

Changing Patterns of Abuse Reported to Poison Centers Following Introduction of Reformulated Extended Release Oxycodone

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Disclosure

- RADARS® System is a department of the Denver Health and Hospital Authority (DHHA), the public safety net hospital for Denver, Colorado
- The System is funded by subscriptions from several pharmaceutical companies.
- All data are owned and held exclusively by DHHA.

Abuse/Tamper Resistant Strategies

- **Hard coatings which resist crushing**
- Polymers which turn to viscous gel when heated
- Polymers which resist dissolving
- **Gel forming agents**
- Nasal tissue irritants
- Agonist/Antagonist Combinations
- Novel delivery systems (patches, implants, etc.)
- Prodrugs

RADARS System Mosaic

**Entering
Treatment**

OTP
73 programs
33 states

M Parrino, A Rosenblum

**Entering
Treatment**

SKIP
125 practices
50 states

T Cicero

**Acute Events
from Abuse**

**53 Poison
Centers**
46 States

R Dart

**Drug
Transactions**

Criminal Justice
280 investigator
50 states

H Suratt, S Kurtz

**New
Initiates**

**2000 college
students**
50 States
3x each year

R Dart

**Illicit Market
Price**
StreetRx.com

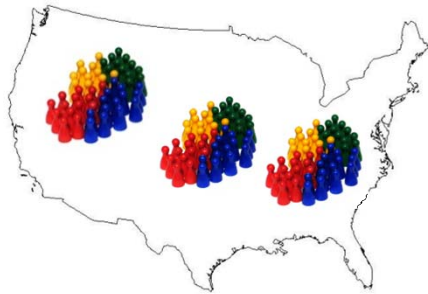
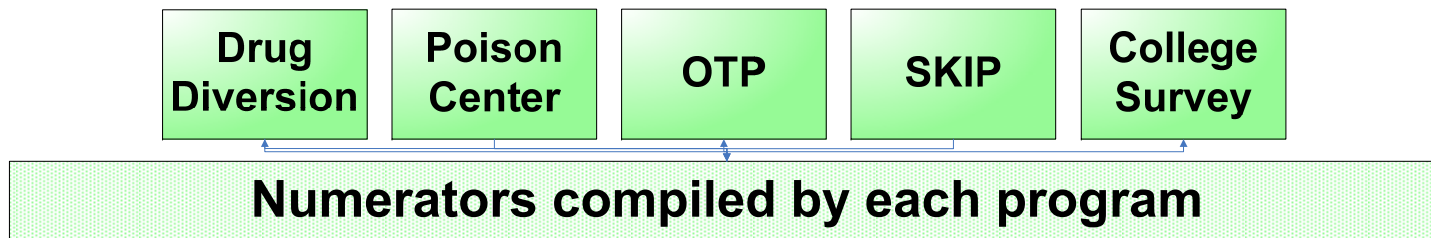
Users/Buyers
Crowdsourcing
50 states

N Dasgupta



RADARS[®] System Process

A Tale of Two Denominators



POPULATION RATE = $\frac{\text{Counts by System}}{\text{US Population}}$

- Disease burden on whole population
- Does not account for drug availability



**UNIQUE RECIPIENTS OF
DISPENSED DRUG (URDD) RATE $\frac{\text{Counts by System}}{\text{URDD}}$**

- Number of unique people filling prescription for drug (refills excluded)

Evaluating a Natural Experiment Involving Abuse Deterrent Formulations

- OxyContin and Opana ER
 - Easily-abused product without tamper-resistant characteristics
 - Replaced by another product with the same brand name, but with abuse-deterrent properties.
 - Shipment was switched entirely to the reformulated version
- Event ratios (rates) were calculated based on population (events per 100,000 persons).
 - Population-based rates estimate the overall public health burden associated with abuse or diversion of each opioid.
 - Population denominators are calculated based on the number of persons residing in the covered 3-digit Zip codes using US Census data.

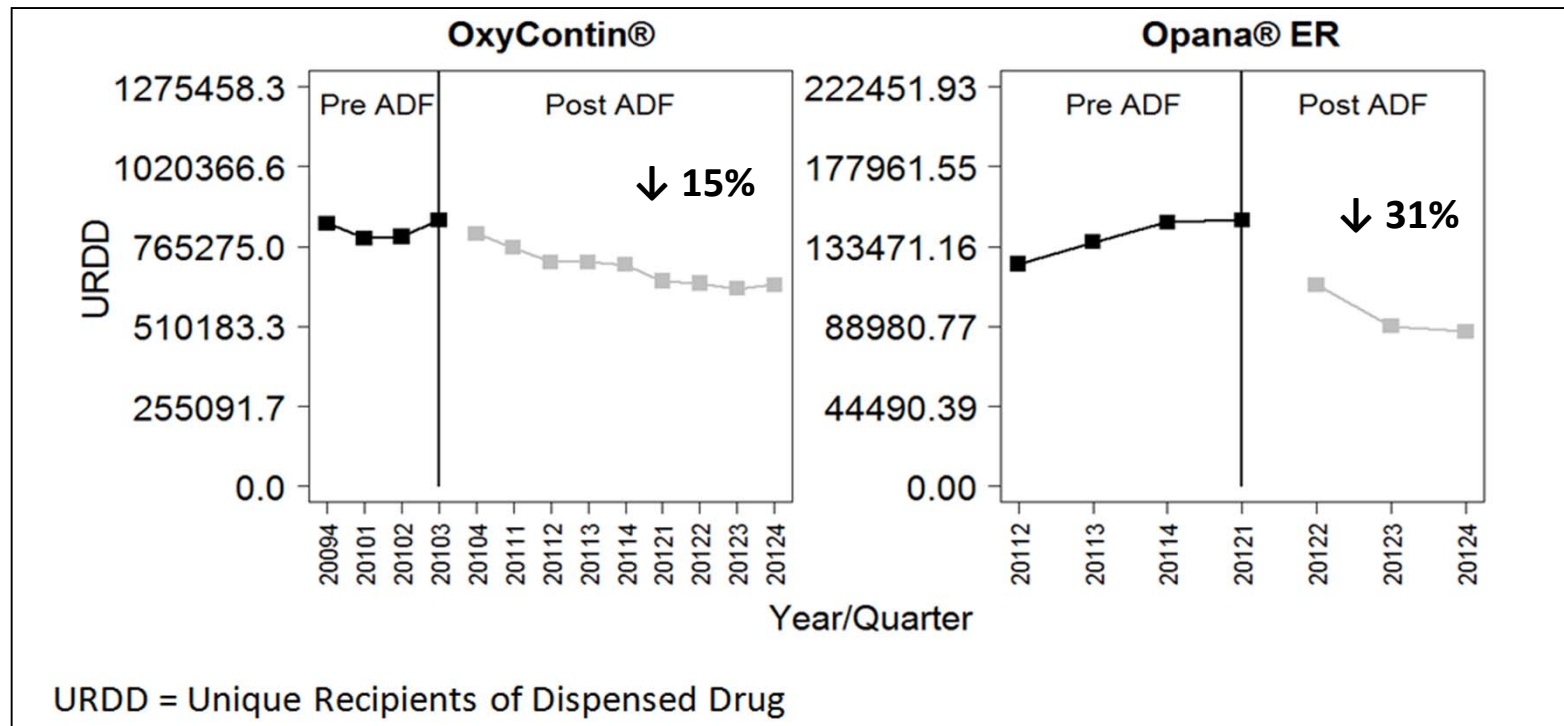
Evaluating a Natural Experiment, cont.

- Differences in drug availability and prescribing practices
 - Unique Recipients of Dispensed Drug (URDD). One URDD is a single patient filling a prescription for a specific product in the reference area.
- RADARS System
 - Schedule 2: Oxycodone, oxymorphone, hydromorphone, morphine, fentanyl, methadone, tapentadol
 - Schedule 3: buprenorphine, hydrocodone + acetaminophen
 - Unscheduled: tramadol
- Other Opioids
 - All other opioids monitored by RADARS System
 - Excluding extended release oxycodone, extended release oxymorphone, and unidentified oxycodone and oxymorphone products as appropriate for the analysis.

Hypotheses

1. Decreased interest in obtaining prescriptions to diversion = fewer individuals filling prescriptions.
2. Rates of abuse and diversion of the ADF drug will be lower following introduction of the reformulation.
3. Use of these drugs through non-oral routes of abuse would decline relative to oral abuse.

Number of Individuals Filling a Prescription Decreased After Reformulation



RADARS[®] System Data

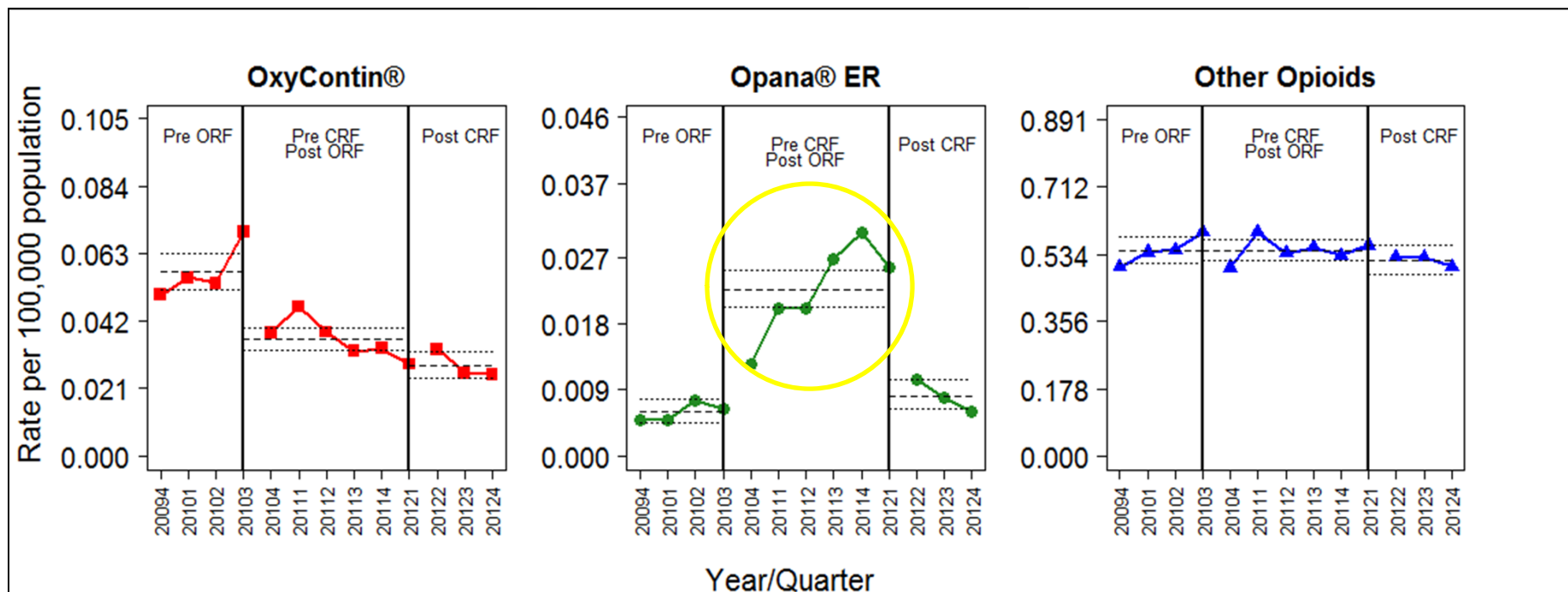
Population Rate
(Per 100,000 population in US Census)

<http://www.google.com/search?q=FDA++docket+oxycontin+RADARS&sourceid=ie7&rls=com.microsoft:en-US&ie=utf8&oe=utf8>

Poison Center Program

Contacts Involving Intentional Abuse

OxyContin®, Opana® ER, Other Opioids



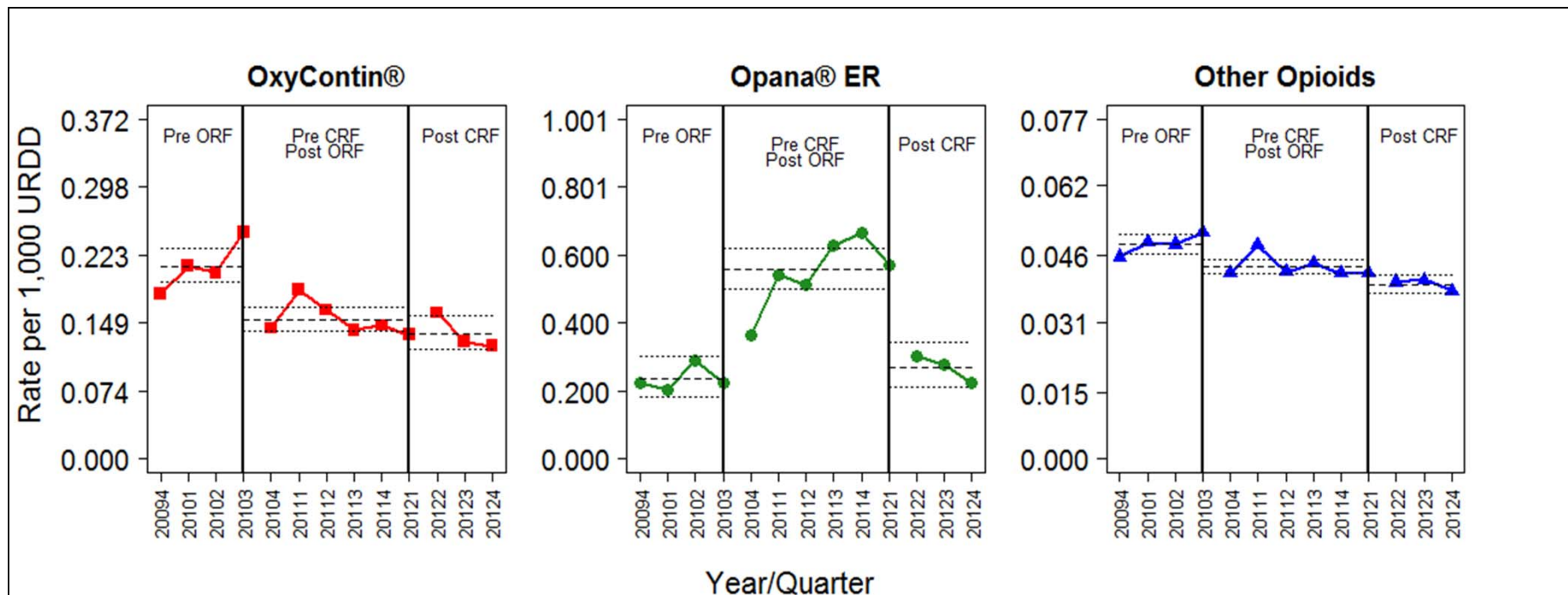
ORF = OxyContin ADF, CRF = Opana ER ADF

Intentional Abuse: An exposure resulting from intentional improper or incorrect use of a substance where the victim was likely attempting to gain a high, euphoric effect or some other psychotropic effect.

Poison Center Program

Contacts Involving Intentional Abuse

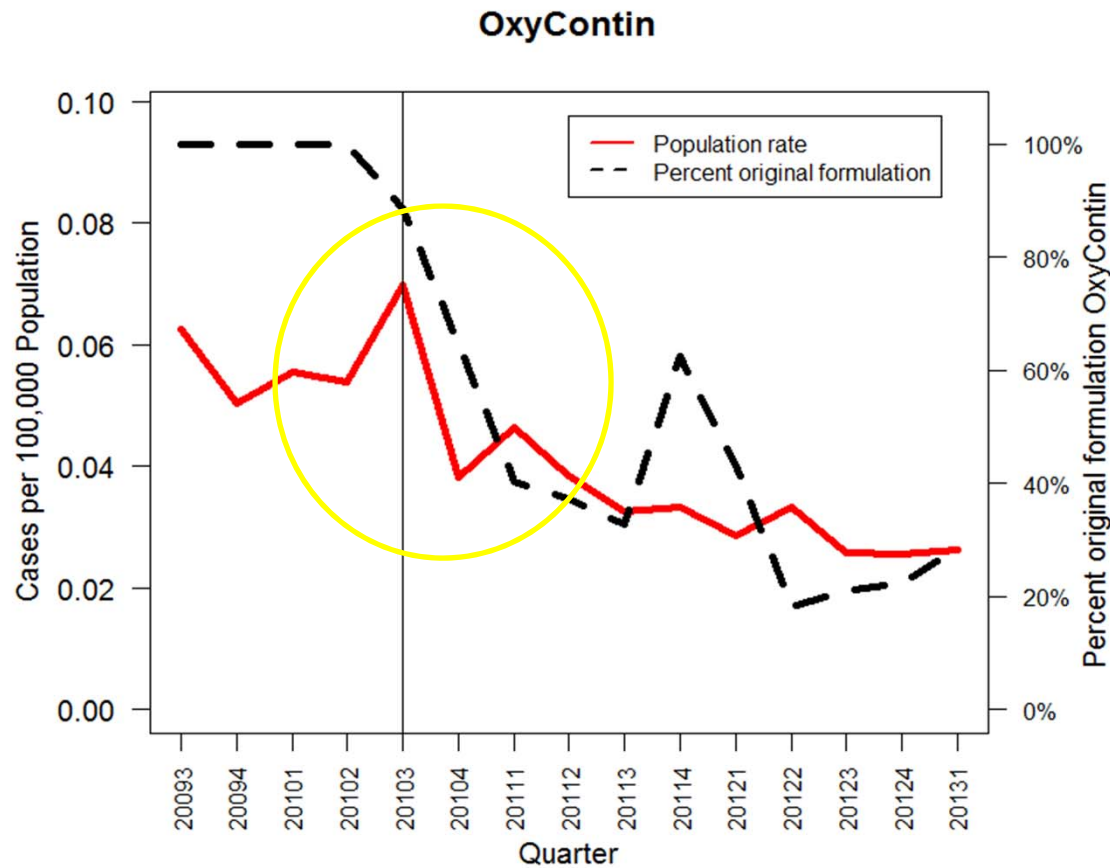
OxyContin®, Opana® ER, Other Opioids



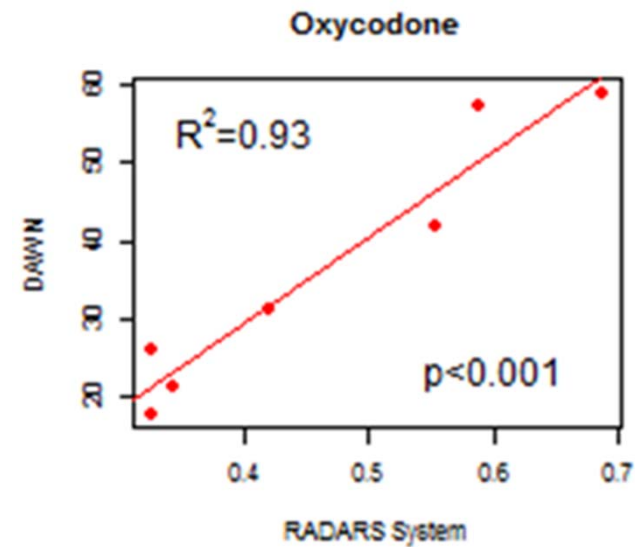
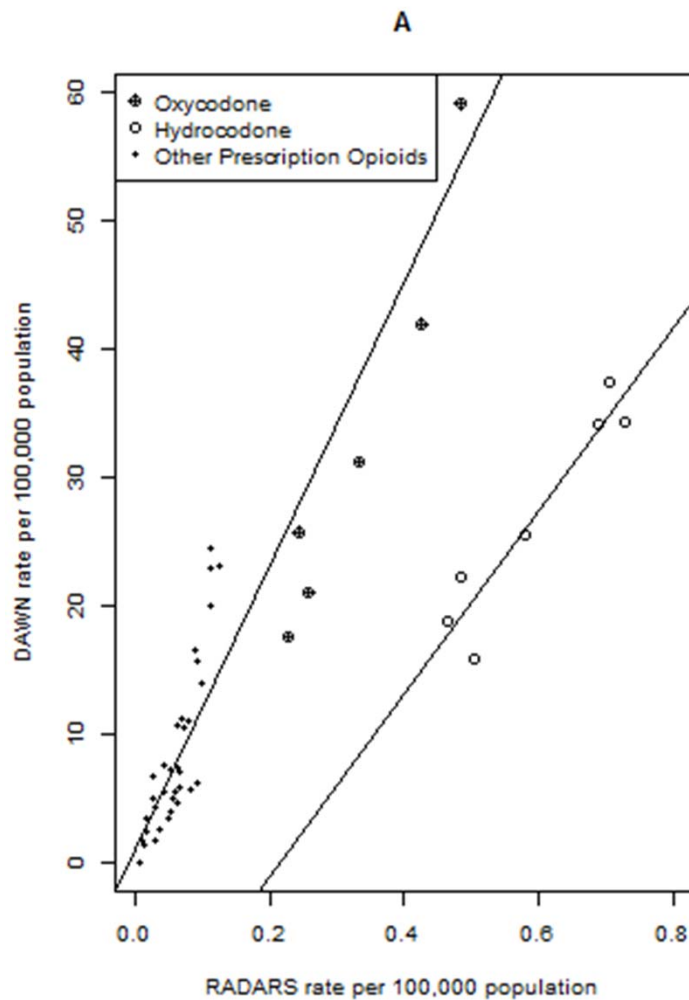
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Intentional Abuse: An exposure resulting from intentional improper or incorrect use of a substance where the victim was likely attempting to gain a high, euphoric effect or some other psychotropic effect.

Decrease in OxyContin Abuse is Related to Decreased Availability of Original formulation on the street



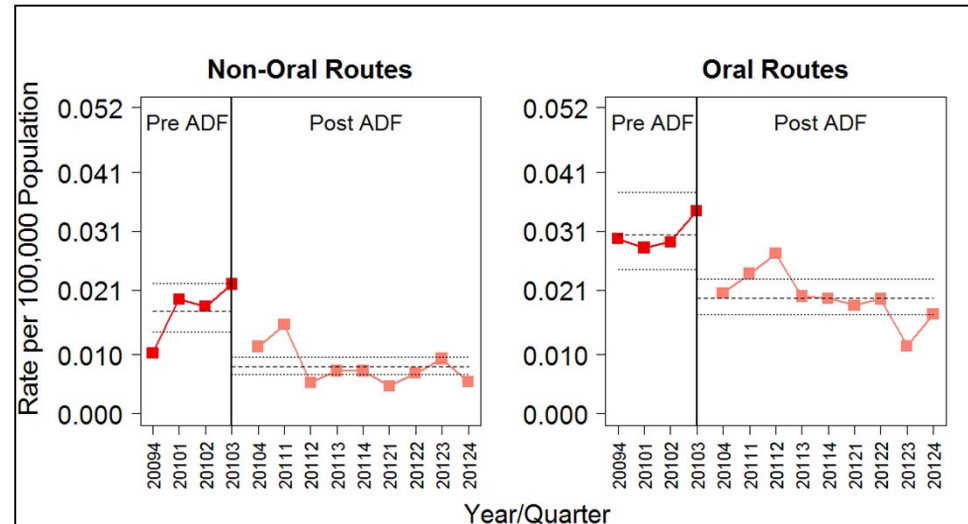
DAWN and RADARS System Poison Centers Results are Highly Correlated



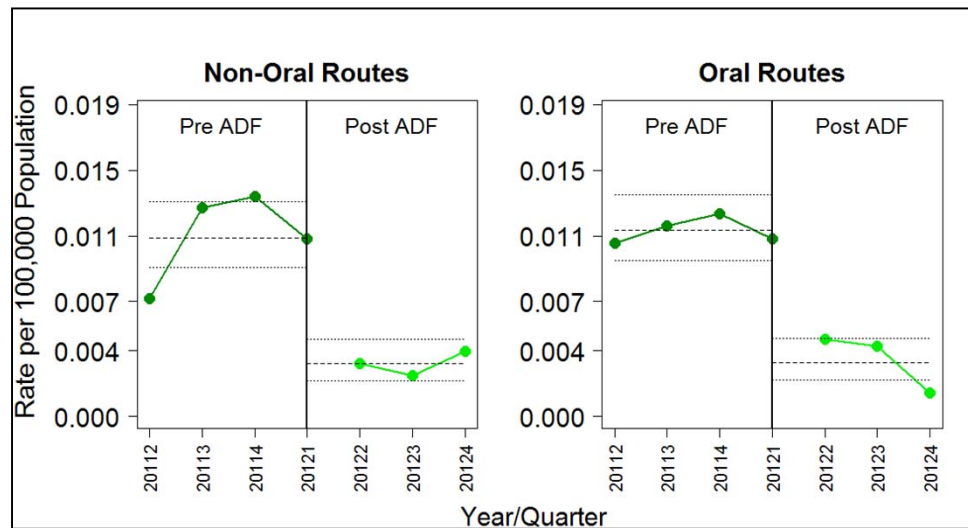
Non-oral Routes of OxyContin Abuse

Poison Center Intentional Abuse

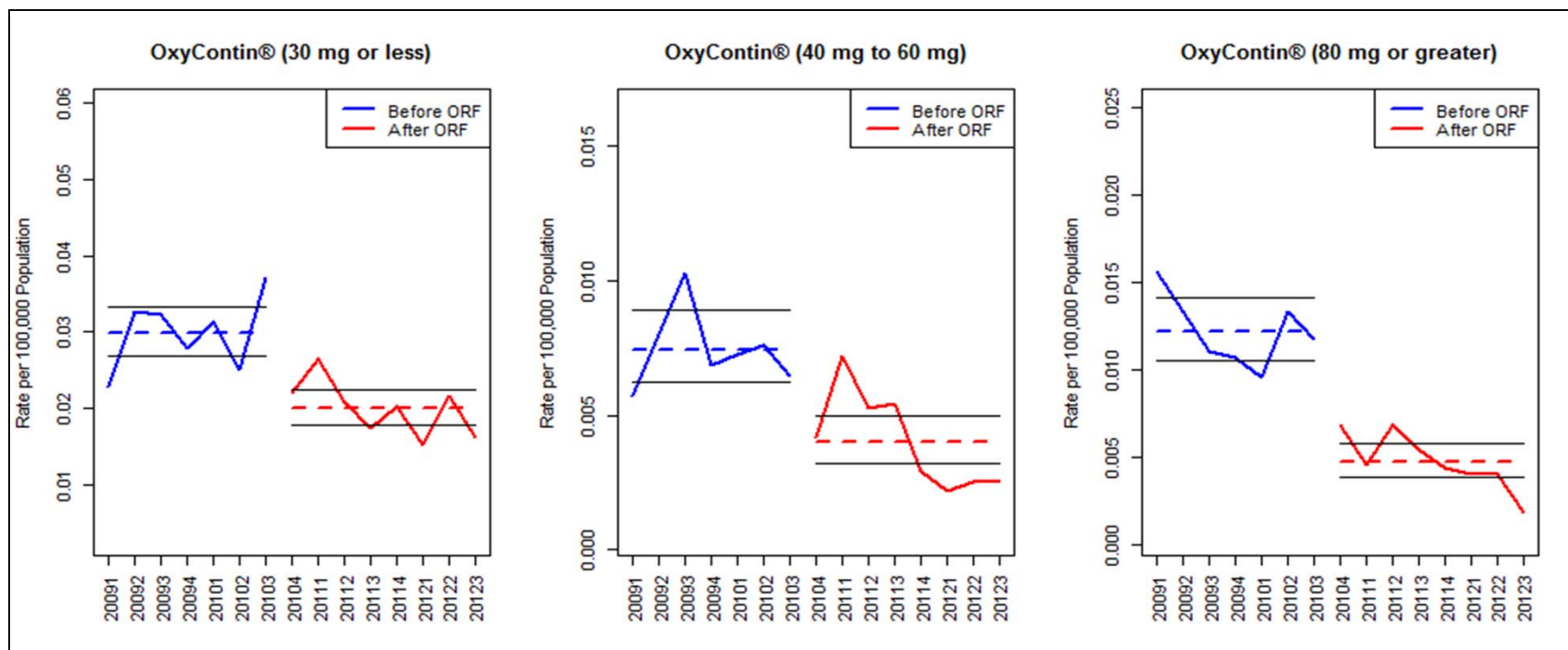
OxyContin



Opana ER



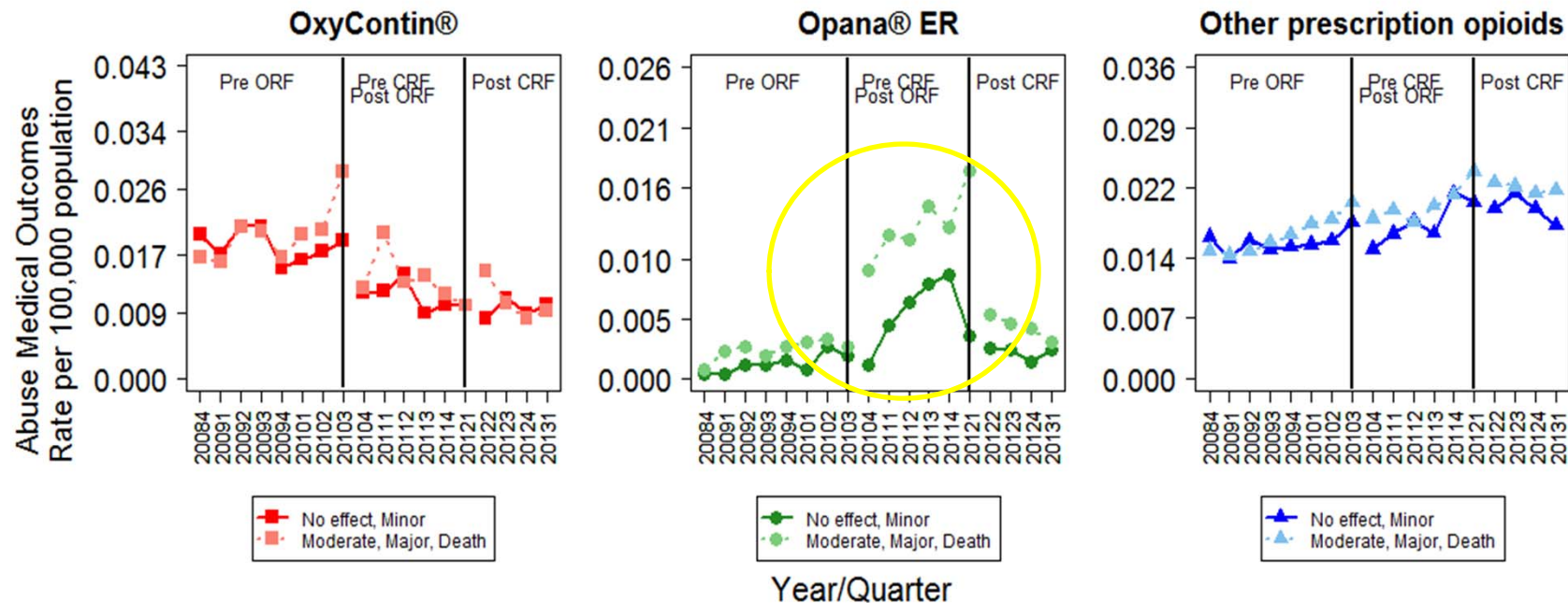
Poison Center Program Contacts Involving Intentional Abuse OxyContin® Tablet Size



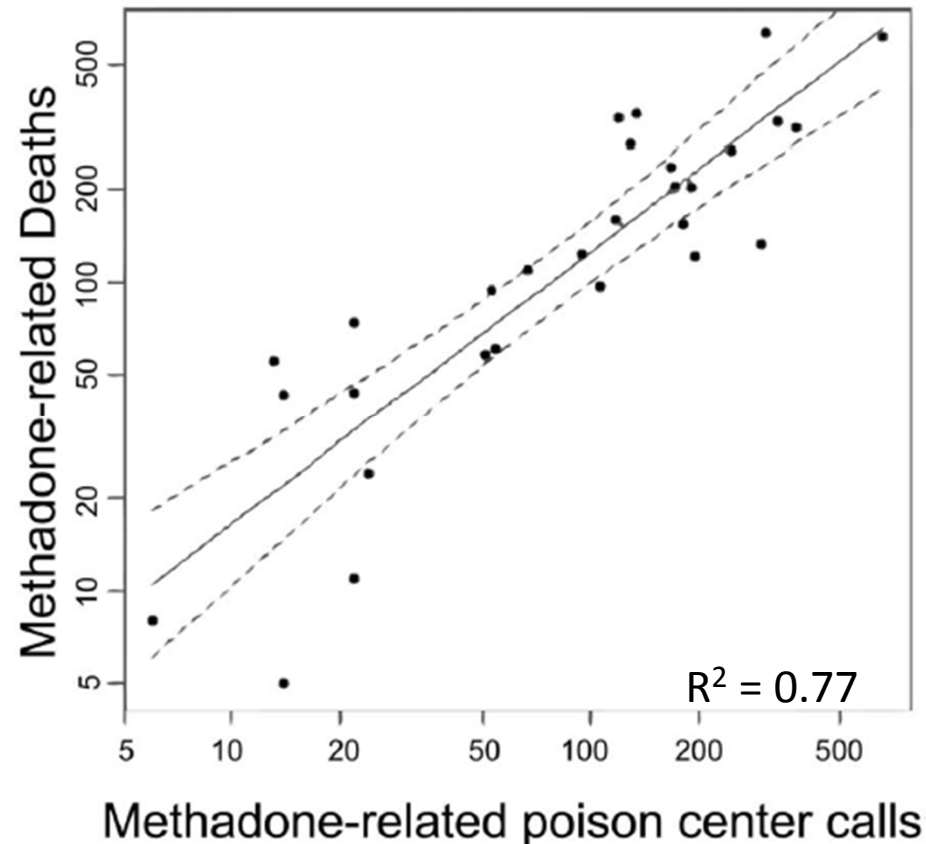
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Clinical Outcomes of Prescription Opioids

Analgesic Abuse



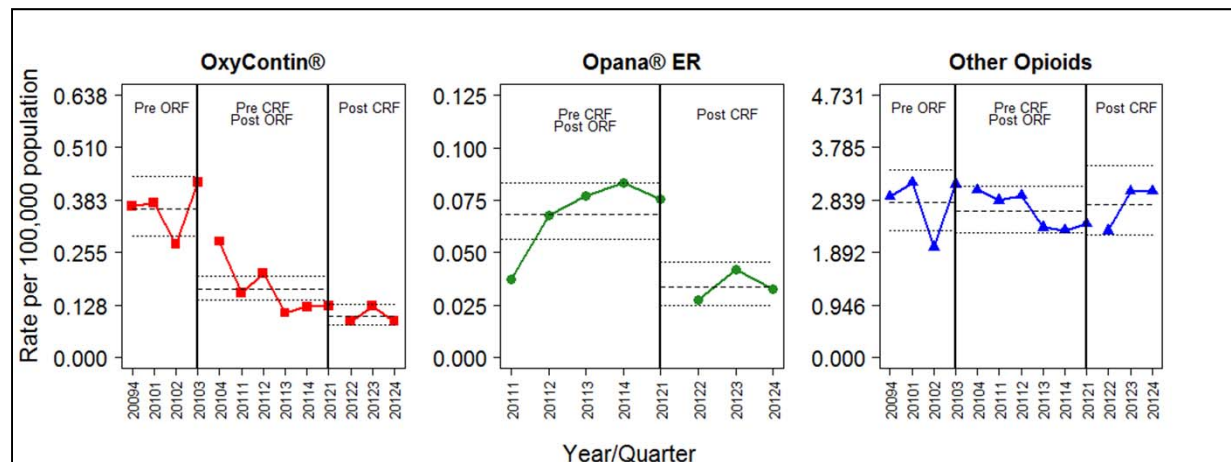
Methadone Deaths and Poison Center Cases are Highly Correlated, 2006-2007



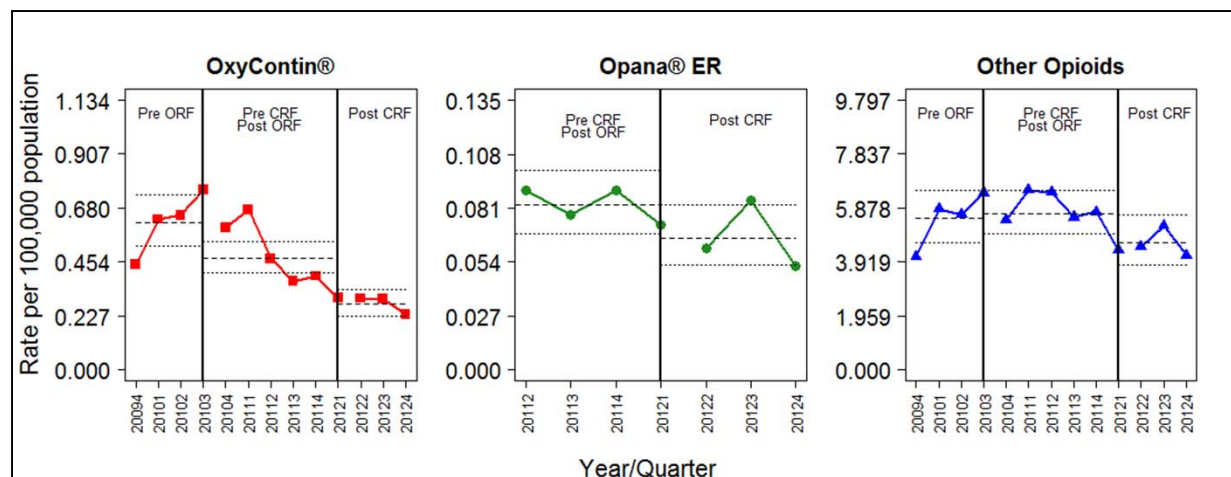
Other RADARS System Programs

OxyContin®, Opana® ER, Other Opioids

Drug
Diversion
Program



Treatment
Programs
Combined
(OTP+SKIP)



ORF = OxyContin ADF, CRF = Opana ER ADF

Comparison of StreetRx, RADARS System Drug Diversion and Silk Road

Product	Median Price (IQR)	P-Value
OxyContin® (new OP, hard to crush)	\$0.63 (\$0.50,\$1.00)	0.0003
OxyContin® (old OC, crushable)	\$1.00 (\$0.63,\$1.25)	
Opana® ER (new, hard to crush)	\$1.00 (\$0.40,\$1.00)	0.0580
Opana® ER (old crushable)	\$1.38 (\$1.00,\$2.67)	

RADARS System Mosaic Analysis

Poison Center:

- ADFs 30% - 68% decrease in abuse rate. Effect is increasing over time
- Non-oral rates of abuse are decreased
- No change in rate for other opioids

Drug Diversion

- ADFs: 30%-60% decreased diversion rates
- No change in abuse cases for other opioids



StreetRx

ADF version value 27 - 38% less in the black market

Treatment Programs

- ADFs: rates decreased 0 - 20%
- No change in other opioids

College Survey

- No difference in rates
- Very low abuse before and after ADF introduction

The End