Fighting the Opioid Crisis Through Artificial Intelligence and Machine Learning

How Mission LISA is tackling the epidemic killing 135 people every day

In the United States, an average of 135 people die per day as a result of opioid-induced overdose, according to the National Institute on Drug Abuse. A November 2017 report issued by the Council of Economic Advisers estimates that the total economic cost of the opioid crisis was $504 billion in 2015. This likely underestimates the total cost, given the difficulty of quantifying social impact on people suffering from opioid use disorder, as well as the financial hardships of family members and communities affected by addiction and fatal overdose.

The opioid epidemic is a national health crisis that requires intervention by state, local, and national policymakers. To reduce the prevalence of opioid-induced
mortality, stakeholders need access to more opportune data that will drive evidence-based policy recommendations and patient-centric treatment pathways.

Mission LISA’s Effort in Fighting the Epidemic

Mission LISA is a data aggregation initiative surrounding America’s opioid crisis that seeks to provide stakeholders and policymakers with more timely and relevant data to drive evidence-based solutions for crisis prevention, treatment, and interdiction. To achieve its mission, Mission LISA has partnered with Lumina, a Tampa-based big data analytics company that provides data aggregation and risk sensing technologies to corporations and governments around the world.

Using deep web mining and machine learning technology, Lumina is systematically capturing real-time content at scale from open-source data found online, down to specific data points. This data provides policymakers and healthcare service providers with timely and relevant intelligence surrounding the current state of the crisis and solutions on how to best combat nationwide overdose death and addiction.

Mission LISA’s Opioid Mortality Ecosystem aggregates data across the Internet and social platforms to capture information on decedents of opioid overdose and track the scope of opioid-induced overdose death. Over time, this data will reveal “communities of addiction” among the living, including individuals with elevated risk of addiction and overdose based on online behaviors.

The Treatment-Seeking Mesh uses behavioral analytics to highlight individuals who have exhibited interest in treatments for opioid use disorder and other health problems associated with opioid use, pinpointing areas where opioid use may be prevalent. Data from this system will show how the epidemic is escalating across the nation and project the movement of the epidemic before it takes hold in a given area.

Mission LISA is also developing two interdiction-focused ecosystems with the goal of illuminating illicit drug supply chains and the key personnel within those supply chains. Social network analysis will be used to identify networks of individuals engaged in the illicit drug markets, leading to key drivers and influencers within the markets.
What We Know About Overdose Rates and Mortality

Available data tells us that individuals who experience non-fatal overdose are at significantly increased risk for ultimate fatal overdose. Many victims of opioid-induced mortality overdose multiple times prior to the overdose incident that ultimately results in death. While national data on the incidence of non-fatal overdose is limited, a recent study of overdose victims in the state of Massachusetts from 2011 to 2015 found that nearly one in 10 patients who experienced a non-fatal overdose died of a fatal overdose within two years of the non-fatal overdose incident.

This relationship indicates that victims of non-fatal overdose often receive insufficient care and attention from healthcare service providers. By implementing an enhanced treatment intervention program at the time of non-fatal overdose, the United States can drastically reduce the incidence of opioid-induced overdose mortality.

Identifying Gaps in Emergency Care for Victims

According to a recent article published in the Yale Journal of Biology and Medicine, revival of overdose patients in the United States rarely includes immediate intervention beyond the administration of naloxone, an antidote that reverses an overdose by blocking opioids from binding with the brain’s pain receptors. Yet, individuals who suffer from a non-fatal overdose are especially vulnerable to rapid recurrent overdose. Patients who receive naloxone experience immediate opiate withdrawal or withdrawal symptoms, causing severe physical, mental, and emotional distress. As a result, these individuals may seek to take opioids following receipt of naloxone to relieve their withdrawal symptoms. Opioid use shortly after non-lethal overdose is especially dangerous because these individuals have not fully metabolized the drugs in their bodies. Introducing additional opioids, even at small, incremental dosages, increases the risk of rapid recurrent overdose among these victims.

Emergency treatment is needed for victims of non-fatal overdose who are at heightened risk of repeat overdose and possible death. Mission LISA recommends
an enhanced treatment intervention program, which should include: EMS transport to a hospital emergency department; in-patient attention for 24 hours; education surrounding the risk of repeat overdose and death, and treatment options for addiction by a nurse or nurse practitioner; introduction to a voluntary Medication-Assisted Treatment prescription program and long-term behavioral therapy, providing both physical and mental health treatment; and release of naloxone to the patient and family members or friends who are present in case of emergency with instruction on how to administer upon release from facility.

With full implementation, Mission LISA forecasts the enhanced treatment intervention program has the capacity to save between 56 and 78 lives per day, reducing nationwide opioid-induced mortality by 41 to 58 percent.

**Curbing the Opioid Crisis**

By aggregating data surrounding opioid-induced mortality and addiction, Mission LISA can enhance understanding of the full lifecycle of addiction and identify drivers leading to opioid use disorder, to better identify opportunities to intervene and provide resources to patients in need.

Implementing enhanced intervention immediately following a non-lethal overdose incident will result in the saving of many lives, prevention of additional overdoses, and reduction of cost from multiple episodes of overdose treatment and overdose death.

Mission LISA’s Advisory Board is comprised of expert physicians, researchers, academics, policy veterans, and industry professionals, who provide strategic direction for ongoing data system development and analysis.

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