

2017 Annual Report of the University of Kansas Health System Poison Control Center

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ABSTRACT

Introduction. This is the 2017 Annual Report of the University of Kansas Health System Poison Control Center (PCC). The PCC is one of 55 certified poison control centers in the United States and serves the state of Kansas 24-hours a day, 365 days a year. The PCC receives calls from the public, law enforcement, health care professionals, and public health agencies, which are answered by trained and certified specialists in poison information with the immediate availability of medical toxicology back up. All calls to the PCC are recorded electronically in the Toxicall® data management system and uploaded in near real-time to the National Poison Data System (NPDS), which is the data repository for all poison control centers in the United States.

Methods. All encounters reported to the PCC from January 1, 2017 to December 31, 2017 were analyzed. Data recorded for each exposure included caller location, age, weight, gender, substance exposed to, nature of exposure, route of exposure, interventions, medical outcome, disposition and location of care. Encounters were classified further as human exposure, animal exposure, confirmed non-exposure, or information call (no exposure reported).

Results. The PCC logged 21,431 total encounters in 2017, including 20,278 human exposure cases. Cases came from every county in Kansas. Most of the human exposure cases (51.4%, n = 10,430) were female. Approximately 66% (n = 13,418) of human exposures involved a child (defined as age less than 20 years). Most encounters occurred at a residence (94.0%, n = 19,018) and most calls (69.5%, n = 14,090) originated from a residence. Almost all human exposures (n = 19,823) were acute cases (exposures occurring over eight hours or less). Ingestion was the most common route of exposure documented (80.5%, n = 17,466). The most common reported substance in pediatric encounters was cosmetics/personal care products (n = 1,255), followed by household cleaning products (n = 1,251). For adult encounters, analgesics (n = 1,160) and sedatives/hypnotics/antipsychotics (n = 1,127) were the most frequently involved substances. Unintentional exposures were the most common reason for exposures (78.6%, n = 15,947). Most encounters (69.4%, n = 14,073) were managed in a non-health care facility (i.e., a residence). Among human exposures, 14,940 involved exposures to pharmaceutical agents, while 9,896 involved exposure to non-pharmaceuticals. Medical outcomes were 28% (n = 5,741) no effect, 18% (n = 3,693) minor effect, 9% (n = 1,739) moderate effect, and 2% (n = 431) major effect. There were 16 deaths in 2017 reported to the PCC. Number of exposures, calls from health care facilities, cases with moderate or



major medical outcomes, and deaths increased in 2017 compared to 2016, despite a decrease in total exposures.

Conclusions. The results of the 2017 University of Kansas Health System Poison Control annual report demonstrated that the center continues to receive calls from the entire state of Kansas, totaling over 20,000 human exposures per year. While pediatric exposures remain the most common, a trend of increasing number of calls remains from health care facilities and for cases with serious outcomes. The 2017 PCC data reflected current national trends. This report demonstrated the continued importance of the PCC to both the public and health care providers in the state of Kansas.

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INTRODUCTION

This is the 2017 Annual Report of University of Kansas Health System Poison Control Center (PCC). The PCC is a 24-hour 365 day/year health care information resource serving the state of Kansas. It was founded in 1982 and is certified with the American Association of Poison Control Centers (AAPCC). There are 55 certified poison control centers in the United States. The PCC is staffed by nine certified specialists in poison information who are either critical care trained nurses or doctors of pharmacy. There is 24-hour back-up provided by four fellowship trained, board certified medical toxicologists.

The PCC receives calls from the public, law enforcement, health care professionals, and public health agencies. Encounters may involve an exposed animal or human (Exposure Call) or a request for information with no known exposure (Information Call). The PCC follows all cases to make management recommendations, monitor case progress, and document medical outcome. This information is recorded electronically in the Toxicall® data management system and uploaded in near real-time to the National Poison Data System (NPDS). NPDS is the data warehouse for all the nation's poison control centers.¹ The average time to upload data for all PCCs is 9.50 [7.33, 14.6] (median [25%, 75%]) minutes, creating a real-time national exposure database and surveillance system. The PCC has the ability to share NPDS real time surveillance with state and local health departments and other regulatory agencies. An analysis and summary of all encounters reported to the PCC from January 1, 2017 to December 31, 2017 follows.

METHODS

All PCC encounters recorded electronically in the Toxicall® data management system from January 1, 2017 to December 31, 2017 were analyzed. Cases were first classified as either an exposure or suspected exposure (Human Exposure, Animal Exposure, Non-Exposure Confirmed Cases) or a request for information with no reported exposure (Information Call). Extracted data included caller location, age, weight, gender, exposure substance, number of follow-up calls, nature of exposure (i.e., unintentional, recreational, or intentional), exposure scenario, route of exposure (oral, dermal, parenteral),

interventions, medical outcome (no effect, minor, moderate, severe or death), disposition (admitted to noncritical care unit, admitted to critical care unit, admitted to psychiatry unit, lost to follow-up or treated and released), and location of care (non-health care facility or health care facility). For this analysis, a pediatric case was defined as any patient 19 years of age or less. This is consistent with NPDS methodology. For medical outcome, the following definitions were used: minor (minimally bothersome symptoms), moderate (more pronounced symptoms, usually requiring treatment), and major (life threatening signs and symptoms).

Data were analyzed using Microsoft Excel (Microsoft Corp, Redmond, WA).

RESULTS

The PCC logged 21,431 total calls in 2017, including 20,278 human exposure cases, 77 non-exposure confirmed cases, 119 animal exposure cases, and 957 information calls. This was a decrease of 534 calls (2.4%) compared to 2016. For information calls, drug information (n = 311) was most common reason for calling. Table 1 further describes the encounter types. The PCC made 31,715 follow-up calls in 2017. Follow-up calls were done in 58.8% of human exposure cases. One follow-up call was made in 26.9% of human exposure cases; multiple follow-up calls (range 2 - 45) were made in 32.0% of cases. In human exposure calls for which follow-up calls were made, an average of 2.66 follow-up calls per case were performed.

The PCC received calls from all 105 counties in Kansas. The county with the largest number of calls was Sedgwick County with 3,260. In addition, calls were received from 48 states, the District of Columbia, Puerto Rico, and the US Virgin Islands; five calls were from foreign countries.

The majority of human exposure cases (51.4%, n = 10,430) were female. A male predominance was found among encounters involving children younger than 13 years of age, but this gender distribution was reversed in teenagers and adults, with females comprising most of the reported exposures. Approximately 66% (n = 13,418) of human exposures involved a child (defined as age 19 years or less). Table 2 illustrates distribution of human exposures by age and gender. Patients one year of age were the most common age group involved in encounters reported to the PCC. For adults, the age group of 20 - 29 years old was most commonly encountered. Seventy-seven (77) exposures occurred in pregnant women (0.4% of all human exposures). Of these exposures, 29.9% occurred in the first trimester, 37.7% occurred in the second trimester, and 27.3% occurred in the third trimester. Most of these exposures (71.4%) were unintentional exposures and 19.5% were intentional exposures. There were no reported deaths to PCC in pregnant women in 2017.

Table 1. Encounter type.

	Number	%
Exposure		
Human exposure	20,278	94.32
Animal exposure	119	0.51
Subtotal	20,397	94.83
Non-Exposure Confirmed Cases		
Human non-exposure	77	0.39
Subtotal	77	0.39
Information Call		
Drug information	311	1.40
Drug identification	117	0.86
Environmental information	94	0.56
Medical information	14	0.14
Occupational information	5	0.00
Poison information	112	0.50
Prevention/safety/education	19	0.14
Teratogenicity information	4	0.00
Other information	46	0.22
Substance abuse	11	0.03
Administrative	6	0.07
Caller referred	218	0.86
Subtotal	957	4.78
Total	21,431	100.00

For human exposures, 69.5% (n = 14,090) of calls originated from a residence (own or other), while 93.8% (n = 19,018) of these exposures actually occurred at a residence (own or other). Calls from a health care facility accounted for 24.1% (n = 4,892) of human exposure encounters. Table 3 further details the origin of human exposure calls and where the exposure took place.

Human exposures were predominantly (87.3%, n = 17,694) acute cases (i.e., exposures occurring over eight hours or less). Chronic exposures (exposures occurring more than eight hours) accounted for 1.8% (365) of all human exposures reported. Acute or chronic exposures (single exposure that was preceded by a chronic exposure of more than eight hours) totaled 2,129 (10.5%). Ingestion was the most common route of exposure documented (80.5%, n = 17,466; Table 4) in all cases.

The most common reported substance in those less than five years of age was cosmetics/personal care products (n = 1,255) followed closely by household cleaning products (n = 1,251). For adult (> 19 years of age) encounters, analgesics (n = 1,160) and sedatives/hypnotics/antipsychotics (n = 1,127) were the most frequently involved substances. Among all encounters, analgesics (n = 2,833, 11.3%) were the most frequently encountered substance category. Table 5 lists most frequently encountered substance categories for pediatric encounters and Table 6 lists those for adult encounters. A summary log for all exposures categorized by category and sub-category of substance is presented in an online supplemental appendix (journals.ku.edu/kjm).

Table 2. Distribution of human exposures by age and gender.

Age	Male		Female		Unknown Gender		Total		Cumulative Total	
	N	% of Age Group Total	N	% of Age Group Total	N	% of Age Group Total	N	% of Total Exposure	N	%
< 1 year	584	51.64	545	48.19	2	0.18	1,131	5.58	1,131	5.58
1 year	1,792	53.18	1,577	46.80	1	0.03	3,370	16.62	4,501	22.20
2 years	1,734	52.91	1,540	46.99	3	0.09	3,277	16.16	7,778	38.36
3 years	809	54.66	671	45.34	0	0.00	1,480	7.30	9,258	45.66
4 years	400	56.58	307	43.42	0	0.00	707	3.49	9,965	49.14
5 years	274	62.70	163	37.30	0	0.00	437	2.16	10,402	51.30
Unknown ≤ 5 years	3	100.00	0	0.00	0	0.00	3	0.01	10,405	51.31
Child 6 - 12 years	702	59.90	469	40.02	1	0.09	1,172	5.78	11,577	57.09
Teen 13 - 19 years	645	35.19	1,186	64.70	2	0.11	1,833	9.04	13,410	66.13
Unknown child	4	50.00	3	37.50	1	12.50	8	0.04	13,418	66.17
Subtotal	6,947	51.77	6,461	48.15	10	0.07	13,418	66.17	13,418	66.17
20 - 29 years	808	45.27	977	54.73	0	0.00	1,785	8.80	15,203	74.97
30 - 39 years	612	43.37	799	56.63	0	0.00	1,411	6.96	16,614	81.93
40 - 49 years	411	38.48	657	61.52	0	0.00	1,068	5.27	17,682	87.20
50 - 59 years	387	40.95	558	59.05	0	0.00	945	4.66	18,627	91.86
60 - 69 years	316	42.93	419	56.93	1	0.14	736	3.63	19,363	95.49
70 - 79 years	175	37.88	287	62.12	0	0.00	462	2.28	19,825	97.77
80 - 89 years	80	32.13	169	67.87	0	0.00	249	1.23	20,074	98.99
≥ 90 years	24	38.71	38	61.29	0	0.00	62	0.31	20,136	99.30
Unknown adult	45	47.87	49	52.13	0	0.00	94	0.46	20,230	99.76
Subtotal	2,858	41.96	3,953	58.03	1	0.01	6,812	33.59	20,230	99.76
Total*	9,812	48.39	10,430	51.44	36	0.18	20,278	100.00	20,278	100.00

*Total includes 48 unknown age cases.

Table 3. Origin of call and site of exposure for human exposure cases.

Site	Origin of Call		Site of Exposure	
	N	%	N	%
Residence				
Own	13,773	67.92	18,315	90.32
Other	317	1.56	703	3.47
Workplace	269	1.33	438	2.16
Health care facility	4,892	24.12	77	0.38
School	52	0.26	221	1.09
Restaurant/food service	4	0.02	36	0.18
Public area	70	0.35	175	0.86
Other	889	4.38	227	1.12
Unknown	12	0.06	86	0.42

Table 4. Route of human exposures.

Route	Human Exposures		
	N	% of All Routes	% of All Cases
Ingestion	17,466	80.54	86.13
Dermal	1,663	7.67	8.20
Inhalation/nasal	1,159	5.34	5.72
Ocular	820	3.78	4.04
Bite/sting	203	0.94	1.00
Unknown	168	0.77	0.83
Parenteral	148	0.68	0.73
Other	23	0.11	0.11
Otic	22	0.10	0.11
Rectal	7	0.03	0.03
Aspiration (with ingestion)	4	0.02	0.02
Vaginal	4	0.02	0.02
Total number of routes	21,687	100.00	106.95

*Some cases may have multiple routes of exposure documented.

Table 5. Substance categories most frequently involved in exposures for ages five years or less.

Substance Category	All Substance	%	Single Substance Exposures	%
Cosmetics/personal care products	1,255	11.48	1,221	12.16
Cleaning substances (household)	1,251	11.44	1,204	11.99
Analgesics	996	9.11	886	8.82
Antihistamines	607	5.55	543	5.41
Foreign bodies/toys/miscellaneous	541	4.95	523	5.21
Topical preparations	534	4.88	514	5.12
Vitamins	468	4.28	417	4.15
Pesticides	429	3.92	417	4.15
Dietary supplements/herbals/homeopathic	409	3.74	378	3.76
Gastrointestinal preparations	292	2.67	257	2.56
Plants	275	2.51	268	2.67
Antimicrobials	237	2.17	217	2.16
Electrolytes and minerals	231	2.11	205	2.04
Cold and cough preparations	222	2.03	199	1.98
Hormones and hormone antagonists	202	1.85	156	1.55

Table 6. Substance categories most frequently involved in exposures of adults (> 19 years).

Substance Category	All Substance	%	Single Substance Exposures	%
Analgesics	1,160	11.45	489	9.55
Sedative/hypnotics/antipsychotics	1,127	11.12	357	6.97
Antidepressants	848	8.37	274	5.35
Cardiovascular drugs	713	7.04	231	4.51
Alcohols	482	4.76	56	1.09
Cleaning substances (household)	437	4.31	342	6.68
Anticonvulsants	427	4.21	123	2.40
Antihistamines	416	4.10	179	3.49
Pesticides	397	3.92	153	2.99
Hormones and hormone antagonists	308	3.04	153	2.99
Stimulants and street drugs	295	2.91	106	2.07
Fumes/gases/vapors	230	2.27	206	4.02
Chemicals	223	2.20	186	3.63
Cosmetics/personal care products	216	2.13	187	3.65
Muscle relaxants	211	2.08	76	1.48

There was a total of 395 plant exposures reported to the PCC. The most common plant exposure encountered was to pokeweed (*Phytolacca americana*) (n = 45). Table 7 lists the top five most encountered plants.

Table 7. Top five most frequent plant exposures.

Botanical Name or Category	N
<i>Phytolacca americana</i> (L.) (Pokeweed)	45
Cherry (Species unspecified)	18
Plants - Toxicodendrol	16
Philodendron (Species unspecified)	13
<i>Spathiphyllum</i> species (Botanic name)	10
Unknown plant	28

Unintentional exposures were the most common reason for exposures (78.6%, n = 15,947) while intentional exposures accounted for 18.8% (n = 3,818) of exposures. Compared to 2016, there was a 12.5% increase in the number of intentional exposures (n = 441). Table 8 lists reasons for human exposures. Most unintentional exposures, 65.0% (n = 10,361), occurred in the less than five years old age group. Up to 12 years of age, 98.5% (n = 11,577) of ingestions were unintentional. However, in the 13 - 19 age group, intentional exposure was most common (67%, n = 1,229). In total, suspected suicide attempts accounted for 14.3% (n = 2,906) of human encounters. This was an increase of 17% (n = 491) compared to 2016 data. When a therapeutic error was the reason for exposure, a double dose was the most common scenario, 29.4% (n = 727).

Table 8. Reason for human exposure cases.

Reason	N	% Human Exposures
Unintentional		
General	10,847	53.5
Therapeutic error	2,395	11.8
Misuse	1,371	6.8
Environmental	596	2.9
Occupational	345	1.7
Bite/sting	206	1.0
Food poisoning	165	0.8
Unknown	22	0.1
Subtotal	15,947	78.6
Intentional		
Suspected suicide	2,906	14.3
Misuse	486	2.4
Abuse	335	1.7
Unknown	91	0.4
Subtotal	3,818	18.8
Adverse reaction		
Drug	241	1.2
Other	65	0.3
Food	37	0.2
Subtotal	343	1.7
Unknown		
Unknown reason	89	0.4
Subtotal	89	0.4
Other		
Malicious	56	0.3
Contamination/ tampering	15	0.1
Withdrawal	10	0.0
Subtotal	81	0.4
Total	20,278	100.0

Most encounters (69.4%, n = 14,073) were managed in a non-health care facility (i.e., a residence). Of the 5,982 encounters managed at a health care facility, 47.7% (n = 2,851) were admitted. Table 9 lists the management site of all human encounters.

Among human exposures, 14,940 involved exposures to pharmaceutical agents while 9,896 involved exposure to non-pharmaceuticals. Because an encounter could include numerous pharmaceutical and non-pharmaceutical agents, this total is greater than the total number of encounters. However, 87.3% (n = 17,700) of all human exposures were exposed to only a single substance. Among these single substance exposures, the reason for exposure was intentional in 22.2% (n = 1,980) of pharmaceutical-only cases compared to 3.6% (n = 319) of non-pharmaceutical single substance exposures.

When medical outcomes were analyzed, 28.3% (n = 5,741) of human exposures had no effect, 18.2% (n = 3,693) had minor effect, 8.5% (n = 1,739) had moderate effect, and 2.1% (n = 431) major effects. Moderate and major effects were more common in those over 20

years of age and in those with intentional encounters. More serious outcomes were related to single-substance pharmaceutical exposures, accounting for 25% (n = 4) of the fatalities. Table 10 lists all medical outcomes by age and Table 11 lists outcomes by reason for exposure.

Use of decontamination and specific therapies, including antidotal therapy, is detailed in Tables 12a and 12b. Sixteen deaths were reported to the PCC in 2017 (Table 13). Fourteen deaths involved adult patients. Twelve deaths involved intentional exposures.

Table 14 compares key statistics from 2015, 2016, and 2017. While total number of exposures declined in 2017 compared to 2016, calls from health care facilities, moderate or major outcomes, and deaths continued to increase.

Table 9. Management site of human exposures.

Site of Management	N	%
Healthcare facility		
Treated/evaluated and released	3,131	15.4
Admitted to critical care unit	1,449	7.2
Admitted to noncritical care unit	719	3.6
Admitted to psychiatric facility	481	2.4
Patient lost to follow-up/left AMA	202	1.0
Healthcare Facility Subtotal	5,982	29.5
Non-healthcare facility	14,073	69.4
Other	28	0.1
Refused referral	175	0.9
Unknown	20	0.1
Total	20,278	100.0

DISCUSSION

The University of Kansas Health System Poison Control Center has been in operation for 36 years and receives over 21,000 calls per year. The PCC is an integral part of the emergency medical response, public health, and health care facilities in Kansas. Childhood poisonings, both unintentional and intentional, are a major focus, with calls for patients under 19 years of age accounting for approximately two-thirds of all exposures.

The PCC statistics reflect the trends seen nationally.¹ In 2017, 2,607,413 encounters were logged by poison control centers nationwide, including 2,115,186 human exposures. Total encounters showed a 3.79% decline from 2016 but health care facility human exposure cases increased by 3.06%. More serious outcomes (moderate, major, or death) have increased since 2000. Nationwide, the five substance classes most frequently involved in adult exposures were analgesics, sedative/hypnotics/antipsychotics, antidepressants, cardiovascular drugs, and cleaning substances (household), while the top five most common exposures in children age five years or less were cosmetics/personal care products, household cleaning substances, analgesics, foreign bodies/toys/miscellaneous, and topical preparations. There were 2,682 exposure related fatalities reported nationwide in 2017, an increase of 1,190 deaths from 2016.²

Table 10. Medical outcome of human exposure cases by patient age.

Outcome	≤ 5 Years		6 - 12 Years		13 - 19 Years		≥ 20 Years		Unknown Child		Unknown Adult		Unknown Age		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
No effect	3,843	36.93	280	23.89	477	26.02	1,112	16.55	1	12.50	6	6.38	22	45.8	5,741	28.31
Minor effect	1,137	10.93	232	19.80	562	30.66	1,733	25.80	1	12.50	26	27.66	2	4.2	3,693	18.21
Moderate effect	122	1.17	37	3.16	371	20.24	1,206	17.95	0	0.00	3	3.19	0	0.0	1,739	8.58
Major effect	15	0.14	8	0.68	51	2.78	357	5.31	0	0.00	0	0.00	0	0.0	431	2.13
Death	0	0.00	1	0.09	1	0.05	14	0.21	0	0.00	0	0.00	0	0.0	16	0.08
No follow-up, nontoxic	381	3.66	34	2.90	13	0.71	30	0.45	0	0.00	3	3.19	0	0.0	461	2.27
No follow-up, minimal toxicity	4,566	43.88	511	43.60	263	14.35	1,709	25.44	4	50.00	38	40.43	8	16.7	7,099	35.01
No follow-up, potentially toxic	240	2.31	41	3.50	69	3.76	267	3.97	2	25.00	15	15.96	14	29.2	648	3.20
Unrelated effect	101	0.97	28	2.39	26	1.42	290	4.32	0	0.00	3	3.19	2	4.2	450	2.22
Death, indirect report	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.0	0	0.00
Total	10,405	100.00	1,172	100.00	1,833	100.00	6,718	100.00	8	100.00	94	100.00	48	100.00	20,278	100.00

Table 11. Medical outcome by reason for exposure in human exposures.

Outcome	Unintentional		Intentional		Other		Adverse Reaction		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Death	1	0.01	13	0.34	0	0.00	0	0.00	2	2.25	16	0.08
Death, indirect report	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Major effect	67	0.42	339	8.88	3	3.70	7	2.04	15	16.85	431	2.13
Minor effect	2,455	15.39	1,107	28.99	22	27.16	100	29.15	9	10.11	3,693	18.21
Moderate effect	537	3.37	1,128	29.54	9	11.11	45	13.12	20	22.47	1,739	8.58
No effect	4,864	30.50	842	22.05	13	16.05	15	4.37	7	7.87	5,741	28.31
No follow-up, nontoxic	443	2.78	16	0.42	1	1.23	1	0.29	0	0.00	461	2.27
No follow-up, minimal toxicity	6,810	42.70	172	4.50	14	17.28	90	26.24	13	14.61	7,099	35.01
No follow-up, potentially toxic	445	2.79	162	4.24	10	12.35	18	5.25	13	14.61	648	3.20
Unrelated effect	325	2.04	39	1.02	9	11.11	67	19.53	10	11.24	450	2.22
Total	15,947	100.00	3,818	100.00	81	100.00	343	100.00	89	100.00	20,278	100.00

Table 12a. Decontamination provided in human exposures by age.

Decontamination	≤ 5 Years	6 - 12 Years	13 - 19 Years	≥ 20 Years	Unknown Child	Unknown Adult	Unknown Age	Total
Cathartic	1	2	18	16	0	0	0	37
Charcoal, multiple doses	2	0	9	8	0	0	0	19
Charcoal, single dose	55	11	153	192	0	0	0	411
Dilute/irrigate/wash	7,870	754	444	2,559	2	38	3	11,670
Food/snack	1,589	140	67	355	1	4	0	2,156
Fresh air	105	41	60	442	1	18	22	689
Lavage	0	0	1	5	0	0	0	6
Other emetic	61	6	13	32	0	0	0	112
Whole bowel irrigation	1	1	3	10	0	0	0	15

Table 12b. Therapy provided in human exposures by age.

Therapy	≤5 Years	6 - 12 Years	13 - 19 Years	≥20 Years	Unknown Child	Unknown Adult	Unknown Age	Total
Alkalinization	2	1	48	140	0	0	0	191
Antiarrhythmic	1	0	1	9	0	0	0	11
Antibiotics	23	8	14	159	0	0	0	204
Anticonvulsants	0	1	1	5	0	0	0	7
Antiemetics	22	5	115	231	0	0	0	373
Antihistamines	23	14	11	76	0	0	0	125
Antihypertensives	1	1	2	20	0	0	0	24
Antivenin/antitoxin	0	1	2	6	0	0	0	9
Antivenin (fab fragment)	2	3	1	18	0	0	0	24
Atropine	0	1	1	15	0	0	0	17
Benzodiazepines	18	5	80	296	0	0	0	399
Bronchodilators	7	4	9	63	0	0	0	83
Calcium	156	8	4	26	0	0	0	194
Cardioversion	0	0	0	2	0	0	0	2
CPR	0	0	0	7	0	0	0	7
Deferoxamine	0	0	1	1	0	0	0	2
Fab fragments	1	0	4	4	0	0	0	9
Fluids, IV	75	24	558	1,502	0	0	0	2,159
Flumazenil	0	0	7	43	0	0	0	50
Folate	0	0	0	2	0	0	0	2
Fomepizole	0	1	0	17	0	0	0	18
Glucagon	0	0	1	25	0	0	0	26
Glucose, > 5%	0	0	7	45	0	0	0	52
Hemodialysis	0	0	0	22	0	0	0	22
Hemoperfusion	0	0	0	1	0	0	0	1
Hydroxocobalamin	0	0	0	4	0	0	0	4
Hyperbaric oxygen	0	2	1	6	0	0	0	9
Insulin	0	0	1	25	0	0	0	26
Intubation	8	2	32	199	0	0	0	241
Methylene blue	0	0	0	3	0	0	0	3
NAC, IV	0	2	85	157	0	0	0	244
NAC, PO	0	0	25	17	0	0	0	42
Naloxone	10	1	17	153	0	0	0	181
Neuromuscular blocker	0	0	1	14	0	0	0	15
Octreotide	0	0	0	5	0	0	0	5
Oxygen	23	11	64	421	0	0	0	519
Physostigmine	0	0	2	8	0	0	0	10
Phytonadione	0	0	2	7	0	0	0	9
Sedation (other)	9	3	31	173	0	0	0	216
Sodium thiosulfate	0	0	0	1	0	0	0	1
Steroids	13	3	4	67	0	1	0	88
Succimer	0	0	0	4	0	0	0	4
Vasopressors	1	1	5	79	0	0	0	86
Ventilator	8	2	30	195	0	0	0	235
Other	66	25	96	444	0	2	0	633

Table 13. Details on deaths and exposure related fatalities.

Non-Pharmaceutical Exposures	Age, Gender	Substances	Substance Rank	Cause Rank	Chronicity	Route	Reason***
Cleaning substances (household)	58 years, Male	Drain Cleaner	1	1	Acute	Ingestion	Int. - suicide
Fumes/gases/vapors	64 years, Male	Carbon Monoxide	1	1	Acute	Inhalation	Unint. - Env.
Heavy metals	59 years, Male	Arsenic	1	1	Acute	Ingestion	Int. - suicide
		Benzene	2	2			
		Toluene	3	3			
Pharmaceutical Exposures							
Analgesics	32 years, Female	Acetaminophen	1	1	Acute	Ingestion	Int. - suicide
	56 years, Male	Acetaminophen/Oxycodone	1	1	Acute	Ingestion	Int. - suicide
		Alprazolam*	2	2			
		Drug, unknown	3	3			
	76 years, Female	Acetaminophen	1	1	Acute	Ingestion	Int. - suicide
	76 years, Male	Salicylate	1	1	Acute	Ingestion	Int. - suicide
Cardiovascular drugs	9 years, Female	Clonidine	1	1	Acute	Ingestion	Unknown
		Cationic detergent	2	2			
		Cyproheptadine	3	3			
		Methylphenidate	4	4			
		Alpha-adrenergic blocker	5	5			
		Desmopressin	6	6			
	26 years, Male	Nebivolol	1	1	Acute	Ingestion	Int. - suicide
		Hydrochlorothiazide/ Losartan	2	2			
	57 years, Female	Diltiazem (extended release)	1	1	Acute	Ingestion	Int. - suicide
		Sotalol	2	2			
		Apixaban	3	3			
		Losartan	4	4			
		Cholecalciferol	5	5			
		Folic Acid	6	6			
		Ethanol	7	7			
Dietary supplements/herbals/homeopathic	19 years, Male	Piper Methysticum	1	1	Acute	Ingestion	Int. - abuse
		Sertraline	2	2			
Hormones and hormone antagonists	31 years, Female	Metformin	1	1	Acute on Chronic	Ingestion	Int. - suicide
		Ibuprofen**	2	2			
Miscellaneous drugs	50 years, Female	Ropinirole	1	1	Acute on Chronic	Ingestion	Int. - suicide
		Clopidogrel	2	2			
		Alprazolam*	3	3			
		Ethanol	4	4			
Sedative/hypnotics/antipsychotics	44 years, Male	Ziprasidone	1	1	Acute on Chronic	Ingestion	Int. - suicide
		Valproic Acid (extended release)	2	2			
		Acetaminophen/ hydrocodone**	3	3			
Stimulants and street drugs	26 years, Male	Methamphetamine	1	1	Acute	Unknown	Unknown
		Amphetamine	2	2			
	28 years, Male	Methamphetamine	1	1	Acute	Ingestion	Int. - unknown reason

*Also sedative/hypnotics/antipsychotics

**Also analgesic

***int. - intentional; unint. - unintentional; env. - environmental

Table 14. 2015 to 2017 comparison of select statistics.

	2015	2016	2017
Total cases	20,109	21,965	21,431
Calls from HCF	4,267	4,514	4,892
Moderate or major outcomes	1,688	1,971	2,170
Deaths	13	15	16

The ongoing importance of the PCC is reflected in increasing trends in rates of poisonings and overdoses that have reached epidemic proportions in some cases. The PCC saw an increase in number of calls from health care facilities, cases with moderate or major medical outcomes, and deaths in 2017 compared to 2016. This is consistent with literature that notes in the United States a 9.6% increase in drug overdose deaths in 2017 compared to 2016.³ A vast majority of these deaths are related to opioids and one study projects an increase of opioid related deaths from 42,200 in 2016 to over 80,000 per year by 2025.⁴ Adolescent intentional overdose also impacts the increase in morbidity. Several studies have documented increasing numbers of adolescent overdose with subsequent increase in morbidity.⁵⁻⁷

Reporting exposures to the PCC is voluntary and the PCC is not contacted for all poisonings in the state of Kansas. Furthermore, in most cases, there is no objective confirmation of exposure. These limitations should be noted when interpreting PCC data.

CONCLUSION

The results of the 2017 University of Kansas Health System Poison Control annual report demonstrated that the center continues to receive calls from the entire state of Kansas totaling over 20,000 human exposures per year. While pediatric exposures remain the most common, there is an increasing number of calls from health care facilities and for cases with serious outcomes. The experience of the PCC reflects the national trends of increasing morbidity and mortality associated with overdoses and other exposures. This report demonstrated the continued value of the PCC to both the public and to health care providers in the state of Kansas.

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REFERENCES

- ¹ Gummin DD, Mowry JB, Spyker DA, Brooks DE, Osterthaler KM, Banner W. 2017 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 35th Annual Report. *Clin Toxicol (Phila)* 2018; 56(12):1213-1415. PMID: 30576252.
- ² Gummin DD, Mowry JB, Spyker DA, Brooks DE, Fraser MO, Banner W. 2016 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 34th Annual Report. *Clin Toxicol (Phila)* 2017; 55(10):1072-1252. PMID: 29185815.
- ³ Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999-2017. *NCHS Data Brief* 2018; (329):1-8. PMID: 30500323.
- ⁴ Chen Q, Larochelle MR, Weaver DT, et al. Prevention of prescription opioid misuse and projected overdose deaths in the United States. *JAMA Netw Open* 2019; 2(2):e187621. PMID: 30707224.
- ⁵ Pringle K, Caupp S, Shi J, et al. Analysis of intentional drug poisonings using Ohio Poison Control Center Data, 2002-2014. *Clin Toxicol (Phila)* 2017; 55(7):652-658. PMID: 28393553.
- ⁶ Froberg BA, Morton SJ, Mowry JB, Rusyniak DE. Temporal and geospatial trends of adolescent intentional overdoses with suspected suicidal intent reported to a state poison control center. *Clin Toxicol (Phila)* 2019; 30:1-8. PMID: 30696297.
- ⁷ Sheridan DC, Hendrickson RG, Lin AL, Fu R, Horowitz BZ. Adolescent suicidal ingestion: National trends over a decade. *J Adolesc Health* 2017; 60(2):191-195. PMID: 27889404.

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