Addictions Grand Challenge (Phase 2)
Analysis and Visualization of Addiction Data Onboarding Session

Date/Time: 2/26, 8:30a-10:00a

Place: Vis Lab in Luddy Hall 4012 at IUB
ZOOM: https://iu.zoom.us/my/cns.iu.edu
Welcome and Introduction of Visual Analytics of Addiction Data in Support of Data-Driven Decision Making

• Katy Börner, Victor H. Yngve Distinguished Professor of Engineering and Information Science, School of Informatics, Computing and Engineering, IUB

• Kosali Simon, Herman B Wells Endowed Professor, School of Public and Environmental Affairs, IUB

• Faith Hawkins, Associate Vice President, Research Development and Strategic Initiatives, IU
Visual Analytics of Addiction Data in Support of Data-Driven Decision Making

https://datausa.io
Visual Analytics requires access to high-quality data.

Image from

Visual Analytics should serve well-defined stakeholders and their needs.

Visual Analytics should be usable & actionable. Impacts should be measurable.

Accessable

Devices, disability, bandwidth

Relevant

Does it tell users what they want to know?

Usable

Can users easily find the information they need?

Personal

Does the website cater for individual users specific needs?

Persuasive

Does the site present content in a way users will find compelling?

https://www.youtube.com/watch?v=qd-9YQcvHIU
Causal Inference Analytics

Visualization Analytics Before, During and After Causal Inference Analytics
Welcome and Introduction of Visual Analytics of Addiction Data in Support of Data-Driven Decision Making

Faith Hawkins, Associate Vice President, Research Development and Strategic Initiatives, IU
Responding to the Addictions Crisis

An Indiana University Grand Challenge
The Addiction Crisis in Indiana

- An adult in Indiana is **more likely to die of a drug overdose than a car accident.**
- Fatal drug overdoses **up by 150% since 2005;** fatal opioid overdoses **up by 400%**.
- Adverse health outcomes related to addiction are rampant – HIV in Scott County (2015-16) is a prime example (10 cases over 10 years … **191 cases in 15 months**)
- The total annual cost of drug overdoses in Indiana tops $1 billion (measured in medical expenses and lifetime earnings losses)
Responding to the Addictions Crisis

• A partnership with Governor Eric Holcomb, IU Health, Eskenazi Health, and a growing number of communities and social service agencies.

• IU’s investment: $50 million over 5 years

• We anticipate additional investments from partners, foundations, industry, and NGOs.
Together, we will

- Reduce the incidence of Substance Use Disorders (SUD)
- Decrease opioid deaths
- Decrease the number of babies born with Neonatal Abstinence Syndrome (NAS)
A Socio-Ecological Model of Substance Use Disorder

A father whose son died of a heroin overdose is quoted in Sam Quinones’ book *Dreamland* reflecting on the need for a united response to the addictions crisis:

“Nobody can do it on their own,” he said. “But none can stand against families, schools, churches, and communities united together.”
To address the complexity of addictions, we will focus our work in 5 key, interrelated areas:

- Data Sciences & Analysis
- Education, Training & Certification
- Policy, Economics, & Law
- Community & Workforce Development
- Applied & Translational Research
How are we doing this?

So far ....

16 “shovel ready” projects began their work in January

Sorting through scores of contacts from across the state and country, eager to partner with us ... community organizations, private companies, families, students, counselors, health professionals ..... 

Federal and state legislators, officials, and agencies connecting and urging us forward

Phase 2 projects will be selected through a process beginning now
Phase 2 overview

- **Eligibility**: Indiana University core-campus faculty and academic appointees are eligible to serve as primary investigators on project proposals. Regional campus faculty members, other staff, and community partners are eligible to serve as co-PIs or key personnel.

- **Funding**: Total funding available for Phase 2 projects will be $16,000,000. Total costs for any project should not exceed $2,000,000 for a work period of no more than 4 years.

- **Timing**: Optional Concept papers due April 5th
  Full proposals due June 25th
  Implementation of Projects to begin late September
Phase 2 Project Development

- Faculty may work independently to develop projects
- Faculty may also choose to take advantage of opportunities to create interdisciplinary teams developing projects

**Scoping Sessions:** March 1 (Indianapolis) and March 2 (Bloomington), 8:30 – 2:00, are interactive workshops where we’ll identify intriguing questions, potential routes to answering questions, and potential partners [Registration and more information at grandchallenges.iu.edu]

**Ideas Lab:** May 14-16\(^{th}\) (New Harmony, IN) – an intensive, residential workshop aimed at finding innovative solutions to the seemingly intractable problems. Applications due March 7\(^{th}\). [More information at grandchallenges.iu.edu]
Scoping
Jump start
sessions

Scoping
Sessions

Ideas Lab

Many routes to
the same endpoint

April
Optional
concept
papers due

June
25th
Full
proposals
due
## Scientific Leadership Team

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Institution(s)</th>
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</thead>
<tbody>
<tr>
<td>Peter Embi</td>
<td>Data Sciences and Analysis</td>
<td>IUSM, Regenstrief Institute</td>
</tr>
<tr>
<td>Andrea Pfeiffle</td>
<td>Education, Training and Certification</td>
<td>IUSM, Interprofessional Education</td>
</tr>
<tr>
<td>Nicolas Terry</td>
<td>Policy, Economics and Law</td>
<td>IUPUI, McKinney School of Law</td>
</tr>
<tr>
<td>David Kareken</td>
<td>Basic, Applied, and Translational Research</td>
<td>IUSM, Indiana Alcohol Research Center</td>
</tr>
<tr>
<td>Jean Duwe</td>
<td>Community &amp; Workforce Development</td>
<td>Fairbanks SPH</td>
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<tr>
<td>Michelle Malott</td>
<td>Regional Campuses</td>
<td>IU East</td>
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<tr>
<td>Katy Börner</td>
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<td>IUB, SICE</td>
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<tr>
<td>Ellen Vaughan</td>
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<td>IUB, EDU</td>
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<td>Hsien-Chang Lin</td>
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<td>IUB, SPH</td>
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<tr>
<td>Ken Mackie</td>
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<td>IUB, CoAS, Gill Center for Biomolecular Science</td>
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<td>Ruth Gassman</td>
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<td>IUB, SPH</td>
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# Steering Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Robin Newhouse</td>
<td>(Dean, IU School of Nursing), Chair</td>
</tr>
<tr>
<td>Paul Halverson</td>
<td>(Dean, Fairbanks School of Public Health)</td>
</tr>
<tr>
<td>Terry Mason</td>
<td>(Dean, IUB School of Education)</td>
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<tr>
<td>Michael Patchner</td>
<td>(Dean, IU School of Social Work)</td>
</tr>
<tr>
<td>Ex officio: Simon Atkinson</td>
<td>(Vice Chancellor for Research, IUPUI)</td>
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<tr>
<td>Ex officio: Rick Van Kooten</td>
<td>(Vice Provost for Research, IUB)</td>
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<tr>
<td>David Allison</td>
<td>(Dean, IUB School of Public Health)</td>
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<tr>
<td>Bill Hetrick</td>
<td>(Chair, Psychological &amp; Brain Sciences, IUB CoAS)</td>
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<tr>
<td>Thomas McAllister</td>
<td>(Chair, IUSM Department of Psychiatry)</td>
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<tr>
<td>Kosali Simon</td>
<td>(Professor, SPEA, IUB)</td>
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<tr>
<td>Faith Kirkham Hawkins</td>
<td>(Associate Vice President for Research)</td>
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</table>
Learn more at 
grandchallenges.iu.edu

Contact us at 
grandchallenges@iu.edu

Faith Kirkham Hawkins 
fhawkins@iu.edu
Presentations of Existing Projects and Results (5 mins each)

1. **Analyzing Trends in the Opioid Epidemic Using Laboratory Results Data.** Titus Schleyer, DMD, PhD, Research Scientist, Regenstrief Institute; Professor of Biomedical Informatics, Indiana University School of Medicine; Advisor, hc1.com and Andres Bueker & Jason Wolfgang, hc1.com

2. **Clinical Decision Support for Managing Opioid Prescriptions in Primary Care.** Chris Harle, PhD, Associate Professor, Health Policy and Management, Indiana University Richard M. Fairbanks School of Public Health; Research Scientist, Center for Biomedical Informatics, Regenstrief Institute

3. **Analysis and Visualization of Addiction Data at MPH.** Darshan Shah, Lee Everett et al., MPH (virtual)

4. **Doctor Shopping: Network Analysis of Healthcare Claims Data.** Patrick Kaminski & Brea Perry, IUB

5. **Cluster Mapping the Opioid Network in Indiana.** David Bodenhamer, Executive Director and Professor, The Polis Center, IUPUI & Sharon Kandris, Associate Director, The Polis Center, IUPUI (virtual)

6. **Trends in Opioid Substances from Toxicology Results: Drug Overdose in Marion County, Indiana.** Brad Ray, Ph.D. Assistant Professor, School of Public and Environmental Affairs, Indiana University-Purdue University Indianapolis (virtual)

7. **Regenstrief Overview.** Shaun Grannis, MD, MS, FAAFP, FACMI, Director, Regenstrief Center for Biomedical Informatics (virtual)
Presentations of existing projects and results (5 mins each)

Analyzing Trends in the Opioid Epidemic Using Laboratory Results Data
Titus Schleyer, DMD, PhD, Research Scientist, Regenstrief Institute; Professor of Biomedical Informatics, Indiana University School of Medicine; Advisor, hc1.com and Andres Bueker & Jason Wolfgang, hc1.com
hc1 Opioid Dashboard

Titus Schleyer, Andres Bueker, Jason Wolfgang

Presented at “Analysis and Visualization of Addiction Data” Phase 2 of IU’s Addictions Grand Challenge Feb. 26, 2018
Continuously Expanding hc1 Data Lake

Vast, infinitely scalable data and live insight:

- 5.2 Billion Dx Results
- All 50 States
- 51 Million Individuals
- 3.8 Million Providers

What Our **HRM Platform** Includes

**Built Exclusively for Healthcare**

**hc1 Information Services**

Identify and prioritize where your organization has untapped potential to grow.

**hc1 CRM**

Combine real-time clinical and business data to confidently take action.

**hc1 Analytics**

Visualize healthcare data in real-time dashboards for an instant view of performance.
Instant Positivity Rate Heat Map Uncovers Rx and Illicit Drug Use

**Summary Metrics**

- Locations: 12,667
- Patients: 410,460
- Patient Positivity Rate: 10.7%
- Orders: 507,895
- Order Positivity Rate: 11.2%
- Results: 1,886,834
- Result Positivity Rate: 8.2%

**Result Positivity Rate by County**

- **Positivity rate by county**

**Result Positivity Rate Trend**

- **Positivity rate over time**

**Result Positivity Rate by Drug**

- **Positivity by Drug**
A Case Study: Indiana’s Scott County, 2014-2018

- In early 2015, rash of new HIV infections
- Linked to intravenous drug use
- All-drug positivity rate shows marked elevation in 2014
- Opioid antagonists (e.g. naloxone) elevated in late 2014

(preliminary results; validation ongoing)
Identify Geographic Movement of Drug Trends

Month 1

Month 2

Month 3
View the Correlation Between Demographics & Drug Usage

Drill down into demographics

Positivity rate by drug over time
Highest positivity rate is in the highest median income counties

~65% Fentanyl users overwhelmingly test positive for two or more additional drugs
Live Insight to Address the Opioid Crisis

hc1 Opioid Dashboard

Contact: Andres Bueker
Email: abueker@hc1.com
Phone: 317-679-9638
Presentations of existing projects and results (5 mins each)

Clinical Decision Support for Managing Opioid Prescriptions in Primary Care
Chris Harle, PhD, Associate Professor, Health Policy and Management, Indiana University Richard M. Fairbanks School of Public Health; Research Scientist, Center for Biomedical Informatics, Regenstrief Institute
Designing User-Centered Decision Support for Chronic Pain and Opioid Prescribing

Chris Harle, PhD

Associate Professor, Health Policy and Management
IU Richard M. Fairbanks School of Public Health
Research Scientist, Regenstrief Institute
charle@iu.edu

Funding: AHRQ R01HS23306, NIDA 1R21DA046085-01
Goals

Overcome the enormous primary care challenge of relieving chronic pain while keeping patients and the public safe from opioid-related risks.
Our design process

Observation, interviews, analysis, translation

- 19 clinicians
- 70+ visit interviews

key decision requirements

Decision support designs

- How do patients and clinicians interact during visits?
- Where do clinicians struggle when making decisions?
- What information is missing and needed?
- When do EHRs help? When do they hurt?
PEG Score

OxyContin 20mg, q24h
OxyContin 10mg, q24h
Diazepam, 5mg q24h
Celecoxib, 250mg q24h

ED Visit 1-11-17
Abn UDS

DOB: 12/21/1972
Weight: 187 lbs.
Age: 40 years
MRN: 200365448
Sex: Male
FIN: 1005-63251
Allergies: Penicillins
**SMART Chronic Pain OneSheet**

**Ima Patient**

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<td>123 Main Street Indianapolis IN 46202</td>
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**Summary**

- **Prescriptions:** 10
- **Orders:** 5
- **Meds:** 2
- **Plx Pay:** 0
- **Daily MME:** 30.0

**Prescriptions**

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<tr>
<th>ID</th>
<th>Written</th>
<th>Drug</th>
<th>QTY</th>
<th>Days</th>
<th>Prescriber</th>
<th>Rx by</th>
<th>Pharmacy</th>
<th>Refill</th>
<th>MME/C</th>
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<td>Medicare</td>
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</table>
Presentations of existing projects and results (5 mins/each)

Analysis and Visualization of Addiction Data at MPH
Lee Everett, Darshan Shah et al., MPH (virtual)
Next Generation Analytics
How data-driven decision making will improve Hoosiers’ quality of life
Attacking the Drug Epidemic

Indiana reported a 570% increase in opioid-related deaths between 1999-2015

- **Goal**: break down information silos to obtain a “big picture” view of the problem
- **10** agency partners
- **66** user stories
Attacking the Drug Epidemic

Achievements
- Eight (8) visualizations/dashboards/alerts created for DDWG and GOV office
  - ED Visits, LIMS, Deaths, INSPECT, Record Linkage
- Supporting initiatives & data visuals – NextLevel Recovery website, OTP locations, data quality initiatives

Upcoming
- Continued Data acquisition (Arrest, Medicaid, DCS, DOC, Treatment)
- Support Data Quality Initiatives & Data needs/analysis for Indiana
- Partnerships with researchers and community stakeholders
- Publicly Sharing Data
Drug Dashboard

Datasource: LIMS

Click the ">" Button to Watch The Map Change Over Time

Select Date Range
(Multiple values)

Incidents Per 100K

Dea Grouping
- Anabolic Steroids
- Cannabinimetic agents
- Cannabis
- Depressant
- Hallucinogenic or psy..<br>
- Opioid
- Stimulant
- Weight loss

Submissions by DEA Group

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<td>Anabolic Steroids</td>
<td>47</td>
<td>45</td>
<td>43</td>
<td>16</td>
<td>35</td>
<td>68</td>
<td>124</td>
<td>82</td>
<td>50</td>
<td>36</td>
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<td>Cannabinimetic agents</td>
<td>41</td>
<td>94</td>
<td>146</td>
<td>589</td>
<td>1,236</td>
<td>1,553</td>
<td>1,606</td>
<td>1,297</td>
<td>1,219</td>
<td>715</td>
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<td>Cannabis</td>
<td>8,123</td>
<td>8,830</td>
<td>9,651</td>
<td>9,210</td>
<td>9,561</td>
<td>9,711</td>
<td>7,549</td>
<td>6,682</td>
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<td>1,425</td>
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<td>1,598</td>
<td>1,641</td>
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<td>1,399</td>
<td>1,374</td>
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<td>Hallucinogenic or psyched.</td>
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<td>359</td>
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<td>299</td>
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<td>Opioid</td>
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<td>3,591</td>
<td>3,999</td>
<td>4,540</td>
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<td>4,773</td>
<td>5,940</td>
<td>6,217</td>
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<td>Stimulant</td>
<td>7,593</td>
<td>6,815</td>
<td>6,236</td>
<td>6,060</td>
<td>5,891</td>
<td>6,175</td>
<td>5,690</td>
<td>6,454</td>
<td>7,820</td>
<td>7,132</td>
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<tr>
<td>Weight loss</td>
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MANAGE PERFORMANCE
Questions?

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Executive Director, MPH  
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**Indiana Management Performance Hub**  
200 West Washington Street, Room 105  
Indianapolis, Indiana 46204
Presentations of existing projects and results (5 mins/each)

Doctor Shopping: Network Analysis of Healthcare Claims Data
Brea Perry, Associate Professor of Sociology and Indiana University Network Science Institute
Doctor Shopping: Network Analysis of Healthcare Claims Data

Collaborators:  Brea Perry, Jeff Talbert, Trish Freeman, Carrie Oser, YY Ahn (Sociology, Pharmacy, Criminology, Informatics)

Doctor shopping = obtaining controlled substances from multiple health care practitioners simultaneously, exceeding the recommended dosage (CDC, 2014)

- Common (40%); indicator of escalation and OD
- Difficult to accurately identify, but is a fundamentally social drug seeking behavior
Doctor Shopping: Network Analysis of Healthcare Claims Data

Specific aims of the grant:

1. Improve the specification and predictive validity of doctor shopping indicators by incorporating network measures
2. Identify characteristics of doctor shopping patients, targeted prescribers, and the point of service to inform interventions
Data: Optum Clininformatics

- All health claims from 2007-2016 (quarterly; 40 obs)
  - Medical, pharmacy, facility, labs
- About 21M patients who ever had an opioid (~40% of total)
- Nationwide coverage with zip-5 data
- Ability to link family members
- Mortality data
- SES data
Ability to create networks through unique patient, doctor, family, or facility identifiers.

- Standard one mode network
- Two mode affiliation network
- Weighted one mode affiliation network

- Node
- Tie
- Patient node
- Doctor node
- Indirect tie
Presentations of existing projects and results (5 mins/each)

Cluster Mapping the Opioid Network in Indiana
David Bodenhamer, Executive Director and Professor, The Polis Center, IUPUI
Sharon Kandris, Associate Director, The Polis Center, IUPUI (virtual)
Cluster Mapping the Opioid Addiction Issue

David Bodenhamer, Executive Director, The Polis Center at IUPUI
Sharon Kandris, Associate Director, The Polis Center at IUPUI
Indiana Data Partnership

State of Indiana’s Management Performance Hub (MPH)

IU Public Policy Institute

The Polis Center at IUPUI

Indiana Business Research Center

IU Network Science Institute
Problem

The opioid addition issue is complex. We need to understand the scope.

The impacts go well beyond the individual involved, and so must the solutions.

The solutions must include service providers across multiple sectors. But that network is not well documented or easy to navigate.

Data can help us understand the issue and identify potential solutions, but the data are not easy to find or access.

And we cannot depend solely upon data available from state government agencies.

Much of the data we need is held by service providers.
Solution: Cluster Mapping – connecting actors across sectors at multiple scales

1. Identify potential collaborators and their likelihood of collaborating in solving the opioid issue

2. Identify the client-level data held by relevant actors in the network and assess viability for collecting and integrating into a larger data system

3. Use the client-level data to follow individuals through the network (entry and exit points) and identify their related outcomes

4. Test the utility of cluster mapping

5. Build a scalable model for cluster mapping that could be semi-automated to apply to another issue area
Goal 1

Identify potential collaborators and their likelihood of collaborating in solving the opioid issue:

- What organizations are involved in addressing the issue?
- What organizations are not currently involved but could be?
- What organizations are working together to address this issue?
- What organizations are not currently working together but could be?
- What organizations are most likely to become involved based on what we know of successful models?
Building the Prototype

Scope: Marion, Clark, and Howard Counties
Compiling Data about organizations and service providers
Conceptual framework of the Opioid Model
Create the cluster map
Presentations of existing projects and results (5 mins/each)

Trends in Opioid Substances from Toxicology Results: Drug Overdose in Marion County, Indiana
Brad Ray, Ph.D. Assistant Professor, School of Public and Environmental Affairs, Indiana University-Purdue University Indianapolis (virtual)
Brad Ray, PhD
Assistant Professor
School of Public and Environmental Affairs (SPEA)

Director of the Center for Criminal Justice Research (CCJR)
Indiana University Public Policy Institute (PPI)
Drug Overdose Deaths in Indiana (CDC Data)

Indiana is notoriously bad at collecting accurate overdose data.

We have a decentralized coroner system and are ranked 5th in the U.S. for our use of “unspecified” ICD codes.

The most accurate way to provide surveillance on drug overdose deaths is through toxicology results.
We collect toxicology data on all drug overdose deaths in Marion County. Using these data we have:

- Examined the prevalence of opioids in unspecified cases
- Tracked the detection of various opioid substances
Fentanyl Detection in Marion County

![Graph showing the detection of Fentanyl, Heroin, Morphine, Oxycodeone, Hydrocodone, Oxymorphone, and Hydromorphone from 2010 to 2016.]

![Graph showing the percentage of Fentanyl test screens that are positive or negative from January 2011 to January 2017.]

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Visualization of Marion County Toxicology Results

Drug Overdose in Marion County, Indiana: Trends in Opioid Substances from Toxicology Results

Trends in Opioid Substances - 2010 to 2017

- Heroin
- Fentanyl
- Prescription Opioids

So far in 2018 the number of drug overdose deaths recorded are:

- Sex
- Race/Ethnicity
- Marital Status
- Detected Opioids
- Start Month
- End Month

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Perceived Need and Future Directions

- Without timely and accurate data it is difficult to assess the impact of policies or interventions.

- The opioid epidemic has become highly politicized with little action; local communities need to be aware of the scope of the problem.

- Future directions include expanding to other counties and integrating other data sources:
Presentations of existing projects and results (5 mins/each)

Regenstrief Overview
Shaun Grannis, MD, MS, FAAFP, FACMI, Director, Regenstrief Center for Biomedical Informatics (virtual)
Regenstrief Overview

Shaun Grannis MD, MS, FAAFP, FACMI
Director, Regenstrief Center for Biomedical Informatics

Prepared for the IADC Collaborative Meeting, 20-Feb-2018
EHR Integration: The Indiana Network for Patient Care (INPC)

Data Management

- Data Repository
- Network Applications
- Health Information Exchange
- Hospital
- Labs
- Outpatient RX
- Physician Office
- Ambulatory Centers
- Public Health

Data Access & Use

- Hospitals
  - Results delivery
  - Secure document transfer
  - Shared EMR
  - Credentialing
  - Eligibility checking
- Physicians
  - Results delivery
  - Secure document transfer
  - Shared EMR
  - CPOE
  - Credentialing
  - Eligibility checking
- Labs
  - Results delivery
- Public Health
  - Surveillance
  - Reportable conditions
  - Results delivery
  - De-identified, longitudinal clinical data
- Payer
  - Secure document transfer
  - Quality Reporting
- Researcher
  - De-identified, longitudinal clinical data (OHDSI CDM, i2b2)
  - Subject Recruitment
  - Clinical Trials
Data Statistics

Source: The Indiana Health Information Exchange, http://www.ihie.org
- Labs
  - Diagnoses
  - Medications

- SNP's
  - Whole Exome
  - Whole Genome

- Pollution
  - Radon
  - Temperature
  - SES
  - Crime

- ED usage
  - Outpatient visits
  - Inpatient admissions
  - Online behavior
  - Quantified self
  - etc.
Integrating Data

- RWJ Wrap-around Services
- Linking claims to clinical
- Geotagging clinical data
Indiana/Regenstrief active history working on solutions

Behavioral Health

Connecting for Impact: Linking Potential Prescription Drug Monitoring Programs (PDMPs) to Patient Care Using Health IT

Prescription drug monitoring programs (PDMPs) are one of the most promising tools available to address prescription drug misuse, abuse, and diversion. PDMPs are state-run electronic databases that provide critical health information to physicians and other health care providers about an individual’s history of using controlled substance prescriptions. This information can be used to avoid inappropriate prescribing, identify drug-seeking behavior, and allow providers to intervene when there are signs of prescription drug misuse.

“Enhancing Access” Pilot Reports

ONC led development of a series of pilots to test different technical solutions ranging from electronic prescribing tools to connecting PDMPs with EHRs. This was done to improve provider access to PDMP data. ONC released white papers which detail pilots’ design and outcomes, and highlight personal anecdotes from health care providers who reflected on the success integration had on their practice.

Phase 1: Six Pilot Studies and Their Impact [PDF - 839 KB]

<table>
<thead>
<tr>
<th>State</th>
<th>Setting</th>
<th>Pilot Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indiana (IN)</td>
<td>Emergency Dept</td>
<td>• Automated query to PDMP upon patient admission to ED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PDMP data integrated into EHR</td>
</tr>
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<td></td>
<td></td>
<td>Read the Full Report [PDF - 548KB]</td>
</tr>
<tr>
<td>Indiana (IN2)</td>
<td>Ambulatory</td>
<td>• Unsolicited PDMP reports sent via Direct</td>
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<td>Read the Full Report [PDF - 628KB]</td>
</tr>
<tr>
<td>Michigan (MI)</td>
<td>Ambulatory</td>
<td>• Automated query to PDMP to create integrated prescription history and alerts</td>
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<td></td>
<td></td>
<td>Read the Full Report [PDF - 409KB]</td>
</tr>
<tr>
<td>North Dakota (ND)</td>
<td>Pharmacy</td>
<td>• Automated query to PDMP using an existing benefits management switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Read the Full Report [PDF - 528KB]</td>
</tr>
<tr>
<td>Ohio (OH) Ambulatory</td>
<td></td>
<td>• Automated query to PDMP upon appointment scheduling and patient check-in</td>
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<tr>
<td></td>
<td></td>
<td>• Patient risk score and a link to PDMP details displayed in EHR</td>
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<tr>
<td></td>
<td></td>
<td>Read the Full Report [PDF - 547KB]</td>
</tr>
<tr>
<td>Washington (WA)</td>
<td>Optiki Tx Center</td>
<td>• Hyperlink to PDMP within EHR</td>
</tr>
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</table>
Assessing Opioid Abuse Potential: Preliminary Risk Modelling

- Evaluating the capacity for features derived from INPC data to characterize the abuse potential of individual patients.
  - a) using previously published features, and
  - b) exploring additional data elements to develop an individual risk measure.

<table>
<thead>
<tr>
<th></th>
<th>Accuracy</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>AUC</th>
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</thead>
<tbody>
<tr>
<td>Preliminary results</td>
<td>91.7%</td>
<td>62.2%</td>
<td>98.7%</td>
<td>92.3%</td>
<td>92.0%</td>
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<tr>
<td>Results from Dufour et al</td>
<td>88.4%</td>
<td>15.9%</td>
<td>99.7%</td>
<td>NA</td>
<td>86.4%</td>
</tr>
</tbody>
</table>
Opioid Hot-spotting

- In similar fashion to existing population surveillance infrastructure and data, we have the potential to support population level geospatial surveillance (hot-spotting) of opioid use in near real time.
Regenstrief Institute Data Core

• 2016 and 2017, Regenstrief Data Core worked on 24 projects related to opioid use/abuse

• Project ideas were generated from 13 investigators in 11 departments/organizations
Regenstrief Overview

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Director, Regenstrief Center for Biomedical Informatics

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