



ARTIFICIAL INTELLIGENCE

AI-Driven Platform Helps Reduce Opioid Exposure for Children Undergoing Surgery

July 6, 2020 | 5 min read



By [Rodika Tollefson](#), Contributor

Surgeries, simple or complex, can be painful. For decades, anesthesiologists and surgeons have relied on opioids—during anesthesia and after surgery—to control patients' pain.

Those surgeries, however, became a gateway to opioid dependence and addiction. Research shows that [5 percent of adolescents](#) who are prescribed opioids after surgery become persistent (long-term) opioid users. For adults, studies have found the numbers varying from [around 6-7 percent](#) to as high as [12 percent](#).

“In the U.S., 50 million patients have surgery every year—and if you think about a 5-7 percent conversion rate, that means two million patients become long-term opioid users after surgery,” says Dr. Dan Low, attending pediatric anesthesiologist at [Seattle Children’s Hospital](#) and co-founder of Seattle-based healthcare-technology startup [MDmetrix](#).

“ We know that if we could reduce the exposure at the time of surgery and around surgery, we could potentially impact millions of lives.”

—Dr. Dan Low, pediatric anesthesiologist at Seattle Children’s Hospital and co-founder of MDmetrix

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Increased awareness due to research on opioid addiction in recent years has prompted the medical community to look for alternative pain relievers. “We know that if we could reduce the exposure at the time of surgery and around surgery, we could potentially impact millions of lives,” Low says.

The challenge is that changes require multiple protocol-review cycles by the researchers or physicians. Each cycle takes months or years to complete because parsing through and analyzing the data manually is very time-consuming.

“That’s the problem in medicine. We have good evidence, but implementing best practice tends to move very slowly,” Low says. Artificial intelligence (AI) promises to change that by dramatically reducing this timeline.

Using MDmetrix’s AI-powered technology, Seattle Children’s Hospital recently created what’s billed as the [nation’s first](#) opioid-free pediatric surgery center. As a result of a study that lasted a year and a half, the hospital reduced the rate of opioid administration at its ambulatory surgery center from 85 percent to 4 percent.

“We’ve been able to accelerate the pace and actually move the needle for anesthesia and medical practices,” Low says.

AI Accelerates Change

The reason moving the needle is hard, Low explains, is because physicians want concrete evidence that if they try something different, the patient outcomes improve. But not just any clinical evidence—rather, data based on their own patients, he says.

“For physicians to change their behavior and their practices, you have to show them their own data in a mirror, and that’s the missing ingredient,” Low explains.

A common protocol review cycle—the standard methodology for developing clinical improvements based on real-world data—uses a four-step process called Plan-Do-Study-Act (PDSA). It involves reviewing thousands of medical journal articles for previous studies, applying the proven protocols to the clinicians’ own patient cohort, and reviewing outcomes; then potentially scaling to a larger group or perhaps refining the protocol.

Each of these steps could take months, Low says. Electronic medical records (EMR) were not designed for culling and analyzing massive amounts of clinical data.

Anesthesia, for example, produces a lot of data points, and manual analysis is labor-intensive. But the MDmetrix platform, called Mission Control, has intuitive dashboards that use AI to highlight the critical data. This allows physicians to visualize and evaluate outcomes quickly across an entire select group of patients, often in real time.

Warren Ratliff, MDmetrix's chief executive officer, says Mission Control blends clinical methodology with AI and data visualization based on control charts. Industrial engineering has used control charts to study how a process changes over time.

"There are no straight lines in medicine. There's always variability because people are different," Ratliff explains. "Control charts can help distinguish random variations from a data signal, showing meaningful patterns in the data."

“ The purpose of the AI is to make it simple for the physician to adapt clinical care.”

—Warren Ratliff, chief executive officer, MDmetrix

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That's one of the areas where AI comes in: It can analyze the large amounts of data and identify the patterns quickly, accomplishing in two to four minutes what would take humans as long as six to 18 months.

"The platform makes it easy for a physician to ask a clinical question and very quickly get an actionable answer," Ratliff says. "The purpose of the AI is to make it simple for the physician to adapt clinical care."

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Going Opioid-Free at Seattle Children's

Seattle Children's treats patients from birth to 21 years old, and consists of a main hospital and a stand-alone surgery center, Bellevue Clinic and Surgery Center (BCSC). Low and his colleagues at Seattle Children's and the University of Washington began their clinical study in January 2018 at BCSC.

They based their protocol on an alternative pain-controlling drug and methodology that other research proved efficacious a decade prior. They started with tonsillectomies. Once they had evidence of real-world effectiveness, the team expanded to more surgeries.

Overall, they analyzed more than 10,700 surgical cases. As a result of this improvement work leveraging data, more than 6,000 pediatric patients at BCSC underwent opioid-free surgery. The international journal *Anesthesia & Analgesia* published the study in April 2020, and since then, Low says the hospital has further reduced opioid exposure, from the published 7 percent to 4 percent in May 2020.

In addition, Seattle Children's all but eliminated the common side-effect of nausea, as well as improving costs. Next, Low is working on adopting the protocols at the on-campus surgery center. And, he notes, physicians can apply the same opioid-free approach to adults.

Fulfilling a Vision

The MDmetrix platform has both clinical and operational applications. Recently, the company offered it to hospitals for free to help them optimize COVID-19 patient care and resources. Customers have also used the technology to reduce recovery time after gastrointestinal procedures, increase operating room capacity, and keep operating room surgical teams on time. Some have saved millions of dollars as a result.

What makes the technology powerful is its ability to turn EMRs into actionable insights, according to Ratliff. And some problems solved have been very complex. One hospital that halted non-emergency services during the pandemic took a big financial hit and needed to optimize reopening capacity, while addressing a large patient backlog.

“The platform did hundreds of millions of calculations and scenarios across a set of patterns to surface 200,000 minutes of potential capacity,” Ratliff says. “There’s no way an analyst could do that in a lifetime, and our system was able to generate results in seconds. That’s a huge leap forward.”

Another leap forward is the ability for hospitals to get more value out of their investment into EMR. Low’s frustration with EMR was, in fact, the genesis behind MDmetrix.

He co-founded the company in 2016 after his manager at Seattle Children’s asked what sounded like a simple question: Was a more expensive drug that the hospital added to its protocol a few months earlier improving patient outcomes?

“What should have been a 60-second question turned into a one-year question to get the data,” he says. “Hospitals might spend \$300 million on EMR and I thought, what’s the point of having this \$300 million system if it takes a year to answer a simple question?”

MDmetrix spun out of Seattle Children’s, and the ability to provide opioid-free surgeries brings Low full circle, in a way. Mission Control has accomplished his vision of bridging the gap between data and the ability to improve patient outcomes as well as efficiency.

Ratliff notes that the overarching goal of MDmetrix’s technology is to enable clinical leaders to adapt rapidly to everyday changes.

“I think we can have a tremendous impact on the quality and cost of care,” he says. “Instead of having to manage by anecdote, they can manage by science and data.”



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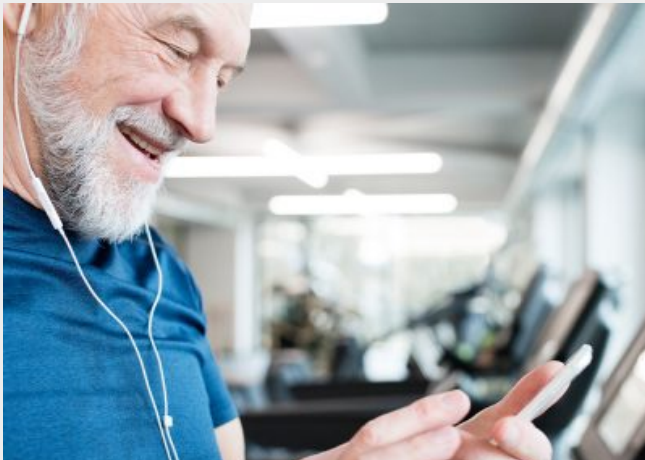


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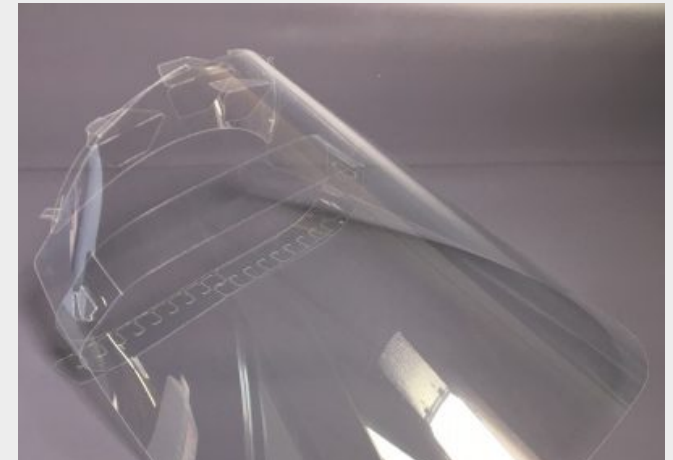
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