REGIONAL CENTER FOR POISON CONTROL AND PREVENTION

2021 Annual Report: Massachusetts and Rhode Island

Boston Children's Hospital, Massachusetts Department of Health and Rhode Island Department of Health

Reported April 2022

Background and Tools

Purpose & Background

The purpose of this report is to describe the people cared for by the Massachusetts and Rhode Island Regional Center for Poison Control and Prevention during calendar year of 2021. The data presented in this report will showcase the data inputted into ToxiCALL by the Massachusetts and Rhode Island Regional Center for Poison Control and Prevention (PCC).

ToxiCall Application & Methodology

The Regional Center for Poison Control and Prevention extrapolates data from ToxiCALL. ToxiCALL is a repository database utilized by numerous poison control centers around the United States to collect toxicology calls made to poison control centers. ToxiCALL is used to make "case entry, tracking and reporting easy, yet flexible" [(1)]. While ToxiCALL holds all of the call information, ToxiCALL Data Analysis also allows MA & RI Regional Center for Poison Control and Prevention employees to analyze and visualize the data; basic math calculators and Microsoft Excel were also used for this data analysis [(2)]. The syntax used for the queries in this report is included in the appendix at the end of the report.

Key Terms & Definitions[4]

- **Unintentional General:** All unintentional exposures not otherwise defined below.
    - **Environmental:** Any passive, non-occupational exposure that results from contamination of air, water, or soil. Environmental exposures are usually caused by manufactured contaminants.
    - **Occupational:** An exposure that occurs as a direct result of the person being on the job or in the workplace.
    - **Therapeutic error:** An unintentional deviation from a proper therapeutic regimen that results in the wrong dose, incorrect route of administration, administration to the wrong person, or administration of the wrong substance. Only exposures to medications or products used as medications are included. Drug interactions resulting from unintentional administration of drugs or foods which are known to interact are also included.
    - **Unintentional misuse:** Unintentional, improper or incorrect use of a non-pharmaceutical substance. Unintentional misuse differs from intentional misuse in that the exposure was unplanned or not foreseen by the patient.
    - **Bite/sting:** All animal bites and stings, with or without envenomation, are included.
    - **Food poisoning:** Suspected or confirmed food poisoning; ingestion of food contaminated with microorganisms is included.

- **Unintentional unknown**: An exposure determined to be unintentional, but the exact reason is unknown.

- **Intentional General**
  - **Suspected suicidal:** An exposure resulting from the inappropriate use of a substance for reasons that are suspected to be self-destructive or self-harm.
  - **Intentional misuse**: An exposure resulting from the intentional improper or incorrect use for reasons other than the pursuit of a psychotropic effect.
  - **Intentional abuse:** An exposure resulting from the intentional improper or incorrect use where the patient was likely attempting to gain a high, euphoric effect or some other psychotropic effect, including recreational use of a substance for any effect.
  - **Contaminant/tampering:** The patient is an unintentional victim of a substance that has been adulterated (either maliciously or unintentionally) by the introduction of an undesirable substance.
  - **Malicious:** Patients who are victims of another person's intent to harm them.
  - **Withdrawal**: Inquiry about or experiencing of symptoms from a decline in blood concentration of a pharmaceutical or other substance after discontinuing therapeutic use or abuse of that substance.
- **Adverse Reactions**
  - **Adverse Reaction Drug:** Unwanted effects due to an allergic, hypersensitivity, or idiosyncratic response to the active ingredient(s), inactive ingredient(s) or excipient of a drug, chemical, or other drug substance when the exposure involves the normal, prescribed, labeled or recommended use of the substance.
  - **Adverse Reaction Food**: Unwanted effects due to an allergic, hypersensitivity, or idiosyncratic response to a food substance.
  - **Adverse Reaction Other**: Unwanted effects due to an allergic, hypersensitivity, or idiosyncratic response to a substance other than drug or food.
  - **Unknown Reason:** Reason for the exposure cannot be determined or no other category is appropriate.
- **Medical Outcomes**
  - **No effect**: The patient did not develop any signs or symptoms as a result of the exposure.
  - **Minor effect:** The patient developed some signs or symptoms as a result of the exposure, but they were minimally bothersome and generally resolved rapidly with no residual disability or disfigurement. A minor effect is often limited to the skin or mucus membranes (e.g., self-limited gastrointestinal symptoms, drowsiness,

skin irritation, first degree dermal burn, sinus tachycardia without hypotension, and transient cough).

- **Moderate effect:** The patient exhibited signs or symptoms as a result of the exposure that were more pronounced, more prolonged, or more systemic in nature than minor symptoms. Usually, some form of treatment is indicated. Symptoms were not life-threatening, and the patient had no residual disability or disfigurement (e.g., corneal abrasion, acid-base disturbance, high fever, disorientation, hypotension that is rapidly responsive to treatment, and isolated brief seizures that respond readily to treatment).
- **Major effect:** The patient exhibited signs or symptoms as a result of the exposure that were life-threatening or resulted in significant residual disability or disfigurement (e.g., repeated seizures or status epilepticus, respiratory compromise requiring intubation, ventricular tachycardia with hypotension, cardiac or respiratory arrest, esophageal stricture, and disseminated intravascular coagulation).
- **Death:** The patient died as a result of the exposure or as a direct complication of the exposure.
- **Not followed, judged as nontoxic exposure:** No follow-up calls were made to determine the outcome of the exposure because the substance implicated was nontoxic, the amount implicated was insignificant, or the route of exposure was unlikely to result in a clinical effect.
- **Not followed, minimal clinical effects possible:** No follow-up calls were made to determine the patient's outcome because the exposure was likely to result in only minimal toxicity of a trivial nature. (The patient was expected to experience no more than a minor effect.).
- **Unable to follow, judged as a potentially toxic exposure:** The patient was lost to follow-up, refused follow-up, or was not followed, but the exposure was significant and may have resulted in a moderate, major, or fatal outcome.
- **Unrelated effect:** The exposure was probably not responsible for the effect.

Data for 2021

Purpose

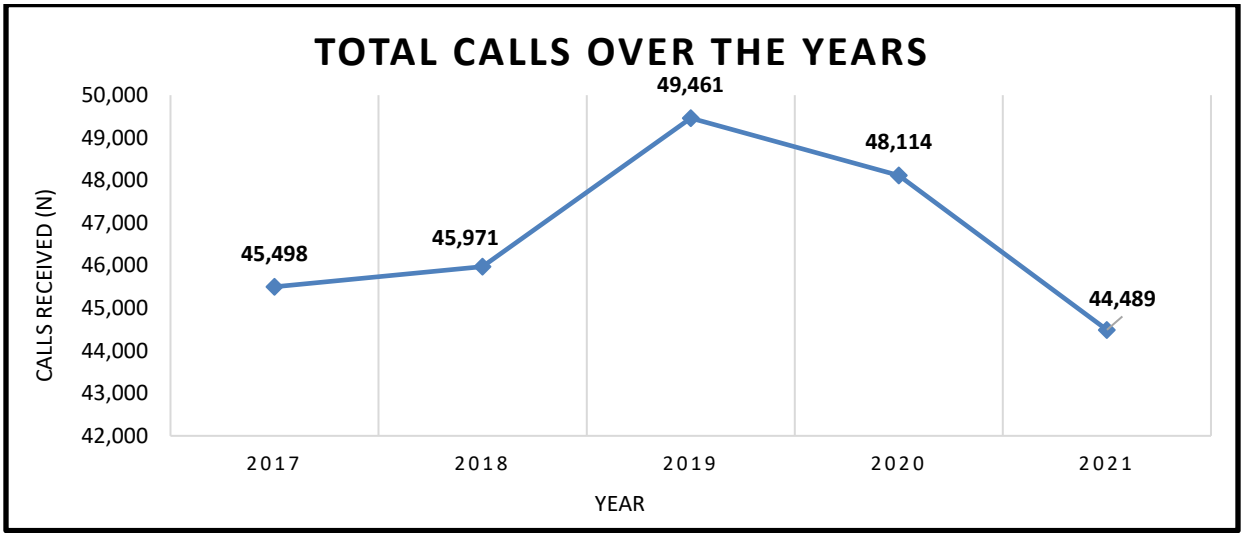
This report describes the various quarters within 2021 and the overall annual statistics. The purpose of the report is to track trends and conduct surveillance regarding toxic exposures and informational needs. The data provided is also useful for funders (such as the state health departments), and to help determine how the PCC should direct its outreach efforts in the future.

Quarter	Dates
Q1	January 1 to March 31
Q2	April 1 to June 30
Q3	July 1 to September 30
Q4	October 1 to December 31

Call Volume

Historical Call Volume

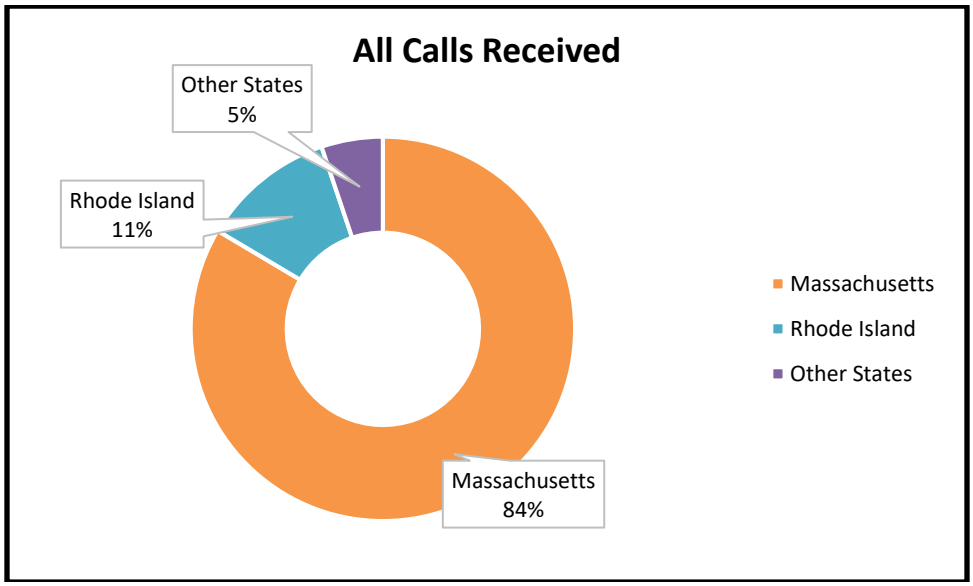
Over the past five years, call volume to the PCC has stayed stable with a slight increase in calls during 2019 and 2020. There was a drop in calls in 2021 compared to 2020.



Annual Data for 2021: All Calls Received

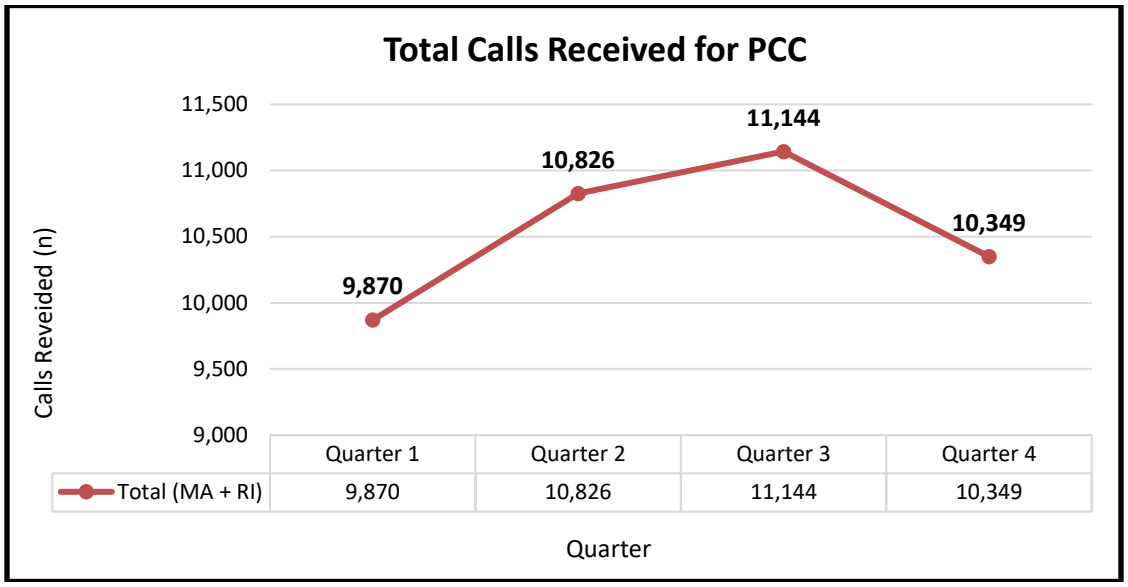
The Regional Center for Poison Control and Prevention (PCC) managed a total of 44,489 calls in 2021. There were 2,300 calls received for people outside of MA and RI, but the majority of calls (95%) were for Massachusetts and Rhode Island. Hereafter, any mention of the PCC will correlate to Massachusetts and Rhode Island data only.

State	Calls Received (n)	Percentage (%)
Massachusetts	37,161	83.5
Rhode Island	5,028	11.3
Other States	2,300	5.2



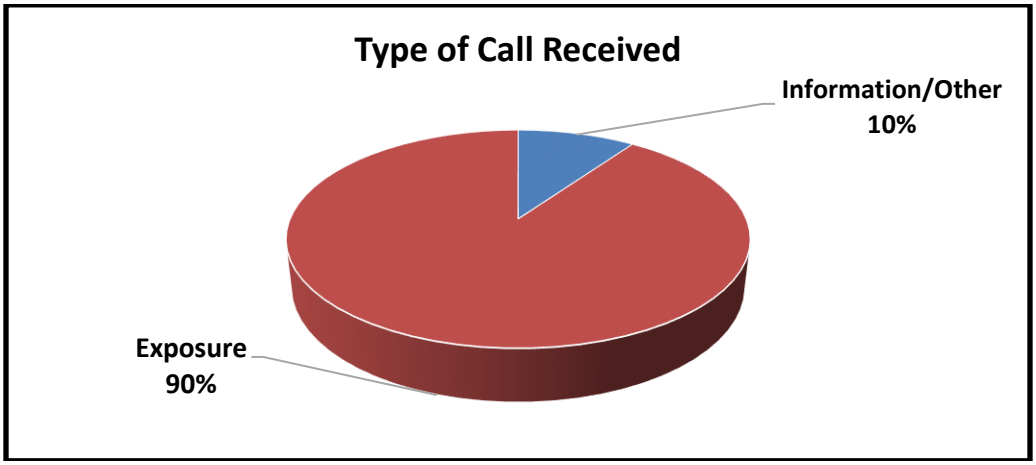
Quarterly Call Volume

The PCC received a total of 42,189 calls from people within Massachusetts and Rhode Island in 2021. This total includes both exposure and information calls. In 2021, most calls were received in Quarter 3 (July 1 to September 30).



Type of Call

The PCC receives two different types of calls: exposure calls and informational calls. Exposure calls occur when someone is exposed to a substance, while informational calls are when people call the PCC asking for information about a potential poison, but no exposure has occurred. Most of the calls the PCC received in 2021 were exposure calls (90%).

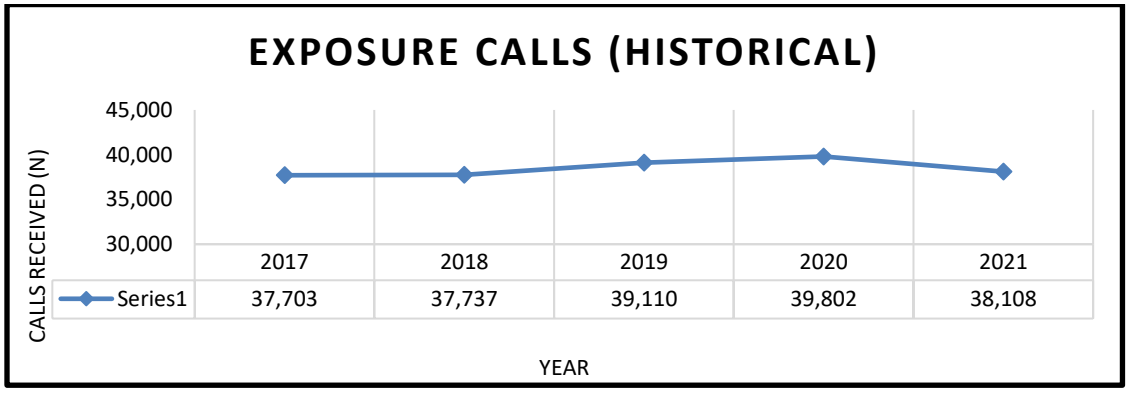


Exposure Calls

Historical

Over the past five years, the PCC has received 192,460 exposure calls. Call volume has been stable over the past five years, but there was a small increase in calls from 2019 to 2020.

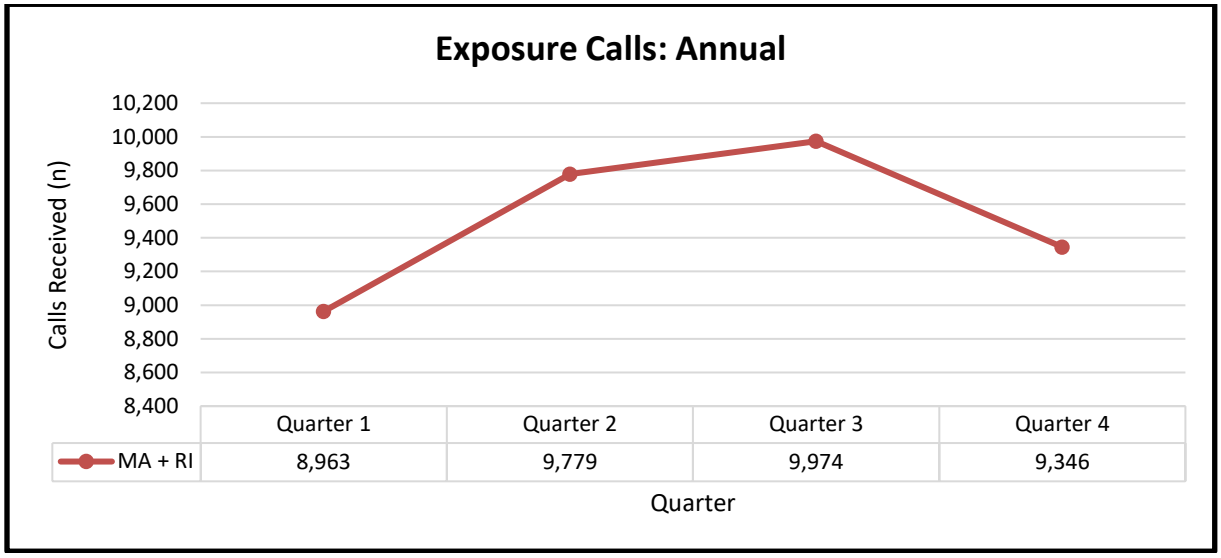
Year	Calls (n)
2017	37,703
2018	37,737
2019	39,110
2020	39,802
2021	38,108



Annual: 2021

For the year 2021, there was a total of 38, 108 exposure calls received by the PCC. Essentially, there was an even split in the number of calls received for each quarter.

Quarter	Calls (n)
Quarter 1	8,973
Quarter 2	9,788
Quarter 3	9,989
Quarter 4	9,358
	Total: 38,108



Exposure Site

The overwhelming majority of patients were exposed to poisons at their own residence (about 94%). There was also a small percentage of exposures at "other residences" or at "school".

Exposure Site	MA + RI Exposure Calls (n)	Percentage (%)
Own Residence	35,778	93.89
School	704	1.85
Other	412	1.08
Workplace	389	1.02
Other Residence	378	0.99
Public Area	191	0.50
Unknown	110	0.29
Healthcare Facility	109	0.29
Restaurant/Food Service	37	0.10
	Total (n): 38,108	**Total (%): 100%**

Where are Poisonings Managed/Treated?

Common Management/Treatment Sites

Most poison exposures were managed/treated onsite, at a non-healthcare facility (likely at home).

Management Site	Calls (n)	Percentage
Managed Onsite/Non-HCF	25,427	66.7
Managed in HCF	11,753	30.8
Other	146	0.40
Refused Referral	727	2.0
Unknown	55	0.1
	Total: 38,108	**Total: 100%**

Management/Treatment Sites: Healthcare Facilities

There were 11,753 poisoning calls poisoning calls referred to healthcare facilities (HCF) for management HCF; this accounts for about 31% of exposure calls in 2021. Healthcare facilities are places where medical treatments are provided (such as a hospital or a doctor's office).

Patients who were treated at a HCF were most likely to be evaluated and released, or were lost to follow-up/left the hospital on their own accord (left AMA).

Site	Calls (n)	Percentage (%)
Treated/evaluated and released	3,585	30.50
Admitted to critical care unit	1,338	11.40
Admitted to noncritical care unit	1,880	16.00
Admitted to psychiatric facility	1,658	14.10
Patient lost to follow-up/left AMA	3,292	28.00
Unspecified level of care	0	0.0
	Total: 11,753	**Total: 100%**

What are the Reasons for Poisoning?

Overall

Poisonings happen for a multitude of reasons. Most exposure calls to the PCC were unintentional, with a small percentage of poisonings being intentional or due to adverse reactions.

Overall Reason	Calls (n)	Percentage (%)
Unintentional	30,424	79.80
Intentional	6,480	17.00
Other	102	0.30
Adverse Reaction	684	1.80
Unknown	418	1.10
	Total: 38,108	**Total: 100%**

Reason: Unintentional

Unintentional poisonings made up most (79.8%) of all poisonings for the PCC in 2021. Unintentional poisonings include environmental, general poisonings, bites/stings, food poisonings and more (see appendix for definitions). The majority of unintentional poisonings were general poisonings.

Reason: Unintentional	Calls (n)	Percentage (%)
General	22,310	73.30
Environmental	1,167	3.80
Occupational	286	0.94
Therapeutic error	5,370	17.70
Misuse	847	2.80
Bite / Sting	78	0.30
Food poisoning	309	1.02
Unknown	57	0.19
	Total: 30,424	**Total: 100%**

Reason: Intentional

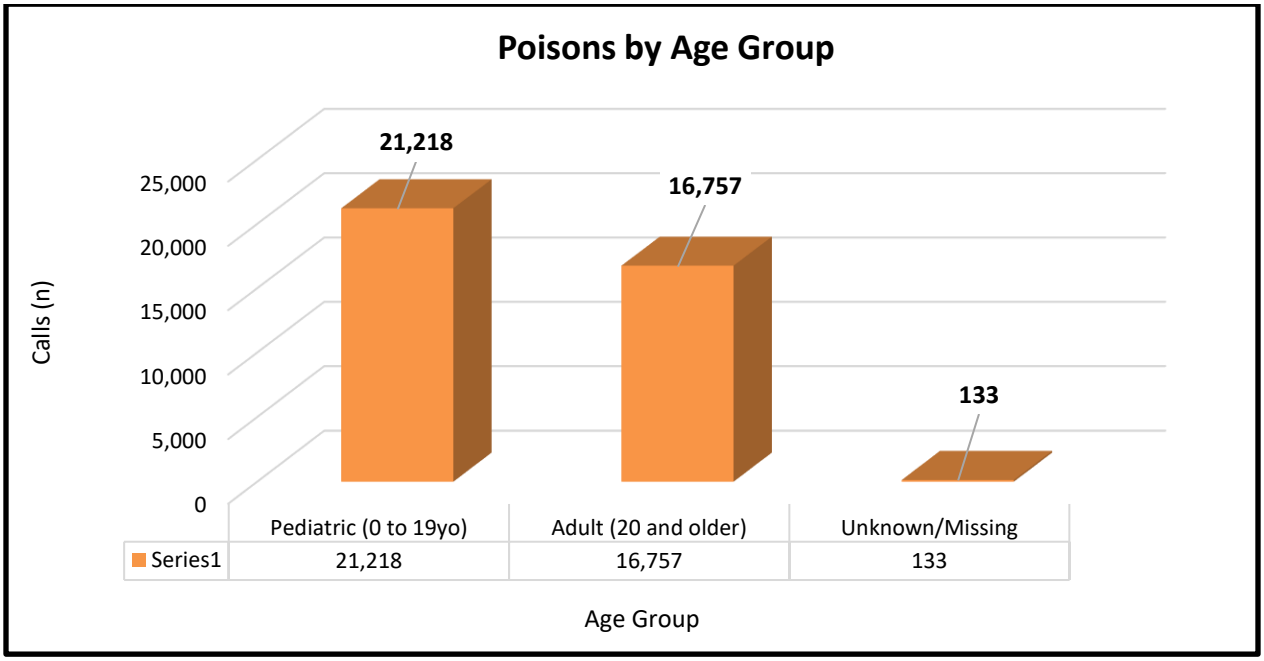
There were 6,480 intentional poisonings recorded in total in 2021; intentional poisonings include suicides, misuses, abuse and other unknown causes. The majority of intentional poisonings were suicide attempts.

Overall Reason: Intentional	Calls (n)
Suspected Suicide	4,812
Misuse	432
Abuse	666
Unknown	570
	Total: 6,480

Age & Poisonings

People of all ages can experience poisonings. The PCC receives calls for children, adults and seniors, so it is important that we differentiate between these groups and look at any apparent trends. Most poisonings were pediatric cases and dealt with children and teens (55.7%). Less than half of the poisonings (43.97%) were adult cases.

Age Group	Calls (n)	Percentage (%)
Pediatric (0 to 19 years old)	21,218	55.70
Adult (20 and older)	16,757	43.97
Unknown/Missing	133	0.35
	Total: 38,108	**Total: 100%**



Age: Adult

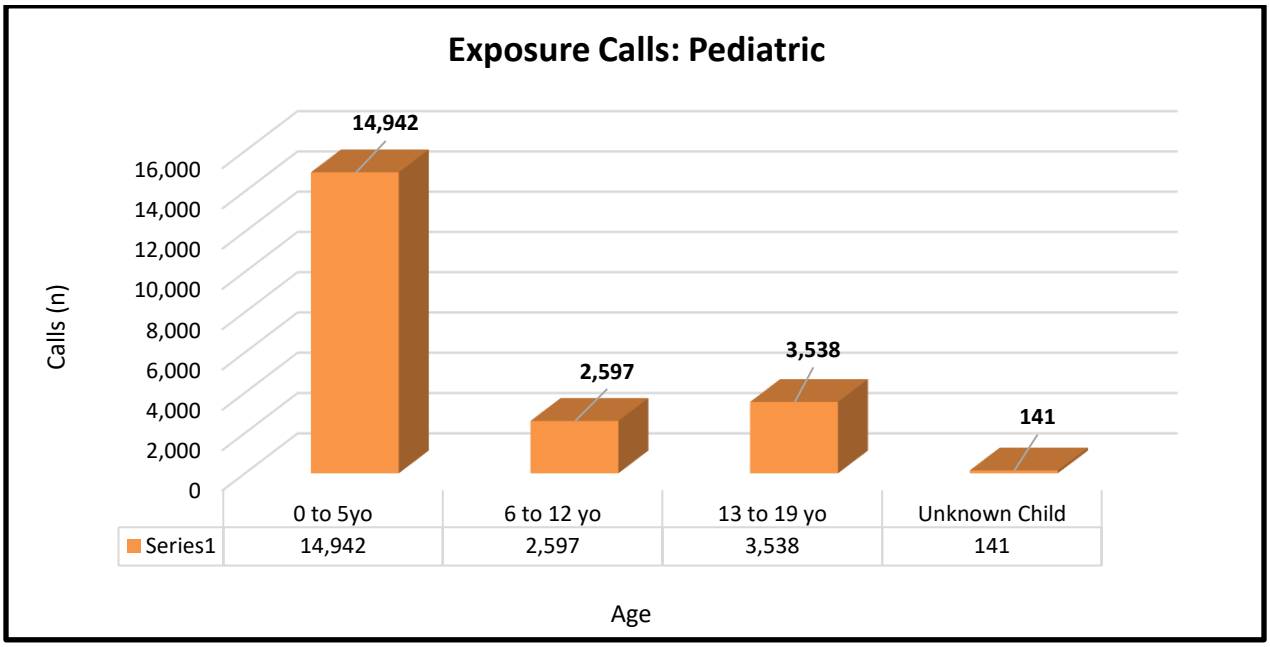
Adults are defined as anyone 20 years old and older. Excluding adults of unknown/missing age, most adult exposures calls were about young adults between the ages of 20 and 29 years old (19.7%) and 30 to 39 years old (16.9%).

Age	Calls (n)	Percentage (%)
20-29 years	3,309	19.7
30-39 years	2,839	16.9
40-49 years	1,944	11.6
50-59 years	1,957	11.7
60-69 years	1,693	10.1
70-79 years	1,136	6.78
80-89 years	539	3.22
> = 90 years	166	0.99
Unknown Adult Age	3,174	18.94
	Total: 16,757	**Total: 100%**

Age: Pediatric

Pediatric patients are defined as anyone 19 years old and younger. The overwhelming majority of pediatric exposure patients were between 0 to 5 years old (70.42%).

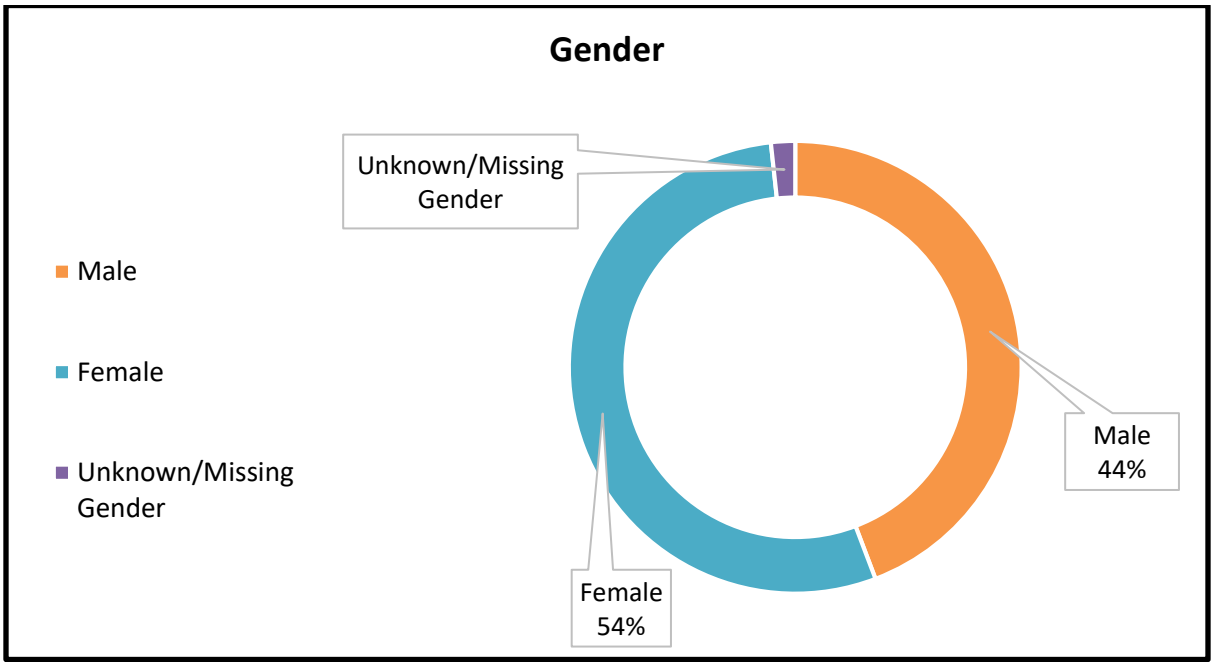
Age	Calls (n)	Percentage (%)
0 to 5 years	14,942	70.42
6 to 12 years (Child)	2,597	12.24
13 to 19 years (Teenager)	3,538	16.67
Unknown Age	141	0.66
	Total: 21,218	**Total: 100%**



Sex

Most exposures were for female patients (54%). Males had less exposures (44%). A small percentage of cases recorded (1.72%) did not include sex.

Gender	Calls (n)	Percentage (%))
Male	16,855	44.23
Female	20,596	54.05
Unknown/Missing	657	1.72
	Total: 38,108	**Total: 100%**



Pharmaceutical vs. Non-Pharmaceutical Substances

The tables below depicts the top ten most common substance exposures of 2021. The tables show the overall ranking of the most common substances and also breaks the substances down into the categories of pharmaceutical and non-pharmaceutical substances.

Substances: Overall Incidence

Poisonings can happen due to a variety of substances but the most frequently occurring substances for which the PCC receives calls are analgesics, household cleaning products, and cosmetics. Ten percent of exposure calls were due to analgesics. Analgesics include items such as acetaminophen, aspirin and ibuprofen. Household cleaning substances includes items such as bleach and laundry detergents. Cosmetics/personal care products include items such as toothpaste/mouthwash, hand sanitizers, and soap.

Ranking	Substances	Incidence (n)	Percentage (%)
1	**Analgesics**	4,529	10.05
2	**Cleaning Substances (Household)**	3,521	7.81
3	**Cosmetics/Personal Care Products**	3,377	7.49
4	**Antidepressants**	2,662	5.91
5	**Sedatives, Hypnotics & Antipsychotics**	2,013	4.47
6	**Cardiovascular Drugs**	1,994	4.43

7	**Foreign Bodies/Toys/Miscellaneous**	1,978	4.39
8	**Antihistamines**	1,924	4.27
9	**Alcohols**	1,170	2.60
10	**Pesticides**	1,089	2.42

Substances: Pharmaceutical vs Non-Pharmaceuticals

Ranking	Pharmaceutical Substances	Incidence (n)
1	**Analgesics**	4,529
2	**Antidepressants**	2,662
3	**Sedatives, Hypnotics & Antipsychotics**	2,013
4	**Cardiovascular drugs**	1,994
5	**Antihistamines**	1,924

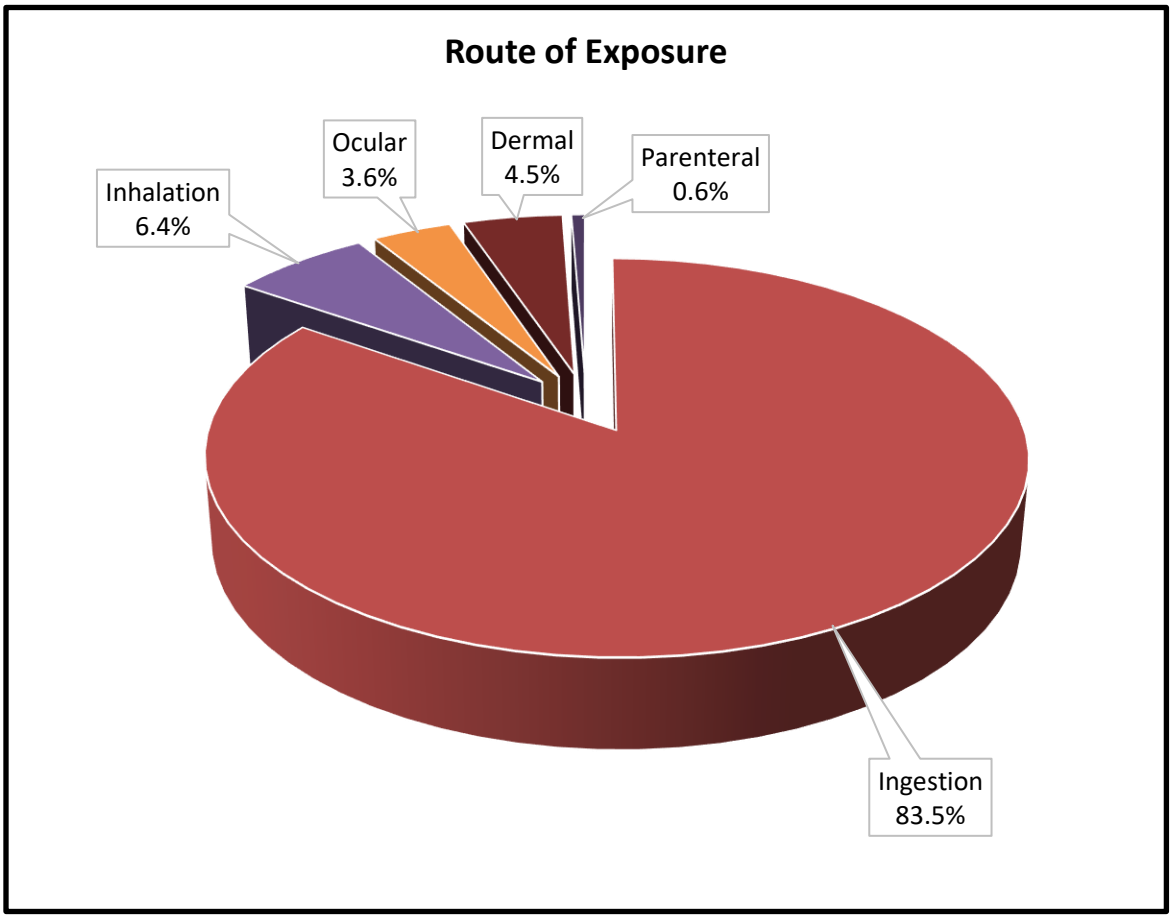
Ranking	Non-Pharmaceutical Substances	Incidence (n)
1	**Cleaning Substances (Household)**	3,521
2	**Cosmetics/Personal Care Products**	3,377
3	**Foreign Bodies/Toys/Miscellaneous**	1,978
4	**Alcohols**	1,170
5	**Pesticides**	1089

Route of Exposure

People can be exposed to poisons by a variety of routes, such as through inhalation, eating/drinking and a multitude of other ways. The most common route of exposure was ingestion (see appendix for definitions).

Route	Incidence (n)	Percentage (%)
Ingestion	32,841	83.52
Inhalation	2,519	6.41
Aspiration	48	0.12
Ocular	1,429	3.63
Dermal	1,785	4.54
Bite/Sting	78	0.2
Parenteral	239	0.61
Rectal	26	0.07

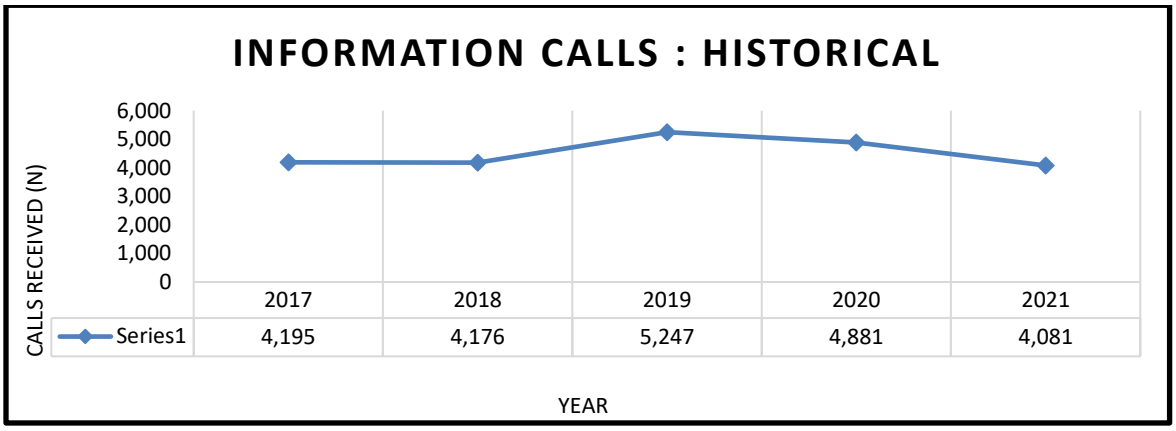
Otic	28	0.07
Vaginal	27	0.07
Other	90	0.23
Unknown	213	0.54
	Total: 39,323	**Total: 100%**



Information

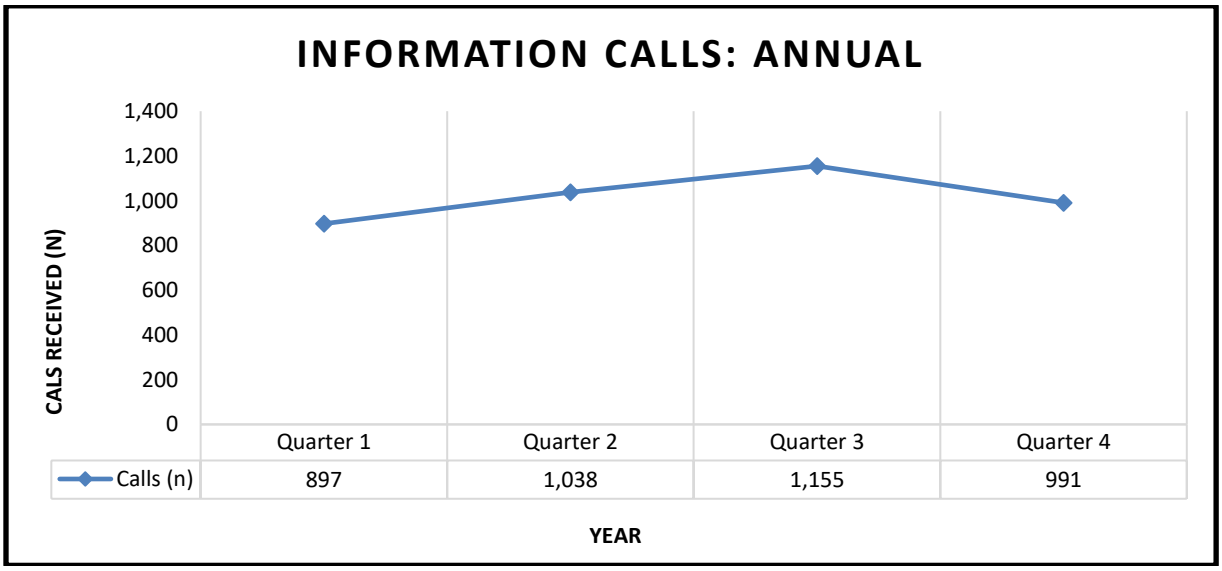
Historical

Over the past five years (2017 through 2021), the PCC has received 22,580 information calls. The highest amount of information calls were received in 2019.



Annual: 2021

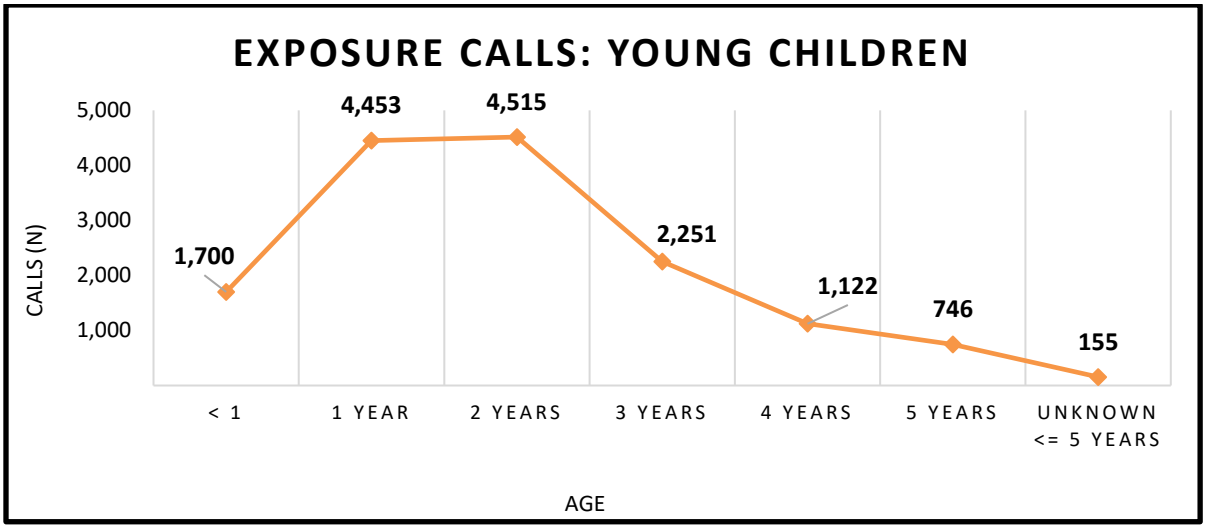
For the year, there were a total of 4,081 information calls received. The highest percentage of calls were received during the third quarter (July 1 to September 30).



Spotlight: Young Children (Ages 0 to 5 years)

Parents are rapidly enrolling their younger children in preschool in both Massachusetts and Rhode Island. Many children begin school at four years old. During this age, children are exposed to new surroundings, substances and people, so this is an opportune time to inform parents and teachers about the importance of poison control.

Age	Exposure Call (n)	Percentage (%)
< 1 year	1,700	11.38
1 year	4,453	29.8
2 years	4,515	30.22
3 years	2,251	15.06
4 years	1,122	7.51
5 years	746	4.99
Unknown Age (5 years old and younger)	155	1.04
	Total: 14,942	**Total: 100%**



The most common substances afecting young children are cosmetics (hand sanitizers, lotion/makeup), cleaning substances (bleach, laundry detergent) and analgesics (ibuprofen).

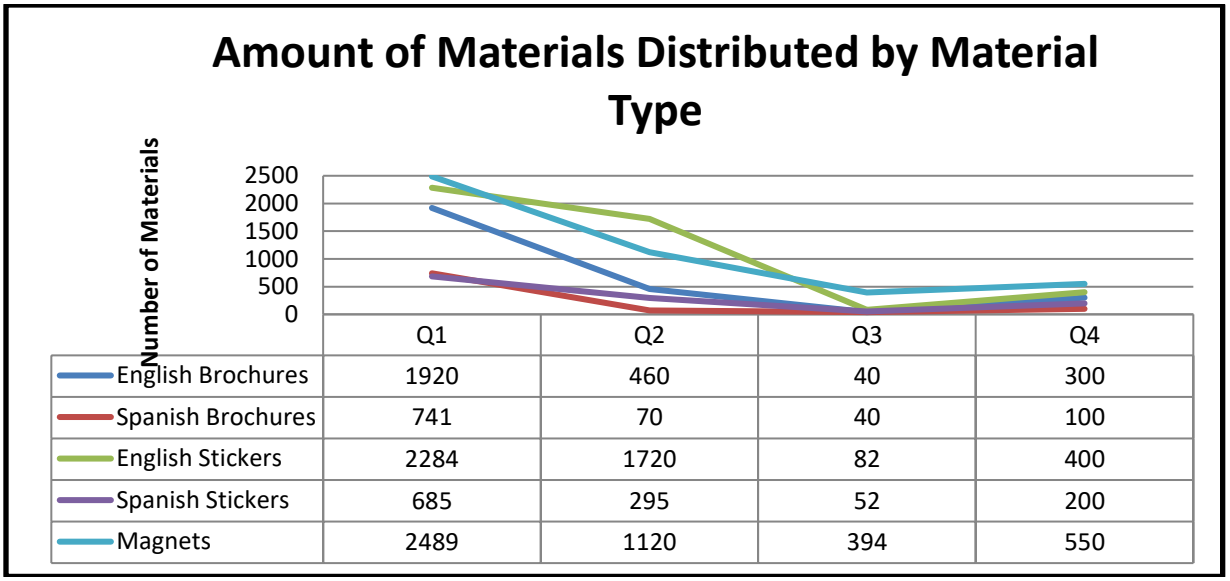
Ranking	Category	Percentage (%)
1	**Cosmetics**	13.37
2	**Cleaning Substances**	9.47
3	**Analgesics**	8.23

Outreach & Publications

Educational Outreach

Material Distribution

The PCC sends educational materials such as stickers, magnets, brochures and magnifiers. All materials are sent free-of-charge to Massachusetts and Rhode Island residents and businesses. To order materials, state residents can reach out to the PCC via phone, email or social media and submit a request. The most common requested material requested were magnets and stickers (English language).



	Q1	Q2	Q3	Q4
English Brochures	1920	460	40	300
Spanish Brochures	741	70	40	100
English Stickers	2284	1720	82	400
Spanish Stickers	685	295	52	200
Magnets	2489	1120	394	550

Educational Trainings

Due to the COVID-19 pandemic and staff availability, the PCC did not conduct any externally-facing educational trainings in 2021. During 2021, the PCC Education Coordinator mainly focused on archiving COVID-19 related PCC calls.

Organization	Date of Training	Number of Attendees	Title; Audience	Trainer
Department of Public Health (Massachusetts)	8/23/2021	6	*Question, Persuade and Refer Trainings*; C-SPIS and SPIs of the PCC	Alexandria Papadimoulis
Department of Public Health (Massachusetts)	8/26/2021	3	*Question, Persuade and Refer Trainings*; C-SPIS and SPIs of the PCC	Alexandria Papadimoulis

Staff Publications in 2021

1. Bartsch YC, Fischinger S, Siddiqui SM, Chen Z, Yu J, Gebre M, Atyeo C, Gorman MJ, Zhu AL, Kang J, Burke JS, Slein M, Gluck MJ, Beger S, Hu Y, Rhee J, Petersen E, Mormann B, Aubin MS, Hasdianda MA, Jambaulikar G, **Boyer EW**, Sabeti PC, Barouch DH, Julg BD, Musk ER, Menon AS, Lauffenburger DA, Nilles EJ, Alter G. Discrete SARS-CoV-2 antibody titers track with functional humoral stability. Nat Commun. 2021 Feb 15;12(1):1018. doi: 10.1038/s41467-021-21336-8. PMID: 33589636; PMCID: PMC7884400.
2. **Burns MM**, Renny MH. Pediatric poisoning fatalities: Beyond cough and cold medications. Pediatrics 2021; 148 (5): e20211052189. doi: 10.1542/peds.2021-052189
3. **Burns MM**, **Toce MS**. Pediatric cannabis use and cardiac complications. CMAJ 2021; 193 (45): E1737. doi: 10.1503/cmaj.80288.
4. Azizoddin DR, Kvaternik N, Beck M, Zhou G, Hasdianda MA, Jones N, Johnsky L, Im D, **Chai PR, Boyer EW.** Heal the Healers: A pilot study evaluating the feasibility, acceptability, and exploratory efficacy of a Transcendental Meditation intervention for emergency clinicians during the coronavirus disease 2019 pandemic. J Am Coll Emerg Physicians Open. 2021 Dec 29;2(6):e12619. doi: 10.1002/emp2.12619. PMID: 35005707; PMCID: PMC8716568.Barbuto AF, **Burns MM**. Pralidoxime and oximes. In: Bateman N, Brent J, editors. A History of Modern Clinical Toxicology. American Press, 2021; p. 255-264.
5. **Chai PR**, Bustamante MJ, Goodman G, Mohamed Y, Najarro J, Sullivan MC, Castillo-Mancilla J, Coyle RP, Mayer KH, Rosen RK, Baumgartner SL, Alpert PE, **Boyer EW,** O'Cleirigh C. A Brief Training Program to Support the Use of a Digital Pill System for Medication Adherence: Pilot Descriptive Study. JMIR Form Res. 2021 Apr 23;5(4):e26213. doi: 10.2196/26213. PMID: 33890863; PMCID: PMC8105755.
6. **Chai PR**, Dadabhoy FZ, Huang HW, Chu JN, Feng A, Le HM, Collins J, da Silva M, Raibert M, Hur C, **Boyer EW,** Traverso G. Assessment of the Acceptability and Feasibility of Using Mobile Robotic Systems for Patient Evaluation. JAMA Netw Open. 2021 Mar 1;4(3):e210667. doi: 10.1001/jamanetworkopen.2021.0667. PMID: 33662134; PMCID: PMC8058534.
7. **Chai PR**, Goodman G, Bustamante M, Mendez L, Mohamed Y, Mayer KH, **Boyer EW**, Rosen RK, O'Cleirigh C. Design and Delivery of Real-Time Adherence Data to Men Who Have Sex with Men Using Antiretroviral Pre-exposure Prophylaxis via an Ingestible Electronic Sensor. AIDS Behav. 2021 Jun;25(6):1661-1674. doi: 10.1007/s10461-020-03082-y. Epub 2020 Nov 21. PMID: 33219877; PMCID: PMC8084862.
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ToxiCall Syntax

Syntax

- Total Calls
  - Display: 003
- Information Calls
  - Display: 003

- Exposure Calls
    - Display: 003
- Management Site
    - Display: 014
- Exposure Site
    - Display: 009
- Gender
    - Display: 026
- Age
    - Display: 026
- Reason for Poisoning
    - Display: 007
- Pharmaceutical & Non-Pharmaceutical
    - Display: 054B
- Medical Outcome
    - Display: 022
- Spotlight: Young Children
    - Display: 026, 054A, 054B
    - Notes: There are 294 more exposure cases listed in display 054 due to duplicates.

- Route of Exposure
    - Display: 011
    - Notes: There are 1,215 extra exposure cases due to duplicates in ingestion routes on single calls.
- Training and Materials
    - Uses separate excel sheet from PCC office
- Note: There are 46 cases (0.12%) included in the exposure total (n = 38,108) that were classified as “Confirmed Nonexposures”. These cases are included in the total (n = 38,108)