Data and Analytics Drive Effort to Curb Opioid Abuse: A Holistic Approach for Health Systems

By Kapila Monga and Harpreet Singh

In the United States, five percent of the world's population consumes about 80 percent of the world's opioids,1 a statistic that merits the status of a public health crisis in which the demand and supply side of the issue deserve equal weight. Current efforts to address this crisis focus mainly on managing the supply side of the equation through prescription guidelines and relevant training programs. The reduction in demand that is driven by awareness, treatment, and prevention of opioid abuse through appropriate medical, social, behavioral, and policy interventions merits equal—if not more—focus.

While all players in the healthcare arena have a role to play, some have a specific set of responsibilities. Physicians are uniquely positioned to address this epidemic as they are the first to observe the signs and symptoms associated with opioid abuse and are equipped to treat the illnesses that can result.

However, it must be acknowledged that this is a huge responsibility to place on the shoulders of one part of a complicated system. We need an effective combination of prevention and treatment strategy, which is why health information management (HIM) can play a large role. They can assist with relatively simple tasks such as altering electronic health records (EHRs) to help physicians adhere to safe prescribing guidelines and converting morphine milligram equivalents. Health IT systems can also help identify opioid-seeking behaviors and patients at risk for overdoses and other adverse events. These and other data-centric solutions give health systems a needed boost in helping to predict, plan for, and support prevention efforts to curb opioid abuse.

Prescription Opioid Abuse Engine

Two years ago, AHIMA launched an effort to improve documentation related to the use of opioids.2 A review of physician notes in EHR systems since reveals the significant improvement that has happened in this regard. Inclusion of ICD-10 codes for opioid-use disorder and opioid overdose or poisoning has helped further the cause. Much more can and should be done, but it will take time to sort through the challenges inherent in streamlining this documentation. The primary job function of physicians is not medical documentation, and with EHRs being a contributing factor to burnout, asking more of them on the documentation front is tricky.

At the same time, the healthcare industry today stands at a crossroads when it comes to effectively analyzing and mining EHR system data for reducing prescription opioid abuse, identifying social determinants of health, slowing chronic disease progression, and reducing avoidable re-admissions, to name a few.

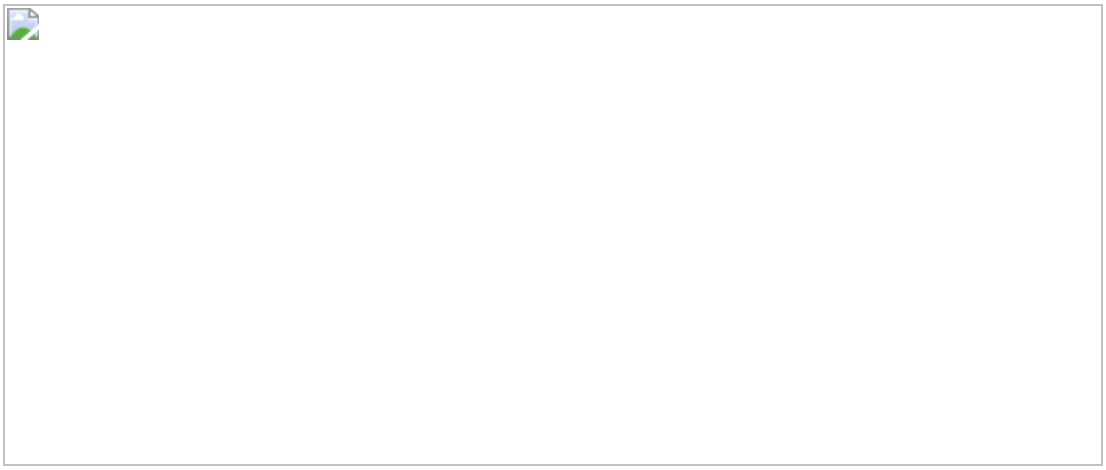
The diagram on page 37 represents a framework of a clinical decision support system that utilizes data from EHR systems to identify, predict, and eventually prevent prescription opioid abuse.

At the core of this decision support system is a quartet of engines: detection, intervention, monitoring, and prevention.

- The detection engine identifies prescription opioid abuse by tapping into the behavioral indicators hidden in physician notes, including pattern analysis and natural language processing, and predicting the same to help identify opioid abuse at an early stage.

- The intervention engine recommends next-best actions based on patients' current needs, such as medication-assisted therapy, nonopioid pharmacological treatments, and nonpharmacological treatments.
- The monitoring engine ensures that the patients adhere to the treatment provided and sends real-time alerts to physicians or nurse practitioners in case of an alarming situation. The engine also lets the provider know if the intervention is not working as intended.
- The prevention engine's objective is to generate insights that can aid policy design and collaboration among various stakeholders within the healthcare landscape to reduce the incidents of prescription abuse.

Quartet of Prescription Opioid Abuse Engines



Quartet of Engines Decoded

The design of the detection engine rests on syntactic and semantic analysis of physician notes from the EHR system using context free grammars and medical-specific data dictionaries by the Unified Medical Language System (UMLS) and SNOMED. At the core of this analysis is the mining of physician notes based on ontologies created along these three dimensions: prescription opioids typically abused by patients; behaviors and symptoms that prescription opioid seekers complain about; and diseases and conditions that such patients typically report. These ontologies can be either created through systematic text mining of physician notes of opioid-use disorder patients or can be developed in collaboration with clinicians utilizing the information available in SNOMED, research journals published in PubMed, and the UMLS.3,4

In either case, validation by clinical experts will help the engine become more accurate relatively faster. Mining of physician notes will reveal a list of patients who are currently suffering from opioid abuse. Superimposing this analysis with the creation of a lexicon specific to problems at hand then helps in the identification of patients who are at risk of opioid abuse. While there is no shortcut to ensure that this engine will flag minimal false positives, with continuous feedback from clinicians and recalibration by data scientists, it is fair to assume that the engine will become reasonably reliable in a short amount of time.

Coupling the above results with analysis of laboratory data, patient demographics, and social determinants of health can help identify the right interventions to treat prescription opioid abuse. The intervention engine can analyze the data available for all treatments across the patient population, identify historical success rates, and recommend the best intervention.

The engine can also consider prescription events from state prescription drug monitoring program (PDMP) data so that adverse interactions among medications are avoided, as well include rules corresponding to guidance from

the Centers for Disease Control and Prevention (CDC) and the Substance Abuse and Mental Health Administration (SAMHSA), on handling opioid prescriptions.

The need for the monitoring engine is clear—human lives are at stake. The monitoring engine takes a two-pronged approach to track and measure the effectiveness of interventions, including patient adherence to the treatment and efficacy of the treatment, respectively. Wearables, Internet of Things (IoT) data, and remote heath monitoring will have to come together to make this engine a reality. There are niche companies who are doing work in the direction of making remote patient monitoring a reality, and collaboration with them might be the best way forward. The data from wearables and remote health monitoring, when coupled with EHR data, can help in tracking adherence to, and measuring the effectiveness of, interventions.

The prevention engine is the most elusive in the data science world. It is intended to help policymakers and lobbyists gather real-world evidence on how prescription opioid abuse is being treated, what is working, and what is not. This engine generates self-service reports on efficacy of various interventions, under various conditions. These reports to executive management can aid policy directions and decisions. Output from the other three engines can help generate these reports.

In an ideal scenario a collaboration, created through collation of various healthcare entities, should manage the hub for the prevention engine, and the various players—such as payers, pharmacies, and pharmacy benefit management companies.

Disclaimer: The opinions expressed in this article are the authors' own and do not reflect the view of the organizations the authors work for, or of any other corporate entity.

Notes

1. Manchikanti, Laxmaiah and A. Singh. "Therapeutic opioids: a ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical use of opioids." *Pain Physician*. March 11, 2018. https://www.ncbi.nlm.nih.gov/pubmed/18443641.
2. Miliard, Mike. "AHIMA: Here's how hospitals should document opioid abuse in the EHR." *Healthcare IT News*. November 10, 2017. https://www.healthcareitnews.com/news/ahima-heres-how-hospitals-should-document-opioid-abuse-ehr.
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