2020 Annual Report of the Kansas Poison Control Center at The University of Kansas Health System

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Abstract

Introduction. This is the 2020 Annual Report of the Kansas Poison Control Center (KSPCC) at The University of Kansas Health System. The KSPCC receives calls from the public, law enforcement, healthcare professionals, and public health agencies.

Methods. Encounters reported to the KSPCC from January 1, 2020 through December 31, 2020 were analyzed for caller location, demographics, exposure substance, nature of exposure, route of exposure, interventions, medical outcome, and location of care. Encounters were classified as human or animal exposure, confirmed non-exposure, or information call (no exposure).

Results. There were 19,780 total encounters, including 18,492 human exposure cases. These cases were primarily female (53.6%, n = 9,911) and pediatric (19 years of age or less; 59.5%, n = 10,995). Acute cases (82.7%, n = 13,294), unintentional exposures (73.8%, n = 13,643), and ingestions (85.9%, n = 15,901) were the most common. The most common reported substance was household cleaning products (n = 937) in pediatric (children ≤ 5) and analgesics (n = 1,335) in adults. An increase in exposures to disinfectants and household cleaning products was seen. Moderate (n = 1,812) or major (n = 482) clinical outcomes were seen in 12.4% of cases. There were 18 deaths in 2020 reported to the KSPCC.

Conclusions. Over 18,400 exposures were managed by the KSPCC in 2020. Pediatric exposures remained the most common encounter. An increase in exposures to disinfectants and other household cleaning products was seen. This report supported the continued value of the KSPCC to both public and acute healthcare in the state of Kansas.

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Introduction

This is the 2020 Annual Report of Kansas Poison Control Center (KSPCC) at The University of Kansas Health System. The KSPCC is a 24-hour, 365 day/year, healthcare information resource serving the state of Kansas. It was founded in 1982 and is one of the 55 poison control centers certified by the American Association of Poison Control Centers (AAPCC) in the United States. The KSPCC is staffed by 11 certified specialists in poison information who are either critical care trained nurses or Doctors of Pharmacy. There is 24-hour back-up provided by five board-certified clinical and medical toxicologists.

The KSPCC receives calls from the public, law enforcement, healthcare 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 KSPCC 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.' The average time to upload data for all poison centers is 6.51 (6.12, 8.68; median [25%, 75%]) minutes, creating a near real-time national exposure database and surveillance system. The KSPCC has the ability to share NPDS real time surveillance with state and local health departments and other regulatory agencies. The analysis and summary of all encounters reported to the KSPCC from January 1, 2020 through December 31, 2020 are reported below.

Methods

All KSPCC encounters recorded electronically in the Toxicall® data management system from January 1, 2020 to December 31, 2020 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-healthcare facility or healthcare facility). For this analysis, a pediatric case was defined as any patient 19 years of age or less. This was consistent with NPDS methodology. Similarly, NPDS descriptions of the medical outcomes of cases 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 KSPCC logged 19,780 total cases in 2020. This was a decrease of 809 cases (3.9%) compared to 2019. In 2020, there were 18,492 human exposure cases, 55 non-exposure confirmed cases, 104 animal exposure cases, and 1,129 information calls. For information calls, drug information (n = 324) was most common reason for calling. Table 1 describes the encounter types.

The KSPCC made 32,650 follow-up calls in 2020. Follow-up calls were done in 59.7% of human exposure cases. One follow-up call was made in 24.7% of human exposure cases and multiple follow-up calls (range 2-65) were made in 35.0% of cases. For human exposure cases which required a follow-up call, an average of three follow-up calls were performed per case.

The KSPCC received calls from all 105 counties and every hospital in Kansas. The county with the largest number of calls was Sedgwick County with 3,101. In addition, calls were received from 47 other states, the District of Columbia, and Puerto Rico.
Overall, a majority of human exposure cases (53.6%, n = 9911) were female. In children younger than 13 years of age, a majority were male, but this gender distribution was reversed in teenagers and adults. In fact, in the age group involving children 13-19 years of age, 66.1% of cases were female. Approximately 59.5% (n = 10,995) 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 two years of age were the most common age group involved in encounters reported to the KSPCC. For adults, the age group of 20-29 years old was most encountered. Seventy-one exposures occurred in pregnant women (0.4% of all human exposures). Of these exposures, 31.0% (n = 22) occurred in the first trimester, 43.7% (n = 31) occurred in the second trimester, and 19.7% (n = 14) occurred in the third trimester. Most exposures in pregnant women (73.2%, n = 52) were unintentional exposures, with 25.3% (n = 18) resulting from intentional exposures. There were no reported deaths to KSPCC in a pregnant woman in 2020.

### Table 1. Encounter type.

| Exposure               | N    | %    |
|------------------------|------|------|
| Human exposure         | 18,492 | 99.04 |
| Animal exposure        | 104  | 0.56 |
| **Subtotal**           | 18,596 | **94.01** |
| Non-exposure confirmed cases | 55  | 100.00 |
| **Subtotal**           | 55   | **0.28** |

### Information call

| Information call                   | N    | %    |
|------------------------------------|------|------|
| Drug information                   | 324  | 28.70 |
| Drug identification                | 55   | 4.87 |
| Environmental information          | 74   | 6.55 |
| Medical information                | 69   | 6.11 |
| Occupational information           | 5    | 0.44 |
| Poison information                 | 124  | 10.98 |
| Prevention/safety/education        | 10   | 0.89 |
| Teratogenicity information         |      |      |
| Other information                  | 32   | 2.83 |
| Substance abuse                    | 10   | 0.89 |
| Administrative                     | 44   | 3.90 |
| Caller referred                     | 382  | 33.84 |
| **Subtotal**                       | 1,129 | **5.71** |
| **Total**                          | 19,780 | **100.00** |

For human exposures, 67.3% (n = 12,448) of calls originated from a residence (own or other), while 92.8% (n = 17,177) of these exposures occurred at a residence (own or other). Calls from a healthcare facility accounted for 25.8% (n = 4,771) of human exposure encounters. Table 3 further details the origin of human exposure cases and the site of the exposure. Most human exposures, 82.7% (n = 15,294), were acute cases defined as exposures occurring over eight hours or less. Chronic exposures, defined as exposures occurring over eight hours, accounted for 2.0% (373) of all human exposures. Acute on chronic exposures, defined as single exposure that was preceded by a chronic exposure over eight hours, totaled 2,675 (14.5%). Ingestion was the most common route of exposure (80.9%, n = 15,901) documented (Table 4).

The most common reported substance in those less than six years of age was household cleaning products (n = 937), followed closely by cosmetics/personal care products (n = 882). Table 5 lists the substances most frequently involved in exposures for those ≤ 5 years old and compares their rank to last year. For adult cases (> 19 years of age), analgesics (n = 1,335) and sedative/hypnotics/antipsychotics (n = 1,110) were the most frequently involved substances, as seen in Table 6. There was no change in the rank order of substances in adults. Among all encounters, analgesics (11.8%, n = 2,812) were the most frequently encountered substance category. Table 7 is a summary log for all exposures categorized by category and sub-category of substance (available online only at journals.ku.edu/kjm).

In 2020, there was a total of 369 plant exposures reported to the KSPCC. The single most common plant exposure encountered was pokeweed (Phytolacca Americana; n = 39). Table 8 lists the top five most encountered plants.

Unintentional exposures were the most common reason for exposures (73.8%, n = 13,643), while intentional exposures accounted for 22.4% (n = 4,133) of exposures. Table 9 lists reasons for human exposures. Most unintentional exposures, 58.1% (n = 7,873) occurred in the ≤ 5-year-old age group. In patients less than 13 years of age, 97.7% (n = 8,814) of ingestions were unintentional. However, in the 13 to 19-year-old group, intentional exposure was most common (71.4%, n = 1,403). In total, suspected suicide attempts accounted for 17.3% (n = 3,207) of human encounters. When a therapeutic error was the reason for exposure, a double dose was the most common scenario (35.7%; n = 826).

Most encounters (63.8%, n = 12,174) were managed in a non-healthcare facility (i.e., a residence). Of the 5,998 encounters managed at a healthcare facility, 43.2% (n = 2,594) were admitted. Table 10 lists the management site of all human encounters.

Among human exposures, 14,756 involved exposures to pharmaceutical agents, while 8,926 involved exposure to non-pharmaceuticals. Because an encounter could include numerous pharmaceutical agents and non-pharmaceutical agents, this total was greater than the total number of encounters. However, 83.9% (n = 15,508) of all human exposures were exposed to only a single substance. Among these single substance exposures, the reason for exposure was intentional in 26.2% (n = 2,113) of pharmaceutical-only cases, compared to 4.0% (n = 300) of non-pharmaceutical single substance exposures.

When medical outcomes were analyzed, 25.2% (n = 4,659) of human exposures had no effect, 20.0% (n = 3,696) had minor effect, 9.8% (n = 1,812) had moderate effect, and 2.6% (n = 482) major effects. Moderate effects were more common in the 13 to 19-year-old group, while major effects were more common in those over 20 years of age. Moderate and major effects were most common in those with intentional encounters. More serious outcomes were related to single-substance pharmaceutical exposures, accounting for 11.1% (n = 2) of the fatalities. Table 11 lists all medical outcomes by age and Table 12 lists outcomes by reason for exposure.
### 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     | 448        | 50.79      | 432           | 48.98  | 2                | 0.23       | 882           | 4.77       | 882            | 4.77      |
| 1 year       | 1,289      | 52.74      | 1,151         | 47.09  | 4                | 0.16       | 2,444         | 13.22      | 3,326         | 17.99     |
| 2 years      | 1,334      | 52.83      | 1,186         | 46.97  | 5                | 0.20       | 2,525         | 13.65      | 5,851         | 31.64     |
| 3 years      | 622        | 54.85      | 511           | 45.06  | 1                | 0.09       | 1,134         | 6.13       | 6,985         | 37.77     |
| 4 years      | 330        | 56.99      | 248           | 42.83  | 1                | 0.17       | 579           | 3.33       | 7,564         | 40.90     |
| 5 years      | 199        | 54.97      | 161           | 44.48  | 2                | 0.55       | 362           | 1.96       | 7,926         | 42.86     |
| Unknown ≤ 5 years | 0 | 0.00      | 1             | 50.00  | 1                | 0.00       | 2             | 0.01       | 7,928         | 42.87     |
| Child 6-12 years | 609 | 55.72      | 477           | 43.64  | 7                | 0.64       | 1,093         | 5.91       | 9,021         | 48.78     |
| Teen 13-19 years | 662 | 33.72      | 1,297         | 66.07  | 4                | 0.20       | 1,963         | 10.62      | 10,984        | 59.40     |
| Unknown child | 4          | 36.36      | 3             | 27.27  | 4                | 36.36      | 11            | 0.06       | 10,995        | 59.46     |
| Subtotal     | 5,497      | 50.00      | 5,467         | 49.72  | 31               | 0.28       | 10,995        | 59.46      | 10,995        | 59.46     |
| 20-29 years  | 842        | 44.43      | 1,052         | 55.51  | 1                | 0.05       | 1,893         | 10.25      | 12,890        | 69.71     |
| 30-39 years  | 678        | 42.14      | 927           | 57.61  | 4                | 0.25       | 1,609         | 8.70       | 14,449        | 78.41     |
| 40-49 years  | 411        | 36.60      | 712           | 63.40  | 0                | 0.00       | 1,123         | 6.07       | 15,622        | 84.48     |
| 50-59 years  | 399        | 39.39      | 612           | 60.41  | 2                | 0.20       | 1,013         | 5.48       | 16,635        | 89.96     |
| 60-69 years  | 309        | 37.41      | 517           | 62.59  | 0                | 0.00       | 826           | 4.47       | 17,461        | 94.42     |
| 70-79 years  | 199        | 38.42      | 319           | 61.58  | 0                | 0.00       | 518           | 2.80       | 17,979        | 97.23     |
| 80-89 years  | 113        | 38.44      | 181           | 61.56  | 0                | 0.00       | 294           | 1.59       | 18,273        | 98.82     |
| ≥ 90 years   | 26         | 34.67      | 49            | 65.33  | 0                | 0.00       | 75            | 0.41       | 18,348        | 99.22     |
| Unknown adult | 49 | 41.88      | 67            | 57.26  | 1                | 0.85       | 117           | 0.63       | 18,465        | 99.85     |
| Subtotal     | 3,026      | 40.51      | 4,436         | 59.38  | 8                | 0.11       | 7,470         | 40.40      | 18,465        | 99.85     |
| Unknown age  | 12         | 44.44      | 8             | 29.63  | 7                | 25.93      | 27            | 0.15       | 18,492        | 100.00    |
| Total        | 8,535      | 46.16      | 9,911         | 53.60  | 46               | 0.25       | 18,492        | 100.00     | 18,492        | 100.00    |

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

| Site               | Site of Caller | Site of Exposure | |
|--------------------|----------------|------------------|---|
| Residence          |                |                  |   |
| Own                | 12,145         | 16,671           | 90.15 |
| Other              | 303            | 506              | 2.74 |
| Workplace          | 212            | 380              | 2.05 |
| Healthcare facility| 4,771          | 96               | 0.52 |
| School             | 17             | 106              | 0.57 |
| Restaurant/food service | 0          | 28               | 0.15 |
| Public area        | 80             | 156              | 0.84 |
| Other              | 923            | 231              | 1.25 |
| Unknown            | 41             | 318              | 1.72 |
### Table 4. Route of human exposures.*

| Route                      | N    | % of all routes | % of all cases |
|----------------------------|------|----------------|----------------|
| Ingestion                  | 15,901 | 80.86          | 85.99          |
| Dermal                     | 1,413  | 7.19           | 7.64           |
| Inhalation/nasal           | 1,170  | 5.95           | 6.33           |
| Ocular                     | 671   | 3.41           | 3.63           |
| Bite/sting                 | 162   | 0.82           | 0.88           |
| Parenteral                 | 168   | 0.85           | 0.91           |
| Unknown                    | 123   | 0.63           | 0.67           |
| Aspiration (with ingestion)| 13    | 0.07           | 1.00           |
| Otic                       | 22    | 0.11           | 0.12           |
| Other                      | 10    | 0.05           | 0.05           |
| Vaginal                    | 5     | 0.03           | 0.03           |
| Rectal                     | 6     | 0.03           | 0.03           |
| **Total number of routes** | 19,664| 100.00         | 106.34         |

*Some cases may have multiple routes of exposure documented.

### Table 5. Substance categories most frequently involved in exposures for age ≤ 5 years old.

| Substance Category                  | Previous Year Rank | All Substance | %   | Single Substance Exposures | %   |
|-------------------------------------|--------------------|---------------|-----|-----------------------------|-----|
| Cleaning substances (household)     | 2                  | 937           | 11.20 | 902                         | 11.85 |
| Cosmetics/personal care products    | 1                  | 882           | 10.54 | 857                         | 11.26 |
| Analgesics                          | 3                  | 712           | 8.51  | 625                         | 8.21  |
| Dietary supplements/herbs/homeopathic | 6               | 547           | 6.54  | 523                         | 6.87  |
| Foreign bodies/toys/miscellaneous   | 4                  | 486           | 5.81  | 466                         | 6.12  |
| Antihistamines                      | 5                  | 441           | 5.27  | 394                         | 5.18  |
| Vitamins                            | 8                  | 409           | 4.89  | 355                         | 4.66  |
| Topical preparations                | 7                  | 365           | 4.36  | 352                         | 4.63  |
| Pesticides                          | 9                  | 301           | 3.60  | 281                         | 3.69  |
| Plants                              | 12                 | 210           | 2.51  | 206                         | 2.71  |
| Gastrointestinal preparations       | 10                 | 210           | 2.51  | 178                         | 2.34  |
| Cardiovascular drugs                | 11                 | 194           | 2.32  | 113                         | 1.48  |
| Electrolytes and minerals           | 14                 | 175           | 2.09  | 162                         | 2.13  |
| Hormones and hormone antagonists    | 13                 | 159           | 1.90  | 122                         | 1.60  |
| Arts/crafts/office supplies*        | 16                 | 146           | 1.75  | 136                         | 1.79  |

*Essential oils 15 previous year

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

| Substance Category                              | All Substance | %   | Single Substance Exposures | %   |
|-------------------------------------------------|---------------|-----|-----------------------------|-----|
| Analgesics                                      | 1,335         | 11.78 | 555                         | 10.17 |
| Sedative/hypnotics/antipsychotics               | 1,110         | 9.80  | 304                         | 5.57  |
| Antidepressants                                 | 931           | 8.22  | 294                         | 5.39  |
| Cardiovascular drugs                            | 808           | 7.13  | 235                         | 4.31  |
| Alcohols                                        | 627           | 5.53  | 71                          | 1.30  |
| Antihistamines                                  | 503           | 4.44  | 194                         | 3.56  |
| Cleaning substances (household)                 | 529           | 4.67  | 408                         | 7.48  |
| Pesticides                                      | 392           | 3.46  | 314                         | 5.76  |
| Anticonvulsants                                 | 430           | 3.79  | 108                         | 1.98  |
| Hormones and hormone antagonists                | 366           | 3.23  | 188                         | 3.45  |
| Stimulants and street drugs                     | 285           | 2.52  | 114                         | 2.09  |
| Fumes/gases/vapors                              | 267           | 2.36  | 230                         | 4.22  |
Table 6. Substance categories most frequently involved in exposures of adults (> 19 years).

| Substance Category                  | All Substance | %   | Single Substance Exposures | %   |
|-------------------------------------|---------------|-----|----------------------------|-----|
| Chemicals                           | 229           | 2.02| 193                        | 3.54|
| Muscle relaxants                    | 207           | 1.83| 61                         | 1.12|
| Cold and cough preparations         | 199           | 1.76| 93                         | 1.70|

Table 8. Top 5 most frequent plant exposures.

| Botanical Name or Category                              | N  |
|---------------------------------------------------------|----|
| Phytolacca americana (L.) (Botanic name)                | 39 |
| Plants: non-toxic                                       | 33 |
| Oxalates (Species unspecified)                         | 31 |
| Cherry (Species unspecified, wild & domesticated)       | 28 |
| Plants-general-unknown                                  | 17 |
| Total of all plant calls                                | 369|

Table 9. Reason for human exposure cases.

| Category                               | N      | %   |
|----------------------------------------|--------|-----|
| Unintentional - general                | 8,540  | 46.02|
| Unintentional - therapeutic error      | 2,309  | 12.05|
| Unintentional - misuse                 | 1,713  | 9.03 |
| Unintentional - environmental          | 474    | 2.06 |
| Unintentional - occupational           | 284    | 1.05 |
| Unintentional - bite/sting             | 163    | 0.09 |
| Unintentional - food poisoning         | 136    | 0.07 |
| Unintentional - unknown                | 24     | 0.01 |
| **Subtotal**                           | 13,643 | 73.08%|
| Intentional - suspected suicide        | 3,207  | 17.03|
| Intentional - misuse                   | 469    | 2.05 |
| Intentional - abuse                    | 358    | 1.09 |
| Intentional - unknown                  | 99     | 0.05 |
| **Subtotal**                           | 4,133  | 22.04%|
| Adverse reaction - drug                | 346    | 1.09 |
| Adverse reaction - food                | 76     | 0.04 |
| Adverse reaction - other               | 63     | 0.03 |
| **Subtotal**                           | 485    | 2.06%|
| Unknown - reason                       | 132    | 0.07 |
| **Subtotal**                           | 132    | 0.07%|
| Other - malicious                      | 57     | 0.03 |
| Other - withdrawal                     | 22     | 0.01 |
| Other - contamination/tampering        | 20     | 0.01 |
| **Subtotal**                           | 99     | 0.05%|
| **Total**                              | 18,492 | 100.00|
Table 10. Management site of human exposures.

| Site of Management                              | N    | %   |
|-------------------------------------------------|------|-----|
| Managed in healthcare facility                  | 3,153| 17.01|
| Treated/evaluated and released                  | 1,230| 6.07 |
| Admitted to critical care unit                  | 722  | 3.09 |
| Admitted to noncritical care unit               | 642  | 3.05 |
| Patient lost to follow-up/left AMA              | 251  | 1.04 |
| **Subtotal (managed in healthcare facility)**   | 5,998| 32.04|
| Managed on site, non-healthcare facility        | 12,174| 65.08|
| Other                                           | 40   | 0.02 |
| Refused referral                                 | 260  | 1.04 |
| Unknown                                         | 20   | 0.01 |
| **Total**                                       | 18,492| 100.00|

Table 11. Medical outcome of human exposure cases by patient age.

| Outcome                              | ≤ 5 Years N | %   | 6-12 Years N | %   | 13-19 Years N | %   | ≥ 20 Years N | %   | Unknown Child N | %   | Unknown Adult N | %   | Unknown Age N | %   | Total N | % |
|--------------------------------------|-------------|-----|--------------|-----|---------------|-----|-------------|-----|----------------|-----|----------------|-----|--------------|-----|----------|-----|
| No effect                            | 2,692       | 33.96| 276          | 25.25| 457           | 23.28| 1,225       | 16.66| 1              | 9.09| 7             | 5.98| 1          | 3.07| 4,659    | 25.19|
| Minor effect                         | 946         | 11.93| 226          | 20.68| 649           | 33.06| 1,854       | 25.21| 4              | 36.36| 16            | 13.68| 1          | 3.07| 3,696    | 19.99|
| Moderate effect                      | 107         | 1.35 | 59           | 5.40 | 427           | 21.75| 1,217       | 16.55| 0              | 0.00| 2             | 1.71| 0          | 0.00| 1,812    | 9.80 |
| Major effect                         | 13          | 0.16 | 1            | 0.09 | 87            | 4.43 | 381         | 5.18 | 0              | 0.00| 0             | 0.00| 0          | 0.00| 482      | 2.61 |
| Death                                | 0           | 0.00 | 0            | 0.00 | 1             | 0.05 | 16          | 0.22 | 0              | 0.00| 0             | 0.00| 0          | 0.00| 17        | 0.09 |
| No follow-up, nontoxic              | 259         | 3.27 | 30           | 2.74 | 5             | 0.25 | 48          | 0.65 | 0              | 0.00| 3             | 0.26| 1          | 3.07| 346      | 1.87 |
| No follow-up, minimal toxicity       | 3,639       | 45.90| 462          | 42.27| 224           | 11.41| 1,836       | 24.97| 4              | 36.36| 43            | 36.75| 7          | 25.09| 6,215    | 33.61|
| No follow-up, potentially toxic      | 204         | 2.57 | 21           | 1.92 | 83            | 4.23 | 377         | 5.13 | 2              | 18.18| 34            | 29.06| 15         | 55.06| 736      | 3.98 |
| Unrelated effect                     | 68          | 0.86 | 18           | 1.65 | 30            | 1.53 | 399         | 5.43 | 0              | 0.00| 12            | 10.26| 1          | 3.07| 528      | 2.86 |
| Death, indirect report               | 0           | 0.00 | 0            | 0.00 | 0             | 0.00 | 0           | 0.00 | 0              | 0.00| 1             | 3.07| 1          | 0.01| 1        | 0.01|
| **Total**                            | 7,928       | 100.00| 1,093        | 100.00| 1,963         | 100.00| 7,353       | 100.00| 11            | 100.00| 117           | 100.00| 27         | 100.00| 18,492   | 100.00|

Table 12. Medical outcome by reason for exposure in human exposures.

| Outcome                              | Unintentional N | %   | Intentional N | %   | Other N | %   | Adverse Reaction N | %   | Unknown N | %   | Total N | % |
|--------------------------------------|-----------------|-----|---------------|-----|---------|-----|---------------------|-----|-----------|-----|----------|-----|
| No effect                            | 3,801           | 27.86| 807           | 19.53| 8       | 8.08| 31                  | 6.39| 12        | 9.09| 4,659    | 25.19|
| Minor effect                         | 2,295           | 16.82| 1,255         | 30.37| 15      | 15.15| 108                 | 22.27| 23        | 17.42| 3,696    | 19.99|
| Moderate effect                      | 470             | 3.44 | 1,240         | 30.00| 10      | 10.10| 67                  | 13.81| 25        | 18.94| 1,812    | 9.80 |
| Major effect                         | 47              | 0.34 | 401           | 9.70 | 5       | 5.05 | 7                   | 1.44 | 22        | 16.67| 482      | 2.61 |
| Death                                | 5               | 0.04 | 10            | 0.24 | 0       | 0.00 | 0                   | 0.00 | 2         | 1.52 | 17        | 0.99 |
| No follow-up, nontoxic              | 328             | 2.40 | 12            | 0.29 | 1       | 1.01 | 4                   | 0.82 | 1         | 0.76 | 346      | 1.87 |
| No follow-up, minimal toxicity       | 5,941           | 43.55| 136           | 3.29 | 22      | 22.22| 109                 | 22.47| 7         | 5.30 | 6,215    | 33.61|
| No follow-up, potentially toxic      | 452             | 3.31 | 219           | 5.30 | 17      | 17.17| 25                  | 5.15 | 23        | 17.42| 736      | 3.98 |
| Unrelated effect                     | 303             | 2.22 | 53            | 1.28 | 21      | 21.21| 134                 | 27.63| 17        | 12.88| 528      | 2.86 |
| Death, indirect report               | 1               | 0.01 | 0             | 0.00 | 0       | 0.00 | 0                   | 0.00 | 0         | 0.00 | 1        | 0.01 |
| **Total**                            | 13,643          | 100.00| 4,133         | 100.00| 99      | 100.00| 485                 | 100.00| 132       | 100.00| 18,492   | 100.00|
Use of decontamination and specific therapies, including antidotal therapy, is detailed in Tables 13a and 13b. There were 18 deaths in 2020 reported to the KSPCC. All but one death involved patients 20 years of age or older, and ten of the deaths involved intentional exposures. There was one death in a 13-year-old. Table 14 details the 18 reported deaths (available online only at journals.ku.edu/kjm).

Table 15 compares key statistics from 2015 to 2020. Overall case volumes have declined since 2016. There was also a slight decline in calls from healthcare facilities in 2020. The number of deaths increased from 2019 to 2020.

Table 13a. Decontamination provided in human exposures.1

| Decontamination                  | N   | %   | N   | %   |
|----------------------------------|-----|-----|-----|-----|
| Activated charcoal administered2 | 270 | 1.46| 29  | 0.37|
| Cathartic                       | 17  | 0.09| 5   | 0.06|
| Ipecac administered             | 2   | 0.01| 1   | 0.01|
| Lavage                          | 1   | 0.01| 0   | 0.00|
| Other emetic                    | 143 | 0.77| 60  | 0.76|
| Whole bowel irrigation          | 10  | 0.05| 0   | 0.00|
| **Total**                       | **443** | **2.40** | **95** | **1.20** |

1Total human exposures = 18,492; Total exposures in children ≤5 years = 7,928.

2Activated charcoal counts - single and multiple doses.

Table 13b. 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 |
|---------------------------|----------|------------|-------------|-----------|---------------|---------------|-------------|-------|
| Decontamination           |          |            |             |           |               |               |             |       |
| Cathartic                 | 5        | 4          | 2           | 6         | 0             | 0             | 0           | 17    |
| Charcoal, multiple doses  | 18       | 17         | 11          | 18        | 0             | 0             | 0           | 18    |
| Charcoal, single dose     | 29       | 5          | 99          | 126       | 0             | 0             | 0           | 259   |
| Dilute/irrigate/wash      | 5,956    | 594        | 363         | 2,400     | 5             | 38            | 3           | 9,359 |
| Food/snack                | 1,741    | 157        | 84          | 438       | 0             | 3             | 0           | 2,423 |
| Fresh air                 | 74       | 41         | 64          | 530       | 5             | 16            | 2           | 732   |
| Ipecac                    | 1        | 0          | 0           | 1         | 0             | 0             | 0           | 2     |
| Lavage                    | 0        | 0          | 0           | 1         | 0             | 0             | 0           | 1     |
| Other emetic              | 60       | 3          | 15          | 65        | 0             | 0             | 0           | 143   |
| Whole bowel irrigation    | 0        | 1          | 0           | 9         | 0             | 0             | 0           | 10    |
| Other therapies           |          |            |             |           |               |               |             |       |
| Alkalinization - systemic | 0        | 0          | 35          | 94        | 0             | 0             | 0           | 129   |
| Alkalinization - urinary  | 1        | 0          | 6           | 11        | 0             | 0             | 0           | 18    |
| Amyl nitrite              | 0        | 0          | 0           | 1         | 0             | 0             | 0           | 1     |
| Antiarrhythmic            | 1        | 0          | 3           | 13        | 0             | 0             | 0           | 17    |
| Antibiotics               | 18       | 7          | 23          | 181       | 0             | 0             | 0           | 229   |
| Anticonvulsants           | 0        | 0          | 2           | 15        | 0             | 0             | 0           | 17    |
| Antiemetics               | 18       | 16         | 207         | 243       | 0             | 0             | 0           | 484   |
| Antifungals               | 0        | 0          | 0           | 1         | 0             | 0             | 0           | 1     |
| Antihistamines            | 14       | 11         | 29          | 82        | 0             | 0             | 0           | 136   |
| Antihypertensives         | 0        | 0          | 4           | 22        | 0             | 0             | 0           | 26    |
| Antipsychotics            | 0        | 1          | 8           | 52        | 0             | 0             | 0           | 61    |
| Antivenom (immune fab fragment) – not specified | 1 | 3 | 1 | 18 | 0 | 0 | 0 | 23 |
| Antivenom - elapidae      | 0        | 0          | 0           | 2         | 0             | 0             | 0           | 2     |
Table 13b. Therapy provided in human exposures by age. cont.

| Therapy                                      | ≤ 5 Years | 6-12 Years | 13-19 Years | ≥ 20 Years | Unknown Child | Unknown Adult | Unknown Age | Total |
|----------------------------------------------|-----------|------------|-------------|------------|---------------|---------------|-------------|-------|
| Antivenom/antitoxin (non-fab) - not specified| 0         | 0          | 0           | 1          | 0             | 0             | 0           | 1     |
| Atropine                                     | 2         | 2          | 4           | 12         | 0             | 0             | 0           | 20    |
| Benzodiazepines                              | 18        | 7          | 126         | 388        | 0             | 0             | 0           | 539   |
| Blood products                               | 0         | 0          | 1           | 4          | 0             | 0             | 0           | 5     |
| Calcium                                      | 71        | 6          | 1           | 48         | 0             | 0             | 0           | 126   |
| Continuous Renal Replacement Therapy (CRRT)   | 0         | 0          | 0           | 6          | 0             | 0             | 0           | 6     |
| CPR                                          | 0         | 0          | 3           | 12         | 0             | 0             | 0           | 15    |
| Erythropoiesis                                | 0         | 0          | 2           | 0          | 0             | 0             | 0           | 2     |
| ECMO                                         | 0         | 0          | 0           | 2          | 0             | 0             | 0           | 2     |
| EDTA                                         | 1         | 0          | 0           | 0          | 0             | 0             | 0           | 1     |
| Fluids, IV                                   | 62        | 44         | 629         | 1,509      | 0             | 0             | 0           | 2,244 |
| Flumazenil                                   | 0         | 0          | 5           | 29         | 0             | 0             | 0           | 34    |
| Folate                                        | 0         | 0          | 1           | 50         | 0             | 0             | 0           | 51    |
| Fomepizole                                   | 0         | 0          | 0           | 9          | 0             | 0             | 0           | 9     |
| Glucagon                                     | 2         | 0          | 2           | 25         | 0             | 0             | 0           | 29    |
| Glucose, > 5%                                 | 3         | 0          | 4           | 38         | 0             | 0             | 0           | 45    |
| Hemodialysis                                 | 0         | 0          | 2           | 14         | 0             | 0             | 0           | 16    |
| Hemoperfusion                                 | 0         | 0          | 1           | 0          | 0             | 0             | 0           | 1     |
| High dose insulin/glucose                    | 0         | 0          | 0           | 8          | 0             | 0             | 0           | 8     |
| Hydroxocobalamin                             | 0         | 0          | 0           | 3          | 0             | 0             | 0           | 3     |
| Hyperbaric oxygen                            | 0         | 0          | 0           | 9          | 0             | 0             | 0           | 9     |
| Hypothermia protocol                         | 0         | 0          | 0           | 2          | 0             | 0             | 0           | 2     |
| Insulin                                      | 1         | 0          | 0           | 32         | 0             | 0             | 0           | 33    |
| Intubation                                   | 3         | 1          | 27          | 160        | 0             | 0             | 0           | 191   |
| L-Carnitine                                  | 1         | 0          | 1           | 4          | 0             | 0             | 0           | 6     |
| Leucovorin                                   | 0         | 0          | 0           | 1          | 0             | 0             | 0           | 1     |
| Lipid emulsion therapy                       | 0         | 0          | 2           | 2          | 0             | 0             | 0           | 4     |
| Magnesium                                    | 0         | 0          | 40          | 141        | 0             | 0             | 0           | 181   |
| Methylene blue                               | 0         | 0          | 1           | 3          | 0             | 0             | 0           | 4     |
| NAC, IV                                      | 1         | 13         | 96          | 174        | 0             | 0             | 0           | 284   |
| NAC, PO                                      | 0         | 4          | 20          | 22         | 0             | 0             | 0           | 46    |
| Naloxone                                     | 17        | 2          | 38          | 175        | 0             | 0             | 0           | 232   |
| Neuromuscular blocker                        | 0         | 0          | 2           | 21         | 0             | 0             | 0           | 23    |
| Octreotide                                   | 2         | 0          | 1           | 5          | 0             | 0             | 0           | 8     |
| Opioid analgesia                             | 2         | 0          | 6           | 27         | 0             | 0             | 0           | 35    |
| Other                                        | 36        | 32         | 75          | 323        | 0             | 4             | 0           | 470   |
| Oxygen                                       | 6         | 5          | 50          | 402        | 0             | 0             | 0           | 463   |
| Pacemaker                                    | 0         | 0          | 0           | 4          | 0             | 0             | 0           | 4     |
| Physostigmine                                | 1         | 0          | 2           | 3          | 0             | 0             | 0           | 6     |
| Phytonadione                                  | 0         | 0          | 0           | 12         | 0             | 0             | 0           | 12    |
Table 13b. Therapy provided in human exposures by age. cont.

| Therapy                  | ≤ 5 Years | 6-12 Years | 13-19 Years | ≥ 20 Years | Unknown Child | Unknown Adult | Unknown Age | Total |
|--------------------------|-----------|------------|-------------|------------|---------------|---------------|-------------|-------|
| Potassium                | 3         | 2          | 119         | 295        | 0             | 0             | 0           | 419   |
| Potassium iodide         | 0         | 0          | 1           | 3          | 0             | 0             | 0           | 4     |
| Propofol                 | 2         | 0          | 12          | 102        | 0             | 0             | 0           | 116   |
| Rabies immune globulin   | 0         | 0          | 0           | 5          | 0             | 0             | 0           | 5     |
| Rabies vaccine           | 0         | 1          | 0           | 6          | 0             | 0             | 0           | 7     |
| Sedation (other)         | 6         | 2          | 35          | 143        | 0             | 0             | 0           | 186   |
| Sodium Bicarbonate - metabolic acidosis | 1 | 0 | 4 | 15 | 0 | 0 | 0 | 20 |
| Sodium Bicarbonate - nebulized | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| Steroids                 | 9         | 2          | 9           | 65         | 0             | 0             | 0           | 85    |
| Succimer                 | 7         | 1          | 0           | 2          | 0             | 0             | 0           | 10    |
| Surgical intervention    | 1         | 0          | 1           | 2          | 0             | 0             | 0           | 4     |
| Thiamine                 | 0         | 0          | 2           | 75         | 0             | 0             | 0           | 77    |
| Vasopressors             | 2         | 0          | 13          | 72         | 0             | 0             | 0           | 87    |
| Ventilation, non-invasive (CPAP, BiPAP) | 0 | 0 | 1 | 14 | 0 | 0 | 0 | 15 |
| Ventilator               | 3         | 1          | 26          | 171        | 0             | 0             | 0           | 201   |

Table 15. 2015 to 2020 comparison of select statistics.

|                  | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------|------|------|------|------|------|------|
| Total cases      | 20,109 | 21,965 | 21,431 | 21,072 | 20,589 | 19,780 |
| Calls from healthcare facilities | 4,267 | 4,514 | 4,892 | 5,224 | 5,195 | 4,771 |
| Moderate or major outcomes | 1,688 | 1,971 | 2,170 | 2,340 | 2,416 | 2,294 |
| Deaths           | 13   | 15   | 16   | 7    | 14   | 18   |

DISCUSSION

The ongoing importance of the KSPCC is reflected in trends that have seen rates of poisonings and overdoses increase at an alarming rate over the last decade. According to the Annual Surveillance Report of Drug-Related Risks and Outcomes, drug poisoning-related hospitalizations in the United States have increased 26% over the last two years that data were available.2-3 The National Center for Health Statistics noted over 70,000 overdose related deaths in 2019.4 Similarly, the KSPCC consistently has seen an increase in the number of cases from healthcare facilities and cases with moderate or major medical outcomes. Since 2015, calls from healthcare facilities have increased by 11.8%, with a slight decrease in calls from healthcare facilities in 2020 compared to 2019.

Cases from healthcare facilities still account for approximately 25% of the cases reported to the KSPCC.5-8 Moderate/major outcomes have increased steadily by 36% since 2015. The percent of cases with a moderate/major outcome was 10.1% of overall cases in 2015 compared to 2020 where these cases account for 11.6% of overall case volume. The decrease in calls from healthcare facilities in 2020 partially may be explained by the impact of COVID-19 on hospital’s patient volumes. The most apparent decreases in call volumes were in the months of August to December of 2020. However, the KSPCC also noticed an increase in calls regarding cleaning substances and disinfectants in 2020 compared to prior years. This was substantial enough that cleaning substances and disinfectants became the number one substance category involved in exposures in children ≤ 5 years and increased by 19% in adults compared to 2019.2 In total, the KSPCC saw a 30% increase in calls regarding bleaches, 46% increase in household disinfectants, and 35% increase in calls regarding hand sanitizers compared to 2019. The number of deaths reported to the KSPCC increased by 28.6%, from 14 in 2019 to 18 in 2020. With the exception of 2018, there has been a steady increase in the number of deaths reported since 2015.5-8

The 2020 KSPCC statistics continued to mirror those seen nationally by the other 54 accredited poison control centers nationwide. In 2019, 2,573,180 encounters were logged by poison control, including 2,148,141 human exposures.1 Overall, encounters showed a 1.70% (n = 42,942) increase from 2018 to 2019, while healthcare facility human exposure cases remained nearly steady with a slight decrease of 0.495%. More serious outcomes (moderate, major, or death) continued to increase. Nationwide, the five substance classes most frequently involved in all human exposures were analgesics, household cleaning substances, cosmetics/personal care products, antidepressants, and sedatives/hypnotics/antipsychotics, while the top five most common
exposures in children age 5 years or less were cosmetics/personal care products, household cleaning substances, analgesics, foreign bodies/toys/miscellaneous, and dietary supplements/herbals/homeopathic.

National poison center data demonstrated that calls regarding household cleaners and disinfectants increased by 20.4% and 16.4%, respectively, just from January to March 2020 (the onset of the COVID-19 pandemic). In May of 2020, an internet survey on knowledge and cleaning practices surrounding COVID-19 showed that 60% of participants had increased the frequency of home cleaning, and 39% indicated they had engaged in high-risk practices not recommended by either the U.S. Centers for Disease Control and Prevention or manufacturer (e.g., gargling or drinking diluted bleach solutions, misting body with a disinfectant product or spray). Finally, there were 2,619 exposure-related fatalities reported nationwide in 2019.

Several important limitations must be noted when interpreting poison center data. Reporting exposures to the KSPCC is voluntary and the KSPCC is not contacted regarding all poisonings in the state of Kansas. In particular, exposures with no or minimal effects may not be reported. Furthermore, in most cases, there is no objective confirmation of exposure.

CONCLUSIONS

The 2020 KSPCC annual report demonstrated that the center received over 19,700 total calls, including more than 18,400 human exposures. While pediatric exposures remain the most common, there continues to be a significant number of calls from healthcare facilities and for cases with serious outcomes. COVID-19 appears to have impacted the type of calls received in 2020, with an increase in exposures to disinfectants and other household cleaning products. The experience of the KSPCC remains similar to national data. This report supported the continued value of the KSPCC to both public and acute healthcare in the state of Kansas.

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