hospital care, wearable technology has also has a potential to disrupt acute care. Acute care is immediate and intense medical care, that requires rapid diagnosis and immediate medical intervention. Hence smart wearable technology that can not only measure but predict underlying triggers leading to the acute condition, can have a significant impact on patients when they are dealing with emergencies. One of the pioneers in acute care is Propeller Health which develops technology for patients and physicians to better understand asthma and COPD, which afflict millions of patients in the U.S. alone, with a goal of improving symptoms and reducing hospitalizations and ER visits. The Propeller Health system includes a sensor that attaches to inhaler rescue or controller medications; an app called Cards (launched in 2016) for patients to better manage their conditions; and tools for providers to proactively manage large groups of patients. This system is FDA-approved as a medical device, with eight separate FDA clearances

obtained so far. Propeller Health's technologies are now used in more than 45 programs across the U.S., including at large health systems like Dignity Health. Propeller has recently completed an analysis of 330 patients showing a 100% reduction in asthma-related hospitalizations and a 60% reduction in asthma-related ER visits over approximately one year. The company also launched the first predictive tool for asthma risk based on environment, using results from a peer-review publication. The company makes money by working with health plans and integrated health systems to help reduce respiratory utilization and cost, as well as pharma companies that are looking for ways to improve medication adherence.

Other wearable asthma attack predictor includes ADAMM Intelligent Asthma Monitoring, that alerts users and potentially a parent if the user's breathing pattern starts to change drastically (Research & Development, 2018). The ADAMM Intelligent Asthma Monitoring wearable technology is "soft, flexible, waterproof" and connects to a phone application via "Bluetooth, WiFi, and cellular connections" (Research & Development, 2018). This technology is able to notify the user about a potential asthma attack because it "tracks precursor symptoms of asthmatic attacks, including cough rate, respiration patterns, heartbeat, and body temperature" (Research & Development, 2018). Through wearable technology like the ADAMM Intelligent Asthma Monitoring system, the user can be better prepared and more aware of when an asthma attack might occur.



As with the previously mentioned types of medical care, alternative care has also been impacted by wearable technology. Alternative care such as yoga., meditation or acupuncture, is defined as any type of therapy that has not been designed with any strict regulatory procedures. There are products such as Prana and Nadi X that available for consumers to help them improve their posture and guide them during yoga. Prana is a clip on technology that can be worn while doing yoga as well as during day to day activities (DOYOUYOGA.COM, 2018). This technology is designed to improve the wearer's posture and breathing via a phone application that sends the user notifications with instructions and reminders (DOYOUYOGA.COM, 2018). Meanwhile, Nadi X is a pair of yoga pants made from smart fabric (Wearable X, 2018). Nadi X uses haptic feedback via vibrations to guide the wearer into the correct position (Wearable X, 2018). These types of wearable technology assist the wearer in keeping themselves healthy, and particularly in tackling chronic conditions such as obesity, diabetes, stress and cardiac problems. Thereby delaying and/or reducing the need for the consumer to avail more expensive clinical care. Wearable technology has just started to penetrate the holistic alternative care marketplace, and has potential to significantly impact how people who practice alternative care will interact with more traditional medical care system.

The world is continuously evolving and with it so does technology. With each progression of wearable technology, the medical industry improves and becomes more advanced. Wearable technologies like Google Glass, Prana, Nadi X, Snap 40, and ADAMM Intelligent Asthma Monitoring have all made significant impacts on medical staff and patients. Google Glass has helped doctors to pay closer attention to the patient they are talking to while keeping up to date on that patient's medical file. ADAMM Intelligent Asthma Monitoring system allows people who are affected by asthma and their guardians to be warned and prepared for an asthma attack. Snap40 allows medical staff to monitor their patient's vital signs without disturbing them, and Prana assists the user in improving their breathing and posture. Meanwhile, Nadi X is a pair of yoga pants that uses vibrations to guide the wearer into the correct yoga position. Although these technologies have different uses, all of these wearable technologies have potential to significantly impacted pre-hospital, preoperative, acute, and alternative care.

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