

Virtual reality as pain relief: Reducing dressing change pain in pediatric burn patients

21 June 2021



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According to the American Burn Association, burn injuries affect approximately 250,000 children in the United States each year. The pain associated with burn injuries extends beyond the injury itself; there is also significant pain from dressing changes, which can be exacerbated by the anxiety of anticipating this additional pain.

Although opioids relieve burn injury-related [pain](#), they have serious adverse side effects. Prior studies have investigated alternative approaches to pain reduction in burn injury patients that focus on distraction, such as music, hypnosis, toys, and [virtual reality](#) (VR).

In a study published today in *JAMA Network Open*, Henry Xiang, MD, MPH, Ph.D., MBA, and his research team reported the use of smartphone-based VR games during dressing changes in [pediatric patients](#) with burn injuries. "The smartphone-based VR game was very effective in reducing patient-reported pain," says Dr. Xiang, a

professor of pediatrics and epidemiology at Nationwide Children's Hospital and director of the Center for Pediatric Trauma Research.

In the pilot study, designed as a randomized clinical trial, the research team divided 90 children, aged 6 to 17 years, into three treatment groups: active VR, passive VR, and standard care (e.g., toys, tablet). These patients, most with second-degree burns, received outpatient care for [burn injuries](#) between December 2016 and January 2019.

The VR game, called "Virtual River Cruise," was designed specifically for the study by Nationwide Children's Research Information Solutions and Innovation department. "Two factors were considered for the game's design," explains Dr. Xiang. "The first factor was a snow, cooling environment within the game. The second factor was cognitive processing to encourage active engagement."

Patients played the game using a smartphone and a headset. During dressing changes, which lasted approximately 5 to 6 minutes, patients in the active VR group actively engaged with the game; to stay still while playing the game, the patients tilted their head to aim a target, notes Dr. Xiang. Patients in the passive VR group only watched the game.

Along with their caregivers, patients reported their perceived pain and subjective experience with the game in post-intervention surveys. Nurses evaluated the game's clinical utility.

Among the three treatment groups, patients in the active VR group had the lowest overall pain scores. Most patients and their caregivers reported a positive experience with the game, calling it "fun, engaging, and realistic."

Nurses considered the game to be clinically useful in the outpatient setting. Previously, computer-based games were used during dressing changes. However, the computers' bulkiness was not clinically practical. "Smartphones are easy to use, and most families have them," said Dr. Xiang.

Given the VR games' ease of use and demonstrated effectiveness at reducing pain during burn dressing changes, Dr. Xiang believes the [game](#) can also be played at home to relieve this pain. "Pediatric burn patients still need dressing changes at home after hospital discharge, and these changes could be very painful," said Dr. Xiang. Currently, Dr. Xiang is leading a research project, funded by the Division of Emergency Medical Service of Ohio Department of Public Safety, to evaluate the feasibility and efficacy of VR games in reducing pain during burn dressing changes at home.

The current opioid crisis underscores the need to continue to explore non-opioid approaches to controlling pain in burn patients. "The future research direction is to evaluate whether smartphone-based VR games have an opioid-sparing effect," says Dr. Xiang.

More information: Xiang H, Shen J, Wheeler KK, et al. Efficacy of smartphone active and passive virtual reality distraction vs standard care on burn pain among pediatric patients. *JAMA Network Open*. 2021;4(6):e2112082.

Provided by Nationwide Children's Hospital

APA citation: Virtual reality as pain relief: Reducing dressing change pain in pediatric burn patients (2021, June 21) retrieved 25 September 2021 from <https://medicalxpress.com/news/2021-06-virtual-reality-pain-relief-pediatric.html>

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