ANESTHESIOLOGY NEWS
Pain Medicine
JUNE 14, 2017

Big Data: The Role of Databases in Perioperative Pain Management Research

San Diego—It's difficult to talk about pain control these days without mentioning the opioid epidemic.

Despite the dramatic rise in opioid prescriptions over the last decade, pain scores and patient satisfaction have remained the same. Opioid-related deaths, on the other hand, have quadrupled in the United States.

According to Karim Ladha, MD, MSc, from the Department of Anesthesia at Toronto General Hospital of the University of Toronto, the perioperative period plays an underappreciated role in the crisis. Perioperative physicians, who have among the highest prescribing rates of opioids, can leverage databases to study trends and practice patterns over time.

"Even if they don't have detailed data from pain questionnaires, databases are a useful way to study pain, providing a lot of information about how we practice and how to improve our practice of pain management," Dr. Ladha said. "In the future, more research

is needed that combines perioperative databases with longitudinal follow-up."


Karim Ladha, MD, MSc

Although unidimensional pain assessment scales are the traditional means of studying pain, their utility has been questioned because of the subjectivity involved.

"Even though we routinely collect these data, I'm not sure if they're of much worth," said Dr. Ladha, who spoke at the 2017 annual meeting of the Society for Technology in Anesthesia. "Questionnaires and surveys are also tedious to complete. … With databases, however, researchers can study prescription patterns, clinical encounters and even rare events."

Overdose, Dependence and Outcomes

The Nationwide Inpatient Sample—the largest publicly available inpatient care database in the United States—was used in a study of 11 million patients undergoing elective surgeries from 2002 to 2011. The database showed that both opioid overdoses and opioid dependence per 1,000 patients increased over time (*Ann Surg* 2017;265:702-708).

In a more recent analysis that has been submitted for publication, Dr. Ladha and his colleagues examined the relationship between opioid dependence and outcomes and found similar trends. Opioid-dependent patients had 1.62 higher odds of suffering postoperative pulmonary complications (95% CI, 1.16-2.27) and longer hospital length of stay by nearly one day. The study also showed that opioid-dependent patients cost the health care system approximately $3,800 more for the same procedure compared with patients who didn't have an opioid use disorder.

Multimodal Therapy

As Dr. Ladha reported, all patients undergoing surgery should receive nonopioid analgesics as part of a multimodal regimen. Because treatment of pain involves multiple teams, he said, researchers need to analyze data at the hospital level.

Using the Premier Research database, which contains detailed codes for all charges related to procedures, medications, laboratory and diagnostic tests, Dr. Ladha and his colleagues investigated the probability that a patient undergoing one of four selected surgeries would receive two or more nonopioid analgesics. Even after adjusting for multiple potential confounders using propensity scores and mixed effects models, there was tremendous variation among the 315 hospitals examined (*Anesthesiology* 2016;124:837-845).

"These data suggest that the use of multimodal perioperative analgesia is due to institutional or provider preference," Dr. Ladha said. "This technique is powerful and can be applied to EMRs [electronic medical records] or done on the provider level."

Longitudinal Follow-up

In the era of the perioperative surgical home, as anesthesiologists expand their role in postoperative care, longitudinal follow-up is needed. For this, said Dr. Ladha, researchers rely on claims-based insurance databases that track patients long after hospital discharge.

"Persistent pain after surgery has been found to be common," Dr. Ladha said, "but little is known regarding persistent opioid use after surgery. There are no studies on potential interventions, but the theory is that providing better analgesia would lead to less persistent pain."

A study of opioid-naive patients undergoing abdominal surgery used time-to-event analysis to analyze prescription data in large databases. The outcome, which was 30 days without filling an opioid prescription, showed no difference in rate of persistent opioid use between patients who had received an epidural and those who had not (*Anesthesiology* 2016;124:396-403). In addition, three to six months after surgery, 30% of patients filled a second opioid prescription and 11% filled a third prescription.

"These data are concerning to me and suggest we need more work to figure out how to prevent this," said Dr. Ladha, who works as part of the transitional pain service at Toronto General Hospital.

"We provide more intensive follow-up for patients at high risk of abuse after discharge, with clinical psychologists and pain specialists to wean them off opioids," Dr. Ladha said. "Success so far has been great, but it highlights the need for these kinds of services if we're really going to take better care of our patients."

An Acute Need

John Dalton, MD, chief quality officer for a private anesthesia group, in Nashville, Tenn., underscored the "acute need" to link perioperative databases with longitudinal follow-up.

"Our payment obviously has downward pressure on value-based modifiers going forward, but the biggest adjustments are based on outcomes over which we lack both unilateral control and the ability to follow long term," Dr. Dalton noted. "If we're going to prospectively affect those outcomes, which CMS [the Centers for Medicare & Medicaid Services] wants us to do, we've got to link longitudinal data to our patients, in whom we have an ever-growing database of perioperative information."

"Coming from Canada," said Dr. Ladha, "we have an advantage in a single-payor system because there's only one insurer, so we can link hospital records to longitudinal data, but there are some limitations. We're in the process of trying to do that—and you see the power of it—but in my mind it doesn't exist yet. I think of that as the holy grail."

—Chase Doyle

Dr. Ladha reported no relevant financial disclosures.