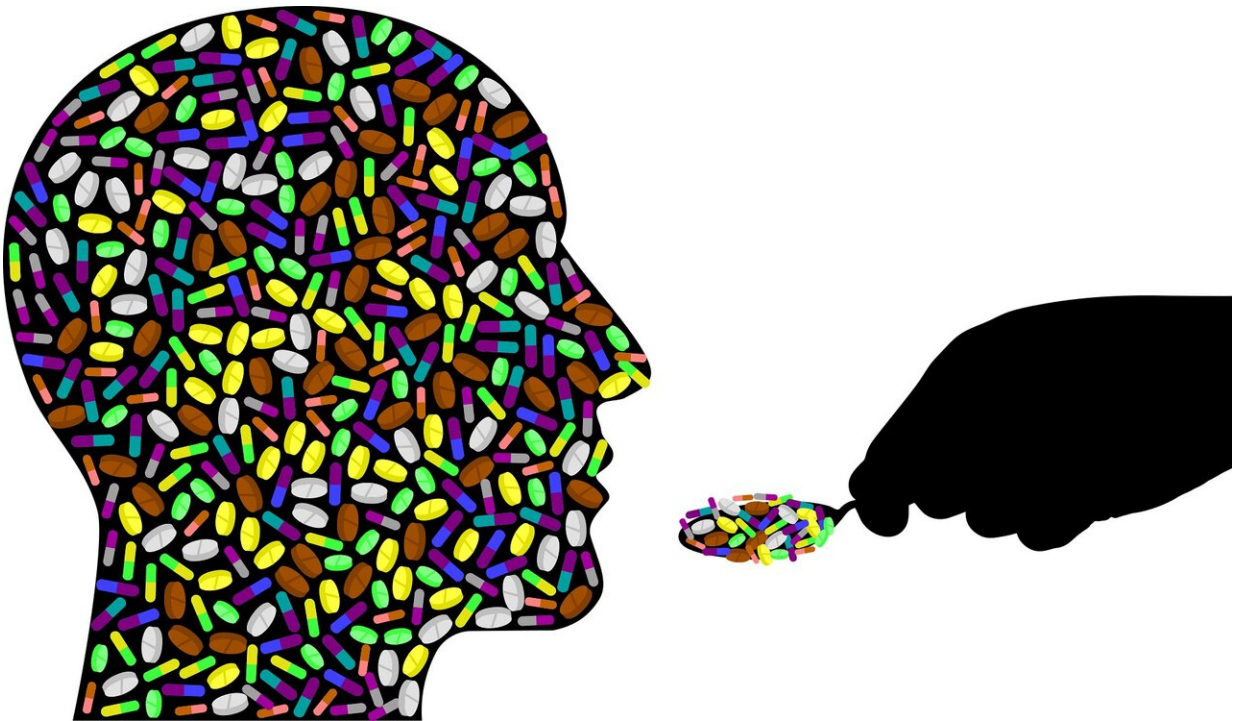


# Management researchers prescribe possible remedy in opioid misuse

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A decision-support framework developed by management science researchers from The University of Texas at Dallas could help clinicians objectively identify and estimate harms and benefits of opioid use for pain management.

In a study published online Feb. 3 in the INFORMS journal *Decision Analysis*, Naveen Jindal School of Management researchers explored how [clinicians](#) make decisions when prescribing opioids and developed a quantitative model of the process that incorporates multiple factors.

"The ongoing opioid epidemic has been a serious public health problem, and prescription opioids play a role in this problem," said Dr. Metin Cakanyildirim, professor of operations management and one of the study's authors. "Opioid drugs are initially prescribed to treat [pain](#), but their use can potentially lead to adverse effects of drug tolerance, increased sensitivity to pain, dependence, addiction and overdose."

According to the Centers for Disease Control and Prevention (CDC), more than 14,000 people died in 2019 from overdoses involving [prescription opioids](#).

Cakanyildirim and first author Abdullah Gokcinar, a doctoral student in operations management, were motivated by the opportunity to use management science tools to manage a nonmonetary process—pain—occurring outside business contexts.

To provide an [analytical framework](#) for evidence-based opioid prescribing, they collaborated with pain researchers Dr. Ted Price BS'97, Ashbel Smith Professor of neuroscience in the School of Behavioral and Brain Sciences and director of the Center for Advanced Pain Studies, and Dr. Meredith Adams, assistant professor of anesthesiology at Wake Forest School of Medicine.

Opioid decision-making incorporates [recovery time](#) and pain intensity, as well as gender, age and drug-use history, Gokcinar said. When prescribing opioids, a clinician faces several uncertainties, including opioid tolerance and hypersensitivity.

CDC guidelines direct clinicians to prescribe the lowest effective dose of opioids. The agency emphasizes evaluation of trade-offs in opioid use and directs clinicians to assess pain, check patient opioid history, discuss adverse effects and observe patient cues for drug abuse.

Although recent guidelines loosely limit prescription amounts, the exact prescription decision is left to the clinician, who typically mentally accounts for the trade-offs of beneficial versus adverse effects.

By quantifying this mental process, the researchers built a framework that could lead to prescription decision-support tools. The framework incorporates several parameters related to pain and recovery time, as well as adverse effects such as discomfort, dependence, tolerance and hypersensitivity.

The analysis found that over- and under-prescribing occur due to clinical uncertainties and lack of estimation and evaluation methods. Accurately incorporating adverse effects into the decision-support framework yields [pain-management](#) models for chronic, acute and persistent pain types.

The models provide optimal prescriptions to minimize the total pain, discomfort and suffering, and can reduce overprescribing, Gokcinar said.

"The clinician can measure the patient's pain, approximate its trajectory and estimate the discomfort during opioid use along with the risk of addiction or overdose," he said. "Inputting these and other factors into a decision-support framework that balances benefits and adverse effects of opioids yields an optimal prescription."

## **Additional Framework Applications**

Gokcinar said that such a framework could also be adapted to host

[patient data](#), including administered dosages, and to facilitate the review of a patient's pain treatment, transfer of information back and forth between clinicians during and after a patient handover, and benchmarking of these treatments across clinics.

The study found that clinicians who initially prescribe opioids before handing over their patients to another provider are prone to underestimating the adverse effects. A framework could draw a clinician's attention to the adverse effects or limit their prescription until the handover, he said.

"Using this model could pave the road toward frequently prescribing reduced amounts of opioids and hence adjusting prescriptions—known as adaptive treatment—according to patient statuses," Gokcinar said.

"Without such decision support, clinicians are forced to quickly come up with good prescriptions by combining their patient observations with their experiences. This is not an easy task to perform well repetitively in stressful settings."

For patients, having a framework in place could help them understand that reduced amounts of opioids will maintain the long-term health of their nervous system.

"That might mean suffering more today to suffer less later," Cakanyildirim said. "Pain management can be a long-term process and requires patients to be less myopic and more forward-looking."

Using real-life data of daily reported pain levels and opioid use from Flaredown, a [mobile app](#) that helps users track their diseases and medication, the researchers inferred the timing and severity of adverse effects. Also, using data from surgery patients in a [clinical setting](#), the researchers compared the suggestions of their models to clinical practice.

Once the models are validated in a clinical setting, they could potentially support balanced [opioid](#) prescribing. They also could aid policymakers in evaluating prescription policies.

Cakanyildirim said the researchers plan to further their work by collaborating with [medical professionals](#) and pain clinics to study information conveyed by patient questionnaires, assessments via telemedicine and adaptive treatment approaches.

**More information:** Abdullah Gökçınar et al, Balanced Opioid Prescribing via a Clinical Trade-Off: Pain Relief vs. Adverse Effects of Discomfort, Dependence, and Tolerance/Hypersensitivity, *Decision Analysis* (2022). [DOI: 10.1287/deca.2021.0447](https://doi.org/10.1287/deca.2021.0447)

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