Fighting the Opioid Crisis with Artificial Intelligence

A SCALABLE HEALTH WHITEPAPER

SCALABLE
HEALTH

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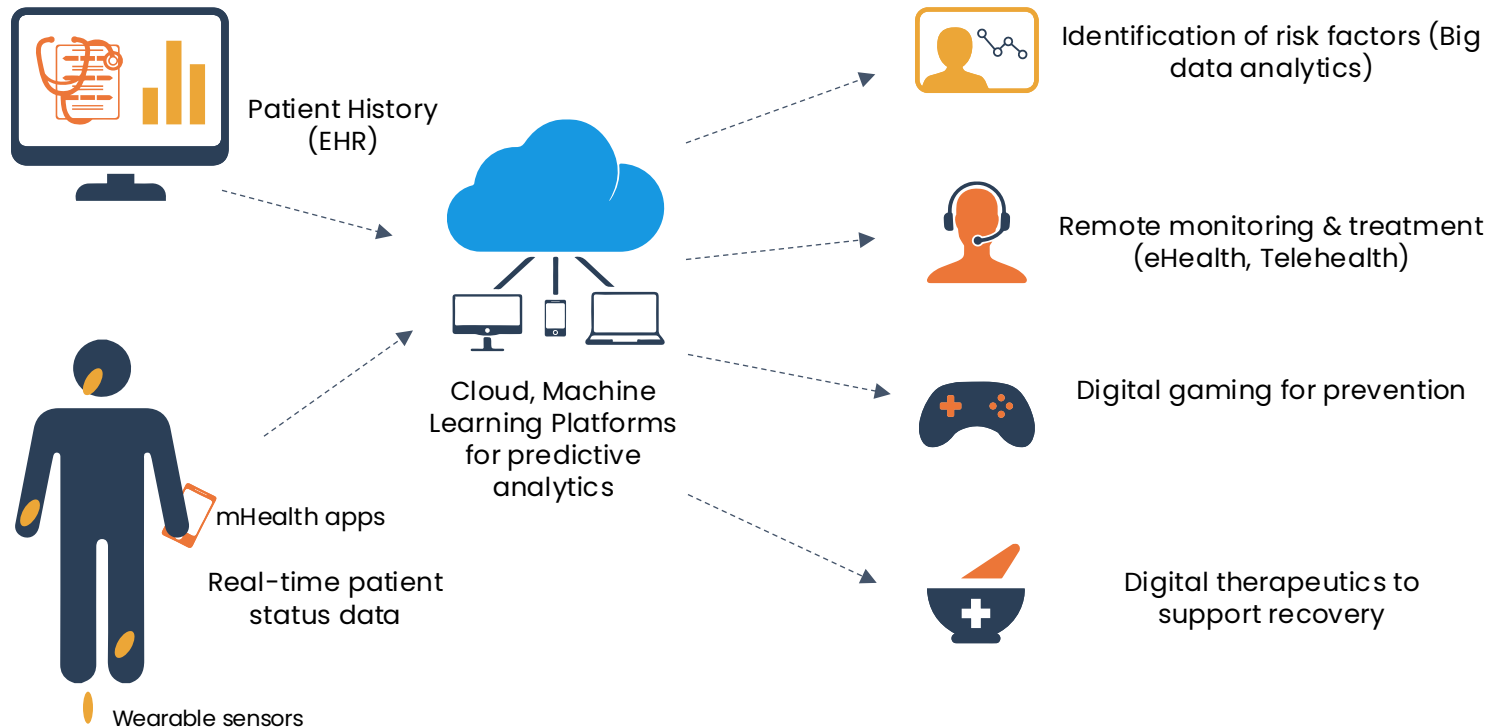# FIGHTING THE OPIOID CRISIS WITH ARTIFICIAL INTELLIGENCE

According to the US Department of Health and Human Services, over 115 million people have abused prescription pain meds resulting in more than 42,000 deaths. The epidemic continues to grow out of control. It is estimated the economic cost of the Opioid Epidemic exceeds $500 Billion annually. Contributing factors include subjective prescribing by medical practitioners, drug diversion or theft by healthcare workers, patients gaming the system, and once addicted - the costs associated with relapses and rehabilitation programs.

Through the 1990s, the medical community was under the impression that prescription opioids were not addictive and were a good tool for chronic pain management. The explosion of addiction has since proven otherwise. Increased misuse of prescribed painkillers led to increased abuse and addiction to both prescribed and illegal opioids.

While there has been tremendous highlight of this crisis in the media, solutions are never easy. Legislating and criminalizing addiction only serves to exasperate the problem. Healthcare providers need to find solutions the identify problems earlier, so that intervention can be more effective.

Big Data and Artificial Intelligence have proven beneficial in offering insights to assist healthcare providers in many areas of early detection, drug discovery, and best practices for value care. Data Analytics and Machine Learning offer valuable potential in combating the opioid crisis through better pain management solutions, stricter control of prescription abuse and drug theft, and greater insights into addictive behaviors and relapses using predictive analytics and digital tools for ongoing support for recovery and rehab.

Workflow for digital prevention of relapse

Patient History (EHR)

mHealth apps

Real-time patient status data

Wearable sensors

Cloud, Machine Learning Platforms for predictive analytics

Identification of risk factors (Big data analytics)

Remote monitoring & treatment (eHealth, Telehealth)

Digital gaming for prevention

Digital therapeutics to support recovery

PRESCRIPTION ABUSE

According to the American Society of Addictive Medicine, the number of pain medicines prescribed in 2010 was four times that in 1999. During the same period, six times as many patients were admitted to substance abuse programs, and overdose death rates increased fourfold.

Doctors do not set out to overprescribe pain meds. The problem is that pain is subjective. There are no biomarkers or other means to measure pain other than what is being self-reported by the patient. Also, different patients have different pain thresholds. When in serious pain, most of us will report that on a scale from 1 to 10, we are an 11. This is because, for most of us, the only comparative is no pain. If we have recurring pain, then we have a basis from which to compare. Then we can tell the doctor the pain is worse, or better, or whatever. A slightly better indicator is still very much subjective to personal interpretation.

In considering treatment options, doctors must rely on each patient's perception of pain and medicate accordingly based on their medical expertise. In the case of chronic pain, patients will develop a tolerance to the pain meds and therefore require higher doses to maintain the same levels of pain management. Now knowing the addictive nature of opioids, this becomes a slippery slope to addiction. Healthcare providers are challenged with meeting the pain management needs of the patient versus the risk of addiction.

By using patient data (reported pain levels and other EHR statistics) along with machine learning, doctors can develop better pain management solutions. Reinforcement Learning (a form of machine learning based on feedback from the patient) will assist care providers in developing personalized pain management solutions that automatically adapt to individual patient's unique and changing needs. Feedback from patients about their pain intensity combined with population health data sets will automatically personalize the pain management treatment options to best meet the patient's needs. This will make pain management less subjective.

Opiate prescribing rates vary widely from state to state. Prescribers in some states write nearly 3X as many prescriptions per person as others. In addition, abusers learn quickly how to game the system to obtain more meds. Machine learning can track anomalies associated with a patient's prescriptions such as a prescription filled and more than one location or known interactions with other medications being taken and alert care providers.
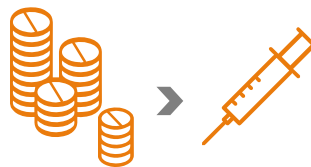
PRESCRIPTION ABUSE

THE NEW EPIDEMIC

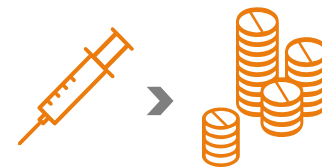## Opioid Misuse & Addiction in the United States

Roughly **21-29%** of patients prescribed opioids For chronic pain misuse them

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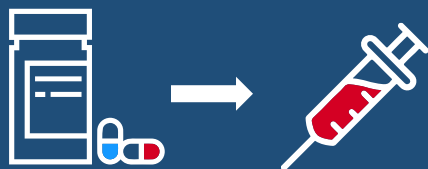Between **8-12%** develop an opioid use disorder

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An estimated **4-6%** who misuse prescription opioids transition to heroin

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Approximately **80%** of people who use heroin first misused prescription opioids

Some prescription medications are highly addictive due to the way the body adapts to the drug

Overdose deaths from prescription drugs have TRIPLED in the last 10 years

1 IN 15 PEOPLE
who take non-medical prescription pain relievers
WILL TRY HEROIN

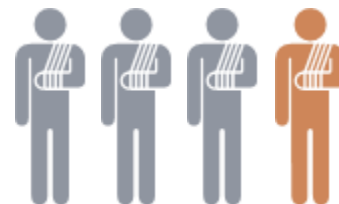Approximately 4.5 million estimated U.S. citizens are addicted to prescription opioids[1]

80%

U.S. consumption of all world prescription opiate supply[2]

$56
billion
per year

U.S. prescription opioid abuse cost[3]

25%

of all workers' compensation costs relate to opioids[4]

Workers who use prescription opioids for 3 months or more almost never return to work[4]
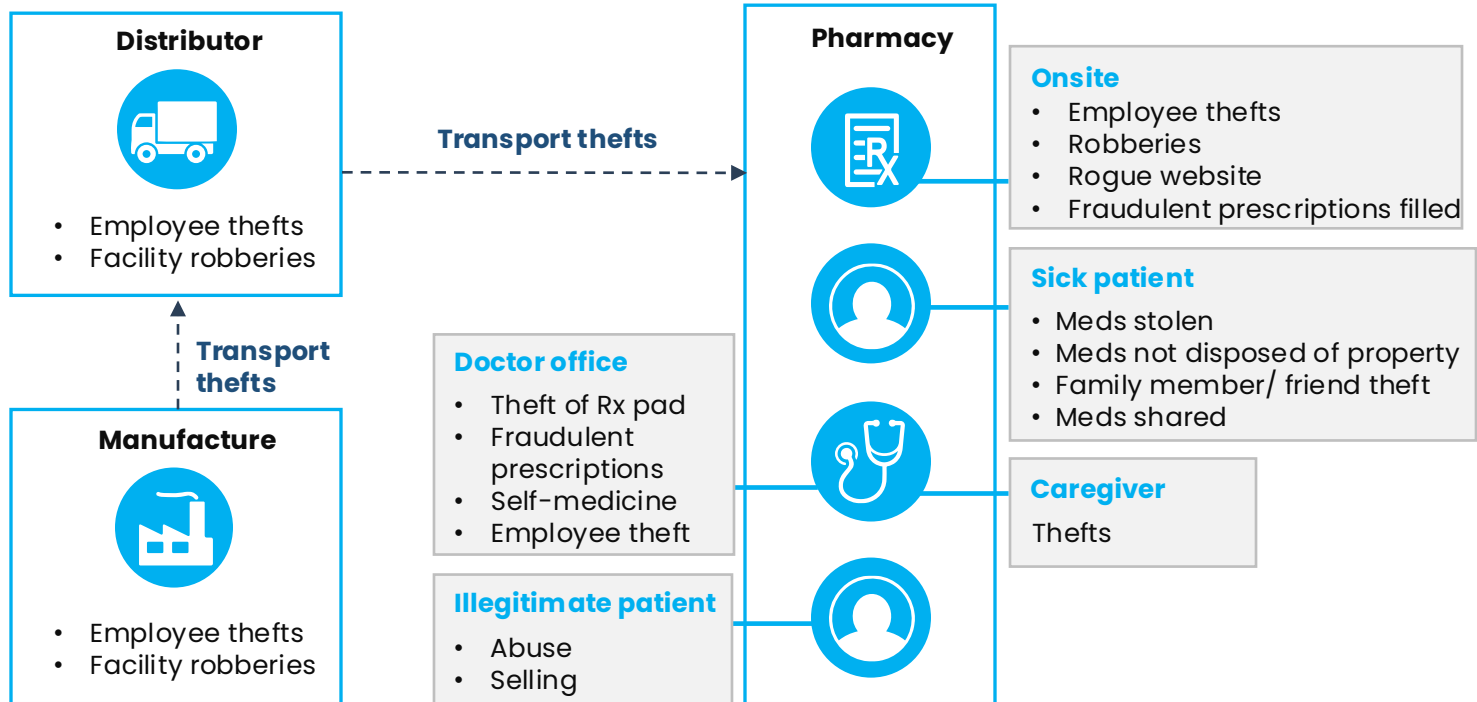
THEFT OR DRUG DIVERSION

According to the US Department of Health and Human Services, in 2016 over 115 million people abused prescription pain meds resulting in more than 42,000 deaths. And the epidemic continues to grow out of control. It is estimated the economic cost of the Opioid Epidemic exceeds $500 Billion annually. Contributing factors include subjective prescribing by medical practitioners, drug diversion or theft by healthcare workers, patients gaming the system, and once addicted - the costs associated with relapses and rehabilitation programs. In the television drama "Nurse Jackie," the main character was an ER nurse addicted to drugs. It follows the trial and tribulations of being an addict in the hospital environment. How she gamed the system to score drugs, the depths she sank to feed her addiction and the impact it had on those around her. Nurse Jackie is obviously a fictional character but people like her work in healthcare settings across the country.

Healthcare workers steal drugs for a variety of reasons - relief from stress, self-medication, or to improve work performance and alertness. But the most commonly diverted drug of choice is opioids. While there are no published statistics on the prevalence of drug diversion in healthcare, The American Journal of Public Health reported a study that almost 7% of nurses reported the illicit use of prescription drugs.

That number is believed to be a low estimation of the extent of the abuse. Some reports suggest a prevalence as high as 18% in nurses. Obviously, nurses are not the only healthcare providers abusing drugs. Studies show that 1 in 10 healthcare professionals, including pharmacists, abuses prescription drugs.

Beyond the economic impact of the stolen drugs, there are many other risk factors to be concerned about. While the abuser is a danger to himself, there are also risks to patients and coworkers. Many healthcare abusers are diverting drugs from patients who need them as part of the recovery. When impaired, the provider is more likely to provide substandard care. And there is an increased risk of infection (such as Hep C) if the abuser tampers with injectable drugs.

Using artificial intelligence, hospitals can identify potential risk factors for diversion. These insights will allow them to identify suspicious activities earlier and address them proactively rather than reactively. Currently, most cases of prescription drug abuse can up to 18 months to detect.

Distributor

- Employee thefts
- Facility robberies

Transport thefts

Transport thefts

Manufacture

- Employee thefts
- Facility robberies

Pharmacy

Onsite
- Employee thefts
- Robberies
- Rogue website
- Fraudulent prescriptions filled

Sick patient
- Meds stolen
- Meds not disposed of property
- Family member/ friend theft
- Meds shared

Doctor office
- Theft of Rx pad
- Fraudulent prescriptions
- Self-medicine
- Employee theft

Caregiver

Thefts

Illegitimate patient
- Abuse
- Selling

RELAPSE AND RECOVERY

It is estimated that prescription addiction is responsible for $78.5 billion in medical costs in the US alone.

More than half a million people are hospitalized each year for opioid dependence costing around $15 Billion. In addition, billions are spent on outpatient facilities and other treatment options. And while treatment programs like Narcotics Anonymous can be effective, 75% of the participants relapse in the first year. Drug misuse accounts for over 2.5 million emergency room visits a year.

Machine Learning can predict when someone is going to relapse and intervene. AI can identify predictive insights through changes in user's routines, sleep patterns, and keyword use. These indicators suggest an increased likelihood of relapse. When this occurs, alerts are sent to care teams and sponsors.

Relapsing can be quite expensive - a 30-day stay in rehab can cost up to $20,000, not to mention other costs like ambulances and emergency room visits.

In addition, there are co-morbidity factors including Hepatitis C infections, which are strongly correlated to intravenous drug use. While Hepatitis C is curable in up to 96% of patients and potentially deadly if left untreated, it is expensive to treat. Treatment cycles require daily medication for 12-24 weeks with costs between $60,000 - $100,000.

Identifying patterns changes in routines, sleep patterns, and keyword use. Most relapses are all less about drugs and are often related to stressful events – loss of a job, death, marital problems. While AI can predict a relapse, most care providers believe human intervention is necessary to prevent a relapse. AI can alert support teams earlier so an intervention can occur.

As previously noted in issues related to drug diversion, there may be additional health risks associated with opioid abuse. For example, users who abuse painkillers are more likely to have their judgment impaired resulting in an increased risk of unsafe sexual activity, STDs, and HIV. Earlier intervention can help mitigate these additional risks.

AI SUPPORTS BETTER DECISIONS AND EARLIER INTERVENTION

AI is never intended to replace the doctor's clinical expertise, but instead to close knowledge gaps and present the practitioner with the latest scientific research to consider when exploring pain management options. Further, Artificial Intelligence can identify patterns of behavior that are predictive of addiction, so that healthcare providers can intervene before the abuse occurs. There are no simple solutions to the opioid crisis, but machine learning can offer healthcare organizations options to mitigate the risk of abuse.

HealthTech can offer support and constant intervention. Wearables and mobile devices will track behavior and alert healthcare professionals when something is amiss. Further, these devices can help patients self-manage their care through reminders, peer-to-peer support, and direct interactions with their care teams via TeleHealth applications and devices resulting in positive behavioral changes. As patients will have greater avenues of support, healthcare providers can focus their efforts and optimize their workflow.

The more patients interact with digital health devices, the more data

that is collected for analysis. As the data increases, machine learning gets smarter. It can begin to identify

the potential for abuse earlier, allowing healthcare providers to intervene with preventative measures to hopefully prevent relapse or abuse. Further, AI will track adherence to treatment protocol and the efficacy of various medications. This will offer valuable insights to healthcare providers, pharmas, and payers to help determine the best course of care for each patient resulting in better care outcomes.

The opiate epidemic is a serious, overwhelming problem within healthcare. HealthTech solutions combined with Machine Learning offer opportunities to intervene earlier and reduce identifiable abuses. While this alone won't solve the problem, it begins to offer providers tools to begin to address the primary causes of abuse and offer patients support in their recoveries. With less abuse, healthcare organizations will experience better outcomes, safer environments, and direct savings to the bottom line.

About Scalable Health

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Scalable Systems is a Data, Analytics & Digital Transformation Company focused on vertical specific innovative solutions. By providing next generation technology solutions and services, we help organizations to identify risks & opportunities, achieve sales and operational excellence to gain an innovative edge. www.scalable_systems.com

Scalable Health

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