

Digital pills successfully monitor opioid use after injury

November 20 2017

Digital pills - gelatin capsules that contain an ingestible sensor along with medication - can help track patterns of drug use, and Brigham and Women's Hospital clinicians are among the first to explore the application of this new technology among patients being prescribed opioids. In a paper published in the December issue of *Anesthesia & Analgesia*, BWH investigators report on the results from a pilot study of 15 individuals who received a prescription to take oxycodone digital pills as needed following treatment for acute fractures. The team found that the opioid-naïve patients self-administered opioids to manage pain for only a brief period and only took a fraction of the number of pills they were given.

"As an investigational tool, the digital [pill](#) provides a direct measure of [opioid](#) ingestion and changes in medication-taking behavior," said senior author Edward Boyer, MD, PhD, of the Division of Medical Toxicology within the BWH Department of Emergency Medicine. "This technology may also make it possible for physicians to monitor adherence, identify escalating opioid use patterns that may suggest the development of tolerance or addiction and intervene for a specific medical condition or patient population."

Earlier this week, the first digital pill was approved by the FDA for use with the antipsychotic drug Abilify, used to treat schizophrenia, bipolar disorder and depression. Opioids such as [oxycodone](#) are frequently prescribed on an as-needed basis for managing acute conditions, but uncertainty exists around how [patients](#) take the prescribed drug. Digital

pills may offer a unique window into patterns of medication usage.

To conduct their pilot study, the investigators approached 26 individuals in the Emergency Department who had been diagnosed with an acute fracture. (Fifteen completed the study.) The team instructed participants to use oxycodone (one to two 5-mg oxycodone digital pills every six to eight hours) as needed for pain. Unused pills were returned after seven days.

The team used the eTectRx ID-Cap system. Each pill in the system consists of a unique radiofrequency emitter and a standard gelatin capsule containing an oxycodone tablet. When the capsule dissolves, the medication is released and chloride ions energize the emitter. The patient wears a sticky patch on their abdomen, attached to a cable reader (the size of an iPod) that stores data about pill ingestion. (Since the study was conducted, advances in the technology have miniaturized the reader and added steps to validate the user of the system and provide directed feedback through a smartphone app.)

The digital pill system recorded a total of 112 ingestion events, compared to 134 ingestions based on pill count (84 percent accuracy). However, all missed ingestion events were traced back to two study participants who ingested digital pills without wearing the reader or did not interact with the reader due to severe pain. Most oxycodone doses were ingested within the first three days after discharge. On average, patients ingested only six pills, despite being given 21.

"It is fascinating to see this technology literally live and in action, especially in light of recent data from the Centers for Disease Control and Prevention about the risk of long-term opioid addiction in patients who have even short courses of oxycodone. These data are important as we continue to have more careful and directed conversations regarding the expectant management of pain, and the dangers associated with

opioid use," said corresponding author Peter R. Chai, MD, MMS, of the BWH Division of Medical Toxicology. "The findings of our [pilot study](#) indicate that most patients stopped taking their prescription opioid after only a brief period, even among patients with fractures that required surgical management."

More information: Peter R. Chai et al, Oxycodone Ingestion Patterns in Acute Fracture Pain With Digital Pills, *Anesthesia & Analgesia* (2017). [DOI: 10.1213/ANE.0000000000002574](https://doi.org/10.1213/ANE.0000000000002574)

Provided by Brigham and Women's Hospital

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