High patient uptake for text message system monitoring opioid use in real-time

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After more than 1,000 orthopaedic procedures at a city health system, roughly 61 percent of the opioids prescribed to patients went unused, according to new research. This was discovered within a study at the

Perelman School of Medicine of the University of Pennsylvania that showed most patients responded to text messages designed to gauge patients' usage of their prescriptions. Knowing that so many patients are comfortable texting this information to their care teams is extremely useful as medical professionals look to right-size painkiller prescriptions and reduce the amount of opioids that might be misused when they're left over. This study was published in *NEJM Catalyst*.

"This approach is a step toward building a dynamic learning health system that evolves to treat patients," said the study's lead author, Anish Agarwal, MD, an assistant professor of Emergency Medicine. "We know that the opioid epidemic has struck the nation in many ways. One of the key areas to address is reducing the amount of 'leftover' opioid pills in the community which pose a risk to individuals, families, and children."

Clinicians know that a balance needs to be struck between pain management and opioid pain medications, but there is little by way of patient data to guide them. Opioid prescription quantities have largely been best estimates based on how clinicians were trained or a rough estimate using a patient's medical history. Agarwal, senior author M. Kit Delgado, MD, co-chair of the Penn Medicine Opioid Task Force and an assistant professor of Emergency Medicine, and their colleagues sought to fine-tune those estimates and adjust guidance on a procedure-by-procedure case. To do that, they sought a way to deliver real-time numbers on how much pain medication patients actually use. The system they developed centered on automated conversational text messaging.

Patients were recommended to join the automated system by their clinical team, then would receive text messages introducing them to the program on the fourth day following their procedure. If the patient responded that they'd like to take part, the automated system triggered a simple text conversation. It asked questions about things like patients' levels of pain, their ability to manage the pain, and their use of their

prescription opioids. These messages were set to go out on the fourth, seventh, fourteenth, and twenty-first days after their procedures. If patients indicated at any point that they weren't taking the opioid pain medication anymore, the messages stopped.

The research team reached out to roughly 2,400 patients of orthopaedic procedures between September 2018 and January 2020. Roughly half consented to taking part in the program, which, in itself, was a significant finding for the researchers because it showed a widespread willingness to use this type of system. On top of that, the researchers saw an extremely high rate of responses among these patients with 88 percent responding on the fourth post-operative day. The lowest rate of responses was seen on the patients' seventh day (at 69 percent). For those patients using medications at day 21, 95 percent responded.

Overall, patients reported a decrease in their pain levels across all procedures. But this appeared to be accomplished without the majority of the opioids that were prescribed. More than 1,100 patients took part in the texting system, and from that population, the researchers discovered that more than 10,000 opioid tablets were left unused, roughly 61 percent of those that had been prescribed. While research is slim on the subject, that is within the range, though on the higher end, of what is thought to be the average amount of leftover opioids from medical procedures.

Agarwal believes that through establishing a system like this—which patients took up at high rates—gives clinicians a patient-centered, real-time feedback system that could be used to adjust opioid prescription levels and reduce the chance of their being leftover pills that could be misused.

"Our system works as a quality improvement mechanism and a way for providers to see trends in patient-reported pain and opioid use following

their surgeries," Agarwal said. "We can collect the data, analyze it, and inform future prescribing to predict and meet the needs of our patients going forward."

One of the goals of the team researching this texting system is to potentially pinpoint what levels of opioids would be needed for each type of procedure. For instance, current prescribing practices may be overshooting the pain management needs of a shoulder surgery patient, but roughly right for someone getting a hip replacement.

"As orthopaedic surgeons, we are always concerned that we will not provide enough medicine to care for our patients' post-operative pain. In the past, it was truly a calculated guess erring on the side of not underprescribing," explained study co-author Brian Sennett, MD, the chief of Sports Medicine and an associate professor of Orthopaedic Surgery at Penn Medicine. "Our goal is to treat our patients well while not overprescribing. In the future, I am excited about sharing this data with our patients and having them involved in their post-operative pain management, which I believe will result in the next great reduction in opioid prescribing."

Although this study used orthopaedic surgeries to test the system, Agarwal said it opens the door for pain management observations across many departments.

"This is the beginning of a lot of exciting work supported by many Departments, the University, and the FDA," Agarwal said.

More information: Anish K. Agarwal et al. An Automated Text Messaging Program to Inform Postoperative Opioid Prescribing, *NEJM Catalyst* (2021). DOI: 10.1056/CAT.20.0440

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