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Could wearable biosensors become part of drug rehab programs?

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There is merit in looking at the use of wearable biosensors to detect whether opioid users stay focused on their rehabilitation programs. This follows a preliminary study in Springer's *Journal of Medical Toxicology* led by Stephanie Carreiro of the University of Massachusetts Medical School in the US. Her team tested the use of wristband sensors worn by a group of patients in an emergency room who were receiving opioids for severe pain relief.

Non-invasive devices worn close to the body are becoming popular among other uses as health tracking tools. These small and user-friendly biosensors provide continuous data that can be stored and reviewed later, or be transmitted wirelessly to allow for real time review and analysis. More data on physical changes and activity are, however, needed before such devices can be put into use as part of substance abuse treatment programs. Numerous studies are underway to determine the biometric profiles of people who are using opioids.

To this end, Carreiro's team conducted preliminary research involving 30 emergency room patients. They were prescribed intravenous opioid analgesics to treat their acute pain. The particular medication and dose administered to each patient was decided on by the attending physician. The patients agreed to wear a wristband biosensor, which allowed the researchers to detect how the patients' bodies reacted to the dosages. The patients were asked how often in the past they had used opioids, and their medical records were also investigated. Heavy users were classified as those who chronically used opioids daily, were part of an opioid

maintenance therapy program (involving for instance the drugs methadone and buprenorphine) or abused the drug.

All in all, it was possible to detect when an opioid was administered, based on the readings of the biosensor. It picked up that patients moved less after they received the drug, and that their skin temperature also rose. These are among the ways in which the body is known to react to an opioid.

Distinguishable features were also found between heavy and non-heavy opioid users, and between different age groups. In particular, there was a greater decrease in the so-called short amplitude movements of heavy users and older patients, which means that they became less fidgety.

"The patterns may be useful to detect episodes of opioid use in real time," says Carreiro, who says that more work is needed before wearable biosensors can become part of treatment programs. "The ability to identify instances of opioid use and opioid tolerance in real time could for instance be helpful to manage pain or during substance abuse treatment."

Biosensors could help monitor developing opioid tolerance and identify people who are at risk for substance abuse or addiction. They could also be applied to opioid addicts in rehabilitation to detect whether they are relapsing. Such relapse data can either be reviewed retrospectively or transmitted wirelessly to trigger an intervention (for example to alert a family member or a community support system).

More information: Stephanie Carreiro et al, Wearable Biosensors to Detect Physiologic Change During Opioid Use, *Journal of Medical Toxicology* (2016). DOI: 10.1007/s13181-016-0557-5

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