



Third Quarter, 2020

Suspected Suicidal Exposures involving Prescription Opioids Reported to Poison Centers Decreased following the Emergence of the COVID-19 Pandemic; Abuse Exposures Increased

Key Findings

- Exposure calls to poison centers involving prescription opioids were significantly lower (74.7 exposures/week, $p < 0.001$) from March 15 through June 20, 2020 compared to a similar time period in 2019. In the weeks before and weeks after this time frame, prescription opioid exposures were not statistically different from 2019.
- Decreases in prescription opioid exposures from March 15 through June 20, 2020 were largely accounted for by reductions in exposures reported by health care facilities (86.9 exposures/week, $p < 0.001$). Among these exposures, the largest decreases were in suspected suicidal exposures, exposures that involved hydrocodone or tramadol (28.0 exposures/week, $p < 0.001$), and exposures with either no effect or minor effect.
- Abuse exposures reported by health care facilities in 2020 increased relative to 2019 from March 15 through June 20 and from June 21 through September 26.
- Prescription opioid exposure calls from residences in 2020 increased relative to 2019 from March 15 through June 20 and from June 21 through September 26.

Introduction

The United States continues to experience an epidemic of opioid-related morbidity and mortality, with a substantial percentage of these cases including prescription opioids. The emergence of COVID-19 and efforts to prevent spread of the disease altered many aspects of daily life within the United States in 2020. School closures, staff shortages at health care facilities, changes in restrictions on medications intended to treat opioid addiction, and limits on social gatherings could impact accidental pediatric ingestions, misuse, abuse, and suicidal behaviors involving prescription opioids. How these efforts have affected morbidity associated with prescription opioids is not well understood.

Surveillance data from poison centers are useful in identifying trends in morbidities related to medications, including prescription opioids. Poison centers provide expert medical advice to both the general public and health care providers regarding possible and confirmed poisonings. Data collected from poison centers are updated in near real-time and are available more than a year before other data sources. Poison center data are used to evaluate the ongoing epidemic of prescription opioid and prescription stimulant poisonings by assessing misuse, abuse, and accidental exposures (1-3). Poison center data have also been used to evaluate the effectiveness of interventions aimed at reducing the morbidity associated with these poisonings such as prescription drug monitoring plans (4), abuse deterrent formulations (5), and child-resistant packaging (3). Additionally, poison center data have identified season patterns in exposures involving suicidal attempts (6).

This study is an analysis of changes in exposures reported to poison centers involving prescription opioid medications in the first 3 quarters of 2020 (December 29, 2019 through September 26, 2020) compared to exposures reported during the same months in 2019. We examined where the exposure call originated as this was likely most impacted by public health measures aimed to reduce the spread of COVID-19.

Methods

Data Sources

The Researched Abuse, Diversion and Addiction-Related Surveillance (RADARS®) System receives weekly data from participating poison centers on exposures involving prescription opioids. We evaluated trends in the number of exposures across all ages involving nine prescription opioids (buprenorphine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, oxymorphone, and tramadol) from 51 participating centers. Exposures involving fentanyl where the product was unknown or known to be illicit were excluded.

Statistical Analysis

We compared the number of prescription opioid exposures for each of the first 39 weeks in 2020 to exposures in corresponding weeks in 2019. Exposure volume in a given week in 2020 was determined to be meaningfully different from 2019 if the number of exposures was two standard deviations above or below the value for the same week in 2019 (7). Similar thresholds of two standard deviations from historical data averages are used to detect disease outbreaks with other surveillance sources (8). Corresponding weeks were compared because poison center exposures show seasonality effects (6). The comparison was restricted to 2019 because several recent studies indicate prescription opioid exposures reported to poison centers have declined in recent years (2, 7, 9, 10). Comparing to years prior to 2019 may exaggerate differences in weekly exposure counts due to COVID-19 for some call types. Exposures were assumed to follow a Poisson distribution, with the standard deviation corresponding to the square root of the mean.

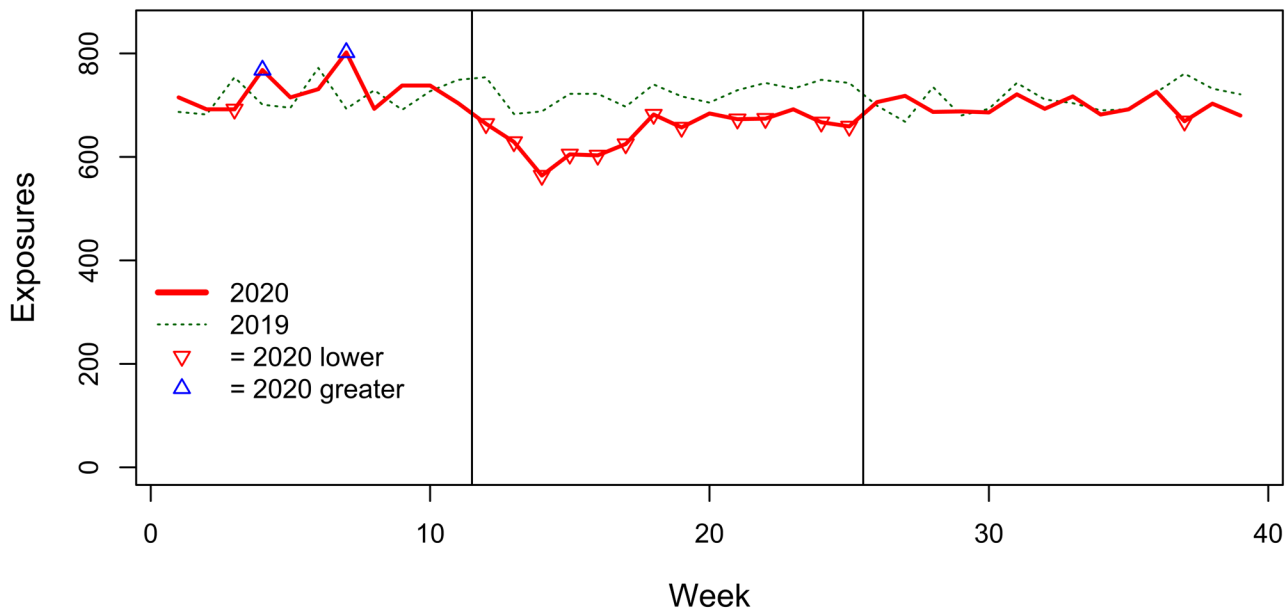
Differences in exposures in 2020 relative to 2019 were used to identify consecutive weeks where exposures were consistently different. The process was repeated on number of exposures by site where the call originated. Exposures were then aggregated by time period, and the number of calls in 2020 were compared to the corresponding time period in 2019 stratified by caller site. We examined changes in the number of exposures involving specific active pharmaceutical ingredients, exposure reasons, and medical outcome of the exposure. Definitions for each category are provided in Gummin and colleagues (11). Analysis comparing exposures by time period were performed using Poisson regression with an identity link. P-values were adjusted using the false discovery rate (12) to account for multiple comparisons.

Results

Weekly counts of prescription opioid exposures meaningfully differed from 2019 in three of the first 11 weeks in 2020 (Figure 1). Between week 12 and week 25, prescription opioid exposures were meaningfully lower than 2019 in all but two weeks. In the final 14 weeks, exposure counts in 2020 were lower in one week. Based on these findings, three periods were identified: from week 1 through week 11 (December 29, 2019 through March 14, 2020) where 2019 and 2020 exposure counts were similar in most weeks, week 12 through week 25 (March 15, 2020 through June 20, 2020) where 2019 and 2020 exposure counts were different in most weeks, and from week 26 through week 39 (June 21, 2020 through September 26, 2020) where 2019 and 2020 exposure counts were similar in most weeks. Time periods were supported by Poisson regression results: from week 1 through week 11 there were 9.8 ($p=0.391$) more exposures/week on average in 2020 relative to 2019. From week 12 through week 25, there were 74.7 ($p<0.001$) fewer exposures/week, and from week 26 through week 39, there were 13.3 ($p=0.185$) fewer exposures/week.



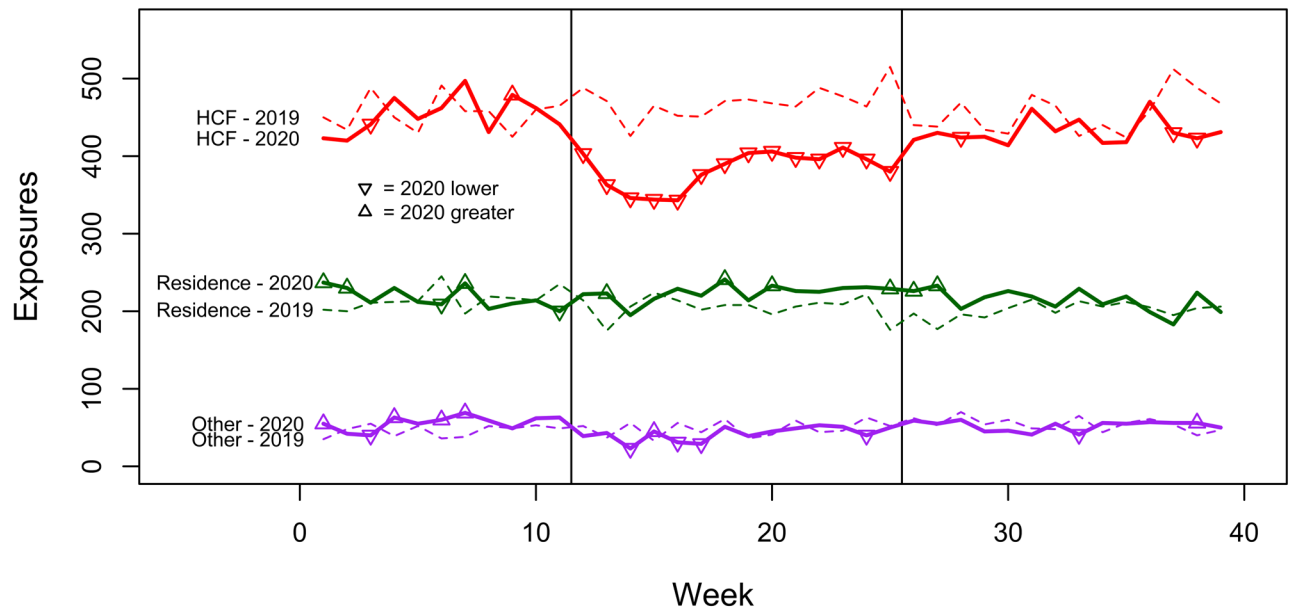
Figure 1. Exposures involving prescription opioids in the first 39 weeks of 2019 and 2020



Weeks represent Sunday through Saturday with the first week including days from the previous year, weeks 1 through 39 represent December 29, 2019 through September 26, 2020 for 2020, December 30, 2018 through September 28, 2019 for 2019.

Changes in the number exposures by site where the exposure call originated were examined. Exposures reported by callers from health care facilities were lower in 2020 relative to 2019 for 14 consecutive weeks from March 15, 2020 through June 20, 2020 (Figure 2).

Figure 2. Exposures involving prescription opioids in the first 39 weeks of 2019 and 2020 by caller location

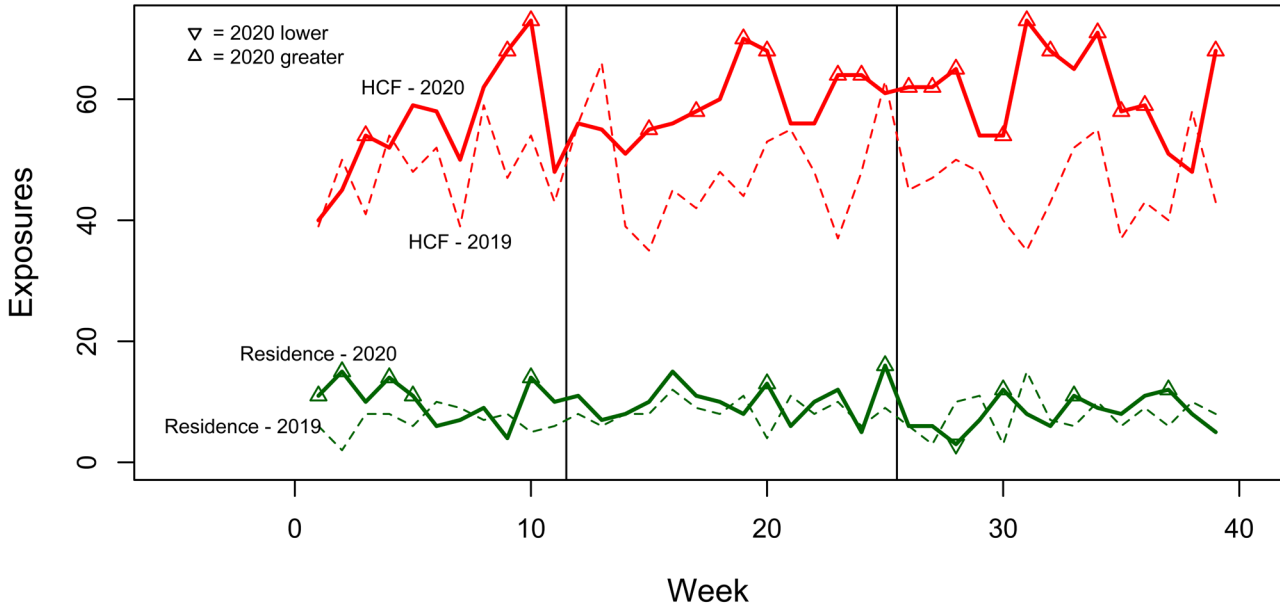


Weeks represent Sunday through Saturday with the first week including days from the previous year, weeks 1 through 39 represent December 29, 2019 through September 26, 2020 for year 2020, December 30, 2018 through September 28, 2019 for year 2019. Health care facility is abbreviated HCF. Residence includes the residence of the caller or another residence. Other includes schools, workplaces, outdoors.

The difference in average exposure calls per week by time period and caller location are presented in Table 1. Exposures reported by callers from sites other than residences or health care facilities are not presented due to low case counts. The number of exposures reported by a caller at a residence in the first 11 weeks of 2020 were not statistically different from 2019. From week 12 through week 25, when total prescription opioid exposure call volume declined, the total number of exposures reported by callers at a residence significantly increased by 18.8 ($p < 0.001$) exposures/week. Among exposures reported by callers at a residence, exposures involving morphine (4.1 exposures/week, $p = 0.012$) and exposures resulting in no or minor effects (8.9 exposures/week, $p = 0.034$) significantly increased from week 12 through week 25. From week 26 through week 39, adverse reaction exposures (7.4 exposures/week, $p < 0.001$) significantly increased.

When evaluating calls from health care facilities, there was a nonsignificant decrease in the total number of exposures from week 1 through week 11. In week 12 through week 25, exposures reported by callers at health care facilities decreased 86.9 ($p < 0.001$) per week on average. The largest decreases were among exposures involving hydrocodone (41.6, $p < 0.001$) or tramadol (28.0, $p < 0.001$), exposures where the reason for exposure was suspected suicidal (68.2, $p < 0.001$), and exposures where the outcome of the exposure was no effect or minor effect (54.0, $p < 0.001$), or moderate effect (21.4, $p < 0.001$). Abuse exposures increased 10.8 exposures/week ($p < 0.001$) on average from week 12 through week 25 (Figure 3). Exposures reported by a caller at a health care facility decreased 23.4 exposures/week ($p = 0.003$) from weeks 26 through week 39. Decreases were largest in suspected suicidal exposures (36.6 exposures/week, $p < 0.001$), exposures involving hydrocodone (21.4 exposures/week, $p < 0.001$) or tramadol (20.4 exposures/week, $p < 0.001$), and exposures where the outcome was no effect or minor (28.3 exposures/week, $p < 0.001$). Exposures where the reason was abuse (15.9 exposure/week, $p < 0.001$) (Figure 3) and exposures where the outcome was major or death (10.9 exposures/week, $p = 0.007$) significantly increased.

Figure 3. Intentional abuse exposures involving prescription opioids in the first 39 weeks of 2019 and 2020 by caller location



Weeks represent Sunday through Saturday with the first week including days from the previous year, weeks 1 through 39 represent December 29, 2019 through September 26, 2020 for 2020, December 30, 2018 through September 28, 2019 for 2019. Health care facility is abbreviated HCF. Residence includes the residence of the caller or another residence.



Table 1. Change in exposure call volume in 2020 relative to 2019 by caller site, opioid active pharmaceutical ingredient, exposure reason, and medical outcome

Variable	Value	Reported by Callers from Residences			Reported by Callers from Health Care Facilities		
		Week 1 through 11	Week 12 through 25	Week 26 through 39	Week 1 through 11	Week 12 through 25	Week 26 through 39
Total	All exposures	2.5	18.8, (p<0.001)	12.4, (p=0.023)	-2.7	-86.9, (p<0.001)	-23.4, (p=0.003)
Drug Group	Buprenorphine	4.5	4.7	3.1	9.9, (p=0.009)	-7.4, (p=0.035)	3.5
	Fentanyl	-0.4	-0.1	-0.6	-2.6	-1.9	-1.4
	Hydrocodone	-3.4	-4.5	3.6	-7.2	-41.6, (p<0.001)	-21.4, (p<0.001)
	Hydromorphone	-0.3	-0.1	-0.4	1.2	-1.3	0.1
	Methadone	-0.4	2.2	1.9	1.4	-1.4	3.1
	Morphine	0.4	4.1, (p=0.012)	-0.4	-2.6	-7.4, (p<0.001)	-1.9
	Oxycodone	2.8	4.7	6.6	5.7	-4.2	11.7
	Oxymorphone	-0.2	0.5	-0.2	-0.8	0	-1.4
	Tramadol	-1.7	5.8	-1.6	-9.1	-28.0, (p<0.001)	-20.4, (p<0.001)
Exposure Reason	Abuse	3.3, (p=0.050)	1.7	0.1	7.5	10.8, (p<0.001)	15.9, (p<0.001)
	Adverse reaction	1.9	4	7.4, (p<0.001)	-0.1	-1.4	0
	Misuse	1.7	3.6	-0.4	1.5	-7.7, (p=0.002)	-4
	Withdrawal	-0.4	-0.1	-0.5	-1.2	0.3	-0.6
	Suspected suicidal	0	2.7	1.5	-4.3	-68.2, (p<0.001)	-36.6, (p<0.001)
	Therapeutic error	1.2	4.3	5.5	1.5	-8.7, (p<0.001)	1.1
	Unintentional general	-4.3	0.1	-2	-3.4	-6.2, (p=0.008)	0.4
	Unknown	-1.3	0.1	0.6	-3.9	-5.8, (p<0.001)	-0.4
	Unknown intentional	-0.5	1.8	0.4	0.5	0.4	1.6
	Other exposure reasons	0.2	-0.4	0.4	-0.7	-0.5	0.1
Medical Outcome	Major effect/death	0.4	1.1	-0.3	-2.6	-6	10.9, (p=0.007)
	Moderate effect	1.4	1.2	0.9	-0.3	-21.4, (p<0.001)	-5.8
	No/minor effect	-3.8	8.9, (p=0.034)	4.4	0.5	-54.0, (p<0.001)	-28.3, (p<0.001)
	Not followed	0.7	-2.5	3.1	0.5	-2.9	-3.8, (p=0.029)
	Unable to follow	5	9.6, (p<0.001)	2.4	3.1	-0.5	3.1
	Unrelated	-1.1	1.3	1.5	-3.6	-1.1	-1.3

Weeks represent Sunday through Saturday with the first week including days from the previous year, weeks 1 through 39 represent December 29, 2019 through September 26, 2020 for 2020, December 30, 2018 through September 28, 2019 for 2019. Purple shading indicates a statistically significant increase relative to 2019, green shading indicates a statistically significant decrease. Residence includes the residence of the caller or another residence.



Conclusions

Prescription opioid exposures reported to poison centers in 2020 significantly decreased from March 15 through June 20, 2020 relative to a similar time period in 2019. This is the time frame in which many states implemented and began to ease policies aimed at reducing the spread of COVID-19. In the weeks before and weeks after this time frame, call volume was not statistically different from 2019. The decline in exposures was largely due to fewer reports of exposures by callers at health care facilities. The largest decreases among exposures reported by callers at health care facilities were where the reason for exposure was suspected suicidal, exposures that involved hydrocodone or tramadol, and exposures that resulted in either no effect, minor effect, or moderate effect. Though the total number of exposures reported by callers at health care facilities declined during these weeks, exposures where the reason was abuse and where the outcome was major or death increased. Exposures reported by callers from residences increased in both the period from March 15 through June 20 and from June 21 through September 26, 2020 compared to the same periods in 2019.

There are multiple factors that may affect exposures reported by callers at health care facilities. Some reasons behind exposures (suicidal, accidental pediatric ingestions, misuse, therapeutic errors) may have decreased because children or adolescents spent more time around caregivers who provided more supervision. However, it is possible that these behaviors were underreported to either health care facilities or poison centers due to attempts to decrease emergency department visits in the face of the pandemic, or due to decreased outside visitors in the home. The increases in abuse reports are noteworthy in that it suggests that reductions in exposure calls from health care facilities may not be due to systematic reductions in reporting to poison centers but reflect behavior changes during this stage of the pandemic. Additionally, the increase in outcomes that involved major effects or death in these calls suggest that more severe cases were still reported during this time despite the overall decreases. However, these increases may be underestimates of true increases in abuse of prescription opioid abuse in 2020. Further investigation is needed to understand the factors affecting poison center utilization during the COVID-19 pandemic.

Suggested Citation

Severtson SG, Gurrola M, Dart RC, Iwanicki JL (2020): Suspected suicidal exposures involving prescription opioids reported to poison centers decreased following the emergence of the COVID-19 pandemic; abuse exposures increased. RADARS® System Technical Report, 2020-Q3.

References

- ¹Dart RC, et al. Trends in opioid analgesic abuse and mortality in the United States. *The New England journal of medicine*. 2015;372(16):1573-4.
- ²Iwanicki JL, et al. Abuse and Diversion of Immediate Release Opioid Analgesics as Compared to Extended Release Formulations in the United States. *PloS one*. 2016;11(12):e0167499.
- ³Wang GS, et al. Unit-Dose Packaging and Unintentional Buprenorphine-Naloxone Exposures. *Pediatrics*. 2018;141(6).
- ⁴Reifler LM, et al. Do prescription monitoring programs impact state trends in opioid abuse/misuse? *Pain medicine*. 2012;13(3):434-42.
- ⁵Severtson SG, et al. Reduced abuse, therapeutic errors, and diversion following reformulation of extended-release oxycodone in 2010. *The journal of pain : official journal of the American Pain Society*. 2013;14(10):1122-30.
- ⁶Davis JM, et al. Seasonal variation in suicidal behavior with prescription opioid medication. *Journal of affective disorders*. 2014;158:30-6.
- ⁷Iwanicki JL, et al. Consistency Between Opioid-Related Mortality Trends Derived From Poison Center and National Vital Statistics System, United States, 2006-2016. *American journal of public health*. 2018;108(12):1639-45.
- ⁸Levin-Rector A, et al. Refining historical limits method to improve disease cluster detection, New York City, New York, USA. *Emerging infectious diseases*. 2015;21(2):265-72.
- ⁹Bucher Bartelson B, et al. Changes in misuse and abuse of prescription opioids following implementation of Extended-Release and Long-Acting Opioid Analgesic Risk Evaluation and Mitigation Strategy. *Pharmacoepidemiology and drug safety*. 2017;26(9):1061-70.
- ¹⁰Dasgupta N, et al. Implications of Declining Poison Center Case Volume on Drug Abuse Trend Monitoring. RADARS® System Technical Report, 2017-Q3. 2017.
- ¹¹Gummin DD, et al. 2019 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 37th Annual Report. *Clinical toxicology*. 2020;58(12):1360-1541.
- ¹²Benjamini Y, Hochberg Y. Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing. *Journal of the Royal Statistical Society: Series B (Methodological)*. 1995;57(1):289-300.



RADARS® System Poison Center Program Participating Sites

- Arizona Poison and Drug Information Center: Dudley S, Johnson L.
- Arkansas Poison and Drug Information Center: Foster H, Nolte T.
- Banner Poison and Drug Information Center: Stevens D.
- Blue Ridge Poison Center: Holstege CP, Rege S
- California Poison Control System – Sacramento: Lewis J.
- California Poison Control System – Fresno/Madera: Huntington S.
- California Poison Control System – San Francisco: Ho R.
- California Poison Control System – San Diego: Cantrell L.
- Central Ohio Poison Center: Funk A.
- Central Texas Poison Center: Baker SD.
- Cincinnati Drug and Poison Information Center: Yin S, Pierce B.
- Connecticut Poison Control Center: Doyon S.
- Florida Poison Information Center – Jacksonville: Schauben JL, Sollee D.
- Florida Poison Information Center – Miami: Bernstein J, Weisman RS.
- Florida Poison Information Center – Tampa: Aleguas A, Cullen T, Kreiser C.
- Georgia Poison Center: Jones A, Geller RJ, Lopez G, Hon S.
- Illinois Poison Center: Kubic A, DesLauries C.
- Indiana Poison Center: Overberg A.
- Iowa Poison Control Center: Bottei E, Kalin L, Ringling S.
- Kentucky Regional Poison Center: Runge H, Webb A.
- Louisiana Poison Center: Ryan M.
- Maryland Poison Center: Goodrich L, Anderson B.
- Massachusetts/Rhode Island Poison Center: Burns M, Sheroff A.
- Minnesota Poison Control System: Lee S, Mattinen D.
- Michigan Regional Poison Control Center: Aaron C, Kolakowski D.
- Mississippi Poison Control Center: Cox R, Stamps D.
- Missouri Regional Poison Center: Weber J.
- Nebraska Regional Poison Center: Jacobitz K, Rasmussen M.
- New Jersey Poison Information and Education System: Ruck B, Calello D, Rego R.
- New Mexico Poison and Drug Information Center: Smolinske S.
- New York City Poison Control Center: Hoffman R, Mercurio-Zappala M.
- North Texas Poison Center: Llerena O, Gardner M.
- Northern New England Poison Center: Simone KE, Lancia C.
- Oklahoma Poison Control Center: Schaeffer S
- Oregon Poison Center: McKeown N, Pizarro-Osilla C.
- Palmetto Poison Center: Michels J.
- Pittsburgh Poison Center: Korenoski A, Supan W, Boda T, Suvak M.
- Regional Poison Control Center of Alabama: White A, Whitworth B, LaDonna G, Slattery A.
- Rocky Mountain Poison & Drug Safety: Dart RC.
- South Texas Poison Center: Cobb DB, Stoller V.
- Tennessee Poison Center: Kumar S, Seger D.
- Texas Panhandle Poison Center: Jaramillo J, Rivers R.
- The Poison Control Center at The Children’s Hospital of Philadelphia: Trella J, Zang T.
- The University of Kansas Hospital Poison Control Center: Silver E, Oller L.
- Upstate New York Poison Center: Stork C, Caliva M.
- Utah Poison Control Center: Johnson A.
- Virginia Poison Center: Rose SR.
- Washington Poison Center: Hastings N, Cole P, Von Derau K.
- West Texas Regional Poison Center: Baeza S, Anzures J.
- West Virginia Poison Center: Scharman EJ, Cook JR.
- Wisconsin Poison Center: Kostic M.
- Alabama Poison Center: Dorough L. – (closed September 2013)
- Long Island Regional Poison and Drug Information Center: Caraccio T, Jao D. – (closed December 2010)
- Northern Ohio Poison Center: Quang L. – (closed February 2014)
- The Ruth A. Lawrence Poison & Drug Information Center Serving Finger Lakes: Barton N, McFarland S, Rekkerth D. – (closed December 2010)
- Western New York Poison Center: Joshi P. – (closed December 2010)

