

RADARS[®]

S Y S T E M

RADARS[®] System Technical Report # 2012Q4-1

Age trends in the abuse of prescription opioids

Key points

- Greater Active Pharmaceutical Ingredient (API) drug class availability predicts earlier age of abuse reported to the RADARS[®] System Poison Center Program.
- Drugs have different trajectories over the age span of 11 to 69 years with respect to mentions in intentional abuse calls received at RADARS[®] System Poison Centers.
- The RADARS[®] System Poison Center Program provides detailed and timely data, including age and drug(s) mentioned by intentional abuse exposure cases.

Background

The availability-proneness theory suggests that drug abuse increases as the availability increases among individuals prone to abuse [1]. There is some support for this concept with marijuana initiation [2]. Considerable research demonstrates that the sequence of drug use initiation from legal products containing alcohol and tobacco, to cannabis, and then other illegal drugs is consistent [3]. This analysis examines if similar patterns exist among prescription opioid products.

Prescription drug abuse is known to present a substantial public health problem. In 2011, results from NSDUH report nearly 1.9 million individuals using prescription pain relievers non-medically for the first time [4]. The aim of this study was to examine the association between specific prescription opioid product availability and most frequent age of poison center intentional abuse calls mentioning those products in the past year. We also examined whether the trajectory of calls across ages 11 through 69 years differed by product in the past year. We hypothesized that there would be an inverse association between product availability (measured by unique recipients of dispensed drug (URDD)) and mode or peak age of abuse calls. URDD represents the number of unique individuals each quarter who fill a prescription for a particular product. We also hypothesized that drugs would show different trajectories across the lifespan, with more available schedule III products (such as hydrocodone) peaking at earlier ages and less available schedule II products (such as hydromorphone) peaking at later ages. We also hypothesized that peaks would be significantly higher for more available products.



Methods

RADARS[®] System Poison Center Data

The RADARS Poison Center program is a nonprofit prescription drug abuse and misuse surveillance program owned and operated by the Rocky Mountain Poison and Drug Center, a division of the Denver Health Hospital Authority. Poison Centers receive spontaneous calls 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 reason, the substance(s) involved in the exposure, 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. Rigorous quality control measures are used to ensure the accuracy of all data fields.

Statistical Analysis

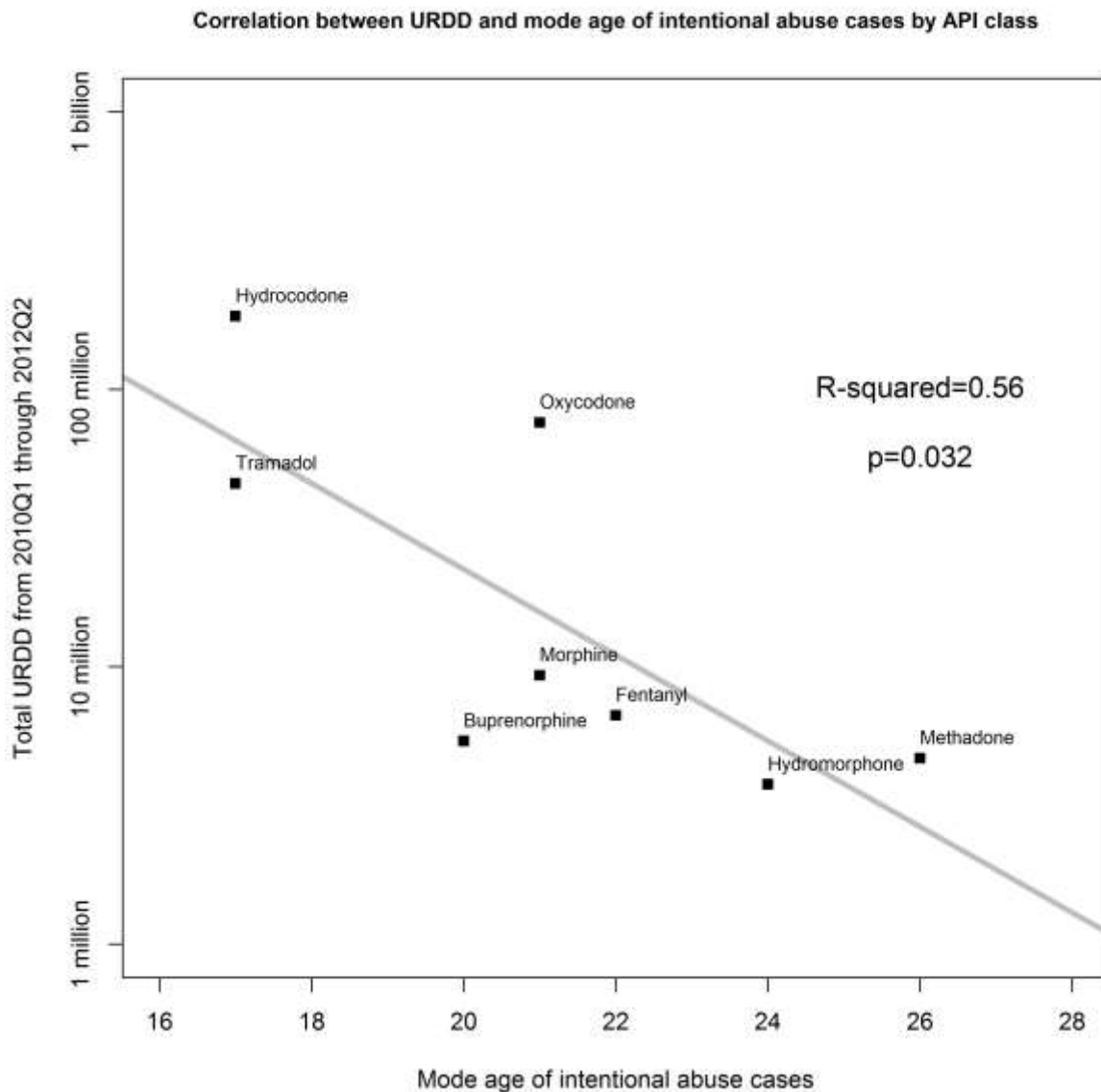
Mentions of prescription opioid drug classes by intentional abuse cases from the 1st quarter of 2010 through the 2nd quarter of 2012 were summed by age between the ages of 11 years and 69 years. The analyses were conducted in two steps. The first step of the analysis used a linear regression model and tested the association between the age with the greatest number of mentions (peak age) for each drug and the log of number of individuals filling a prescription for that drug between 1st quarter of 2010 and 2nd quarter of 2012. The second stage of the analysis utilized a negative binomial regression to fit a growth curve to each prescription opioid class to examine differences in age trends by drug class. This model was used to determine whether different drug classes had different trajectories over the lifespan. Analyses were conducted with the REG and GLIMMIX procedure in SAS v9.3.



Results

Results from the linear regression of peak age on the natural log of the total unique recipients of dispensed drug are displayed in figure 1. Findings suggest a statistically significant ($R^2 = 0.56$, $p = 0.032$) inverse association between peak age of intentional abuse calls to poison centers and drug availability. Results suggest that 56% of the variability in the peak age of intentional abuse calls to poison centers can be explained by the log of drug availability.

Figure 1. Correlation between URDD and mode age of intentional abuse cases by API class.



A graph of the number of intentional abuse calls by age is displayed in figure 2. Predicted values from the negative binomial growth curve model by drug class are also displayed. Predicted values demonstrate that the second degree polynomial growth curve model was a good fit to the data. Results from the model suggest a statistically significant difference in trajectories by age group. By examining the results in figure 2, hydrocodone and oxycodone are the most commonly mentioned products by intentional abuse cases. Hydrocodone appears to peak slightly earlier (prior to age 20) and oxycodone appears to peak around age 20. Tramadol also peaks prior to the age of 20, but the number of calls is not as great.



Figure 2. Intentional abuse calls and predicted intentional abuse calls based on growth curve modeling by age and drug from 1st quarter of 2010 through 2nd quarter of 2012.

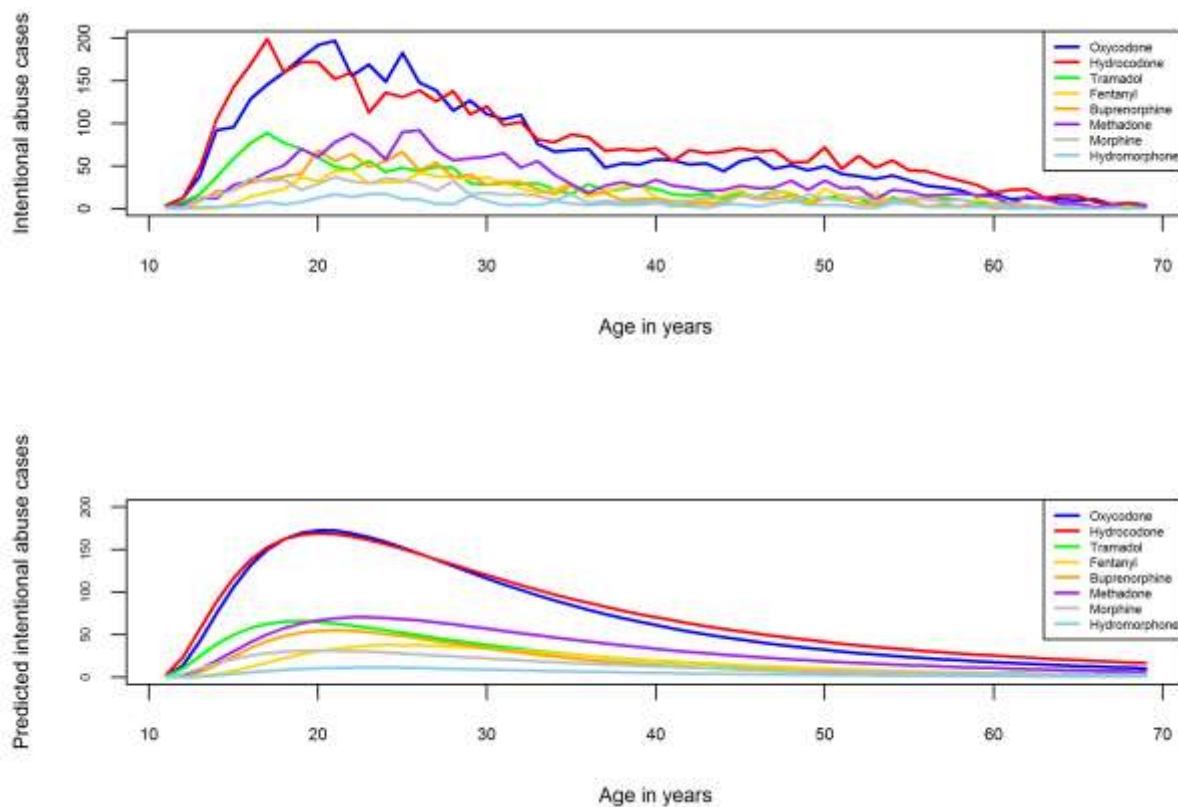


Table 1 presents the information on the predicted and observed number of cases at different ages (in years). In bold are the highest for the age groups displayed. With the exception of morphine, the highest predicted and expected ages are the same. This table demonstrates that hydrocodone and tramadol both have highest values at age 17, with hydrocodone being the highest. At age 25, oxycodone is the highest. Other drugs also have a higher value at age 25 than at age 17.

Drug class	Age 14		Age 17		Age 25		Age 40	
	Observed	Predicted	Observed	Predicted	Observed	Predicted	Observed	Predicted
Oxycodone	92	75.281	146	150.021	183	152.37	58	61.292
Hydrocodone	105	89.036	199	152.681	131	150.746	71	70.509
Tramadol	37	38.906	89	62.964	48	52.479	23	19.218
Fentanyl	1	3.709	19	17.598	31	38.087	13	19.919
Buprenorphine	20	14.714	34	42.658	67	48.553	11	14.562
Methadone	12	19.605	43	50.562	90	68.551	34	33.688
Morphine	15	16.516	32	28.484	33	28.107	9	13.032
Hydromorphone	2	2.342	8	7.475	11	11.369	7	5.203

Conclusions

These analyses suggest two key points with regard to age of abuse of prescription opioids. The first is that drugs classes that are more readily available are more likely to have an earlier peak age of mentions to poison centers. The second is that drugs appear to have different trajectories over the age span of 11 to 69 with regard to intentional abuse case mentions to poison centers. Drugs with high availability (such as hydrocodone and tramadol) appear to show much earlier peaks in abuse mentions than drugs less available and schedule II (such as methadone, oxycodone, hydromorphone). Though these results do not explicitly test for a “gateway” effect or the availability-proneness theory, results are consistent with a pattern similar to those of illegal drugs. Widely available prescription opioids appear to be abused in higher numbers and at earlier ages.

This study does have notable limitations. Poison center calls rely on spontaneous reports. This limitation may lead to an inflation of counts of younger patients or less experienced substance abusers. We also examined mode ages across all products with a class. These estimates may be affected drug product, drug formulation, and other variables.

Despite these limitations, the study does have some notable strengths. The RADARS System Poison Center program includes quality checked information from poison center cases across 90% of the country. Given the scale of prescription drug abuse and the unique nature by which these drugs are obtained and regulated, future inquiry can examine the unique pattern by which individuals initiate and progress through different prescription pain reliever classes and even specific products which may be of particular value as the impact of abuse deterrent formulations is evaluated.

Suggested citation: Severtson, SG; Bartelson, B.B. & Dart, R. (2012). Age trends in the abuse of prescription opioids. RADARS System Technical Report, 2012Q4-1.

References

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