Better methods: Novel methods and analyses to better understand prescription drug misuse

ROCKY MOUNTAIN POISON & DRUG SAFETY
Saving lives with answers.™

RADARS® SYSTEM

John Schwarz, PhD

How to Measure Drug Misuse

- Understanding common approaches to surveillance
- Exploring new methods of analysis
- Developing new methods to capture data

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Traditional Surveillance Programs

- Targeted populations
  - Example: individuals entering treatment or part of an ongoing trial
- Voluntary submission
  - Example: individuals calling poison centres and other agencies for advice or assistance

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Advantages

- Often provide data from experienced users
  - Specificity
  - Captures rare events
- Obtain qualitative data
  - Reasons
  - Pathways
  - Can lead to new studies

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BUPRENORPHINE Used in the past month **to get high**	Select all that apply						
	Used	Swallowed whole	Dissolved in mouth	Chewed	Smoked	Snorted	Injected
FORMULATION UNKNOWN							
Buprenorphine, type unknown	☒	☐	☒	☐	☐	☐	☐
SINGLE INGREDIENT TABLETS							
Subutex®	☒	☐	☒	☐	☐	☐	☐
Single ingredient tablets by Roxane	☐	☐	☐	☐	☐	☐	☐
Single ingredient tablets by Teva	☐	☐	☐	☐	☐	☐	☐
Single ingredient tablets by Hi-Tech	☐	☐	☐	☐	☐	☐	☐
Single ingredient tablets by Actavis	☐	☐	☐	☐	☐	☐	☐
Single ingredient tablets, not listed above	☐	☐	☐	☐	☐	☐	☐
Single ingredient tablets, not sure of name	☐	☐	☐	☐	☐	☐	☐
COMBINATION TABLETS							
Suboxone® tablets	☒	☐	☒	☐	☐	☐	☐
Zubsolv® tablets	☐	☐	☐	☐	☐	☐	☐
Combination ingredient tablets, not listed above	☐	☐	☐	☐	☐	☐	☐

HEROIN Used in the past month **to get high**	Select all that apply						
	Used	Swallowed whole	Dissolved in mouth	Chewed	Smoked	Snorted	Injected
Heroin (any form)	☐	☐	☐	☐	☒	☐	☐

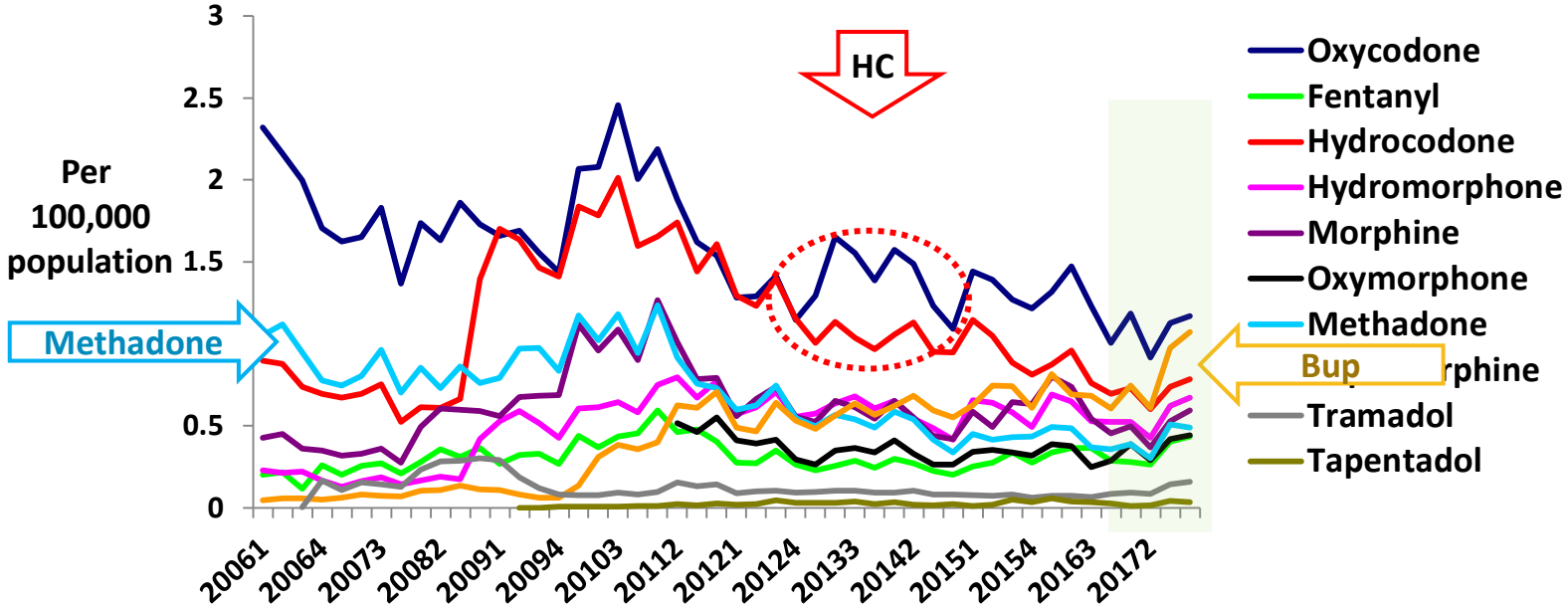
TRAMADOL Used in the past month **to get high**	Select all that apply						
	Used	Swallowed whole	Dissolved in mouth	Chewed	Smoked	Snorted	Injected
Tramadol (any form)	☒	☒	☐	☐	☐	☐	☐

FENTANYL Used in the past month **to get high**	Select all that apply						
	Used	Swallowed whole	Dissolved in mouth	Chewed	Smoked	Snorted	Injected
FORMULATION UNKNOWN							
Fentanyl, type unknown	☒	☐	☐	☐	☒	☐	☐
PATCHES							
Duragesic®	☐	☐	☐	☐	☐	☐	☐
Generic reservoir patch by Sandoz	☐	☐	☐	☐	☐	☐	☐
Matrix patch by Mylan	☐	☐	☐	☐	☐	☐	☐
Patches, not listed above	☐	☐	☐	☐	☐	☐	☐
Patches, not sure of name	☐	☐	☐	☐	☐	☐	☐

GABAPENTIN Used in the past month **to get high** *e.g., Neurontin®, Gralise®*	Select all that apply						
	Used	Swallowed whole	Dissolved in mouth	Chewed	Smoked	Snorted	Injected
Gabapentin (any form)	☒	☒	☐	☐	☐	☐	☐

KRATOM Used in the past month **to get high** *e.g., Thang, Kakuam, Thom, Ketum, Biak*	Select all that apply						
	Used	Swallowed whole	Dissolved in mouth	Chewed	Smoked	Snorted	Injected
Kratom (any form)	☒	☒	☐	☐	☐	☐	☐

Treatment Center Programs Combined API, 2006-2017



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Traditional Surveillance Analysis

- Descriptive in nature
  - Rates
  - Interrupted time series
  - Linear models (ie Poisson)

- Inability to quantify interventions and policy impact
- Limited in capturing environmental data

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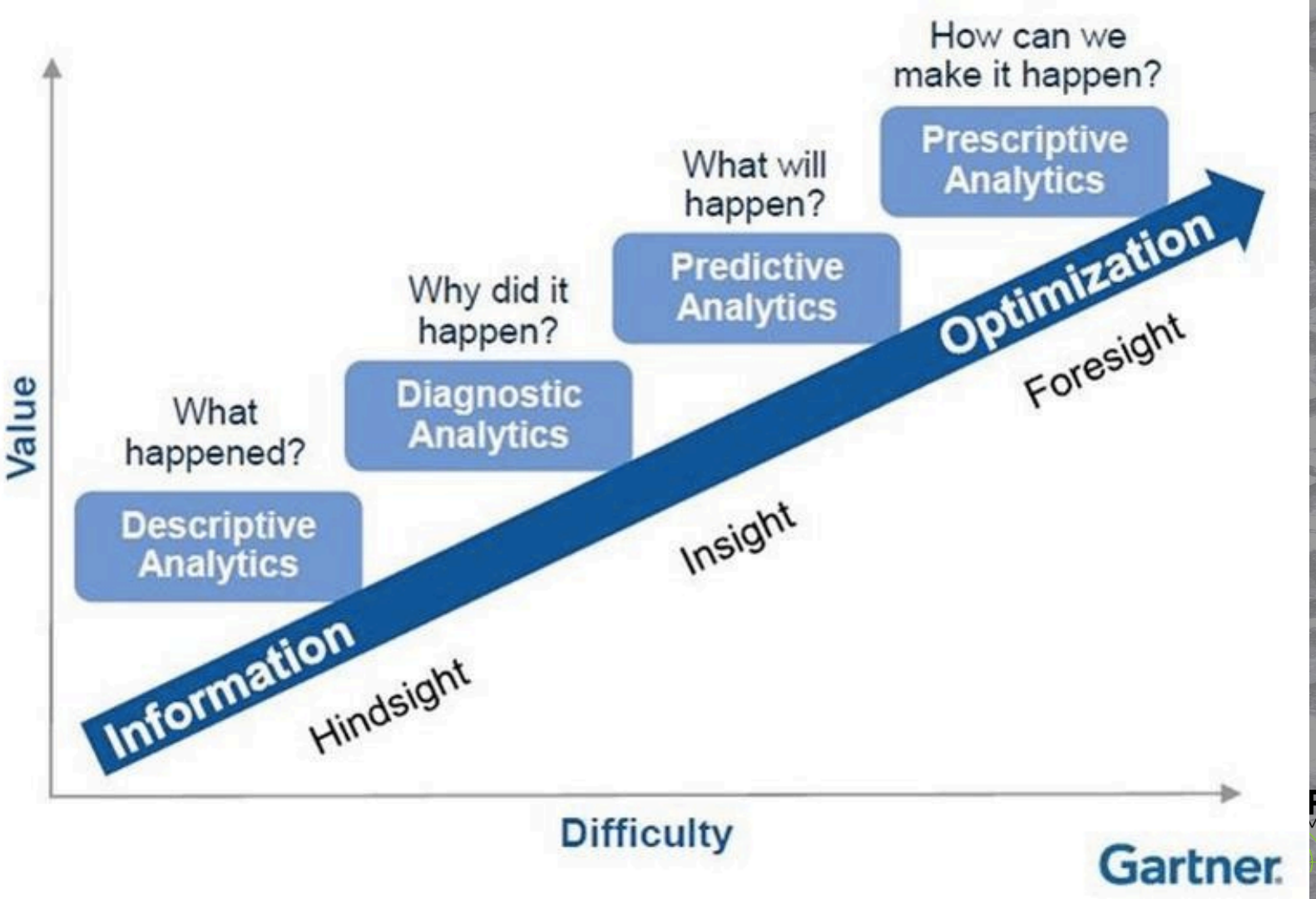
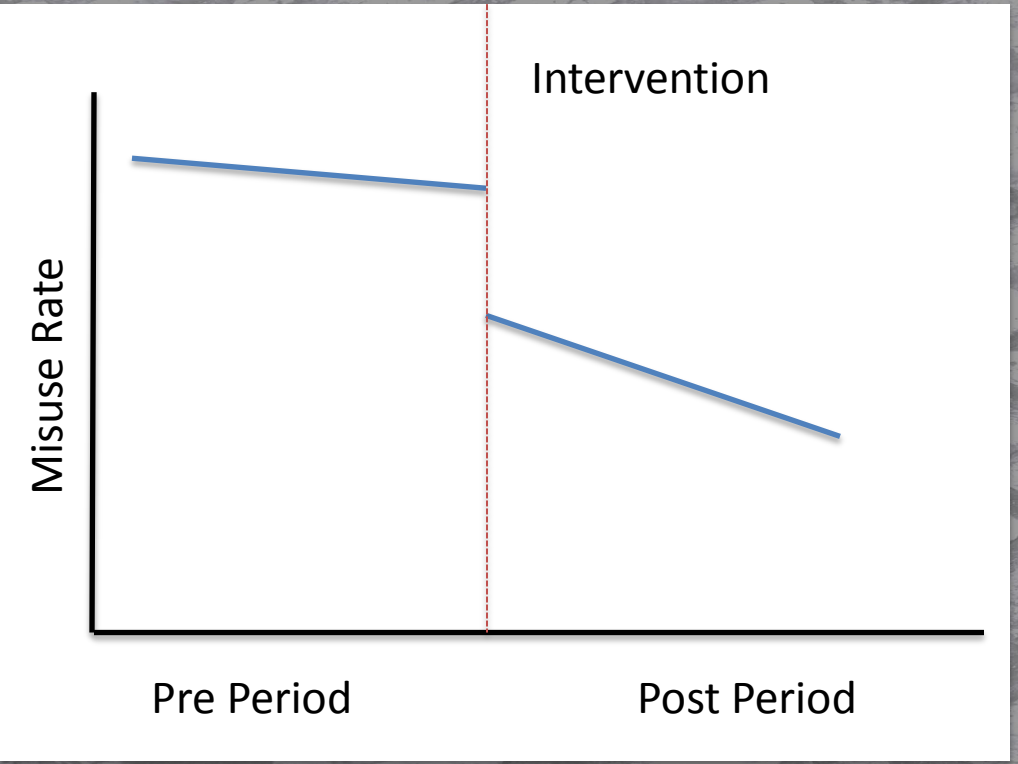

How can we make it happen?
Prescriptive Analytics
What will happen?
Predictive Analytics
Why did it happen?
Diagnostic Analytics
What happened?
Descriptive Analytics
Optimization
Foresight
Insight
Hindsight
Information
Value
Difficulty
Gartner

Example: Interrupted time series



- Pre post evaluation for an intervention
- What other environmental factors change?
- Does prescribing of products change during this time?

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Challenges

- What do the descriptive values mean?
- How can we compare these across cities, states, countries?
- Measuring impact of changes to the environment
  - Policy
  - Product Availability

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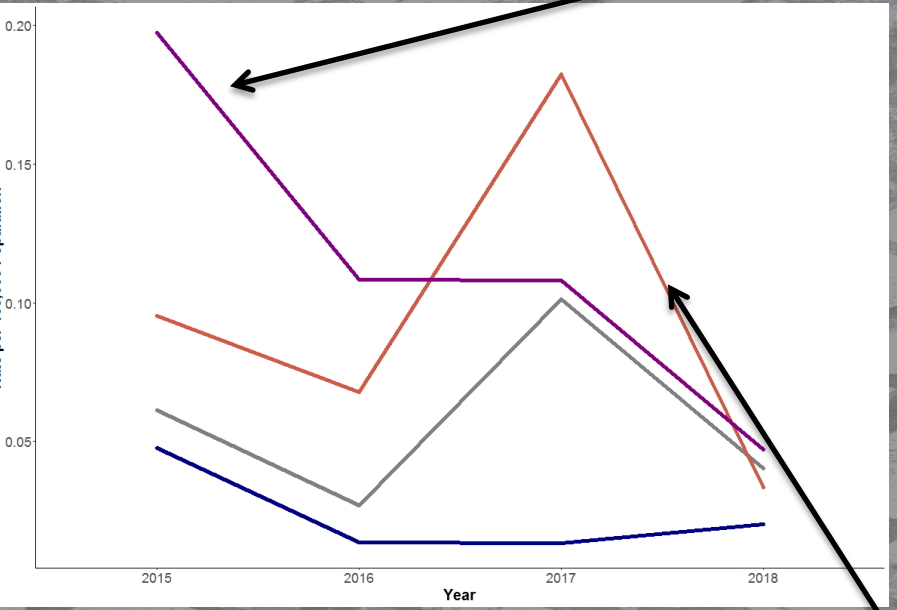
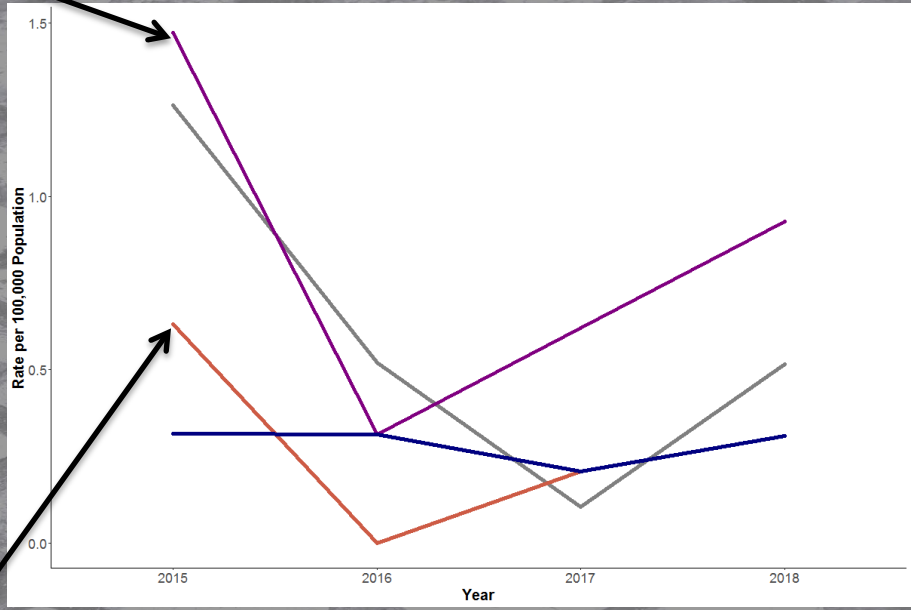
France

Morphine

Germany





Codeine

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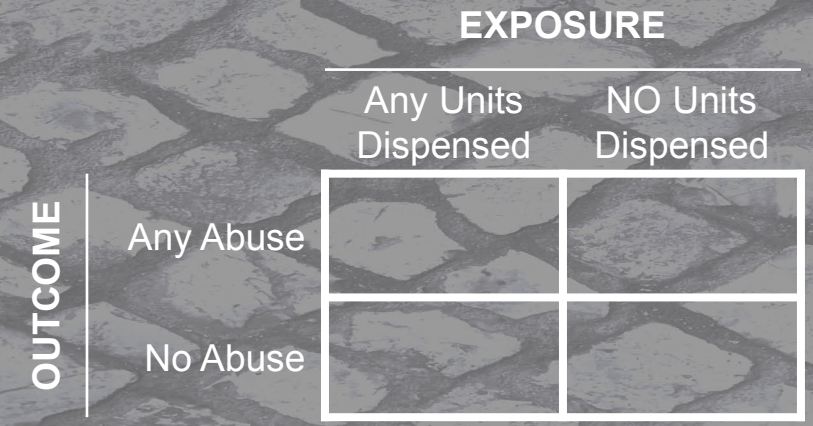
New Analytic Techniques

- Use more epidemiological driven methods to evaluate causal relationships
- Allow for adjustment of interventions



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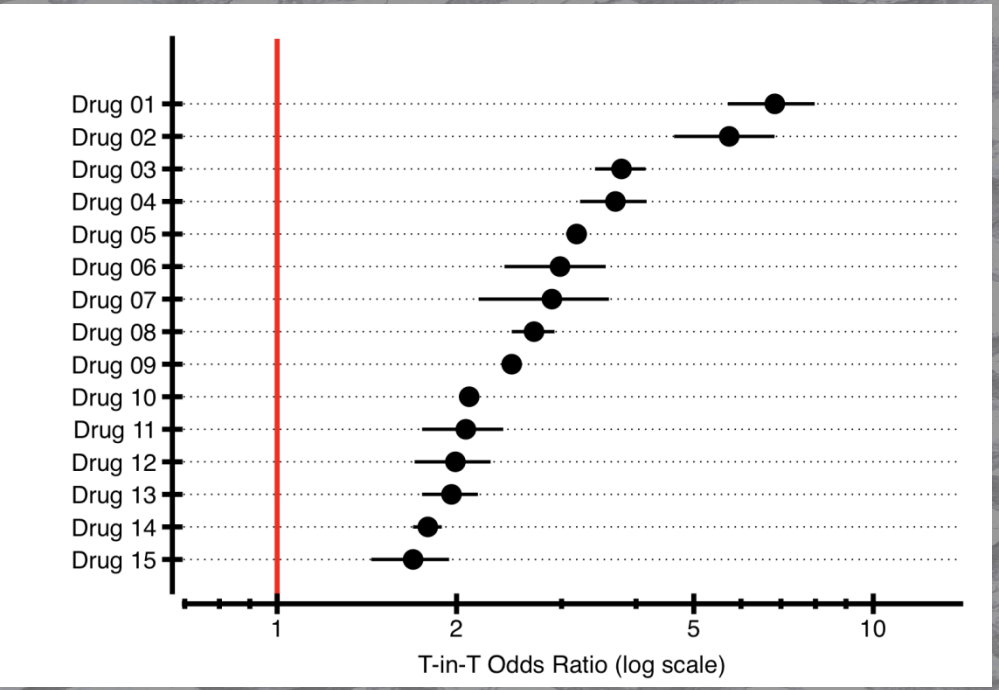
Trend in Trend



- Odds ratios based on observed cases and exposure over time
- Compare multiple drugs to one another
- Compare misuse by route
- Account for unmeasured time varying confounders

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New Techniques in Data Collection

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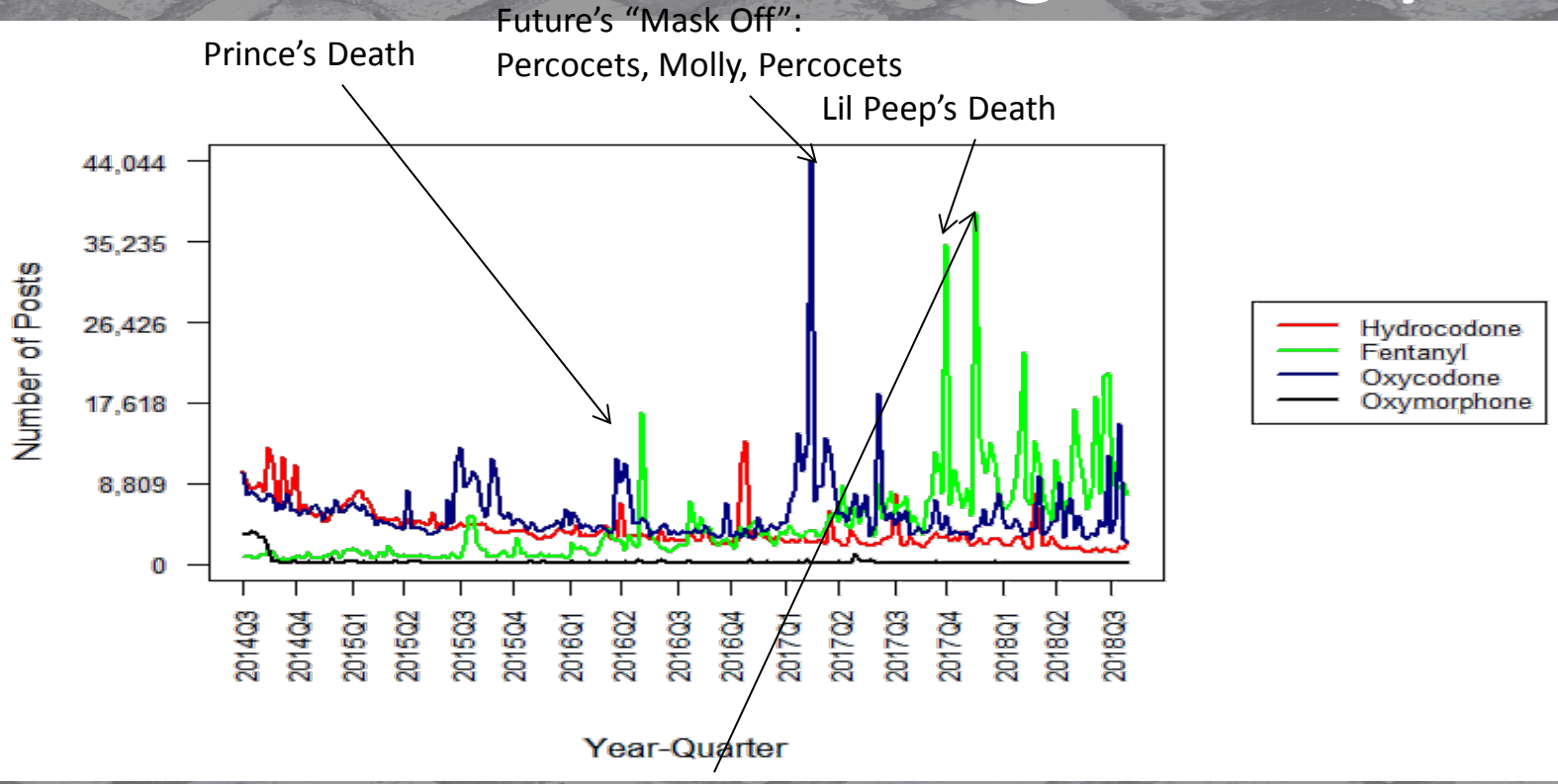
New Methods of Drug Misuse Surveillance

- Web based approaches allow for multiple advantages
  - Timely
  - Flexible
  - Ability to Follow up
  - Reach diverse populations
  - Compare Across Geographies

Web Monitoring Activity



Riff Raff: "PSA: DONT DO COCAiNE ANYMORE, ALOT OF PEOPLE ARE BEiNG SOLD FENTANYL (A DEADLY DRUG) MiXED iN WiTH THERE BAGS OF COCAiNE ... SO FOR THAT REASON iM OUT .. YOU SHOULDNT PLAY WiTH YOUR LiFE WE HAVE A BRiGHT FUTURE LETS ENJOY THE FRESH AiR WiTH VERSACE NOSTRiLS

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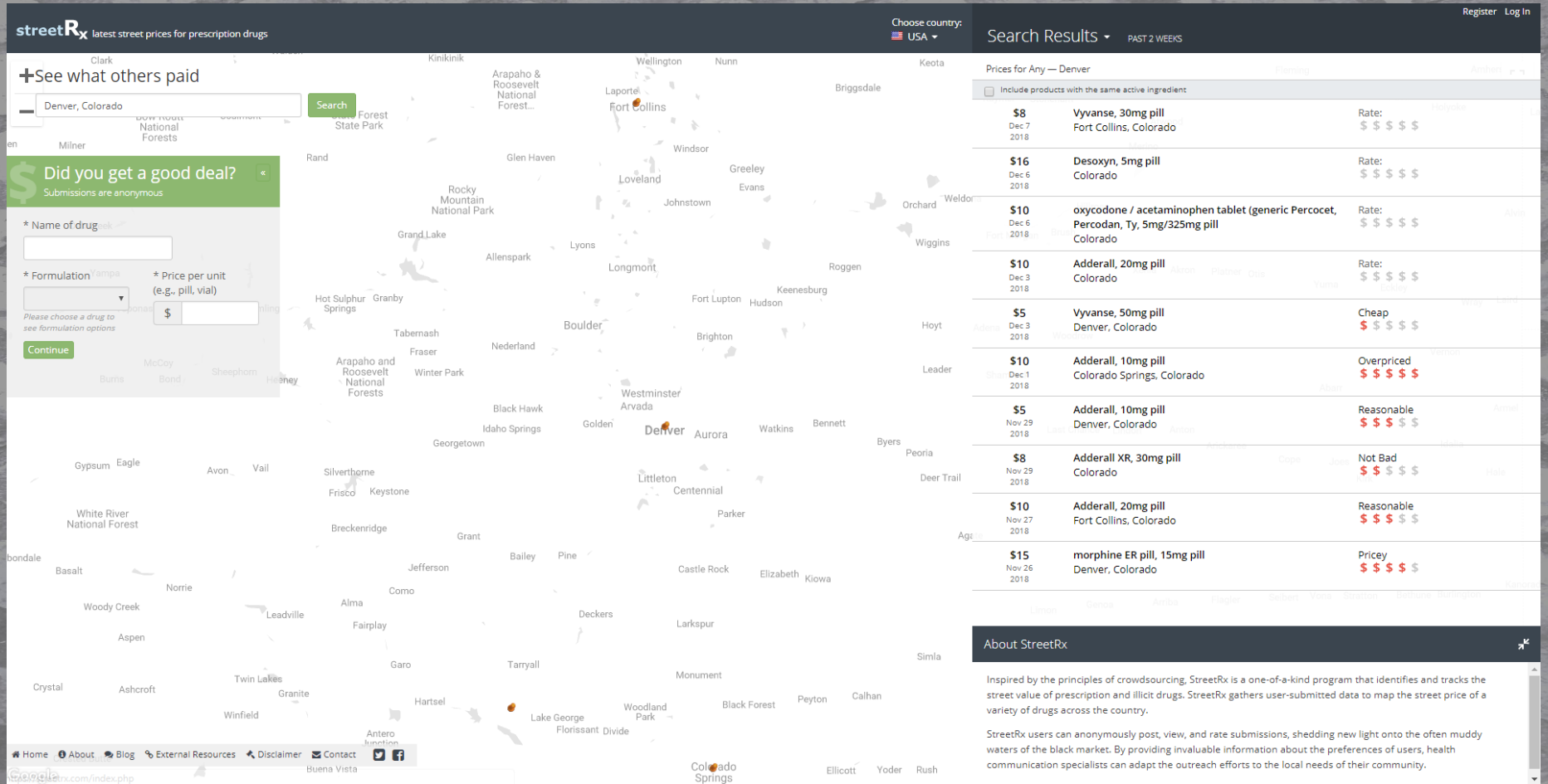
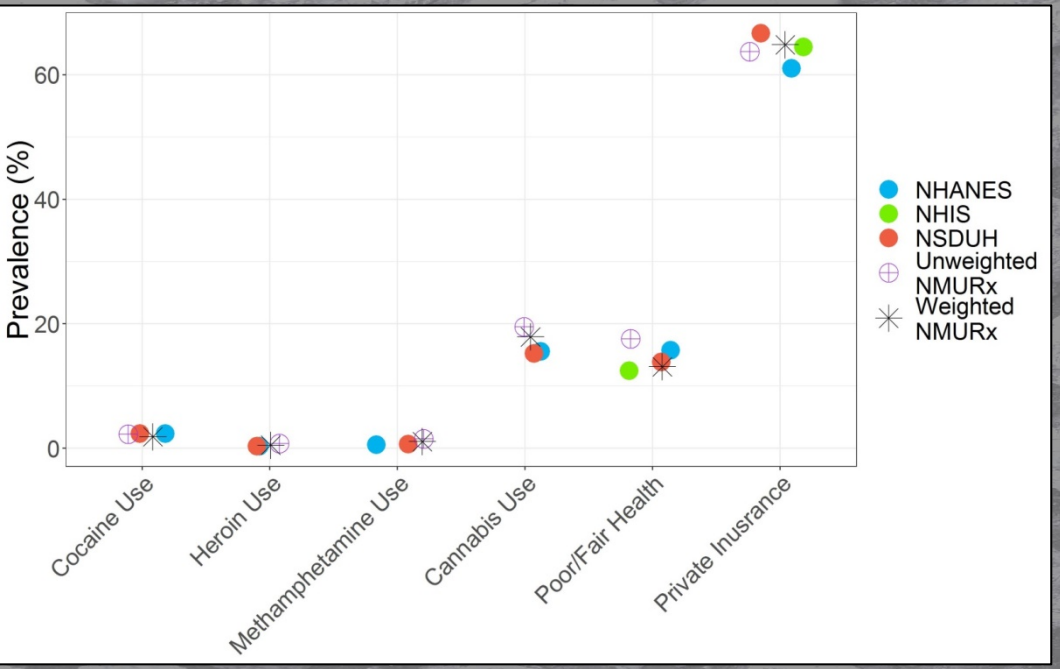
Crowd Sourcing



Online Surveys



- Gather large amounts of data quickly
- Mobile friendly
- Use skip logic and responsive design
- Benchmark against other data

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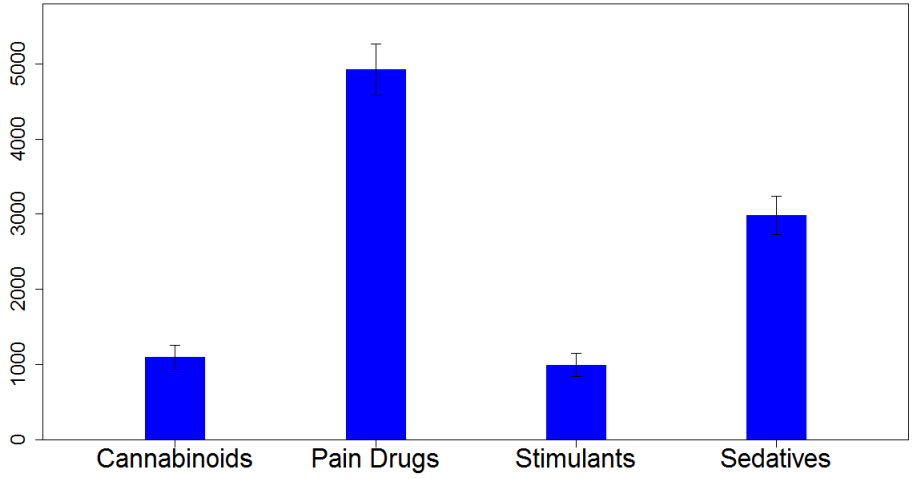
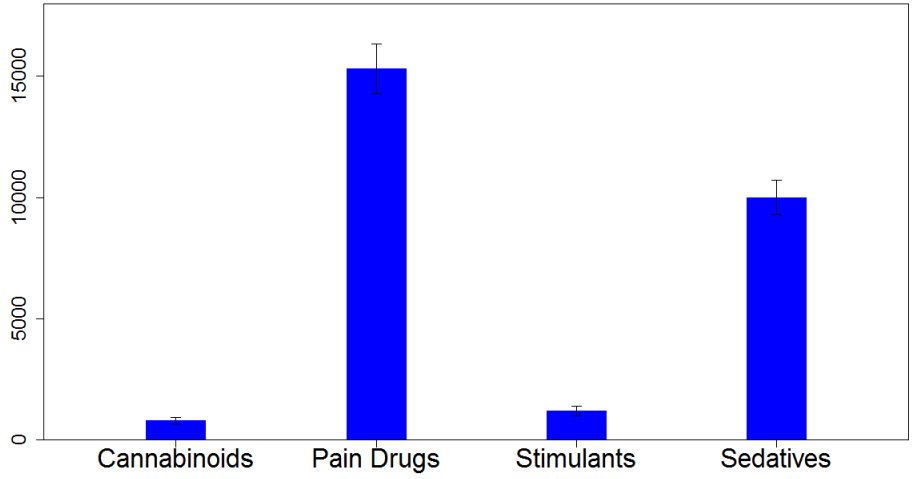
Non Medical Use per 100,000 Population

Germany



Spain