Crowdsourcing as a way to evaluate drug abuse in the community

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Advancements in the Assessment of Abuse Liability

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This presentation will be available on Twitter @epidemico by the end of the animation

Crowdsourcing

How is this different from routine biomedical research?

RADARS® SYSTEM

The Researched Abuse, Diversion and Addiction-Related Surveillance collects timely product- and geographically-specific data on rates of abuse, misuse, and diversion, contributing to the understanding of trends and aiding the development of effective interventions.

The RADARS System is supported by surveillance subscriptions from pharmaceutical manufacturers. By contract, subscribers do not have access to raw data and are allowed no role in publication, scientific decisions, or site design.

Motivations

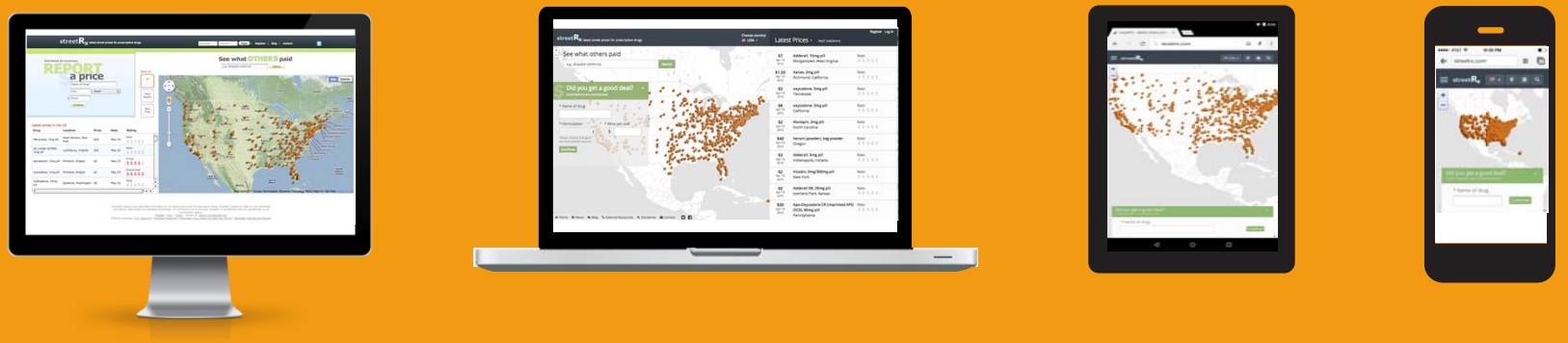
Street prices of diverted prescription pharmaceutical products can provide an indicator of drug availability, demand, and abuse potential. Crowdsourcing is a rapid and cost-effective way to gather information about transactions, and has been shown to provide a valid estimate of the street price of diverted prescription opioids.

CROWDSOURCING

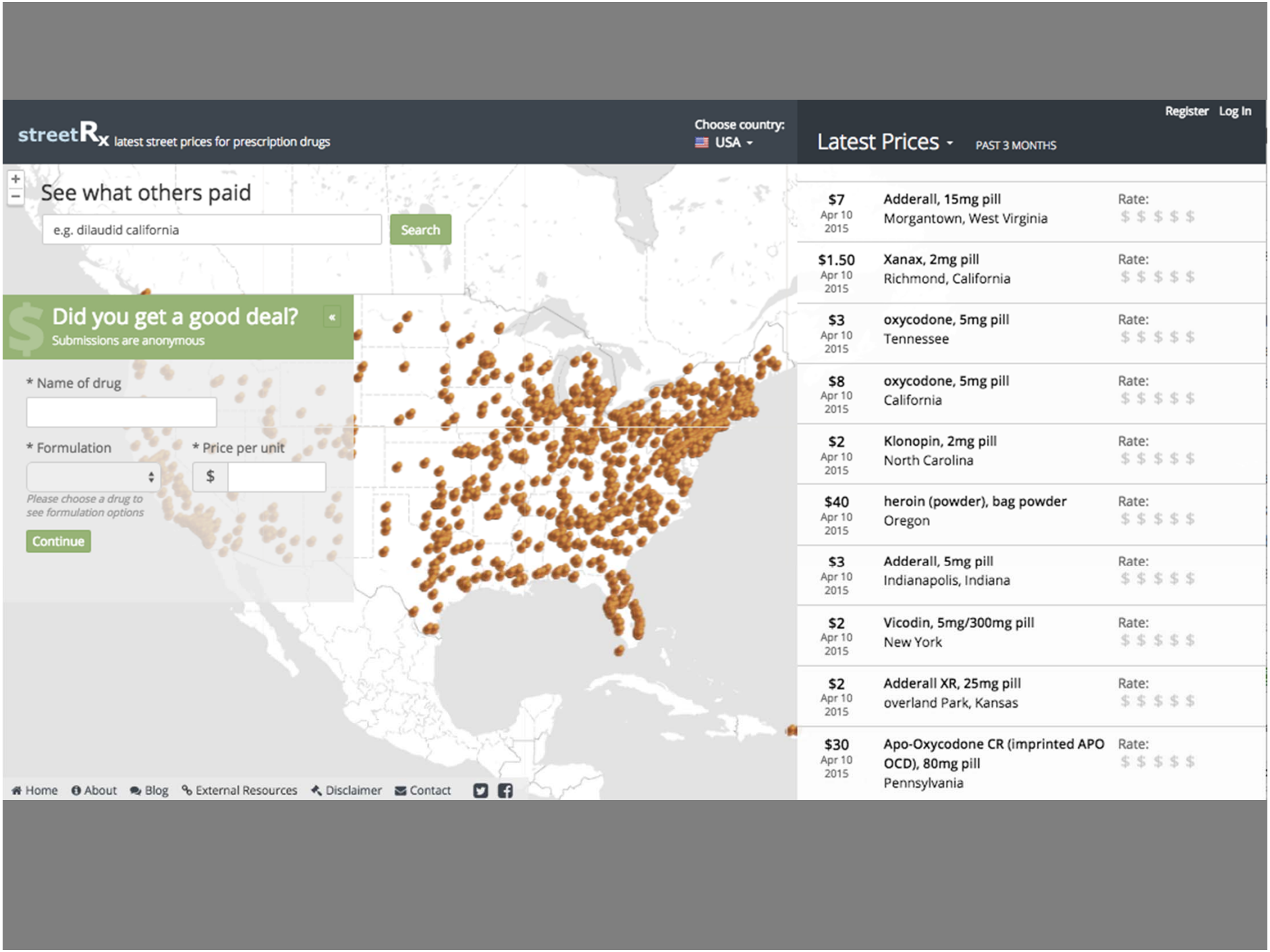
Systematic efforts to collect information from a wide audience, particularly through the use of online tools, that is mutually beneficial to the participants and activity sponsors

Source: Estellés-Arolas, Enrique; González-Ladrón-de-Guevara, Fernando (2012), "Towards an Integrated Crowdsourcing Definition," *Journal of Information Science* 38 (2): 189–200.

StreetRx.com



StreetRx (streetrx.com) is a collection of databases, websites, and citizen reports enabling real-time collection, organization, and display of street price data on diverted pharmaceutical controlled substances. Based on principles of crowdsourcing for public health surveillance, the site allows users to anonymously submit prices they paid or heard were paid for diverted prescription drugs.


streetRx latest street prices for prescription drugs
Choose country:
USA
Register
Log In
Latest Prices
PAST 3 MONTHS
See what others paid
e.g. dilaudid california
Search
Did you get a good deal?
Submissions are anonymous
* Name of drug
* Formulation
* Price per unit
$
Please choose a drug to see formulation options
Continue
$7 Apr 10 2015 Adderall, 15mg pill Morgantown, West Virginia Rate:
$1.50 Apr 10 2015 Xanax, 2mg pill Richmond, California Rate:
$3 Apr 10 2015 oxycodone, 5mg pill Tennessee Rate:
$8 Apr 10 2015 oxycodone, 5mg pill California Rate:
$2 Apr 10 2015 Klonopin, 2mg pill North Carolina Rate:
$40 Apr 10 2015 heroin (powder), bag powder Oregon Rate:
$3 Apr 10 2015 Adderall, 5mg pill Indianapolis, Indiana Rate:
$2 Apr 10 2015 Vicodin, 5mg/300mg pill New York Rate:
$2 Apr 10 2015 Adderall XR, 25mg pill overland Park, Kansas Rate:
$30 Apr 10 2015 Apo-Oxycodone CR (imprinted APO OCD), 80mg pill Pennsylvania Rate:
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Unique Visitors per Day

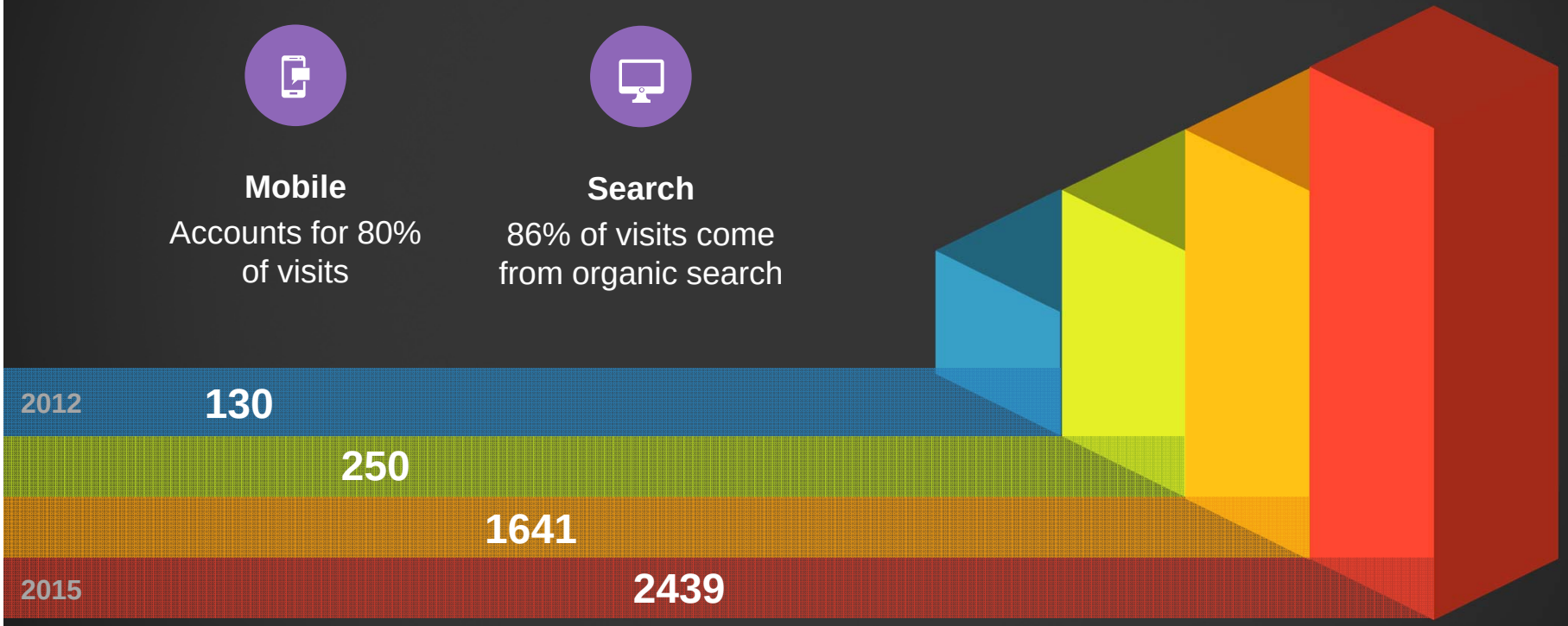
Average daily visitors per year identified by Google Analytics

Mobile

Accounts for 80% of visits

Search

86% of visits come from organic search



Not to scale.

Visitor Demographics

Based on 58% of known demographics from Google account users

43%

Male

18-34 years-old

20%

Male

35+ years-old

22%

Female

18-34 years-old

15%

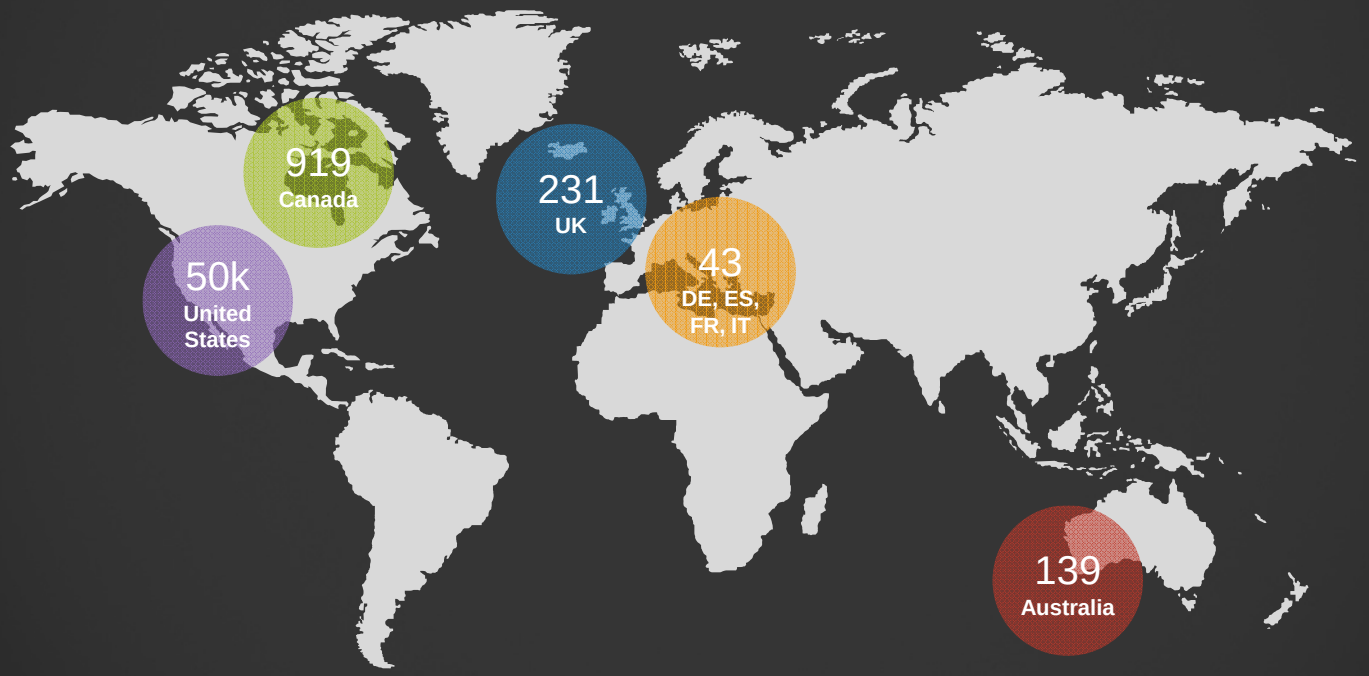
Female

35+ years-old

As captured by Google Analytics. January 1 through March 31, 2015

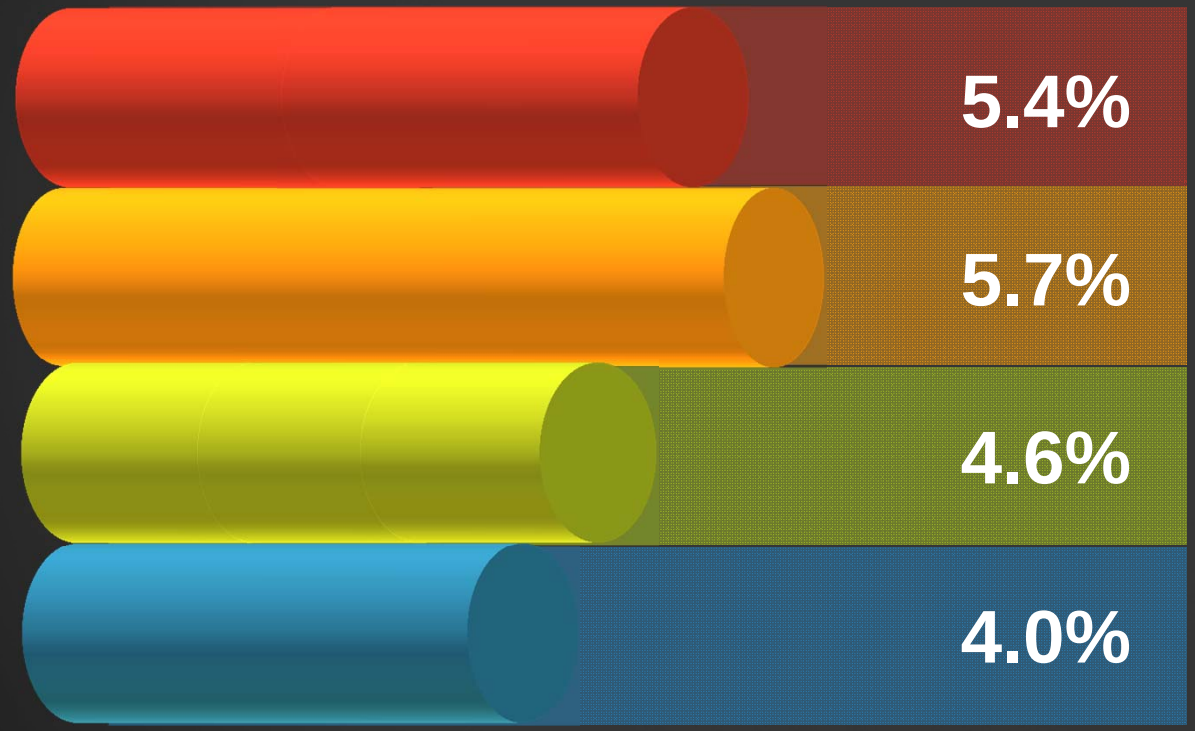
Number of Price Reports

All RADARS System drugs, from November 1, 2010 through March 31, 2015



Who is Likely to Submit a Price?

Percent of visitors, 58% of known Google Account users, 1Q2015



18-24 years-old

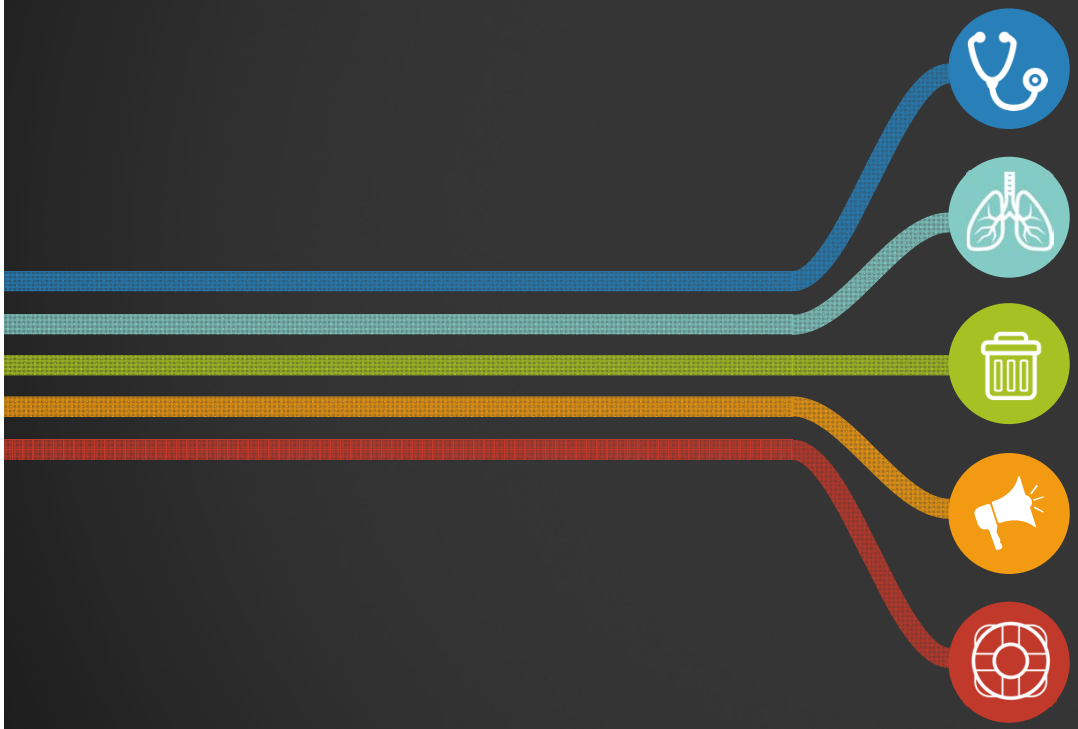
25-34 years-old

35-44 years-old

45+ years-old

External Referrals

Public health, pain patient advocacy, proper disposal



Find Addiction Treatment

SAMSA, ADIN, DroguesInfoService.fr, L'ANAPAA, DBDD

Overdose Prevention

Medication safety sites, HRC, naloxone

Safe Storage, Disposal & Takeback

FDA, Health Products Stewardship Association

Safe Pain Management & Advocacy

Canadian Pain Coalition, PainAustralia.org, RBK Stuttgart

Harm Reduction

HRC, EuroHRN

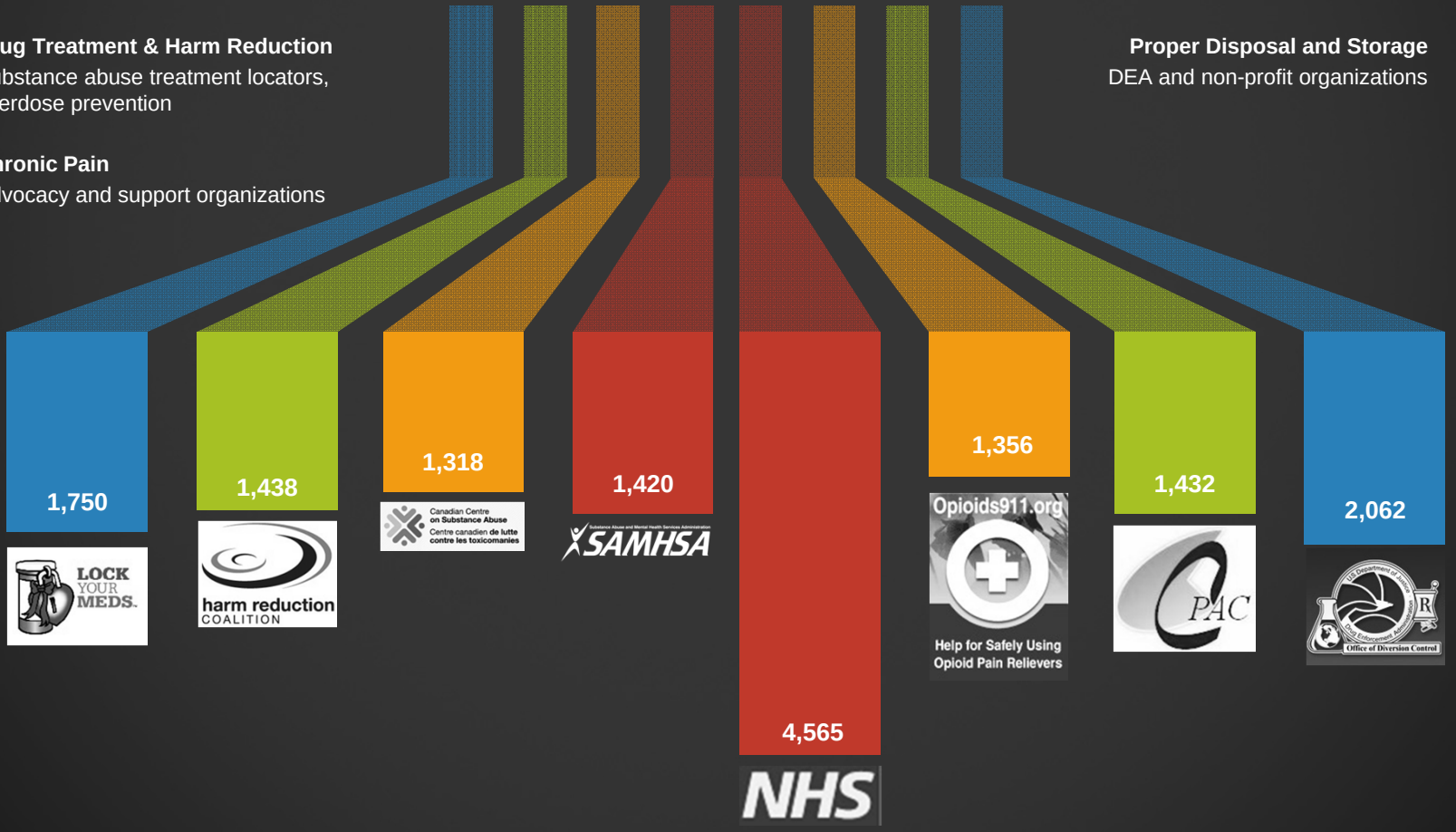
42,058 Referrals to Health Organizations

From November 1, 2010 through March 31, 2015

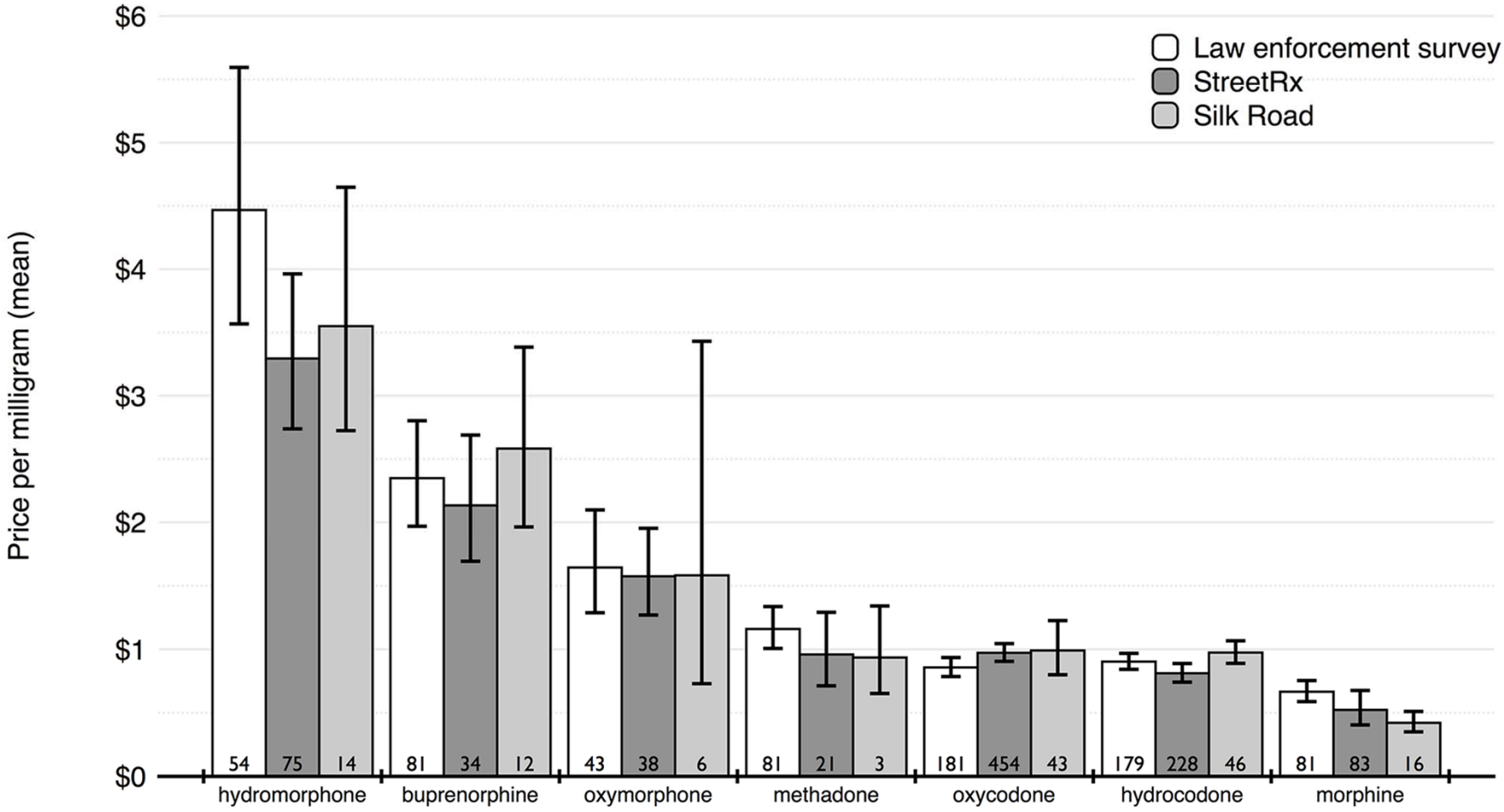
Drug Treatment & Harm Reduction
Substance abuse treatment locators, overdose prevention

Chronic Pain
Advocacy and support organizations

Proper Disposal and Storage
DEA and non-profit organizations



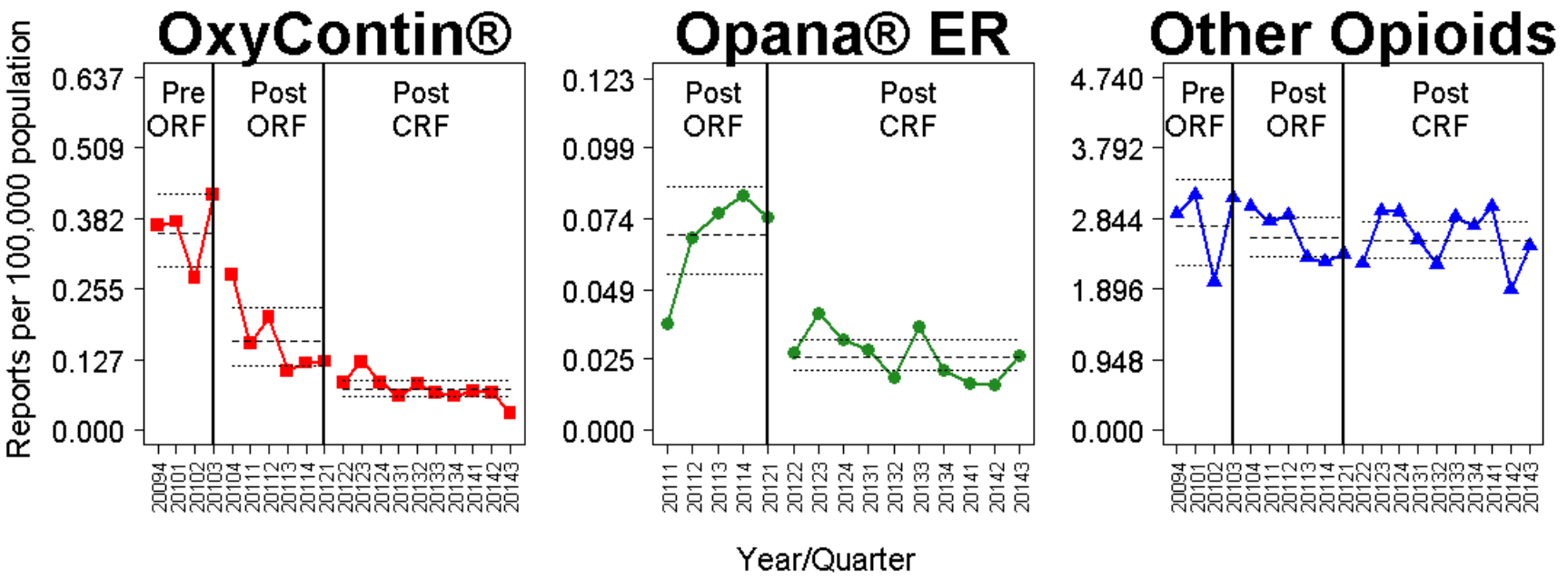
Cross-Validation of Black Market Prices



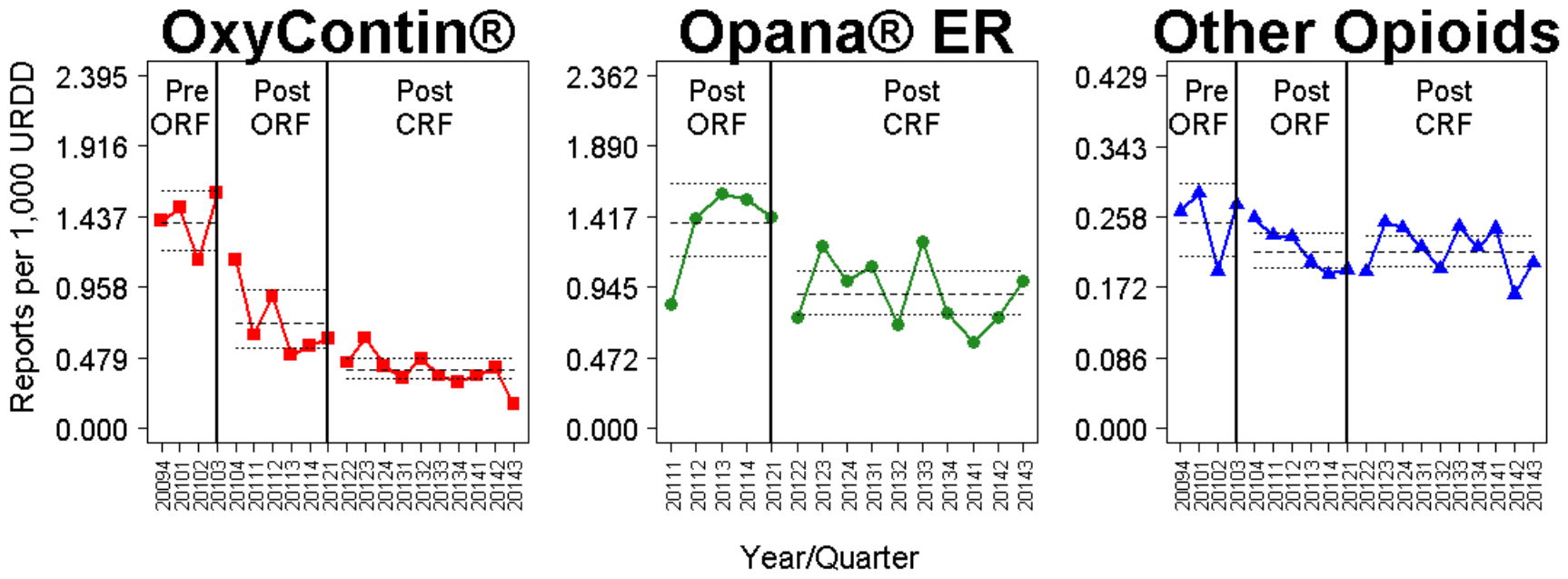
Dasgupta et al. *Journal of Medical Internet Research*. 2013

	Crowdsourced Data from StreetRx		Predicted Relative Potency	Clinical Equianalgesic Potency[b]
Drug	n	Mean, US$ (95% CI)	(95% CI)[a]	Milligrams
Hydromorphone	75	3.29 (2.74-3.96)	6.3 (5.8-6.8)	4
Oxymorphone	38	1.57 (1.27-1.95)	3.0 (2.9-3.2)	3
Methadone	21	0.96 (0.71-1.29)	1.8 (1.8-1.9)	1.5
Oxycodone	454	0.97 (0.90-1.04)	1.9 (1.5-2.2)	2
Hydrocodone	228	0.81 (0.74-0.89)	1.5 (1.3-1.8)	1
Morphine	83	0.52 (0.40-0.68)	1.0	1
Tramadol	21	0.05 (0.03-0.07)	0.1 (0.07-0.13)	0.3

Dasgupta et al. *Journal of Medical Internet Research*. 2013

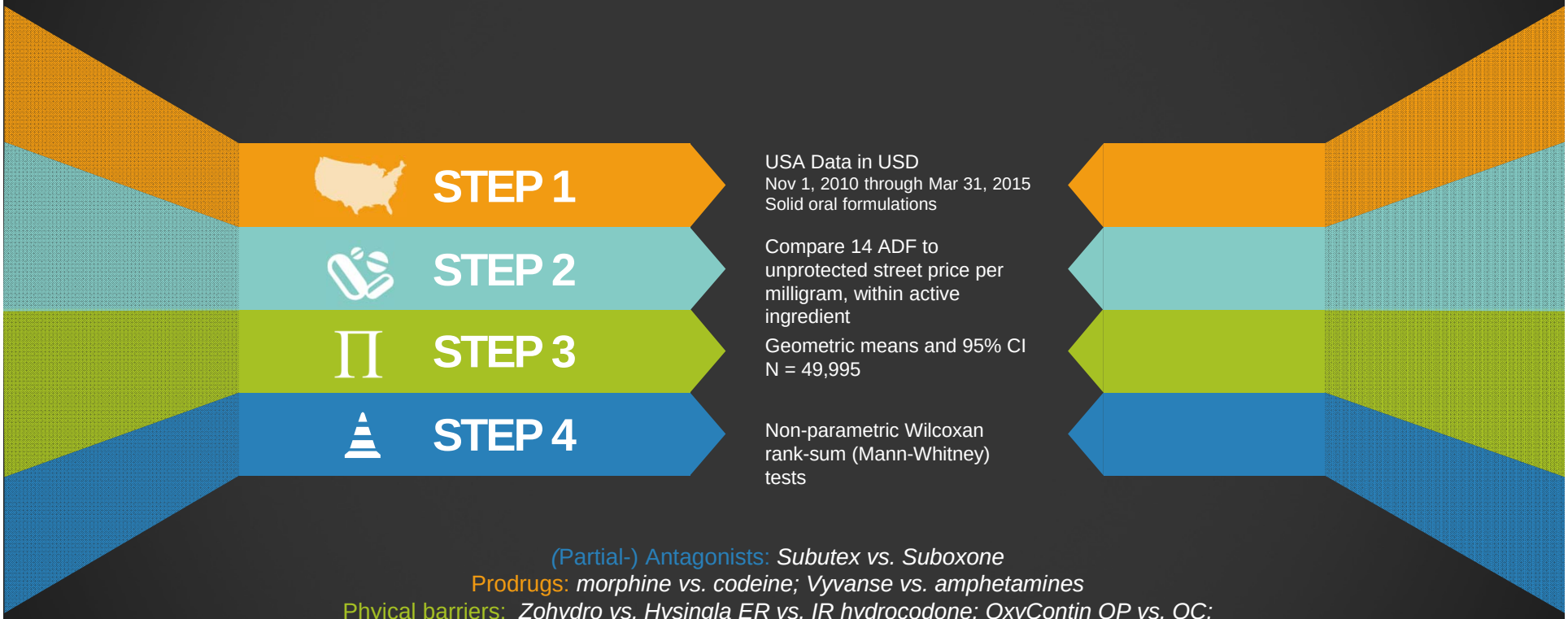


RADARS® System Drug Diversion (law enforcement)



Can the Black Market Discriminate between ADFs?

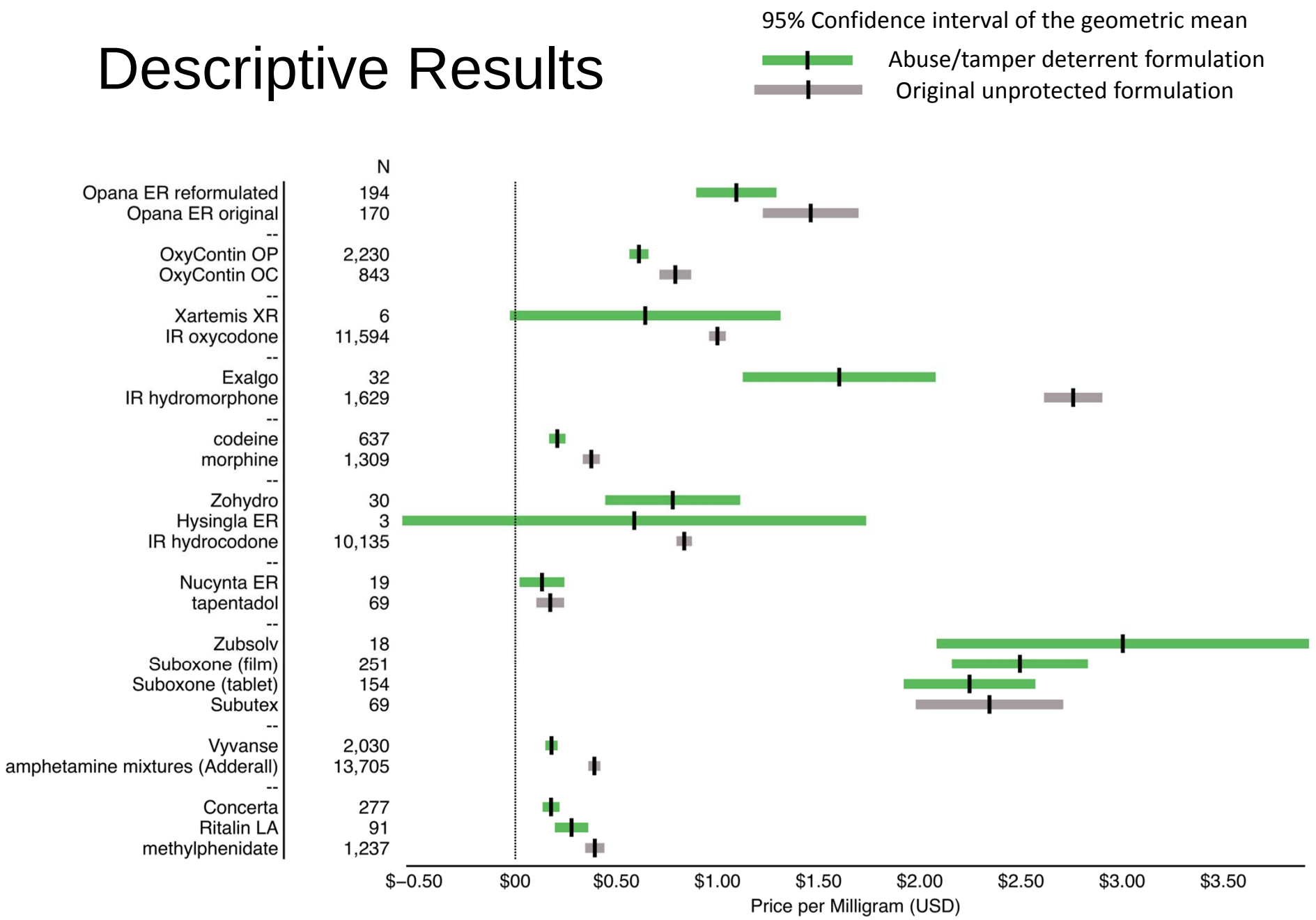
Do different deterrence strategies and platforms result in discernible street price differences?



(Partial-) Antagonists: *Subutex vs. Suboxone*
Prodrugs: *morphine vs. codeine; Vyvanse vs. amphetamines*
Phyical barriers: *Zohydro vs. Hysingla ER vs. IR hydrocodone; OxyContin OP vs. OC; Opana ER reformulation vs original; Xartemis XR vs. IR oxycodone; Exalgo vs. IR hydromorphone; Concerta vs. Ritalin LA vs. methylphenidate, Nucynta ER vs. IR tapentadol*

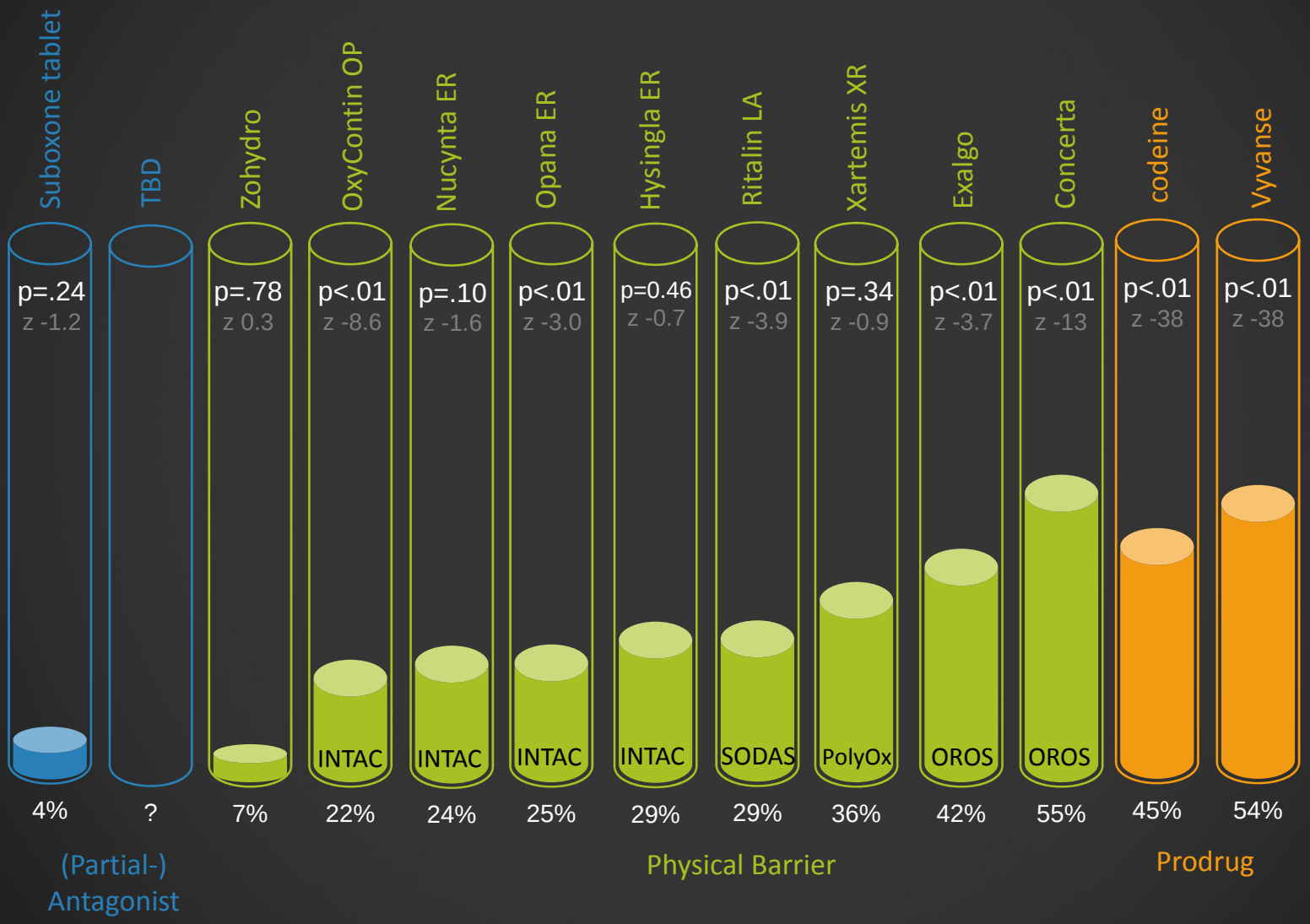
Not enough data to evaluate yet:
Embeda,Targin(iq), Oxytrex, Oxecta, Quillivant XR, Talwin NX, Amrix

Descriptive Results



Percent Reduction in Street Price

Putative abuse-deterrent formulation versus unprotected formulations with same active ingredient, using statistical comparison that is less influenced by outliers.



Thanks you & Contact Info

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