Public Health and Privacy Concerns Collide in the Opioid Crisis

Jeff Livesay – Senior Executive Vice President
Shreya Patel – Policy Analyst
Agenda

- What Is a Statewide Health Information Network (HIN)
- What Are Opioids
- Why Opioid Abuse Is Considered a National Epidemic
- Challenges for Prescribers Treating Opioid Abuse
- Initiatives to Mitigate Opioid Abuse Through Care Coordination
- Using Predictive Modeling to Detect Opioid Misuse
- Final Takeaways
- Questions
Network of Networks:

- MiHIN Statewide Shared Services
- Health Plans
- MDHHS Data Hub
- Immunizations
- MI Syndromic Surveillance System
- MI Disease Surveillance System
- State Labs
- Chronic Diseases
- Medicaid
- Single point of entry/exit for state

Consumer-facing Organizations:
- PIHPs (10)
- Other Data Sharing Orgs
- Health Information Exchanges (HIEs)
- Health Plans
- Health Systems
- Providers & Health Systems
- Other Data Sharing Orgs
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- Health Plans
- Health Systems
- Providers & Health Systems

Federal

Medicaid

MSSS State

Labs

Providers & Health Systems

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Weekly Transactions

MiHIN M3 Report: Period Totals by Week

Use Case | February 18, 2018 | February 25, 2018 | March 4, 2018 | March 11, 2018 | March 18, 2018 | March 25, 2018
---|---|---|---|---|---|---
Encounter Notifications Inbound | 16,777,151 | 17,045,945 | 16,919,710 | 17,126,304 | 17,123,402 | 17,017,490
Encounter Notifications Outbound | 5,000,000 | 5,000,000 | 5,000,000 | 5,000,000 | 5,000,000 | 5,000,000
Immunizations (Public Health) | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000
Syndromics (Public Health) | 500,000 | 500,000 | 500,000 | 500,000 | 500,000 | 500,000
The Real Users to Believe In!
Christi Munson – the Consumer

- 26 year-old Michigan mother of a preschool-aged son
- Suffers from chronic low back pain
- Oxycodone dependence with secondary heroin addiction
- DUI and possession of a Level 1 Controlled Substance
- Probation agreement includes outpatient treatment for chemical dependency in Toledo, OH
- Christi is assigned to Ellen, a case worker who assists with Medicaid eligibility and benefits, to pay for ongoing Methadone treatment
- Ellen coordinates services with patient-centered medical home, recovery program, probation officer and Christi
Michigan’s Secret Sauce

- Health Plans
- Primary Care Provider
- Specialist
- Hospital or SNF
- Pharmacist
- Care Coordinator
- Physician Organizations & ACOs
- Community Based Services
- Foster Care Program
- Telehealth & Consumer Services
- Research Study
- Clinical Trial

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<table>
<thead>
<tr>
<th>Periodic Table of Drug Addiction</th>
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</thead>
<tbody>
<tr>
<td>A Alcohol</td>
</tr>
<tr>
<td>C Cocaine</td>
</tr>
<tr>
<td>T Tobacco</td>
</tr>
<tr>
<td>Cr Crack</td>
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<tr>
<td>Cm Crystal Meth</td>
</tr>
<tr>
<td>L LSD</td>
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<tr>
<td>Mj Marijuana</td>
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<tr>
<td>Fl Flunitrazepam</td>
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<tr>
<td>S Sedatives</td>
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<tr>
<td>Az Alprazolam</td>
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<tr>
<td>Fn Fentanyl</td>
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<tr>
<td>M Morphine</td>
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<tr>
<td>O Oxycodone</td>
</tr>
<tr>
<td>H Heroin</td>
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<tr>
<td>O Oxycodone</td>
</tr>
<tr>
<td>H Heroin</td>
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<tr>
<td>E Ecstasy</td>
</tr>
<tr>
<td>Am Amphetamine</td>
</tr>
<tr>
<td>Ps Psilocybin</td>
</tr>
<tr>
<td>Dx DXM</td>
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<tr>
<td>Gh GHB</td>
</tr>
<tr>
<td>Z Zolpidem</td>
</tr>
<tr>
<td>Dz Diazepam</td>
</tr>
<tr>
<td>Br Barbiturates</td>
</tr>
<tr>
<td>Hy Hydrocodone</td>
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<tr>
<td>Om Oxydormorphone</td>
</tr>
<tr>
<td>Cd Codeine</td>
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<tr>
<td>Me Meperidine</td>
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<tr>
<td>Mm MDMA</td>
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<tr>
<td>Md MDA</td>
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<tr>
<td>Dm DMT</td>
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<tr>
<td>Py Psycate</td>
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<tr>
<td>Km Ketamine</td>
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<tr>
<td>Sv Solvents</td>
</tr>
<tr>
<td>Lz Lorazepam</td>
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<tr>
<td>Mq Methaqualone</td>
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<tr>
<td>Tr Tramadol</td>
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<tr>
<td>Op Opium</td>
</tr>
<tr>
<td>Pc PCP</td>
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<tr>
<td>Kh Khat</td>
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<tr>
<td>Dd Designer Drugs</td>
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<tr>
<td>Sa Salvia</td>
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<tr>
<td>St Steroids</td>
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<tr>
<td>Ni Nitrous</td>
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<tr>
<td>Cz Clonazepam</td>
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<tr>
<td>Kr Kratom</td>
</tr>
<tr>
<td>Mt Methadone</td>
</tr>
<tr>
<td>Bn Buprenorphine</td>
</tr>
<tr>
<td>Bs Bath Salts</td>
</tr>
<tr>
<td>Ap Alpha-PYP</td>
</tr>
<tr>
<td>Mp Mephedrone</td>
</tr>
<tr>
<td>My Methyleone</td>
</tr>
<tr>
<td>Sp Spice</td>
</tr>
<tr>
<td>Tc 2c</td>
</tr>
<tr>
<td>Nb 25i-NBOMe</td>
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<tr>
<td>Do DOx</td>
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**Source:** Detox Local’s Periodic Table of Drug Addiction. Based on National Institute on Drug Abuse, Substance Abuse and Mental Health Services Administration, Drug Enforcement Administration and US Food and Drug Administration, among other reliable sources.
What Are Opioids?

- Class of drugs including both prescription pain medications and illicit drugs
- Can cause both physical and psychological dependence
- Examples
  - Morphine
  - Oxycodone
  - Hydrocodone
  - Codeine
  - Heroin
  - Fentanyl
  - Oxymorphone
  - Hydromorphone
  - Meperidine
  - Tramadol
  - Opium
  - Methadone

Why Opioid Abuse Is Considered a National Epidemic
Opioid Use in the U.S.

- From 1991 to 2011, there was a **tripling** of opioid prescriptions dispensed by pharmacies: from 76 million to 219 million prescriptions.

- Increase in opioid use over last three decades due to:
  - Greater social acceptance of pain medication
  - Increased number of pain medications prescribed

- Risks with higher prescription rate:
  - Misuse
  - Abuse
  - Addiction
  - Overdose

Deaths Related to Drug Overdose

- Deaths related to drug overdose increasing exponentially
  - 1990  9,000
  - 2000  17,000
  - 2010  38,000
  - 2015  52,000
  - 2016  64,000 (23% increase in one year)

Death numbers are lower than actual number of deaths because these numbers only account for drug overdose

Numbers do not account for deaths resulting as consequence of opioids
E.g. motor vehicle accident after drug use

Deaths Related to Drug Overdose

Total U.S. Drug Deaths

More than 64,000 Americans died from drug overdoses in 2016 -- 64,070

Deaths Related to Opioid Use

Drug overdose surpassed car accidents to become leading cause of unintentional injury death for Americans under 50

10 Leading Causes of Death in 2016: United States

Statistics on Opioid Epidemic

Prescriptions
One out of every three opioid prescriptions is abused

Medical Spending
Opioid abusers cost employers 2 times as much in health care expenses on average than non-abusers

Age
Baby boomers 4 times more likely to abuse opioids than Millennials

SOURCE: American Society of Addiction Medicine; CDC; Castlight Health analysis of de-identified medical and prescription claims from 2011 to 2015 across demographic categories and 2015 annual medical health care spending
Behavioral Health
Patients with behavioral health diagnosis are 3 times more likely to abuse opioids than those without one.

Pain
Opioid abusers have 2 times as many pain-related conditions than non-abusers.

Income
Individuals living in low income areas are 2 times as likely to abuse opioids than those living in the highest income areas.

SOURCE: American Society of Addiction Medicine; CDC; Castlight Health analysis of de-identified medical and prescription claims from 2011 to 2015 across demographic categories and 2015 annual medical health care spending.
Statistics on Opioid Epidemic

Geography
Opioid abusers are more likely to live in the rural South than in other regions.

Economic Cost
The cost of opioid misuse to the economy is $56 billion.

Human Toll
16,000 overdose deaths from prescription opioids/year

“Jessie’s” death was the result of prescription opioids.

SOURCE: American Society of Addiction Medicine; CDC; Castlight Health analysis of de-identified medical and prescription claims from 2011 to 2015 across demographic categories and 2015 annual medical health care spending.
Challenges for Providers

• Lack of coordinated care between providers

• Inability of providers to examine complete medical history before prescribing treatment

• Silos of health information

• Stigma of substance abuse may cause patients to hide aspects of medical past from providers
Confidentiality of Substance Use Disorder Patient Records (42 CFR Part 2)

• Governs which substance use treatment information may only be disclosed with the patient’s consent

• Pros:
  • Protects against substance use stigma
  • Honors autonomy of the patient

• Cons:
  • Inability to receive accurate assessment of past substance abuse history before prescribing opioid (Jessie)
  • No national standard or solution for eConsent (yet)
Initiatives to Decrease Opioid Abuse Through Care Coordination

• “Breaks the glass” to allow sharing of substance use information

• Would ensure doctors have access to patient's prior addiction history to make informed care and treatment decisions

• Passed in the Senate; however, has not passed in House of Representatives

21st Century Cures Act of 2016

• Legislation promoting medical product innovation and development to help patients receive effective treatment

• Designates portion of state research and development funding to advancement of opioid addiction initiatives

• Changes how pharmaceutical drugs and technologies are approved by Food and Drug Administration (FDA):
  • Encourages drug development for addiction treatments
  • Alternative drugs receive priority review, expedited approvals

• Calls for national Trusted Exchange Framework and Common Agreement (TEFCA) for data sharing across jurisdictions

Will there be an end to Silos?

- Today, data sharing is limited across:
  - EMRs / EHRs
  - Public Registries
  - HIEs and HINs
  - Jurisdictions

- HHS/ONC published draft “Trusted Exchange Framework and Common Agreement” (TEFCA) in Jan. 2018 to promote interoperability and data sharing nationally

- TEFCA scheduled for implementation in 2019
Prescription Drug Monitoring Programs

- State-operated, electronic database to track controlled substance prescriptions statewide
- Gives providers timely information about prescriptions dispensed to patients
- Allows states to assess prescription opioid use trends
- Major Limitation: Not all PDMP vendors cooperating with statewide data sharing efforts (HIEs/HINs)

Providers Can Query for Controlled Substances

Appended info lets doctor know person is in Prescription Drug Monitoring Program

Enriched Standardized ADT Message

Patient Attribution to Providers

Prescription Monitoring Indicator
Predictive Modeling

• Process using statistics, machine learning, and artificial intelligence to forecast outcomes

• Clinical research is used to create computer models that predict specific outcomes, such as risk scores and costs associated with managing the health of a patient or population

Value of Predictive Modeling

- Ability to identify at-risk patients and implement early interventions
- Allows physicians to make more accurate diagnoses
- Allows researchers to develop models without requiring massive, expensive population studies
- Allows pharmaceutical companies to forecast the public’s medication needs
- Improves patient outcomes and better informing patients of their healthcare needs

The Knowledge Grid (KGRID)

- Software platform refining organization of biomedical knowledge with goal of decreasing latency between generation of knowledge and use

- KGRID has three primary functions:
  - Package, organize, and deploy computable biomedical knowledge

- KGRID technology and combined approach are replicable, highly scalable, and general-purpose

- First predictive modeling technology applied to flow of data

- Successfully piloted to identify patients at risk for opioid use and respiratory depression
Raw data → Population → Analysis → Predictive model or decision rule → Classification Indicator

\[(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}\]
Computable Biomedical Knowledge (CBK)

Predictive Models

\[(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}\]

* [http://hdl.handle.net/2027.42/140789](http://hdl.handle.net/2027.42/140789)
Shared Computable Biomedical Knowledge (CBK)
CBK is Reusable
Enrichment Example

- ADT Notifications
- Care Summary & Results
- Category 1 Quality Measures

Appended Info

Standardized

Patient Attribution to Providers

Registries
Scored Analytics Data
High Utilizer Database
Social Determinants
Patient Activation

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Power of Data Enrichment

{Utilization}, {Public Health}, {Engagement}, {ACRS}, {URLS (end points)}, {Risk Scores}

GEORGE TULLISON; 62 yo black male admitted to Windward Hospital on January 18, 2017 with Diagnosis Codes (ICD-10) I50.43 and E1010, DRGs 291 and 637

Health Plan High Utilizer Program
Chronic: Diabetes, CHF
PAM Score = Level 2
UMHS Epic Portal (http:xxx)
PCMH Contact: jones@direct.clinic.com
LACE = 14
Shared Intelligent Processing of Message Content (Filters)
Opioid Filter Example

Simple classifier to identify a high-risk, first-time opioid user

Append the classification information to message and send out to ACRS distribution

Auto update statewide monitoring system

Send to providers or generate alert based on ACRS

Auto enroll member in education program

Notify prescriber of nonstandard prescription

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Initial KGRID-enabled Reports

Michigan Medicine Results

<table>
<thead>
<tr>
<th></th>
<th>Records Available</th>
<th>Opioid</th>
<th>Percentage</th>
<th>3 RX</th>
<th>3 RX: Opioid (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>30,862</td>
<td>13,244</td>
<td>42.91%</td>
<td>387</td>
<td>2.92%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>32,487</td>
<td>13,783</td>
<td>42.43%</td>
<td>398</td>
<td>2.89%</td>
</tr>
</tbody>
</table>

THESE DATA may serve as KPIs

SCOPE of the KGrid-enabled FILTERING REPORTED ABOVE

- Michigan Medicine’s CCDs discharge filtered for presence of:
  - Opioids (Opioid column)
  - Opioid + Benzodiazepine + Muscle Relaxant (3RX column)
- Live CCD data feed tested from September 12 to October 31 of 2017
- Results validation on Nov 7: 10/10 for Opioid hits 5/5 for 3RX hits
Pilot Detected Problems!

- Discovery of debug output from MiHIN’s compilation of health information from sources connected to the MiHIN network
- Information collected in the normal process of software testing third-party predictive modeling decision support program
- Technical staff indicated potential for opioids “triple threat:”
  - Three medications (including certain opioid medications) which, when taken together, could result in respiratory depression and even death
  - 183 patients potentially affected in one month, one hospital

What were we required to do? What SHOULD we do?
Legal Review & Ethical Analysis

- Legal review commenced immediately
- Examined legal agreements pertaining to data sharing
- Concluded *no legal duty to take action* regarding output
- But *what were we ethically and morally bound* to do?
  - New area: Ethics of Health Information Exchange
- Retained top law firm to help conduct analysis of ethical obligations
  - Law, Case Law, and Literature review
  - Consultation with academic and professional bioethicists
  - Extensive interview with management to discuss and analyze guiding principles of bioethics

*Result: Opinion letter and recommendation to take action*
Framework for Analysis

• Four Principles of Biomedical Ethics
  1. Respect for personal autonomy (individual choice)
  2. Non-maleficence (do no bad / Hippocratic oath)
  3. Beneficence (always do good)
  4. Justice (what is best for populations)

• Additional ethical considerations in health information exchange and “big data” context
  • Role of privacy
  • Emphasis on balancing benefits created by data analytics with other interests affected
Respect for Personal Autonomy

Principle: Right of individual to make own choices

- Support for taking action:
  - Patients may not have been informed of risk for injury
  - Right to make meaningful decisions about healthcare includes whether to take medications that may be harmful in interaction
  - Duty of providers to inform patients of potential drug interactions
  - MiHIN could assist patients to make more informed decisions by enabling access to information

- Potential concerns:
  - Potential invasion of privacy of patients
  - Right to choose physicians and rely on physicians’ decisions, even if reliance results in less information
Non-maleficence

Principle: “First, do no harm”

- **Support for taking action:**
  - Minimal potential risk of causing patients harm by taking action, whereas taking no action could be viewed as causing harm that could be prevented
  - Little effort or risk to the organization in choosing to act
  - Potential harm to employees or others involved based on stress created by knowledge of Debug output

- **Potential concerns:**
  - Importance of maintaining faith in privacy and security of MiHIN
  - Community benefits achieved by sharing data potentially at risk
Beneficence

Principle: Acting in best interests of another individual

- **Support for taking action:**
  - Taking action may prevent harm (i.e., relieving conditions that could cause harm to patients)
  - Allow patients and caregivers to make informed decisions to promote their health
  - Prevent future harm by spreading awareness

- **Potential concerns:**
  - Potential of losing faith in MiHIN
Justice

Principle: Fairness and equality among individuals

- Relevant considerations:
  - Whether burdens of potential risk may fall on more disadvantaged populations, or those suffering from addiction
  - Whether wealthier patients / those with better provider relationships would be more likely to have risks of medical errors caught
  - May involve public policy considerations beyond MiHIN scope
Key Takeaways

• Opioid crisis cannot improve without better data sharing

• Federal and state laws for privacy and consent are woefully behind today’s technology for data sharing

• Vendors must be compelled to share data based on federal standards for interoperability

• More work needed in Ethics of Health Information Sharing
Questions?

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