RADARS® SYSTEM
Researched Abuse, Diversion and Addiction-Related Surveillance System

Third Quarter 2011 Volume 6, Issue 3

In This Issue

Did You Know?

Senator Feinstein submitted Senate Resolution 261 designating the month of October 2011 as “National Medicine Abuse Awareness Month”

RADARS® System Profile: Cmdr. John Burke, President of the National Association of Drug Diversion Investigators

Commander John Burke is a member of the RADARS® System Scientific ‘Advisory Board (SAB). He has been a law enforcement officer for over 41 years including 32 years with the ‘Cincinnati Police Department, working in uniform patrol until he was promoted to detective. He then spent several years investigating homicides, rapes, and child sexual assaults and abuses. He was promoted to the rank of sergeant and was ultimately assigned to the Internal Investigations Section. In 1990, he was asked to form and Institute the department’s Pharmaceutical Diversion Squad (PDS).

The PDS, comprised of himself, six investigators, and a secretary, soon accrued considerable notoriety in the law enforcement world. The office was first featured in the FBI monthly magazine, and then spotlighted on NBC’s Dateline for their work on the investigation of drug diversion in health facilities.

After retiring from the Cincinnati Police Department, Commander Burke accepted a new position late in 1999, and continues as the head of the Greater Warren County Drug Task Force in southwest Ohio. The drug task force investigates the illegal distribution of both licit and illicit drugs. In 2004, he was named as the co-commander for the Southern Ohio High Intensity Drug Traffic Area (HIDTA) for major drug case initiatives and interdiction.

Commander Burke has provided education and lectured across the United States to law enforcement and health professionals on the topic of prescription drug abuse. He has published numerous articles on the topic, and has written a monthly column for the past 6 years in Pharmacy Times magazine on pharmaceutical diversion.

He is the president of the National Association of Drug Diversion Investigators (www.naddi.org) a non-profit organization, and is the owner and president of Pharmaceutical Diversion Education Inc., a company which provides education and consulting work on a wide variety of prescription drug abuse issues to law enforcement, health professionals, and the pharmaceutical industry (www.rxdiversion.com). Commander Burke has recently initiated two new programs that help address the prescription drug abuse problems that are described below.

RX DRUG DROP BOX

The National Association of Drug Diversion Investigators (NADDI), www.naddi.org , recognized the fact that although a great service, the periodic scheduled prescription drug take back events left a gap in the pursuit to provide citizens a place to return outdated or unneeded pharmaceuticals. With this concern in mind, NADDI was able to obtain a grant from Endo Pharmaceuticals that allowed for the distribution of 100 secure boxes for individuals to return these prescription drugs anytime the law enforcement agency is open for business.

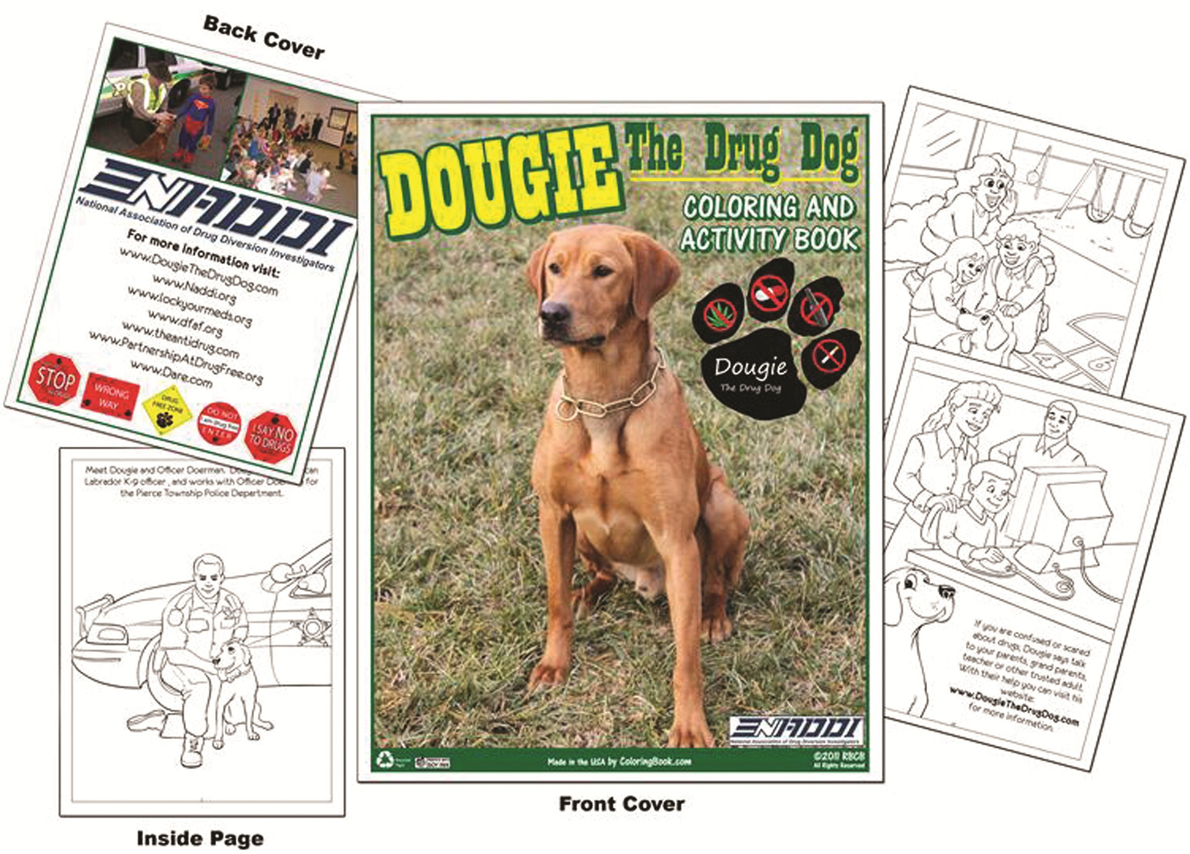
The demand for these boxes was so overwhelming that all 100 were awarded within three weeks of the announcement going out. Essential program information and drop box locations can be found at www.rxdrugdropbox.org.

“DOUGIE THE DRUG DOG” COLORING BOOK

The number one substance of abuse with those 12-17 years of age is prescription drugs. One of the main sources of these drugs for this age group is the family medicine cabinet. NADDI, and others, have recognized for many years the seriousness of the abuse and diversion of pharmaceuticals by our nation’s teenagers, and wanted to create a vehicle to provide awareness to pre-teens and to their parents.

NADDI created a coloring book designed for 2-10 year olds to promote the fact that prescription drugs are good medicine when prescribed by your doctor, dispensed by your pharmacist, and given to you by your parents or other trusted adults. The coloring book stars “Dougie the Drug Dog”, a real Ohio police canine trained to detect pharmaceuticals. In addition to pages to color, puzzles and other games, a message to parents on the back inside cover details the importance and methods to help secure prescription drugs in their homes.

The website, www.dougiethedrugdog.org is currently under construction and is intended to augment the coloring book by providing 2-10 year olds additional information on prescription drugs along with a format for more fun things to do while they learn.



Comparing Drug Distribution in Ohio to the US

The Prescription Monitoring Program of Ohio investigated the relationship of drug distribution captured by this program compared to unique recipients of dispensed drug (URDD) captured and provided by SDI Health. Additionally, comparisons were made between the state of Ohio to the rest of the United States.

The Ohio Automated Rx Reporting System has collected data on the prescription distribution of solid oral opioids and fentanyl patches since the fourth quarter of 2008. Data on total doses dispensed by year-quarter and three digit zip codes were provided. Data were collected by drug class: buprenorphine, fentanyl (patch), hydrocodone, methadone, oxycodone and tramadol. On a quarterly basis, the RADARS system obtains a measure of prescription drug availability that is specific to drug class and 3-digit zip code for many commonly abused prescription drugs. This measure of drug availability is the URDD (SDI Health).

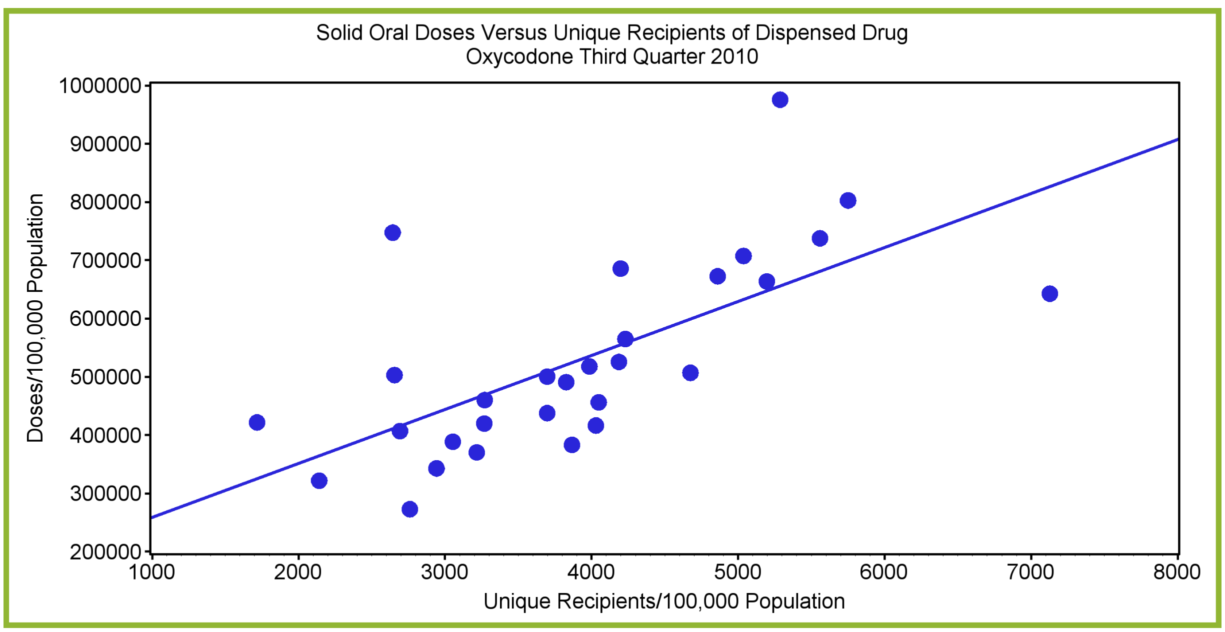
Table 1 quantifies the strength of the linear relationships between the total doses recorded in the prescription monitoring program and unique recipients captured by URDD for an example quarter, fourth quarter of 2010, for buprenorphine, fentanyl patch, hydrocodone, methadone, oxycodone and tramadol. Pearson correlation coefficients can range from -1 to +1, where values of zero indicate no linear relationship and values of 1 indicate positive or negative correlations as indicated by the sign of the correlation coefficient. Correlation coefficients greater than 0.80 are considered strong. A positive correlation between the total doses reported to the prescription monitoring program and URDD was indicated for each of the six drugs studied.

Table 1 Pearson Correlation Coefficients for Prescription Monitoring Program of Ohio (Total Doses) and URDD for Fourth Quarter 2010

Drug	Correlation
Buprenorphine	0.81
Fentanyl Patch	0.89
Hydrocodone	0.96
Methadone	0.91
Oxycodone	0.96
Tramadol	0.92

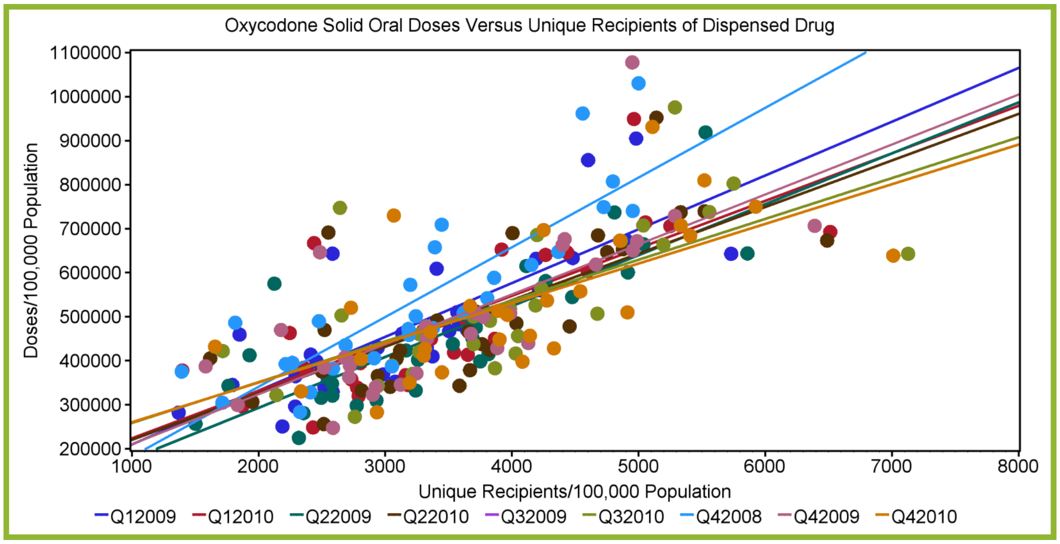
The distribution data for solid oral opioids and fentanyl patches obtained from the Ohio Automated Rx Reporting system were plotted against the URRD data for the 29 3-digit zip code regions in Ohio. Both measures of drug availability have been converted to rates per 100,000 population based upon the 2000 US Census. Figure 1 depicts this relationship for one of the six drug classes, Oxycodone, for fourth quarter of 2010. Strong linear relationships between the two measures of drug availability were present.

Figure 1



As URDD data are available for the entire US and distribution data were not, we first sought to model the relationship between solid oral doses or fentanyl patches and URDD, pooling across quarters. Figure 2 shows a plot of the dose data versus the URDD data for each of the 3-digit zip codes in Ohio for Oxycodone. Each quarter is represented by a different colored regression line with corresponding colored data points. A random coefficient model was then fit to the data. The random coefficient model fits an overall regression line and assumes that the intercepts and slope of the quarter specific regression lines vary randomly about the overall regression line. The quarter specific regression lines are shown for Oxycodone below. Again, strong relationships between total doses and URDD are illustrated.

Figure 2

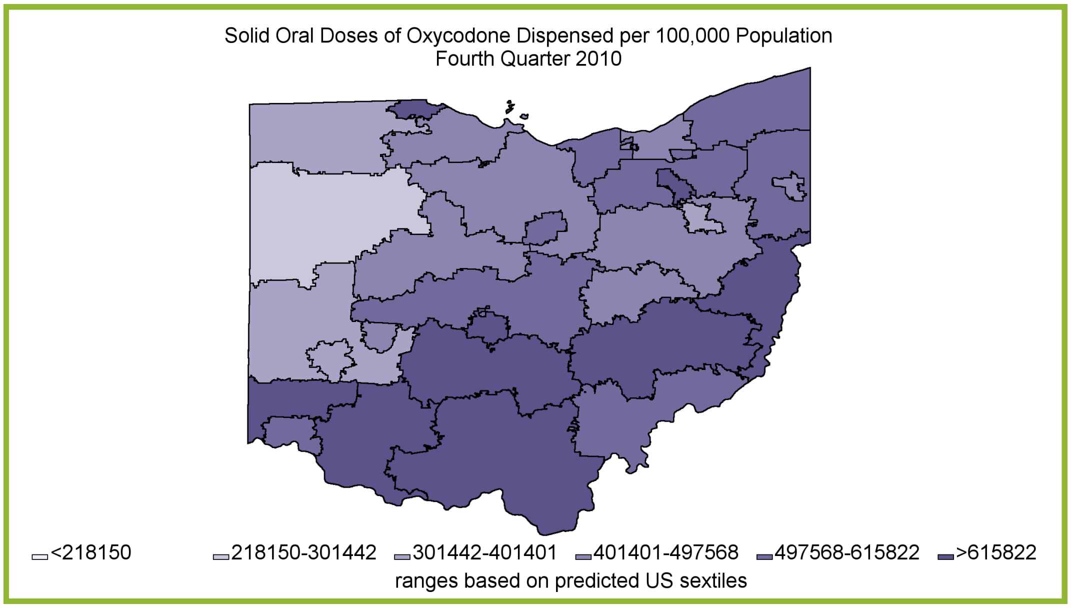


For each year and quarter, the US 3-digit zip code URDD rate data were categorized according to sextiles (16.7, 33.3, 50.0, 66.7, 83.3, and 100 percentiles) within drug class. The predicted doses corresponding to the US sextiles were then computed based upon the overall regression line from the random coefficient models. These predicted doses were then used to categorize the Ohio dose data (separately for each drug class). Data for the 6 drug classes were utilized to create 3-digit zip code maps of Ohio for each drug class. Predicted sextiles were shaded so that increasing rates were represented by darker shades of purple. If Ohio's drug distribution rates were lower than the US, then the map would only show light shades of purple, and conversely if rates were high versus the rest of the US then only dark shades of purple would be shown. If rates are reflective of US rates then 4-5 (4.83) 3-digit zip code areas of each shade of purple are expected.

A map of Ohio for Q4 2010 for the example drug class oxycodone is shown in Figure 3. Darker shades of purple are predominant in most southern and eastern border zip code areas, indicating higher rates than expected based on US URDD rates. Darker shaded southern border zip code areas were evident for buprenorphine, hydrocodone and tramadol as well (maps not shown). A chi-square test was done to evaluate the expected distribution based upon the US URDD data for each drug. Significant departures existed for fentanyl patches ($p= 0.0085$) and hydrocodone ($p=0.0325$).

Figure 3

In summary, total dose count and URDD counts are highly correlated. In Ohio the distribution of dispensed drug per 100,000 population for fentanyl patches and hydrocodone are higher than expected based upon US URDD rates. Overall higher drug distribution rates are seen in the south and south-eastern regions of Ohio.



Poison Center Calls for Intentional Exposures to Opioids are Highly Correlated with Retail Availability in the RADARS System Poison Center Program

Calls to Poison Centers (PCs) involving prescription opioids have increased in recent years. The RADARS System analyzed the relationship between intentional exposure call (IEC) volume for prescription opioids received by PCs to the retail availability of these drugs. The Poison Center Program captures drug exposures from participating US PCs. PCs use a standard electronic system to record calls from the public, and the coordinating PC performs quality control checks to verify product coding accuracy. Intentional exposures are coded as suspected suicide, misuse, abuse, intentional unknown, or withdrawal. Total IECs by quarter from 2003 – 2010 involving at least one opioid of interest were included in the analysis (n=166,180). Opioids of interest were hydrocodone, oxycodone, fentanyl, hydromorphone, morphine, buprenorphine, and methadone. Retail availability was represented by Unique Recipients of Dispensed Drug (URDD) within the reporting PC coverage area for each quarter. Mixed effects modeling correcting for autocorrelation was used to determine the relationship between PC IEC volume and retail availability.

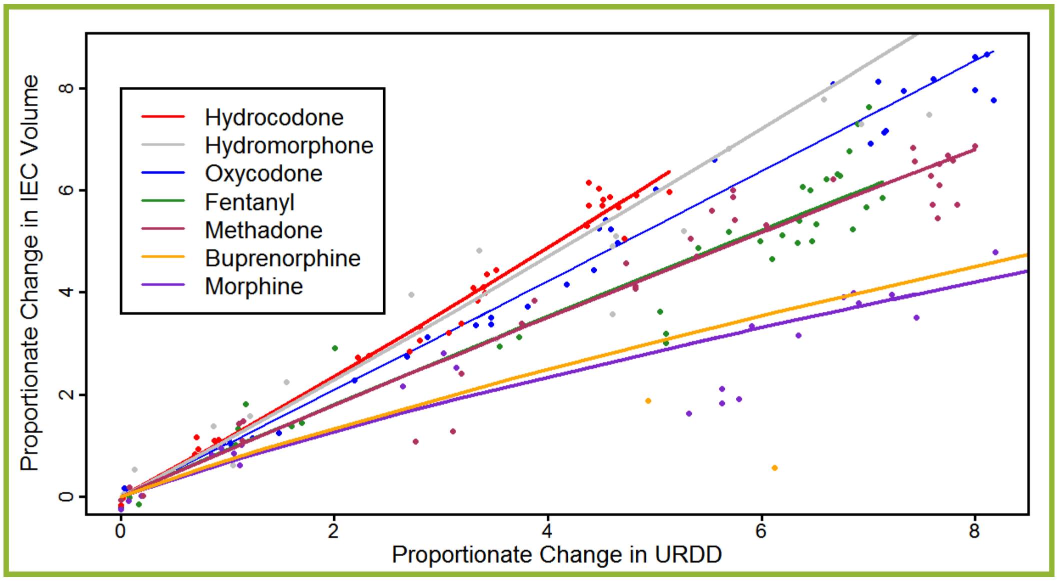
Expected IEC volume at 100,000 URDD ranged from 12.2 for hydrocodone to 168.6 for methadone (Table 1). Individual opioid class IECs ranged from 2,765 for hydromorphone to 84,582 for hydrocodone.

Table 1. Expected IEC Volume at 100,000 URDD

Drug Class	Expected Volume	95% CI	IEC Volume 2003 – 2010
Hydrocodone	12.2	5.4 – 27.9	84,582
Oxycodone	26.6	15.5 – 45.6	44,744
Fentanyl	36.0	28.7 – 45.2	5,192
Hydromorphone	42.2	37.7 – 47.1	2,765
Morphine	83.1	68.1 – 101.5	9,034
Buprenorphine	98.1	88.2 – 109.1	4,476
Methadone	168.6	141.8 – 200.4	15,387

Inclusion of an interaction term suggests that across all drug classes there is some variability in the association between intentional exposure call volume and URDD, but higher quarterly URDD are a strong predictor of greater quarterly intentional exposure calls across all drug classes ($p < .001$) (Figure 1).

Figure 1. Proportionate Change in IEC Volume vs. Proportionate Change in URDD



In conclusion, retail availability is a strong predictor of PC IEC volume when considering drugs with varying levels of availability, and overall PC IEC volumes are sensitive to changes in retail availability.

Recent RADARS System Publications and Presentations

- Cicero TJ, Ellis MS, Paradis A, Ortbal Z. Role of key informants and direct patient interviews in epidemiology studies of substance abuse. Pharmacoepidemiol Drug Safety. 2011 Mar;20(3):308-12.
- Dart RC, Dasgupta N, Bailey JE, Spiller HA. Interpreting poison center call volume associated with tramadol. Ann Pharmacother. 2011 Mar;45(3):424.
- Davis J, Buchholtz C, Wheat A, Bartelson BB, Dart RC. Predictors of moderate, substantial or severe problems associated with drug abuse in college students reporting recent opioid use. College on Problems of Drug Dependence Annual Meeting. Hollywood, FL. June, 2011.
- Davis J, Miller H, Winter E, Dart RC. Suicide behaviors with prescription drugs in individuals over 50 years of age identified by Radars System Poison Center Program. American Public Health Association Annual Meeting. Washington, DC. October, 2011.
- Katz N, Dart RC, Bailey E, Trudeau J, Osgood E, Paillard F. Tampering with prescription opioids: nature and extent of the problem, health consequences, and solutions. Am J Drug Alcohol Abuse. 2011 Jul; 37(4):205-17.
- Wheat A, Buchholtz C, Davis J, Dart RC. Predictors of severe prescription drug abuse among college students using the RADARS System College Survey. College on Problems of Drug Dependence Annual Meeting. Hollywood, FL. June, 2011.
- Wheat A, Davis J, Bartelson BB, Buchholtz C, Dart RC. Is drug source a predictor of severity of non-medical prescription drug use among college students? Do source predictors vary by Gender? American Public Health Association Annual Meeting. Washington, DC. October, 2011.
- Wheat A, Davis J, Bartelson BB, Dart RC. The interaction between gender and severity of prescription drug abuse among college students on ability to correctly identify photos of recently abused drugs. International Conference of Pharmacoepidemiology. Chicago, IL. August, 2011.
- Winter EJ, Buchholtz C, Davis JM, Severtson SG, Dart RC. Poison center calls for intentional exposures to opioids are highly correlated with retail availability in the RADARS System Poison Center Program. North American Congress of Clinical Toxicology Conference. Washington, DC. September 2011.

Upcoming Meetings of Interest

- Institute of Medicine, October 16-17, 2011. Washington, District of Columbia.
- American Association of Homes and Services for Aging, October 16-19, 2011. Washington, District of Columbia.
- National Association of State Controlled Substances Authorities, October 18-21, 2011. Portland, Maine.
- American Society for Clinical Pathology, October 19-23, 2011. Las Vegas, Nevada,
- Society of Urologic Nurses and Associates, October 28-31, 2011. San Antonio, Texas.
- American Public Health Association, October 29-November 2, 2011. Washington, District of Columbia.
- American College of Rheumatology, November 4-5, 2011. Chicago, Illinois.
- National Association of Drug Diversion Investigators, November 15-18, 2011. Jacksonville, Florida.
- American College of Neuropsychopharmacology, December 4-8, 2011. Waikoloa, Hawaii.
- Academy of Addiction Psychiatry, December 8-11, 2011. Scottsdale, Arizona.

Did You Know?

The Medical Association of Georgia has developed the initiative called "Think About It". The program takes a three-pronged approach: creating legislation, educating health care professionals, and providing safe places to dispose of and store prescription drugs

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RADARS System Mission Statement

The RADARS System provides timely, product specific and geographically-precise data to the pharmaceutical industry, regulatory agencies, policymakers and medical/public health officials to aid in understanding trends in the abuse, misuse, and diversion of prescription drugs in the United States.

Rocky Mountain Poison and Drug Center and Denver Health and Hospital Authority

The RADARS System is a governmental nonprofit operation of the Rocky Mountain Poison and Drug Center (RMPDC), an agency of Denver Health (DH). The RMPDC has been in operation for more than 50 years, making it one of the oldest poison control centers in the nation. DH is the safety net hospital for the City and County of Denver and is the Rocky Mountain region's academic Level I trauma center and includes Denver Public Health, Denver's 911 emergency medical response system, nine family health centers, 12 school-based clinics, NurseLine, correctional care, Denver CARES, the Denver Health Medical Plan, and the Rocky Mountain Center for Medical Response to Terrorism, Mass Casualties and Epidemics.

Denver Health — Level One Care for ALL

RMPDC — Rocky Mountain Poison & Drug Center — Saving Lives with Answers™

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