

# RADARS<sup>®</sup>

S Y S T E M

## RADARS<sup>®</sup> System Technical Report # 2012Q3-1

### ***Prescription Opioid Abuse and Misuse rates from RADARS<sup>®</sup> System are Highly Correlated with Rates from The Drug Abuse Warning Network (DAWN)***

#### Key points

- The RADARS<sup>®</sup> System Poison Center Program collects data regarding abuse and misuse exposures to prescription opioids. Data from the RADARS System are available at the 3-digit zip code level within 3 months of the close of the previous quarter.
- The Drug Abuse Warning Network (DAWN) collects data regarding Emergency Department (ED) visits due to abuse and misuse of prescription opioids as well as illicit drugs. The most current data publicly available from DAWN is from 2010 and is projected to the entire U.S. based from participating EDs from 11 metropolitan regions.
- Poison center call mentions are strongly associated with DAWN ED visit mentions and can be used as sentinel reporting for drug abuse and misuse occurring nationwide due to the timeliness and geographic specificity of the data.

#### Background

National surveillance systems are essential to assess intervention effectiveness in reducing the national burden of prescription drug abuse and misuse. Despite being excellent sources of data, large federally funded monitoring systems are frequently delayed. This delay hampers their utility as an early warning system. Further, a timely geographically-specific early warning system for opioid abuse would likely increase the effectiveness of public health strategies by supporting specific targeted interventions.

Poison centers collect data on exposures to numerous psychoactive substances including opioid analgesics. The early warning utility of using poison center data arises from the fact that poison center data are available in near real-time. In addition, poison centers participating in the RADARS System currently cover 90% of the population, and collect data on the nature of the exposure including the specific compound and geographic location of the event.

In previous work we demonstrated that poison center calls due to methadone have a strong correlation with deaths due to methadone recorded in national vital statistics data [1]. Deaths due to prescription drug overdose are an important concern, however, emergency department (ED) visits account for a considerable proportion of the burden of prescription drug abuse and warrant concern as well.

The aim of this study is to evaluate the ability of poison centers to act as sentinel indicators of prescription drug abuse and misuse. We present associations of population rates of drug abuse and misuse related poison center call mentions with population rates of ED visit mentions documented by DAWN. We hypothesized that data from poison centers participating in the RADARS System Poison Center program would correlate well with data from DAWN.

## Methods

### **RADARS® System Poison Center Data**

The RADARS Poison Center program is a nonprofit prescription drug abuse and misuse surveillance program administered by the Rocky Mountain Poison and Drug Center, a division of the Denver Health Hospital Authority [2]. Poison centers receive spontaneous reports from caregivers, patients, and health care providers regarding potentially toxic exposures. Poison center specialists assist in the care of the individual, but also document critical aspects of the case including; exposure reasons, the substances involved, and the location of the individual at the time of the call. These records are then uploaded to a central database in the RADARS System program where case review and quality control is conducted. Poison centers participating in the RADARS program have expanded in coverage from 40% of the United States population in 2004 to 85% of the population in 2010 (Figure1).

### **The Drug Abuse Warning Network (DAWN)**

DAWN, in part, consists of a network of emergency departments who treat individuals and document visits mentioning a drug exposure. DAWN provides information regarding a wide range of drug related visits including visits mentioning misuse or abuse of prescription opioids. In 2009, 242 hospitals in 12 major metropolitan regions throughout the country contributed data to DAWN estimates. DAWN uses a complex survey design to project population rates of ED visits to the entire population of the country [3].

**Figure 1**

**The RADARS System Poison Center Program Coverage Area in 4<sup>th</sup> quarter 2010.**

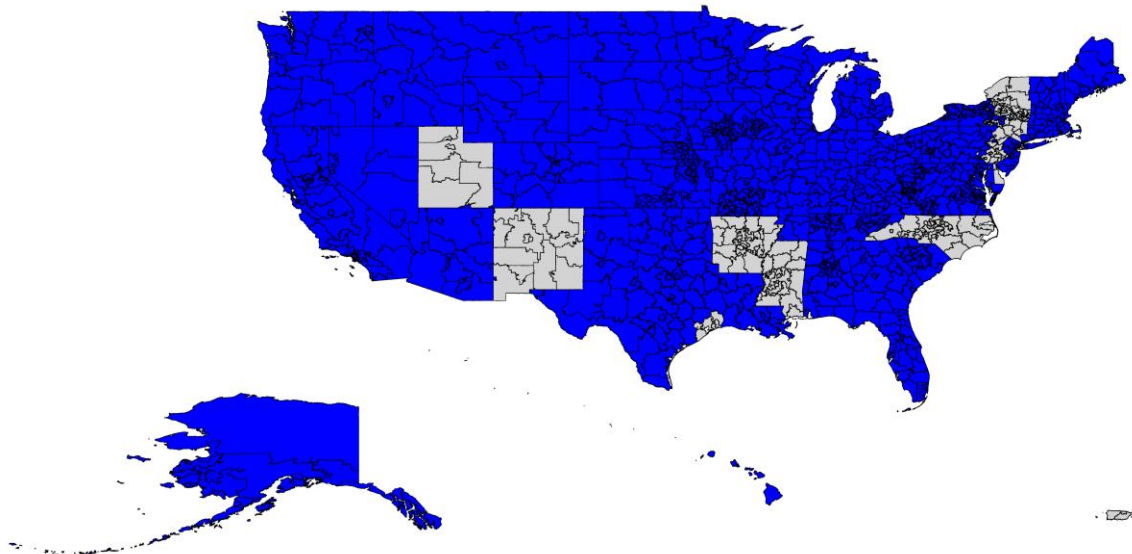


Figure 1 displays the national coverage of RADARS System Poison Center Program in the 4<sup>th</sup> quarter of 2010 with participating zip codes colored in blue. National rates of drug abuse and misuse are calculated without complex inference due to near nationwide coverage in the RADARS program.

## Statistical Analysis

Population rates of mentions regarding abuse and misuse of prescription opioids collected by poison centers were compared to population rates of abuse and misuse mentions from ED visits noted by DAWN on a national level. Using population rate data adjusted for the growth of the RADARS System during the study period. Drug exposures included in this analysis were class level prescription opioids consisting of; oxycodone, methadone, hydrocodone, fentanyl, buprenorphine, morphine and hydromorphone. Population rates for poison center calls were determined using the 2000 Census population of the region covered by poison centers. Covered population was corrected linearly assuming a consistent 0.97% growth per year. Nationally, the population grew by 9.7% between the 2000 and 2010 Census. Population rates were constructed annually for poison center data to match data available from DAWN. Population rates for DAWN were obtained from the data file including national estimates of all drug-related misuse and abuse ED visits through 2010 posted at <http://www.samhsa.gov/data/DAWN.aspx>. In both programs population rates of prescription opioid mentions per 100,000 individuals are compared. Data from 2004 through 2010 were included.

Two Linear regression analyses were used to test associations of annual population rates between programs. First an analysis comparing all opioid class levels combined was conducted. Second specific class level analysis were conducted.  $R^2$  and related p-values are presented where appropriate. Given this is an analysis over consecutive time points it may be subject to time correlated observations. The inclusion of an error structure that assumes a stronger correlation of points closer in time was evaluated by comparing the AIC score between regression models with and without a time correction. When appropriate, corrections for time correlated observations were made. Analyses were conducted with the GLIMMIX procedure in SAS v9.3.



## Results

Figures 2 and 3 display linear associations of prescription drug abuse and misuse population rates received by RADARS System poison centers with prescription drug abuse and misuse population rates from ED visits documented in the DAWN system. In aggregate, strong associations exist between the two programs (Figure 2). At the drug class level morphine and fentanyl display moderate correlations while the remaining opioids show strong correlations between the two programs (Figure 3)

**Figure 2**

Linear Associations of Drug Abuse and Misuse Population Rates between the RADARS System Poison Center Program and the Drug Abuse Warning Network from 2004 through 2010

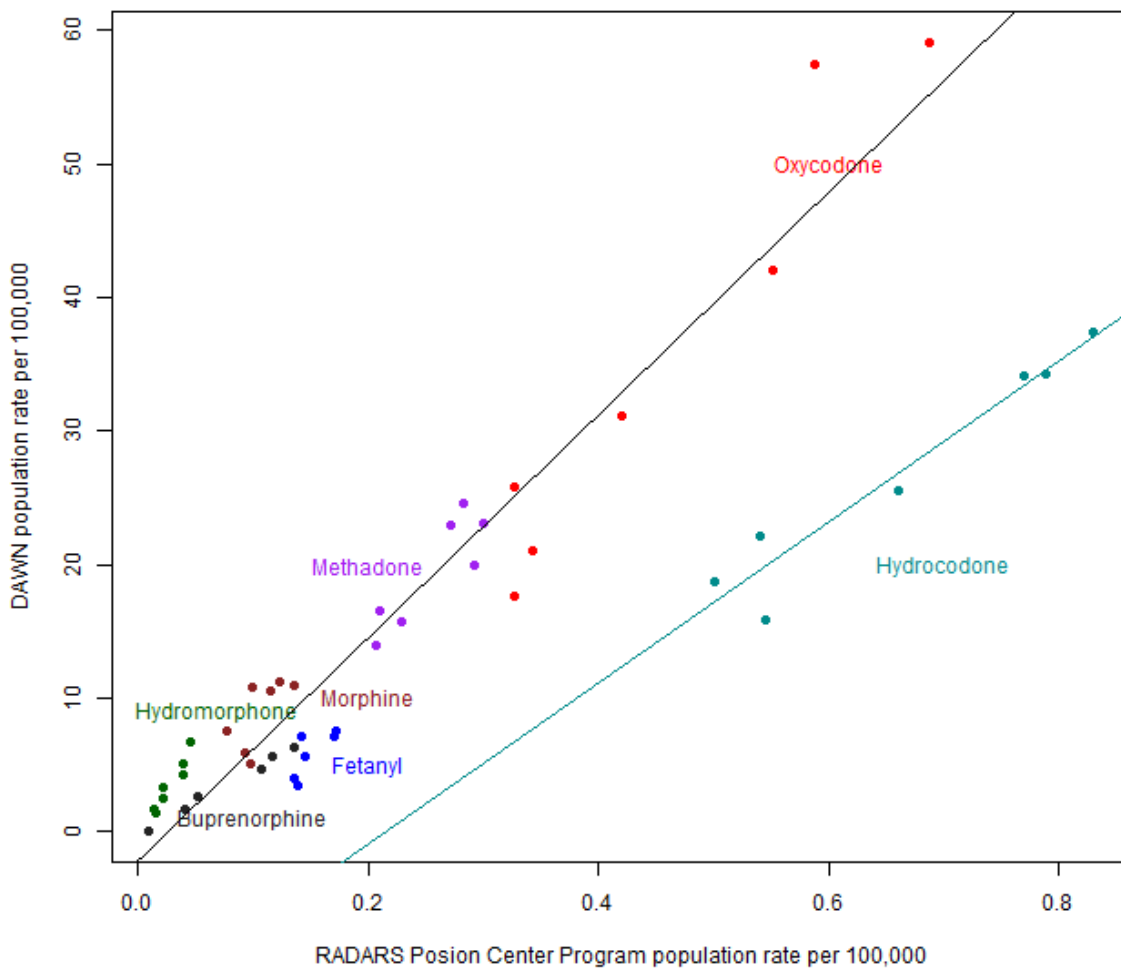


Figure 2 presents linear associations of prescription opioid abuse and misuse population rates between RADARS System Poison Center data and DAWN. Opioid classes in aggregate have a strong association between the two programs ( $p < 0.001$ ). Interestingly hydrocodone is disproportionately high relative to other opioids in poison center data, however the association between the two programs within hydrocodone is likewise strong ( $p < 0.001$ ).

Figure 3

Linear Associations of Drug Abuse and Misuse Population Rates per 100,000 within Specific Opioid Classes between the RADARS and DAWN programs from 2004 through 2010.

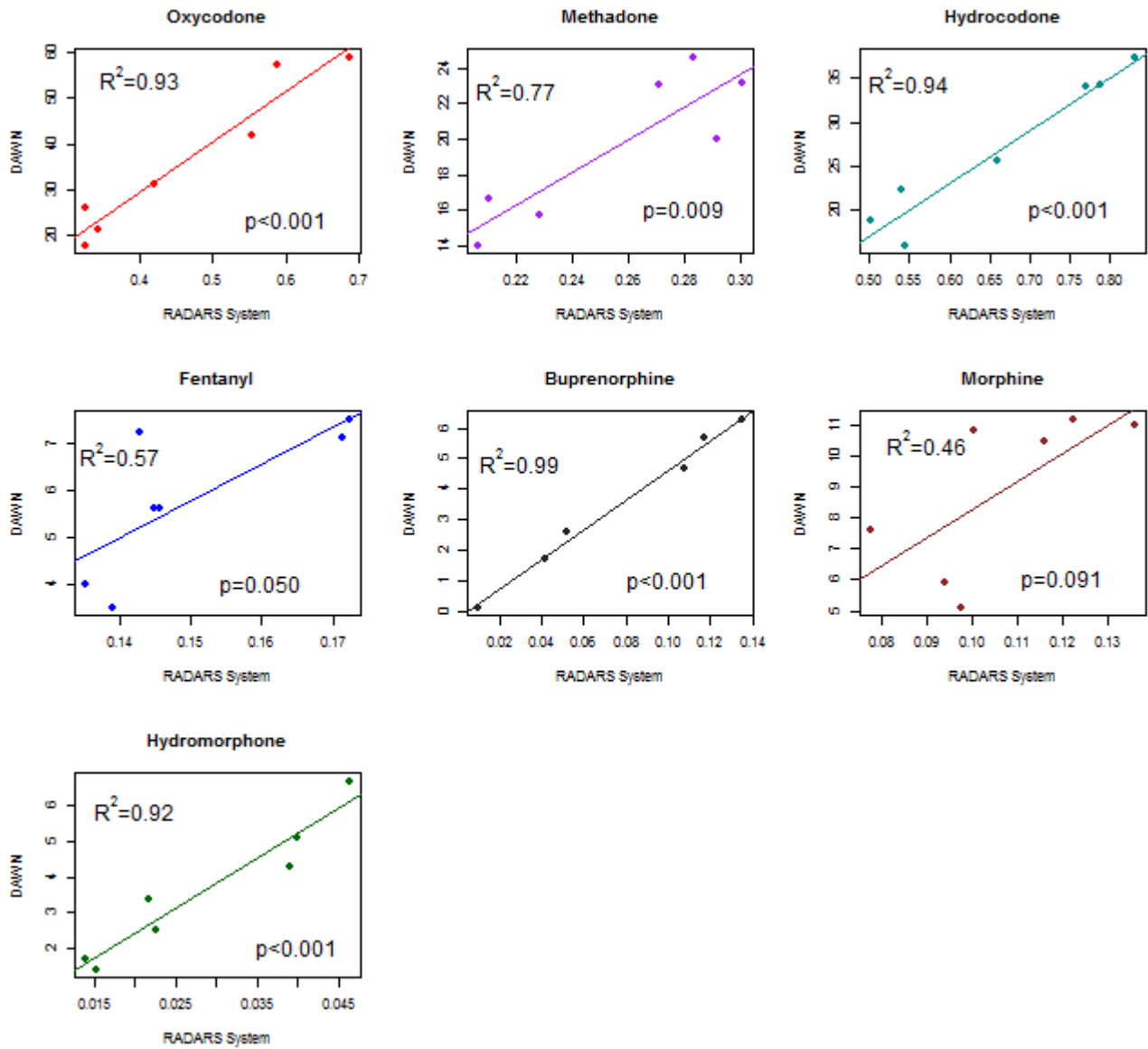


Figure 3 presents associations within drug classes. With the exception of morphine and fentanyl all opioid class level population rates are significantly linearly associated between the two programs.



## Conclusions

Overall, strong associations of population rates of abuse and misuse of prescription opioid medications between RADARS System and DAWN are illustrated. At the drug class level, associations were strong for most opioids and moderate for morphine and fentanyl. While not statistically significant, the proportion of the variance in DAWN rate estimates explained by the RADARS Poison Center Program rate estimates regarding morphine and fentanyl is substantial (46% and 57% respectively). A sizable proportion of poison center cases are treated at the location of the call which frequently is not from a health care facility. This suggests different health impacts of drug abuse and misuse detected between the two programs, which may influence the difference in morphine and fentanyl abuse and misuse detected. Further research regarding morphine and fentanyl abuse and misuse would inform on these differences.

DAWN is a respected and well known drug abuse surveillance system. The RADARS System poison center program agrees well with DAWN regarding drug abuse and misuse trends. The RADARS System is designed specifically to capture accurate information on both substance and geography while presenting timely information. The RADARS System relies on a large portion of the US population covered and collects geographic information directly without complex statistical inference. Further data from the RADARS system is designed to have only a one quarter lag in reporting.

Perhaps the strong associations identified between both programs are indicative of a level of availability of prescription opioids in the United States. Abuse and misuse in general, whether resulting in an ED visit or poison center call, could be responsive to the availability of the drug chosen for abuse and misuse. With increasing availability we may expect both ED visits and poison center calls to increase.

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## References

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