

# RADARS<sup>®</sup>

## SYSTEM



Researched Abuse, Diversion and Addiction-Related Surveillance System



## 2nd Quarter 2014 Technical Report

### ***Choice of Denominator in the Calculation of Opioid Abuse Rates***

#### **Key Points:**

1. The RADARS<sup>®</sup> System is able to track trends in various measures of drug availability, including unique recipients of dispensed drugs, opioid prescriptions counts, dosage units dispensed, milligrams of opioids dispensed, and morphine-equivalent milligrams dispensed.
2. These metrics can be used as denominators to estimate opioid abuse and misuse rates, with each denominator providing a distinct perspective.

### **Background**

The Researched, Abuse, Diversion, and Addiction-Related Surveillance (RADARS<sup>®</sup>) System is a comprehensive network of programs that collect data on various aspects of prescription drug abuse that are timely, as well as product- and geography-specific. The RADARS System Poison Center Program, coordinated by the Rocky Mountain Poison and Drug Center (RMPDC), gathers data on spontaneous reports of exposures and acute medical events associated with one or more prescription drugs of interest, including opioids. The RADARS System has the ability to estimate opioid abuse and misuse rates using various denominators, including the commonly used number of unique recipients as well as prescription counts, units dispensed, milligrams dispensed, and morphine-equivalent milligrams dispensed. Poison Center data were used to examine differences in trends across the various denominators of interest.

### **Methods**

Data on the number of unique recipients of dispensed drugs, prescription counts, dosage units dispensed, and unit strengths were obtained from IMS Health for opioid products sold in the United States from 2009 through 2013. Products were restricted to tablets and capsules. Opioids of interest consisted of hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, and tramadol products sold during the study period. Products introduced during the study period were included in the analyses. Unit strength data were defined as the milligrams of active ingredient of interest per dosage unit. Milligrams dispensed were calculated as the strength of a dosage unit multiplied by the number of units dispensed. Morphine-equivalent milligrams dispensed were calculated as the milligrams dispensed for each opioid multiplied by a scaling factor (Table 1).

Cases were defined as Poison Center mentions of an exposure resulting from the intentional improper or incorrect use of an opioid where the victim was likely attempting to gain a high, euphoric effect, or some other psychotropic effect.

Rate data were calculated as the number of mentions of an opioid of interest divided by a measure of drug availability per year.

**Table 1.** Morphine-equivalent conversion factors for various opioids

Opioid	Morphine-Equivalent Conversion Factor <sup>a</sup>
Hydrocodone	1
Hydromorphone	4
Methadone	3
Morphine	1
Oxycodone	1.5
Oxymorphone	3
Tramadol	0.1

<sup>a</sup> Used to scale the milligrams dispensed of each opioid by the noted conversion factor (Von Korff et al., 2008).

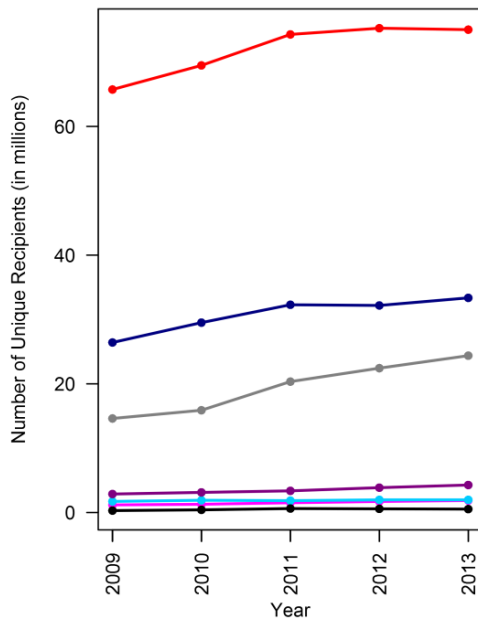
## Results

Hydrocodone was the most prescribed opioid of interest in the United States during the study period (Figures 1, 3, 5), and had relatively low Poison Center rates with the denominators unique recipients, prescriptions, and units dispensed (Figures 2, 4, 6). Poison Center rates for oxymorphone were relatively higher than the other opioids' rates for the denominators unique recipients, prescriptions, and units dispensed (Figures 2, 4, 6).

More milligrams of tramadol were dispensed relative to the other opioids of interest (Figure 7). Poison Center rates per 100,000 milligrams dispensed were highest for hydromorphone and oxymorphone (Figure 8). Oxycodone was dispensed the most in terms of morphine-equivalent milligrams dispensed (Figure 9). Tramadol had the highest Poison Center rates per 100,000 morphine-equivalent milligrams dispensed among the studied opioids (Figure 10).

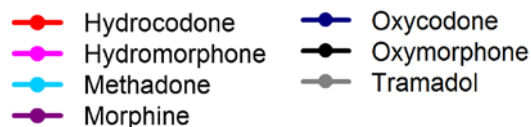
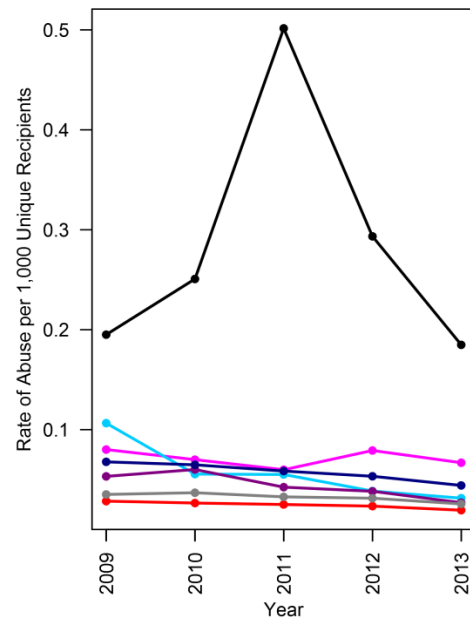
**Figure 1.**

Unique recipients of opioid prescriptions: 2009-2013



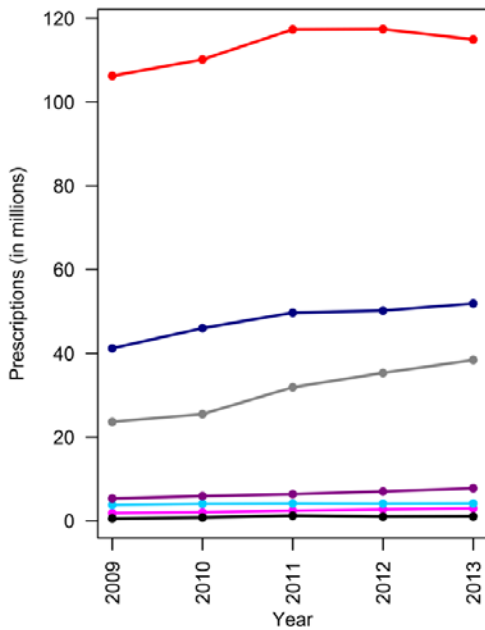
**Figure 2.**

Poison Center rates for various opioids (per 1,000 unique recipients): 2009-2013



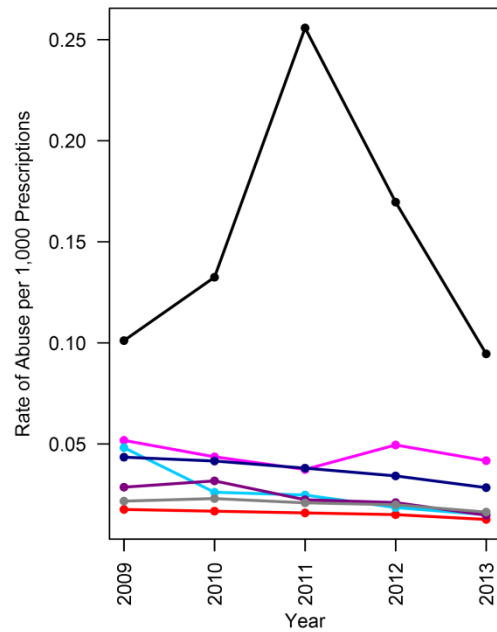
**Figure 3.**

Opioid prescription counts: 2009-2013



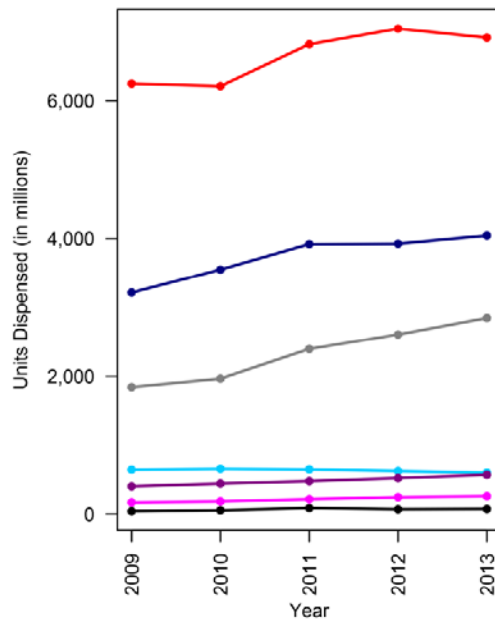
**Figure 4.**

Poison Center rates for various opioids (per 1,000 prescriptions): 2009-2013



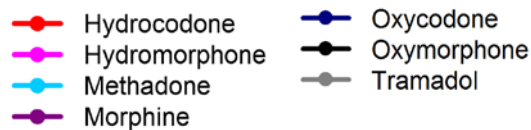
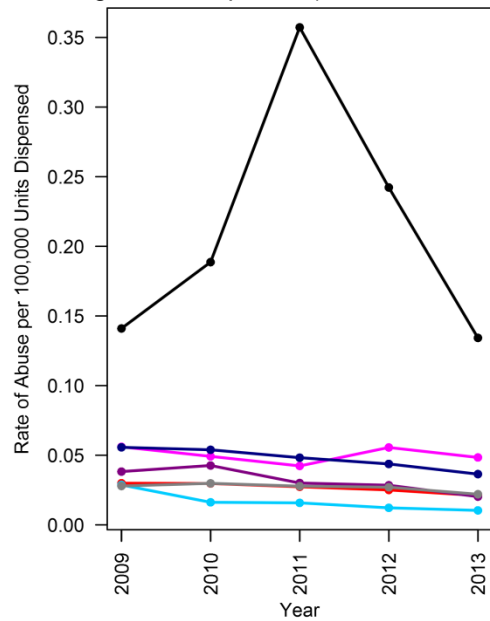
**Figure 5.**

Dosage units dispensed of various opioids: 2009-2013



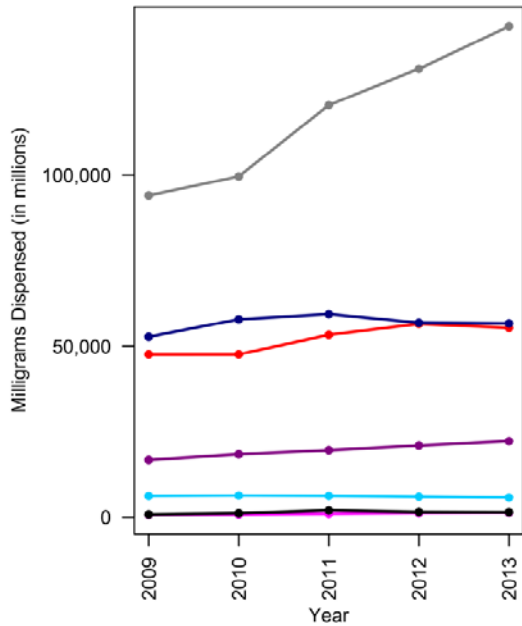
**Figure 6.**

Poison Center rates for various opioids (per 100,000 dosage units dispensed): 2009-2013



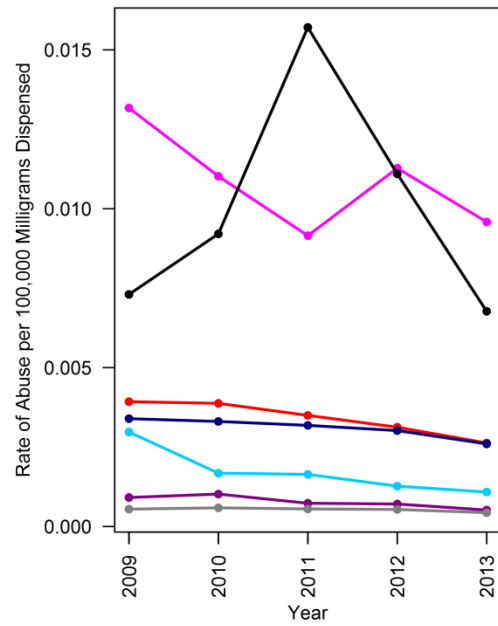
**Figure 7.**

Milligrams dispensed of various opioids: 2009-2013



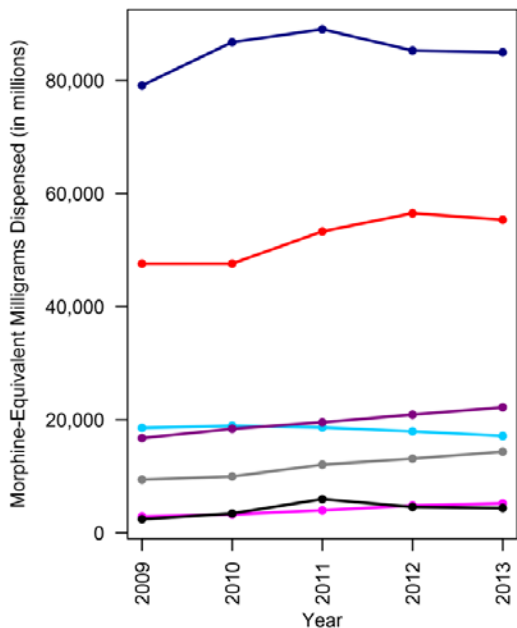
**Figure 8.**

Poison Center rates for various opioids (per 100,000 milligrams dispensed): 2009-2013



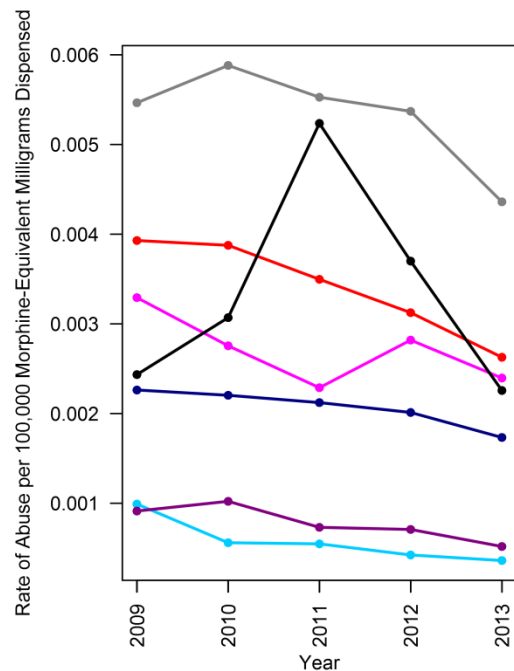
**Figure 9.**

Morphine-equivalent milligrams dispensed of various opioids: 2009-2013



**Figure 10.**

Poison Center rates for various opioids (per 100,000 morphine-equivalent milligrams dispensed): 2009-2013



- Hydrocodone
- Hydromorphone
- Methadone
- Morphine
- Oxycodone
- Oxymorphone
- Tramadol

## Conclusions

Trends in Poison Center rates appeared to depend on the measure of drug availability used. For example, the relative differences in Poison Center rates between oxycodone and the other opioids qualitatively varied across the denominator choices. The rates per 100,000 milligrams dispensed for oxycodone appeared less different than the rates for the other opioids relative to the differences in rates between oxycodone and the other opioids for the denominators unique recipients, prescriptions, and units dispensed. Differences in trends are likely due to several factors, including differences across products in milligrams per unit, units per prescription, prescriptions per unique recipient, and potency differences relative to morphine. Overall, the use of various denominators may provide a unique perspective on the abuse and misuse of prescription opioids.

## References

Von Korff M, Saunders K, Ray GT, Boudreau D, Campbell C, Merrill J, Sullivan MD, Rutter C, Silverberg M, Banta-Green C, Weisner C. 2008. De Facto Long-term Opioid Therapy for Non-Cancer Pain. Clin J Pain. 24(6): 521-527.

## Suggested citation

Christopher Ronk, Geoff Severtson, Claire Le Lait, Nancy West, Becki Bucher Bartelson, Richard Dart (2014). Choice of Denominator in the Calculation of Opioid Abuse Rates. RADARS<sup>®</sup> System Technical Report, 2014Q2.

