Opioid Crisis and Potential Role of Cognitive Analytics

Mustafa Karakus, PhD
Vice President, Behavioral Health Policy and Services Research

NCHICA 24th Annual Conference
10/8/2017
The Opioid Crisis

The opioid crisis “lies at the intersection of two public health challenges: reducing the burden of suffering from pain and containing the increasing toll of the harms that can arise from use of opioid medications.”

—National Academies of Sciences, Engineering and Medicine, 2017 ¹
The Opioid Crisis

• Opioid-related overdose deaths in the United States have quadrupled since 1999.

• Among those aged 12 years or older in 2015, 3.8 million reported current nonmedical use of prescription opioids, 12.5 million reported prescription opioid misuse in the past year, and 2.0 million had a prescription opioid use disorder.
The human and social toll grows, especially for prescription opioid overdoses, abuse, and dependence.

- 16,000 lives lost due to Rx opioids alone
- $21.5B for fatal overdose (healthcare and lost productivity)
- $28.9B for healthcare and substance abuse treatment
- $20.4B for other lost productivity, including incarceration
- $7.7B in criminal justice costs

$78.5B economic burden in 2013

Costs and Work Loss Burden of Diagnosed Opioid Abuse Among Employees on Workers Compensation or Short-term Disability

Stephen S. Johnston, MA, Andrea H. Alexander, MBA, Elizabeth T. Masters, MS, MPH, Jack Mardekian, PhD, David Semel, PharmD, Elisabetta Malangone-Monaco, MS, Ellen Riehle, MPH, Kathleen Wilson, MS, and Alexis Sadovsky, PhD

Objective: To compare 12-month healthcare costs between employees with versus without diagnosed opioid abuse within 12 months after an injury-related workers’ compensation (WC) or short-term disability (STD) claim.

Methods: Retrospective study using 2003 to 2004 US insurance claims linked to administrative data on WC/STD claims. Multivariable models compared healthcare costs between employees with versus without diagnosed opioid abuse. Results: Study included 107,975 opioid-related employees with an injury-related WC or STD claim. Mean number of opioid prescriptions fills and adjusted total healthcare costs were substantially greater in employees with diagnosed opioid abuse versus without (WC: 13.4 vs. 4.5, P < 0.001; $34,021 vs. $14,939, F < 0.001; STD: 21.7 vs. 4.8, P < 0.001; $25,693 vs. $14,939, F < 0.001). Conclusions: Opioids are commonly prescribed to employees with injury-related WC/STD claims. Employers may benefit from proactively addressing the issue of opioid misuse in these populations.

Another population which may be disproportionately at risk for opioid abuse is employees who are on injury-related short-term disability (STD) and have been prescribed opioid medications for the management of pain. There is currently a lack of information regarding opioid use patterns, opioid abuse incidence, and outcomes in the STD population. Because of the high economic toll of opioid abuse, effective strategies to reduce the incidence of opioid abuse among employees who are candidates for opioid therapy, such as those on injury-related WC or STD, may result in cost offsets and savings for employers. This study aims to advance the understanding of the burden of opioid abuse in the WC population and the STD population. Specifically, the objectives of this study were to describe selected medication use patterns and to compare 12-month healthcare costs and work loss outcomes in employees with versus without diagnosed opioid abuse or dependence within 12 months after an injury-related WC or STD claim.

METHODS

Watson Health data, analytics, and research expertise produce insights which help stakeholders tackle the Opioid epidemic.
**RESEARCH**

Example research & insights

---

**HEALTH POLL:**
**Narcotic Painkillers**

**SURVEY OVERVIEW**
Every other month, the Trust Health Analytics® Health Poll analyzes a representative sample of 1,000 American adults aged 18 and older on a wide range of healthcare issues. Full results are reported by NPH on its Health blog. [Visit blog](http://www.nphblog.com/health_poll).

The Trust Health Analytics® Health Poll is sponsored by the Trust Health Analytics® (TSA) Health Poll and is independently funded. More details can be found on the TSA Health Poll website.

The results reported from the 2016 survey represent responses from 2,000 survey participants interviewed from Feb 1-15, 2016. Results from the 2015 survey represent responses from 2,000 survey participants interviewed from Feb 1-15, 2015. The margin of error for 2016 is 2.5% with a 95% confidence level.

NPH represents its findings in electoral terms.
[Visit NPH blog](http://www.nphblog.com/health_poll).

---

**RESEARCH**

**How States Are Tackling the Opioid Crisis**

Shalini Wickramatilake, MHS1, Julia Zur, PhD2, Norah Mulvaney-Day, PhD3, Melinda Campopiano von Klimo, MD2, Elizabeth Selmi, BA1, and Henrik Harwood, BA1

---

**FACING ADDICTION IN AMERICA**

**The Surgeon General’s Report on Alcohol, Drugs, and Health**

---

**Addictive Behaviors**

**Short Communication**

Trends in average days' supply of opioid medications in Medicaid and commercial insurance

Ali Bonakder Tehrani6, Rachel Mosher Henke6, Mir M. Ali6,7,8, Ryan Mutter6, Tami L. Mark8

---

**Public Health Reports**


© 2017 Association of Schools and Programs of Public Health

All rights reserved.

Reprints and permissions:
[Contact](https://journals.sagepub.com/journal/PHReports)

DOI: 10.1177/0033354916682306

[Visit website](https://journals.sagepub.com/home/PHReports)
Trends in Opioid Prescribing
Conducted for SAMHSA

Rates of Potentially Problematic Prescriptions

Understanding Addiction Risk

- Apply causal modeling to quantify relationship between the initial opioid prescription patterns and adverse outcomes.

- Findings: Longer days of supply and use of synthetic opioids lead to long-term use or addiction treatment needs

Class I (continued opioid use after 1 year or seeking addiction treatment) and Class II (discontinued opioid use).

Figure 1: Treatment frequencies in two outcome classes

*Addictive Behaviors 76 (2018) 218-222, Tehrani AB, Henke RM et al
Addressing the Opioid Crisis – A Range of Approaches

Many interventions have been implemented to try and curb opioid-related harms while also attempting to meet patients’ pain needs. They generally fall into the following categories:

1. *Reducing the supply of prescription opioids*
2. *Reducing demand*
3. *Reducing harm*
4. *Influencing prescribing practices*
Speech as an indicator of substance abuse

- Research shows speech can be an indicator of substance abuse

- Results shown with Ecstasy/Molly

- Potential to apply this analysis to Opioid abuse

- Requires study with speech transcripts

Figure 1. Participants were asked to speak about someone of importance in their life. Speech graphs were derived such that individual words were assigned to nodes in the graph, while a directed edge was assigned between two nodes (word A and word B) whenever word A immediately preceded word B in an interview. In the example shown, nodes (words) are represented with circles, with edges shown as arrows and sequentially numbered.

Neuropsychopharmacology (3 April 2014) | doi:10.1038/nps.2014.80

A Window into the Intoxicated Mind? Speech as an Index of Psychoactive Drug Effects

Gillinder Bedi, Guillermo A. Cecchi, Diego F Slezak, Facundo Camilo, Mariano Sigman and Harriet de Wit
Speech Recognition

- Drug abuse \(\rightarrow\) alter mental states in ways that may motivate drug use.
- These effects are usually assessed with self-report, an approach that is vulnerable to biases.
- Automated semantic speech analyses can capture subtle alterations in mental state, accurately discriminating between drug
Drug

- **Lack of Transparency**: Like the overall healthcare system, the prescription drug market has many actors, each driven by different motives.
- **Lack of Data Integrity**: Despite various data initiatives to shed light on the prescription system, there is no single source of truth.
- By ‘redesigning’ the lifecycle of prescription drugs, it is possible to track the prescriptions sent from providers to the pharmacy and the quantity being prescribed.

IBM Blockchain

**What is blockchain?**

It's a shared ledger for recording the history of transactions - that cannot be altered.

**Why do we need it?**

Transactions take place every second — orders, payments, account tracking. Often, each participant has his own ledger — and, thus, his own version of the truth.
Natural Language Processing

- Reporting requirements
- MAT and Evidence based services
- Reimbursement of services
Watson Care Manager

- Supporting care management
- Interactive decision making through simulations before trying it on the patient
- Designing the best course of action
- Tools for effective communications with other providers on treatment decisions to date
Opioid Epidemic Insights

- Enables Program Managers to easily review key metrics and indicators of the impact that the Opioid epidemic is having on their population in a set of visually compelling and actionable dashboards.
- Includes embedded advanced analytics (e.g., Medicaid Episode Grouper)
- Opioid Use Disorder (OUD) predictive model

What is happening? Why is it happening? Where is it happening?

- Where are my Hot Spots?
- What is magnitude of the problem in a population?
- Who are the super utilizers?
- What are the prescribing patterns?
- Who are the bad actor providers?
Predictive Model

Predicting patients at high risk for OUD after first opioid prescription

Variables
- Opioid prescription
- Synthetic vs. non-synthetic opioid
- Mental health diagnosis
- Good vs. bad opioid potentials
- Continuous enrollment
- ER visits
- Inpatient stays
- Patient demographics (age, sex, urban/rural, race)
- Opioid days supply
- History of substance abuse
- Future: geospatial, overdose, procedure groups, SDOHs

Key Value
- Earlier intervention opportunity
- Broader identification of ‘at risk’ cohorts
- Reduced ER visits, overdoses, deaths

Future Potential

Additional Data Sources
- Death records
- Veteran’s data
- Homelessness data
- Incarceration release
- MAT program
- State Rx registries (PDMP)
- EHR data
- Ambulance data

Apply Machine Learning

Additional Models
- Identifying problematic providers
- Predicting acute events
- Finding best treatment route
Cognitive computing has the potential to radically redefine everyday life, changing how individuals perform their jobs, interact with others, learn and make decisions.

It also represents a new era of computing that will fundamentally alter how we think about, plan for, implement and engage with information technology systems.

In order to be successful in utilizing this technology in fighting with Opioid epidemic, we need to identify and take advantage of opportunities that align with cognitive computing’s emerging capabilities.