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## **Predictive Modeling of Opioid Prescription Fraud**
## **by Centers for Medicare and Medicaid Services (CMS) Providers**

Natural and synthetic opioids are powerful and highly effective prescription medicines used by doctors / health care providers in the treatment of moderate to severe pain in patients. Although useful as an approach to pain management, opioids have also shown to be dangerous as they can lead to addiction, overdoses, and even death. With a reported 46,000 opioid-related deaths in 2017 (an average of around 130 people per day) and an estimated 11.4 million people reportedly misusing prescriptions[1], the over-prescription of opioids presents a sizeable challenge to the healthcare system and its' patients in the United States.

As last publicly reported by the Centers for Disease Control (CDC) in 2017, the opioid prescription rate per 100 people in the United States was 58.7, which represents a significant decline from its peak of 81.3 in 2012[2]. While experiencing a decline on the national level, on a local / community-level the popularity opioids has fostered an environment where providers and organizations can financially benefit from the over-prescription and misuse of the drugs for the treatment of pain.

The goal of this project is to evaluate the prescription patterns of providers which have been either formally charged, plead guilty to, or convicted by the United States Government of engaging in opioid-related fraud against CMS. By determining the key indicators exhibited by providers known to have committed fraud, this project aims to develop a predictive model to determine the likelihood of fraud being perpetrated by other providers.

The predictive model will be based upon analysis of the following sources of relevant data:

- Department of Justice Press Releases (2010-2020)
  The Department of Justice issues regular press releases pertaining to individuals and organizations which have been formally charged, plead guilty to, or convicted of fraudulent activity. This project will focus on press releases identified as "Health Care Fraud" and reference opioids or opioid-related terms (such as specific drug names) for identification of provider / organization names.

- National Provider Identifier (NPI) Registry
  The CMS National Plan and Provider Enumeration System (NPPES) contains a registry of all Medicare / Medicaid eligible providers. This project will utilize NPIs as a mechanism to accurately trace fraudulent provider / organization names to the records contained within the Medicare Provider Utilization and Payment Dataset.

- Medicare Provider Utilization and Payment Data: Part D Prescriber Public Use File (PUF) (2013-2017)
  The PUFs contain information on prescription drugs prescribed by providers which have been paid for using the Medicare Part D Prescription Drug Program. The data is based upon the CMS Chronic Conditions Data Warehouse with prescription drug event records associated with Medicare Advantage Prescription Drug (MAPD) plans and Prescription Drug Plans (PDP) and will be utilized by this project to determine prescription trends.

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[1] CMS Roadmap: Fighting the Opioid Crisis
[2] Centers for Disease Control and Prevention: U.S. Opioid Prescribing Rate Maps