

Machine learning predicts which patients will continue taking opioids after hand surgery

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A machine learning algorithm performs well in predicting the risk of persistent opioid use after hand surgery, reports [a study](#) in the August issue of *Plastic and Reconstructive Surgery*.

"We found that a machine learning model performs well in identifying [hand surgery](#) patients who are more likely to become persistent opioid users," comments ASPS Member Surgeon Kevin C. Chung, MD, MS, of University of Michigan, Ann Arbor.

"This may provide a more efficient strategy to identify [high-risk patients](#) and implement measures to prevent [opioid addiction](#). Similarly, the use of artificial intelligence can facilitate a more personalized approach in prescribing the right pain medication in the optimal amount for a specific patient undergoing a particular operation."

Two machine learning models tested to predict persistent opioid use

The study evaluated two previously described machine learning models: one using patient-reported data from the Michigan Genomics Initiative (MGI) and one based on insurance claims data. The models were first evaluated in a large sample of general surgery patients, then in patients undergoing hand surgery, such as [carpal tunnel](#) or wrist fracture surgery.

The study focused on whether the machine learning models could predict which patients would develop persistent opioid use, based on prescriptions filled up to six months after surgery. The MGI model included 889 patients, about half of whom had previous opioid use. The claims model was limited to 439 "opioid-naive" patients, without recent opioid use.

In the MGI model, which included previous opioid users, 21% of patients developed persistent opioid use. In the insurance claims model, which excluded previous opioid users, 10% of patients had persistent opioid use.

On "area under the curve" analysis, the MGI model performed very well in identifying patients with persistent opioid use: 84% in the model trained on hand surgery data and 85% in the general surgery population. By contrast, in the claims model, predictive ability was 69% based on hand surgery data and only 52% in the full data set.

Machine learning may streamline assessment of postoperative opioid risk

In the MGI model, having an opioid prescription before surgery was the strongest predictor of postoperative opioid use. Other predictive factors included overall body pain and prescription of hydrocodone—a relatively potent opioid that is commonly prescribed for postoperative pain.

As in other types of surgery, persistent opioid use is a risk for patients undergoing hand surgery. Although some [risk factors](#) have been identified, assessing postoperative opioid risk is a challenging and time-consuming process given the diversity of the patient population and variation in complexity of procedures. The new study suggests that machine learning can provide a more integrated, straightforward approach to identifying high-risk patients.

Models including patient-reported data on factors like pain and [mental health](#)—such as that collected in the MGI—appear to offer the highest predictive value.

"With access to comprehensive datasets, machine learning has the potential to streamline the identification and analysis of detailed factors that influence patients' postoperative pain experiences," the researchers write.

The authors note some limitations of their study, which may not reflect changes in prescribing patterns in response to the [opioid](#) epidemic. Dr. Chung and co-authors conclude, "In practice, these models could be implemented as decision-support tools to help clinicians efficiently identify patients who are most vulnerable to addiction and in need of tailored pain management or counseling."

More information: Predicting Persistent Opioid Use after Hand Surgery: A Machine Learning Approach, Natalie B. Baxter et al, Predicting Persistent Opioid Use after Hand Surgery: A Machine Learning Approach, *Plastic & Reconstructive Surgery* (2023). [DOI: 10.1097/PRS.00000000000011099](#)

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