

A new tool crunches tonnes of data and uses predictive AI models to help healthcare providers create interventions that could reduce opioid misuse.

By **Mayank Sharma**

CAN BIG DATA HELP CURB THE OPIOID CRISIS?


THE OPIOID CRISIS CLAIMS over a hundred lives every day in the US alone. Medically known as the Opioid Use Disorder (OUD), the crisis that's taken the form of an epidemic impacts everyone across economic barriers and social strata. Dr Meera Kanhouwa describes how an anaesthesiologist friend recently committed suicide on Mother's Day: "If a physician who has access to care feels so disconsolate, what are we missing?" With over two decades of working in emergency rooms (ERs) across the US, Kanhouwa wishes she knew who was at risk: "When two people walk into my ER – same age and same

back pain – who is going to be an opioid addict, or who is at risk of opioid addiction? And who has resilience? Anything I know in my gut is not a data-driven approach."

Kanhouwa now works with Deloitte Consulting on a data-driven solution called Opioid360, which she demonstrated at the recent DataStax Accelerate conference in Washington. Opioid360 synthesises de-identified data from disparate and siloed sources together with AI and predictive modelling to provide meaningful insight to first responders and healthcare providers. These are the people who are in a position to

help the victims but are unable to do so because of a lack of data. Opioid360 helps turn this data into generic personas, which the system then uses to answer meaningful questions.

Kanhouwa's co-presenter, Sean Conlin, works with her on the project. He explains that three types of data are coming into the solution. The first is from the public sector, from organisations such as health, human services and law enforcement agencies: "In two of the states we are working with currently there are 30 different data sets that all get combined into a common database."



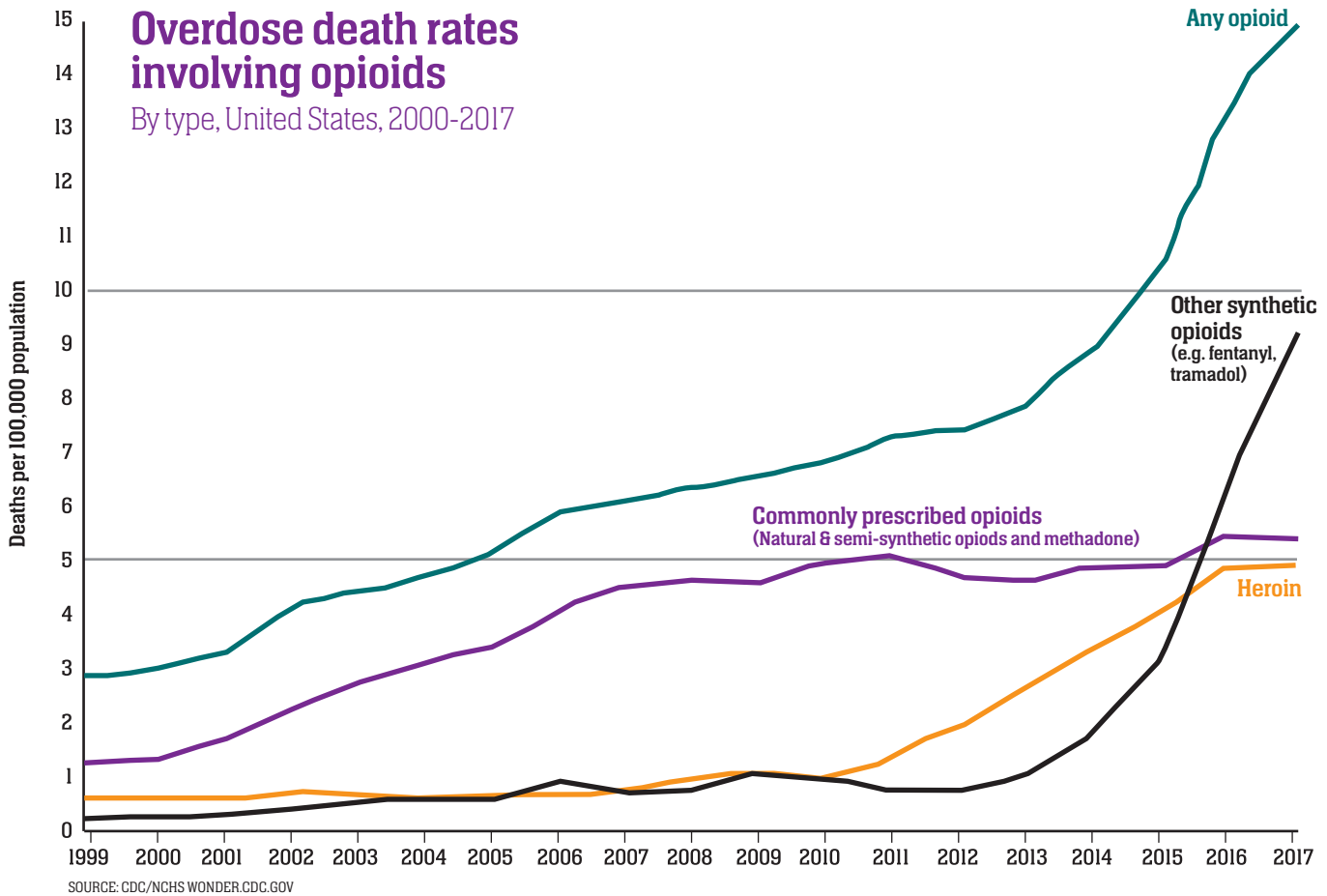
Twenty-seven million people suffered from opioid use disorders in 2016 according to the World Health Organisation

The second and more interesting source of data is the social determinants and behaviour data. To put the importance of this data into perspective, Kanhouwa uses Facebook as an example and says that studies have shown that if the six people you interact with the most on Facebook have a BMI over 30, you are 80 per cent more likely to have a BMI over 30 as well: “Now take that to these de-identified personas. We are looking at a dataset of 280 million adults based on which we create these de-identified personas.” This is a mind-blowing figure when compared to the fact that the best FDA trials are based on

a patient set of maybe 10,000: “Never before in medicine had we had the ability to look at almost 300 million people and derive analytics and statistical relevance from that. And that’s what makes this so exciting – to really help us understand the biological basis of disease and how our lifestyle impacts our overall health.”

The third input, Conlin continues, comes from Google Analytics. This is the data that comes, for example, from online marketing campaigns by public sector organisations. The platform taps into this data and mines it for critical signals.

Both Conlin and Kanhouwa emphasise several times that the whole system is built with privacy and security in mind and the empathetic knowledge that people are more than data sets. Still curious about the privacy implications of such an all-encompassing system, we spoke to Scott Heath, enterprise solutions executive at Expero, who has a similar product for tackling the opioid crisis: “Deloitte has its own product and works in Federal space and works with government opioid,” he notes. “We work with commercial opioid, which is more for healthcare and health providers and insurance companies. ▶



◀ The difference is they do theirs for the state and government agencies and we do ours for the commercial sector.”

The Expero system has a built-in privacy control module called Entitlements that regulates the kind of data that an individual is allowed to see. Deloitte’s solution would have similar access controls but the company was tight-lipped about their implementation.

Prevention by prediction

Opioid360 employs several predictive models that help identify at-risk populations and treatment barriers. Conlin illustrates by using the example of two individuals, both of whom have had a back injury, have been in rehab for three-six months, and have been put on a particular prescription: “One came in via ambulance for his pain but that doesn’t make him less or more likely to become addicted. The question is what’s the likelihood that anybody in either group would develop an addiction to the prescription?”

Demonstrating the solution, Conlin says the predictive model puts them both in about a 10-15 per cent range of developing an addiction. To get a more accurate result, he begins exploring the circled data sets to bring in their behavioural data. For instance, people in Persona A tend to be home owners that have family and got back to exercise during rehab rather quickly, have short commutes to work, and tend to have good strong financial indicators. Then there’s Google Analytics data, which Conlin emphasises again isn’t tracked individually but only at a neighbourhood level. This data shows a direct correlation between search behaviours being a precursor to OUD and people in Persona A tend to live in areas that don’t do high-risk search.

Once you factor all this in, you get a much more comprehensive picture about the individual than before and as Conlin navigated the interface, the platform showed a decrease in the likelihood of developing an addiction for Persona A. In contrast, drilling down on Persona B showed they tend to have a high rate of divorce, have problematic eating habits, tend to get very high risk financial indicators bordering on bankruptcy, and usually lived in geographic areas that both are economically struggling and have high-risk search behaviour patterns. When fed to the predictive model, the group generated a four-fold increase in the risk of developing opioid addiction.

New conversations

In addition to helping frontline practitioners, identifying potential opioid abusers also helps facilitate new economic conversations for people such as state Medicaid directors. Conlin set up a series of models and drilled down into the population that are very vulnerable and high risk individuals that just ‘fall through the cracks’ in the current system. During his demonstration, he identified a sub-population that had a very high risk of addiction, that was probably pregnant, most likely uninsured and perhaps with housing insecurity.



Kanhouwa says the first time someone like this would come to her attention would be when they are brought to the emergency room. And that’s already too late. To demonstrate how the system

The singer Prince became a high-profile victim of opioids in 2016

would help flag an at-risk individual a lot earlier, Conlin continues drilling down this sub-group. Suppose two patients came up with similar names but slightly tweaked addresses. Conlin did some entity resolution – linking of records – and combined those two entities to one individual. That brought new doctors into the picture, one of whom had a high-risk ring around them because they use a lot of prescriptions from the same pharmacies. Further investigation brought forward the fact that this individual has children and that these children show up in other parts of the government services as they consume foster care resources, for instance: “With that kind of integration and access to the data, we can now form an image about an individual who has a 90 per cent chance that they are going to consume over half a million dollars-worth of resources over the next five years. But if we have very aggressive intervention, and spend \$100,000 very quickly and help them become more self-sufficient and get them back on their feet with job training and child care and really become much more self-sufficient, we have an 80 per cent chance of only spending \$200,000.”

As the system undergoes trial at several undisclosed states and facilities across the US, Kanhouwa adds that the next challenge is to integrate it in the health provider’s workflow: “So we are working with our partners to help understand how you do that and make that additional information on patients available at the point of care or decision making.

“I can’t think of a better way to apply technology than to help our world with that,” believes Billy Bosworth, the CEO of DataStax, who hosted the conference and has family who deal with people who are addicted to opioids. *