



Maryland Poison Center
UNIVERSITY OF MARYLAND SCHOOL OF PHARMACY

2021

ANNUAL REPORT



1.800.222.1222
www.mdpoison.com

Celebrating **50 Years** at the University of Maryland School of Pharmacy

While reflecting on the Maryland Poison Center's 2021 annual report, a message I heard regularly as a child kept coming to mind:

"The one constant in life is change."

The perspective of a child is very different than that of an adult. When I was younger, I didn't see a lot of change from day to day. As an adult, I now have the perspective to better understand that statement.

Things change. And the rate of change has been accelerating. The changes that have taken place over the past 50 years are hard to comprehend. I was nine years old in 1972, the year the Maryland Poison Center (MPC) joined the University of Maryland School of Pharmacy. Computers were only envisioned in science fiction TV shows or movies. No one had them at home. Telephones were large, connected to the wall, and had a rotary dial. A "mobile phone" was one with a really long cord. Making calls from your wrist was a Dick Tracy comic book fantasy. Cameras all used an actual roll of film. These days, everyone has a powerful device in their hands, their pockets, or bags that connects to a world of information AND takes stunning pictures and video. They can even use these devices to make calls!

In 1972, poison centers were a relatively new phenomenon. There were no standards for what a poison center was, meaning anyone could establish a "poison center." In 1972, there were approximately 600 poison centers in the United States. Many of these "centers" consisted of one telephone that was available in a hospital emergency department with no dedicated staff responsible for providing the service.

There were few information resources available - certainly no internet or computerized references, but also few textbooks devoted to clinical toxicology. There were no regional certified poison centers and no board certified toxicologists. When the MPC arrived at the University of Maryland School of Pharmacy, the very essence of what a poison center was supposed to be was still evolving. Initially, the MPC was staffed Monday through Friday from 8 a.m. to 5 p.m. by one person who had a master's degree in education. The remaining days and hours the service was "staffed" by pharmacy and medical students. The medical director of the MPC was a psychiatrist with no formal training in toxicology (it didn't exist!).

Initially, the service wasn't available for parents at home to call about children getting into toxic substances. The MPC's focus was on providing overdose information to physicians. The MPC expanded to home callers, with a statewide 1-800 number implemented in the late 1970s to allow anyone to call without cost. A health educator was added in the mid-1970s to help increase awareness of the service. Staffing was modestly expanded to meet the increased need; however, budget challenges continued during this time. Health professional students supplemented our staffing until 1996 when we were finally fiscally able to field a staff of trained health professionals 24 hours a day.

Despite these very modest beginnings, the MPC has maintained exceptional service. Lisa Booze, one of our former poison specialists, played a role in setting the standard for the certification of poison specialists in the U.S. Lisa and others were asked by the American Association of Poison Control Centers

(AAPCC) to pilot test a certification exam to ensure that it was a reasonable method for demonstrating expertise as a poison specialist. I half-jokingly refer to Lisa as the specialist by whom all others are judged.

When the AAPCC developed the certification designation for poison centers, the MPC met the criteria and has maintained that distinction ever since. All the pharmacists and nurses who answers calls to the MPC are certified as poison specialists. I am a fellowship trained and board-certified clinical toxicologist, as is one of our poison specialists, Jimmy Leonard. Josh King, our medical director, is fellowship trained and board certified in internal medicine, nephrology, AND medical toxicology. Emily Paterson, our public health educator, is a Certified Health Education Specialist (CHES) and recent MPH graduate. In short, we have exceptional individuals who have incredible backgrounds, training, and experience.

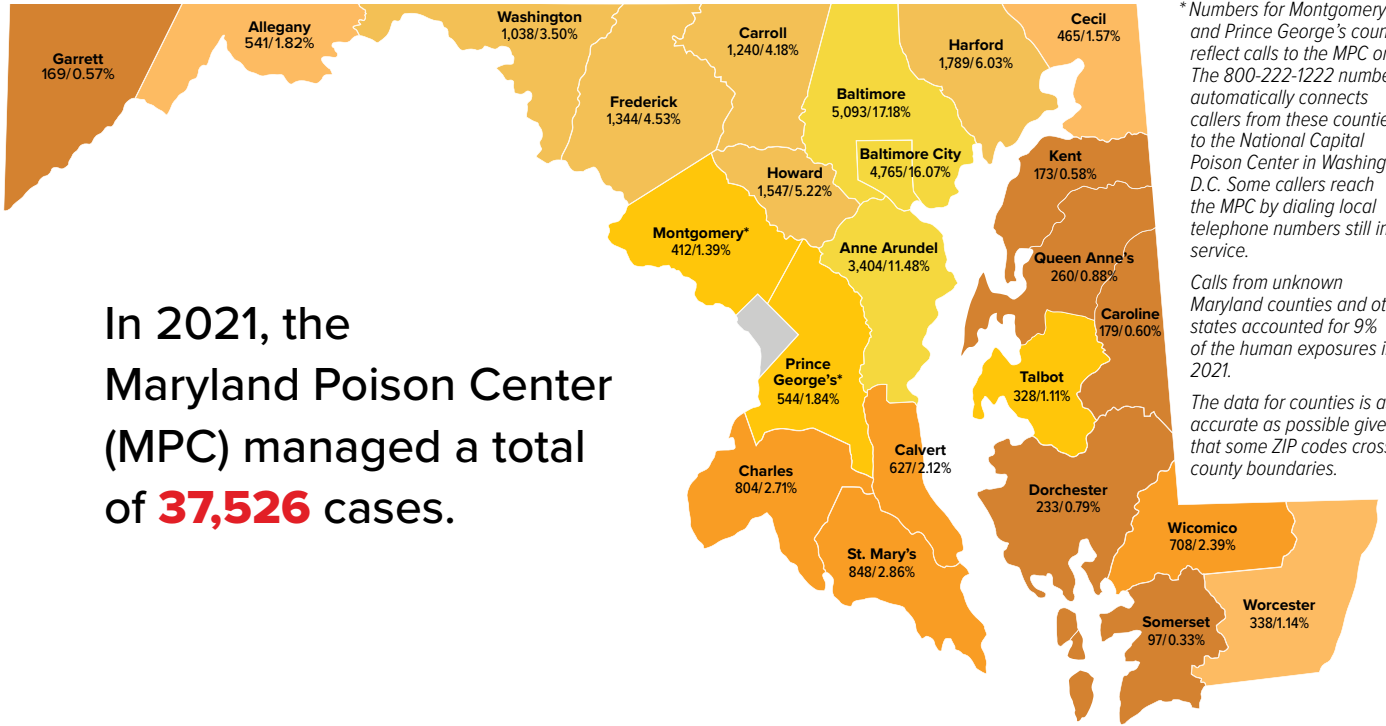
As evidenced by the data and information in this 2021 annual report, the MPC today bears little resemblance to its 1972 version. Despite the outward differences, the commitment to providing the most accurate and appropriate information to our callers is the same today as it was 50 years ago.

Happy 50th to the Maryland Poison Center and to all the people who have helped to make this service successful!



Bruce D. Anderson
Executive Director

Human Exposures

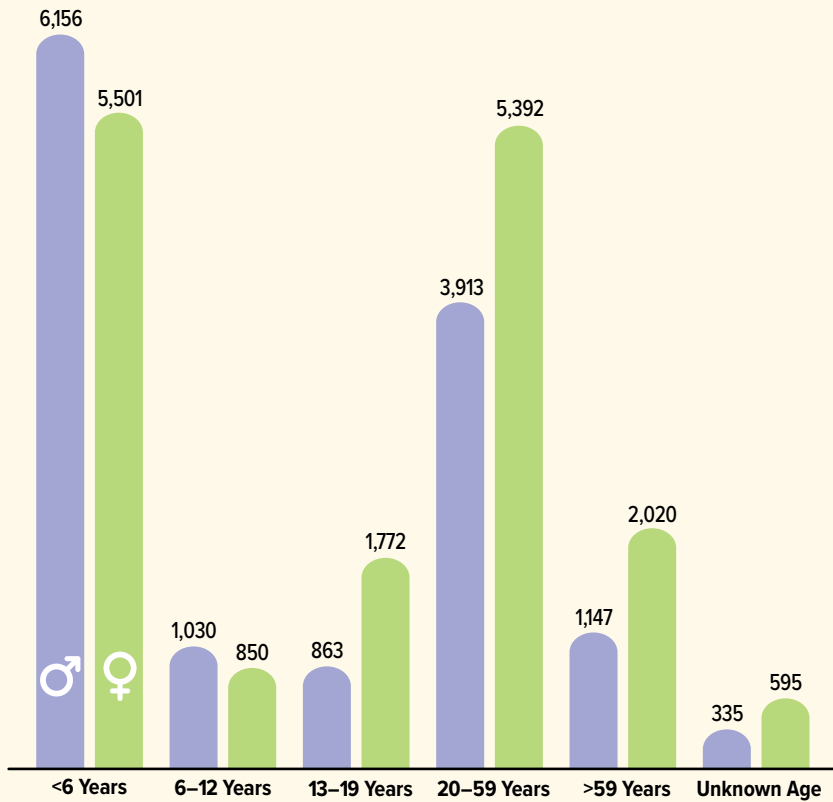


*Numbers for Montgomery and Prince George's counties reflect calls to the MPC only. The 800-222-1222 number automatically connects callers from these counties to the National Capital Poison Center in Washington, D.C. Some callers reach the MPC by dialing local telephone numbers still in service.

Calls from unknown Maryland counties and other states accounted for 9% of the human exposures in 2021.

The data for counties is as accurate as possible given that some ZIP codes cross county boundaries.

In 2021, the Maryland Poison Center (MPC) managed a total of **37,526** cases.



Exposures By Gender

Males **45.4%**

Females **54.4%**

Unknown **0.2%**



Human Exposures
29,645

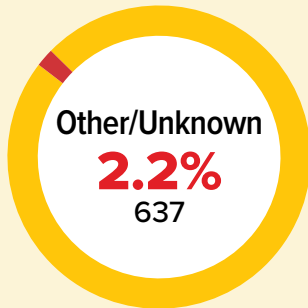
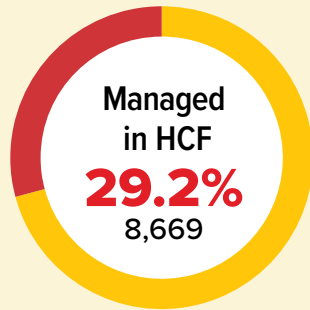
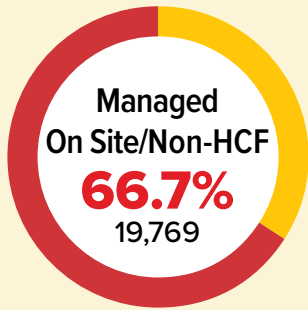


Information Requests
6,924



Animal Poisonings
957

Management Site



Managing cases safely at home:

- Saves millions of dollars in unnecessary health care costs compared with managing patients in a health care facility (HCF)
- Allows more efficient and effective use of limited health care resources

Of the cases managed in a health care facility, 54 percent were treated and released, 7.9 percent were admitted to a critical care unit, 12.7 percent were admitted to a non-critical care unit, 17.4 percent were admitted for psychiatric treatment, and 8 percent were lost to follow-up.

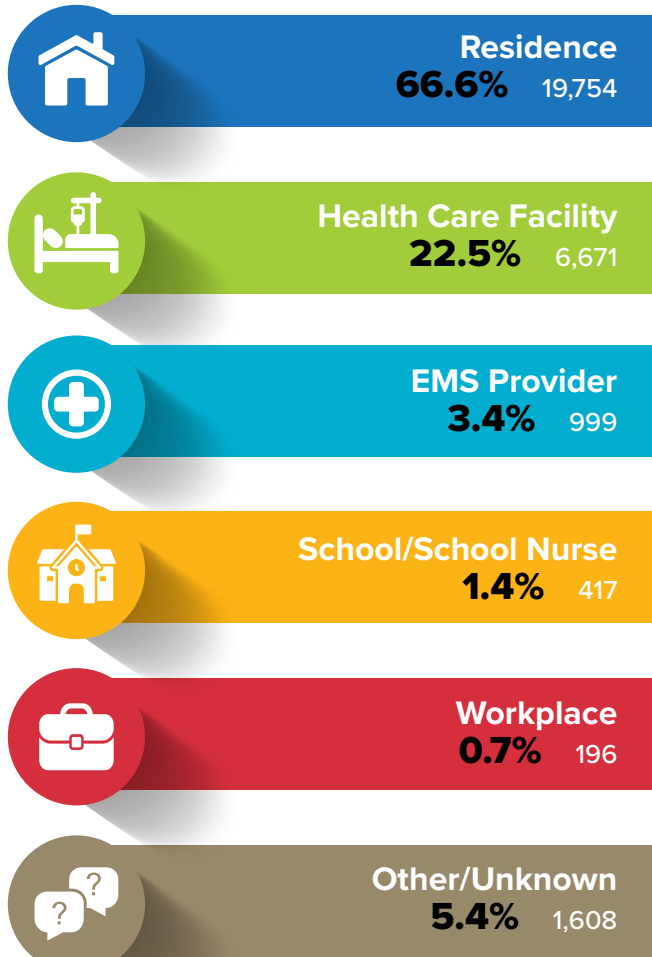
When EMS providers or 911 consulted with the MPC in 2021 about patients, 19.9 percent of those patients were managed safely at home.

Exposures By Age

6 years and under	39.4% 11,665	6–12 years	6.3% 1,882	13–19 years	8.9% 2,637
20–59 years	31.4% 9,310	60 years and over	10.7% 3,167	Unknown Age	3.3% 984



Site of Caller



Residence can be the patient's residence or another residence.

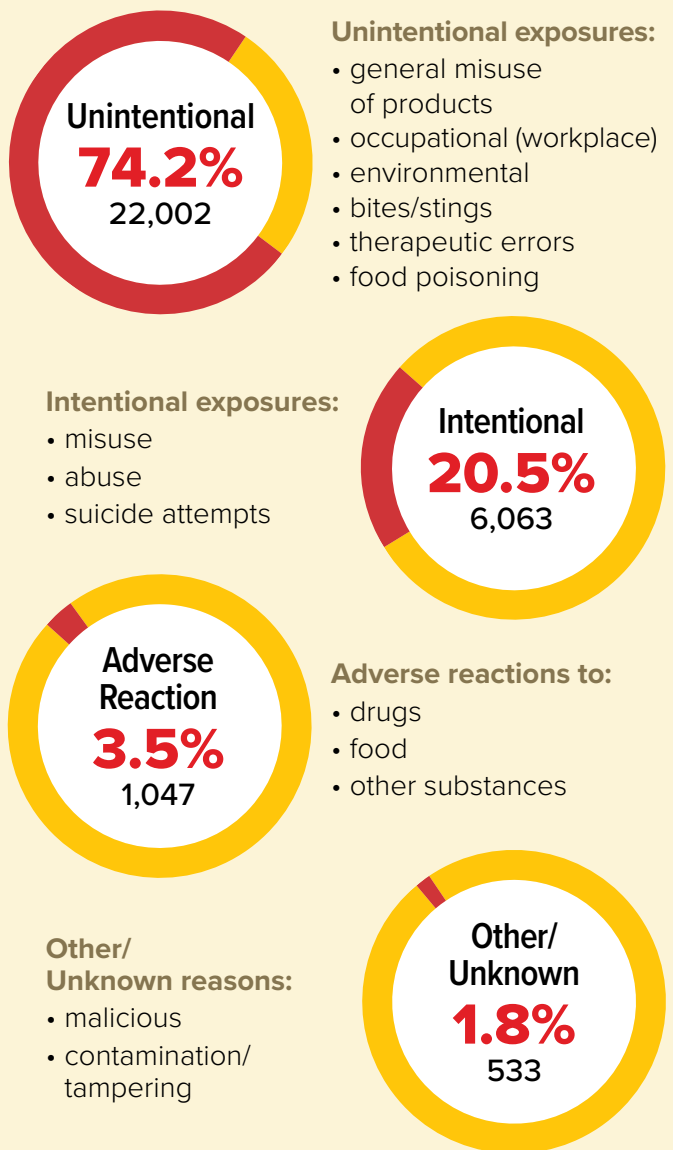
Health care facilities include hospitals, doctor's offices, urgent care centers, clinics, and others.

Emergency medical services providers include EMS, paramedic, first responder, and emergency medical dispatcher (911 dispatcher).

90% of cases reported by the public were managed at home.
89% of cases involving children <5 yrs old were managed at home.

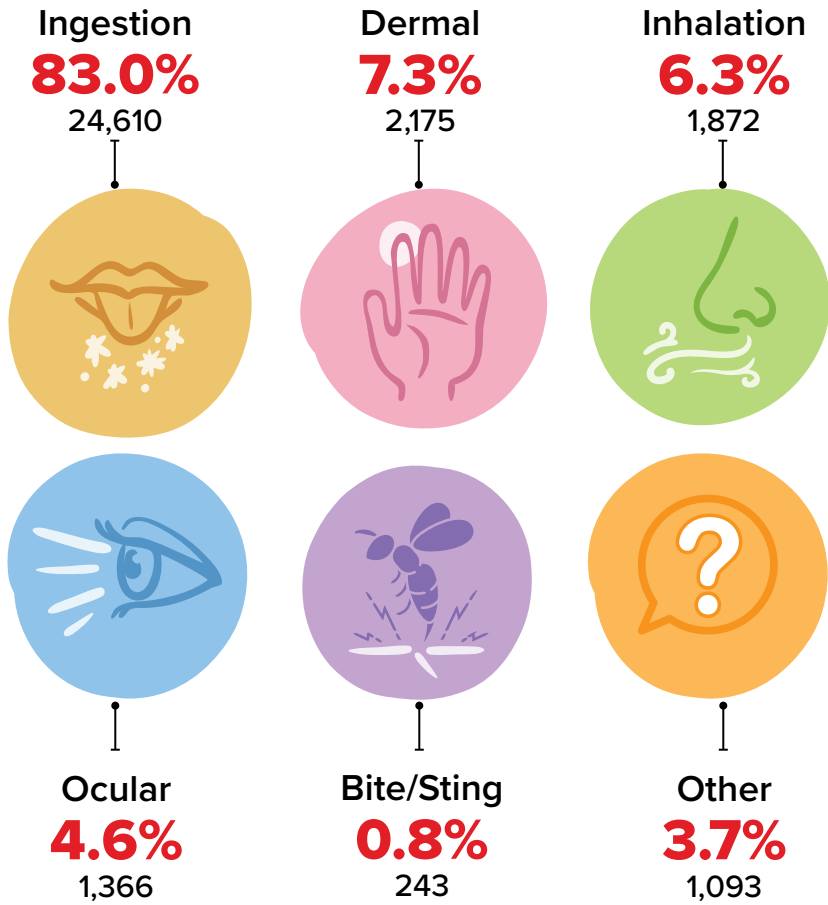
Circumstance

Reasons for poison exposures differ by age. In young children (under 6 years), 99 percent of exposures were unintentional, while in teens (13-19 years), only 28 percent of exposures were unintentional. Exposures in adults (20-59 years) were split more evenly with 53 percent being unintentional and 38 percent being intentional. In tweens (6-12 years) and older adults (60 years and older), most exposures were unintentional (85 percent and 74 percent respectively).



Therapeutic errors (double-doses, wrong medicines taken, etc.) accounted for 17 percent of total exposures.

Route of Exposure*



*Some cases involved multiple routes of exposure. Percentages are based on the total number of human exposures.

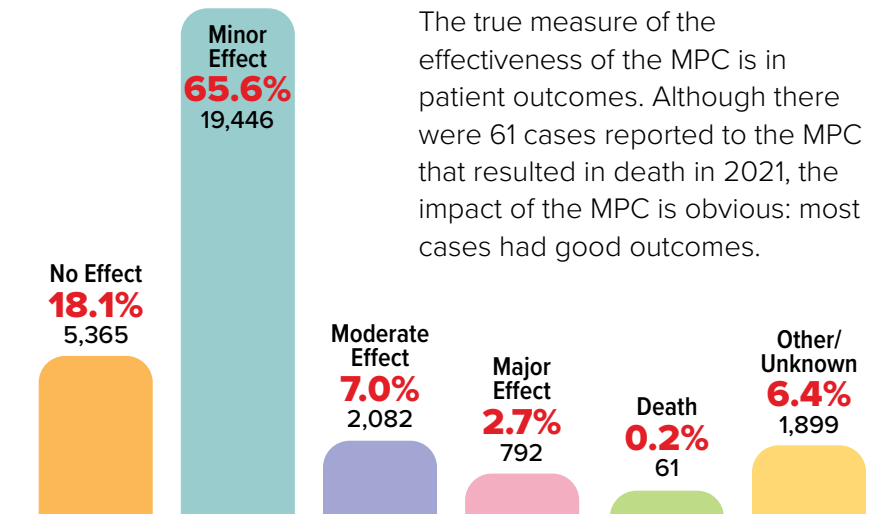


CAUSES OF POISONING

1. Pain relievers
2. Household cleaning products
3. Cosmetics and personal care products
4. Antidepressants
5. Heart medicines

Medical Outcomes

Calling the MPC as soon as a poisoning or overdose is suspected is the best way to reduce the likelihood of developing severe toxicity.



The true measure of the effectiveness of the MPC is in patient outcomes. Although there were 61 cases reported to the MPC that resulted in death in 2021, the impact of the MPC is obvious: most cases had good outcomes.

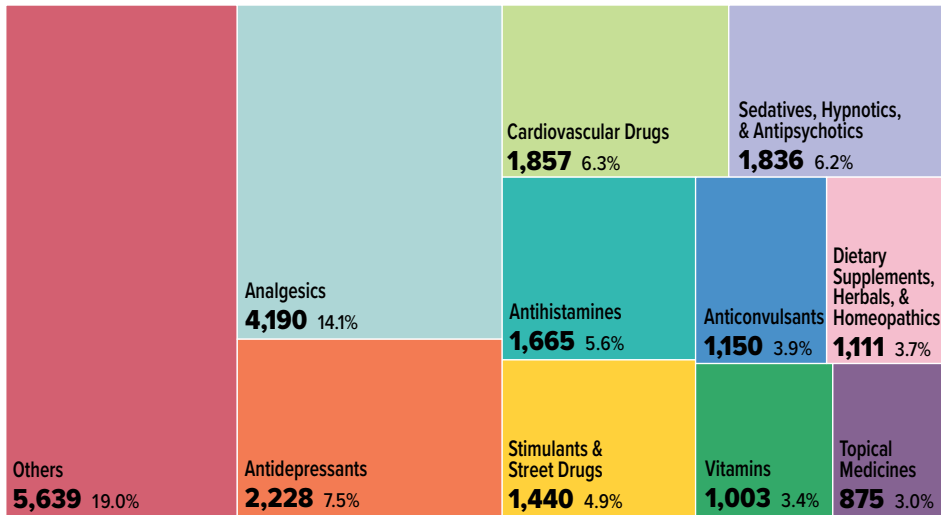
Our mission is to decrease the cost and complexity of care while maintaining and/or improving patient outcomes. These data clearly show that we're fulfilling our mission.

Substances Involved in Poisonings

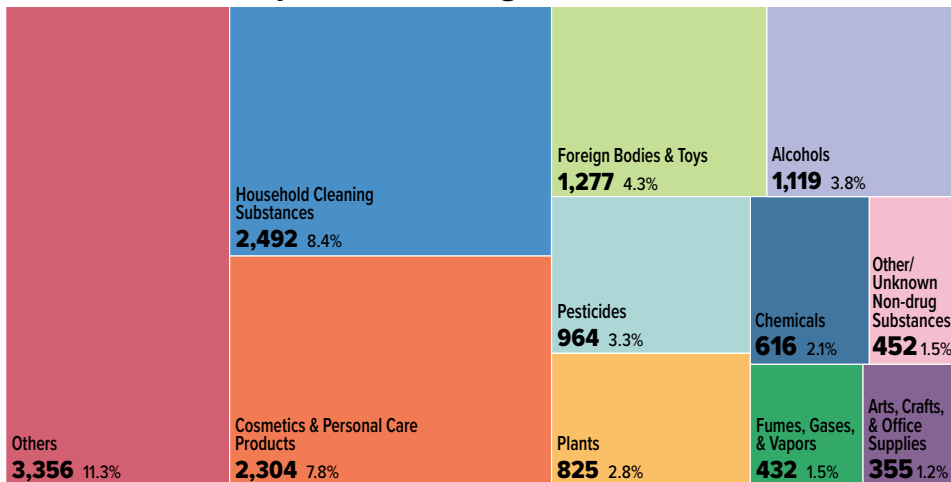
The diagrams below list the most common substances involved in poisonings and overdoses reported to the MPC in 2021. A patient may be exposed to more than one substance in a poisoning or overdose case.

56.7 percent of the poisoning and overdose cases managed by the MPC involved a drug, while 46.5 percent of cases involved a non-drug substance.

Top 10 Drug Substances



Top 10 Non-Drug Substances



Percentages in the graphics are based on the total number of human exposures.

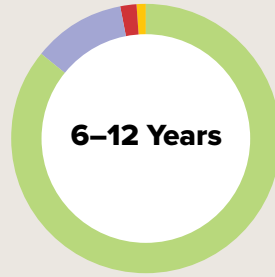
2,220 cases involving older adults were about medicines (this is 70% of the cases about older adults!).



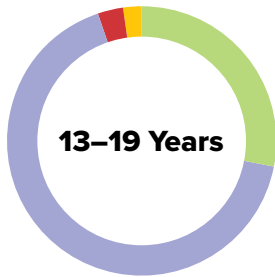
Exposure Reason By Age



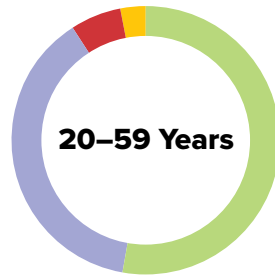
Unintentional
99.3% 11,588
Adverse Reaction
0.4% 43
Other/Unknown
0.3% 34



Unintentional
85.4% 1,607
Intentional
11% 208
Adverse Reaction
2.4% 45
Other/Unknown
1.2% 22



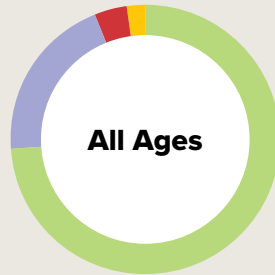
Unintentional
28.2% 744
Intentional
66.4% 1,752
Adverse Reaction
3.5% 91
Other/Unknown
1.9% 50



Unintentional
53.2% 4,956
Intentional
38.1% 3,542
Adverse Reaction
5.6% 525
Other/Unknown
3% 94



Unintentional
73.6% 2,331
Intentional
14.9% 474
Adverse Reaction
8.5% 268
Other/Unknown
3% 94



Unintentional
74.2% 22,002
Intentional
20.5% 6,063
Adverse Reaction
3.5% 1,047
Other/Unknown
1.8% 533

For every \$1 spent on poison center services, \$13 is saved in health care costs.

600
 cases reported by grandparents.



Public Education and Satisfied Callers

Our focus

- Increase awareness of the poisons found in every home, business, and school.
- Help prevent poisonings from occurring by encouraging safe storage and proper use of household products and medicines.
- Highlight the expertise of the staff of the MPC and that calling will result in fast, free, confidential help.

Public Ed Spotlight

The mission of public education at the MPC is vital for the safety of the more than four million people in the MPC's service area. Through the work of our

public health educator, assistant director of operations and public education, and numerous trainees across the state we ensure our various audiences such as health care students, parents, teachers, and older adults are aware of poisons, the MPC, steps to prevent poisonings, and steps to take when a poisoning happens. We use a combination of virtual and in-person educational programs to fulfill our mission.

Nursing students attend presentations on the MPC's services and our role as a member of the health care team in treating patients. They learn about poison risk factors and common poison exposures in all age groups. Finally, we empower them to be our partners in teaching their communities about poison prevention and safety.

General audiences receive our materials at events such as health fairs, safety days, and education sessions. We also have presentations for parents on keeping their families and older adults safe and how the MPC can be a resource for them.

We also spend time educating community partners about poison safety and the importance of calling the MPC so they can share these messages with the communities they serve.

**Elizabeth Millwee, BSN, RN
Certified Specialist in Poison Information*

“

Andrew left a Google Review in June 2021:

“They were kind, helpful, knowledgeable, and didn't do what I was expecting (project the worst possible case and direct me to the ER). HIGHLY recommend!”

”

“

Kathleen responded to the MPC Caller Satisfaction Survey in September 2021:

“Elizabeth* was so calm and informative. Elizabeth answered the phone immediately and advised me on what to do, what I can expect, and to call get back if anything changes. Fortunately, based on my situation, we did not have to worry, and the remedy was easy. Elizabeth's calm demeanor and offer to be available later if questions or concerns arose were very reassuring.”

”



Caller Satisfaction, Guaranteed

- **100%** rated their overall satisfaction with their call as extremely satisfied.
- **100%** will consult the MPC again.
- **100%** would recommend the MPC to others.

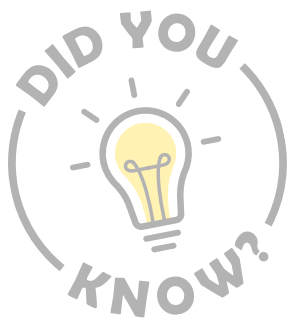
Public Education



Emily Paterson

Public Education and Communication Specialist

21 live and virtual programs attended
by **600** people across Maryland.



Some of our public education partners:

- State and local health departments
- Healthy Start programs
- State and local Safe Kids coalitions
- Head Start programs
- Fire/EMS/police
- Schools and childcare providers
- Physicians and hospitals
- Health insurers
- Local health improvement coalitions

More than **113,000** pieces of educational materials distributed.

MPC's eAntidote Blog

The MPC's blog, *eAntidote*, was launched in September 2017 as an additional educational resource for the more than four million people in the MPC's service area. The goal was to provide easy access to important information when it's most convenient for our readers, meeting them where they were. After four years and more than 4,000 visitors, the blog reached its 100th post in November 2021. Visit blog.mdpoison.com to find information on different topics regarding poison safety and prevention.

72%
of MPC
Facebook followers
are female.

- ▶ **19%** increase in MPC Twitter followers.
- ▶ Our **20** YouTube videos were viewed 4,000 times with a total watch time of 135 hours.
- ▶ Facebook had activity from followers in **20** of the **22 counties** in our service area.



Social Media and Website

In an attempt to reach more Marylanders with our educational and awareness messages, the MPC continued to routinely update its social media in 2021 on **Facebook** (@MarylandPoisonCenter) and **Twitter** (@MDPoisonCtr). Posts often directed followers to information on our website, blog, and YouTube channel.



194 Facebook posts reached more than **48,000 people** and generated an increase of **23 followers**.



192 tweets lead to more than **181,000 impressions** and a **19 percent increase** in followers.



Approximately **600 visitors** to our **e-Antidote blog**, yielding more than **1,300 page views**.



Added **two new videos** on **YouTube**. Our channel had more than **4,000 views** for a total watch time of more than **135 hours**.



More than **22,000 people** visited the **MPC website**, yielding approximately **55,000 page views**.

Traditional Media

In 2021, the MPC and its staff appeared in the media at least eight times in web articles. Topics included **National Poison Prevention Week**, medicine absorption by activated charcoal, summer poison prevention tips, and copperhead snakes.



Health Professional Education

Professional education is designed to help clinicians better manage poisoning and overdose cases that end up in a health care facility by providing on-site training for physicians, pharmacists, nurses, and EMS providers. Over the years, we have seen decreases in calls coming from homes and increases in calls coming from health care facilities and first responders. In 2021, approximately one-fourth of calls to the MPC came from physicians, physician assistants, nurse practitioners, nurses, and emergency medical personnel.

The MPC's Twitter account for health care professionals (@MPCToxTidbits) posted clinical and medical toxicology content relevant for health care providers.

Program Spotlight

The mission of the MPC's Health Care Professional Education Program

is to increase the understanding of clinical toxicology concepts and improve the management of Maryland's poisoned and overdosed patients by providing on-site and virtual training programs to physicians, pharmacists, nurses, EMS providers, and health professions students.

Some of the programs offered in 2021 for physicians included:

- THC Edibles: An Emerging Threat for Children, given to a local hospital's pediatric residents
- Update on the Management of the Latest Drugs of Abuse, given to a local psychiatry practice's medical residents
- Calcium Channel Blocker Overdose Management, New Acetaminophen Overdose Management Approaches, and Toxicology Escape Room, all given to local internal medicine and emergency department medical residents

Education offerings for nursing students this year were:

- Poisoning and Overdose Management for Nurses
- Toxicology for Acute Care Doctor of Nursing Practice Students

- Perilous Pediatric Poisonings: What Pediatric Doctor of Nursing Practice Students Need to Know

Additionally, a partnership exists between the Maryland Poison Center and the Chesapeake Critical Care Consortium - a collaboration of several central Maryland hospitals working together to train their critical care nurses - to teach a monthly class on poisonings and overdoses.

The MPC spoke at two nursing conferences this year:

- EVALI: E-Cigarette and Vaping Associated Lung Injury and the Vaping of Illicit Drugs - presented at the annual American Association of Emergency Nurses' Conference
- Calcium Channel Blocker Overdoses: Managing Fluid Overload from Life Saving Insulin Therapy was presented at ENA by the Bay, the annual conference for the Maryland Emergency Nurses' Association

▶ **18 programs and webinars reached more than 815 health care professionals.**

▶ **157 health professionals participated in virtual MPC daily case conference rounds to learn about the assessment and treatment of poisoned patients.**

▶ **59 tweets lead to more than 115,000 impressions, more than 12,000 engagements, and an increase of 253 followers.**

One presentation was given at the invitation of a group of school nurses on the Eastern Shore.

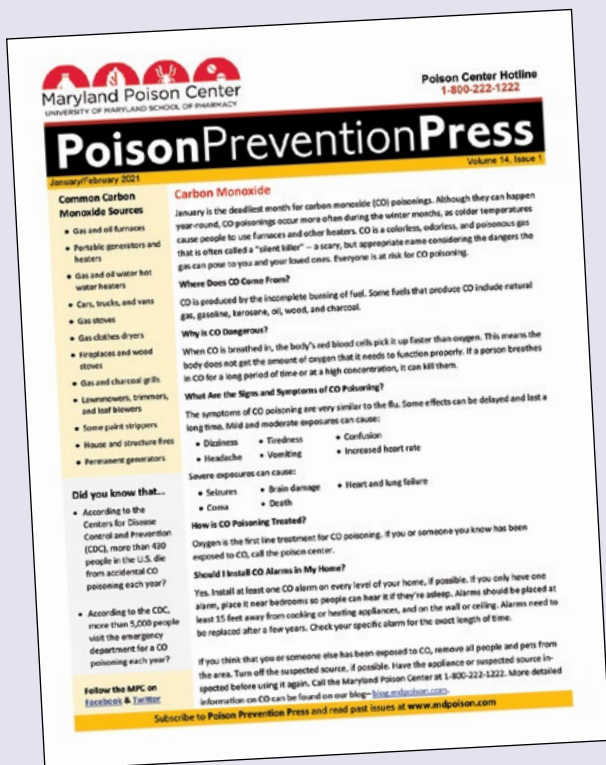
For paramedics, topics presented included:

- Xylazine in the Maryland Drug Supply: How Does That Impact the Approach to the Overdosed Patient?
- What Happens When You Drink Antifreeze?

For paramedic students, presentations included Introduction to the Poison Center and Clinical Toxicology for EMS: The Approach to the Poisoned Patient, along with a virtual tour of the MPC.

▶ **Educating health care professionals about topics in clinical toxicology and the importance of consulting the MPC on poisoning and overdose cases is a vital part of our mission.**

Poison Prevention Press and ToxTidbits



The MPC publishes **Poison Prevention Press**, an e-newsletter for the public, every other month. The newsletter highlights poison safety topics for all ages.

Topics presented in 2021 include:

- Carbon Monoxide
- Mr. Yuk's 50th Birthday
- A Day in the Life of a Poison Center
- What You Should Know About Delta-8-THC
- What Tweens and Teens Should Know About the Poison Center
- The 100th eAntidote Blog Post

Poison Prevention Press is sent to e-mail subscribers, who are encouraged to post and share the newsletter with others. In 2021, the contact list gained 118 new recipients.

Poison Prevention Press and ToxTidbits keep community members and health care providers up to date on poison-related topics.

ToxTidbits is a monthly newsletter for health professionals containing important toxicology information, updates, and news. Some of the topics addressed in 2021 include:

- Colchicine
- Tramadol Revisited
- Anavip® vs Crofab®, The Battle of the Antivenoms
- Delta-8 Distilled
- Levocarnitine for Valproic Acid Toxicity
- Pediatric Aripiprazole Ingestions

ToxTidbits is sent to email subscribers and faxed to every emergency department in our service area. In 2021, the contact list gained 85 new recipients.

To receive **ToxTidbits** or **Poison Prevention Press** by email, visit www.mdpoison.com and click on Receive Newsletter. Current and previous issues of both newsletters can be read and downloaded from the MPC website.



Research Publications and Presentations

Journals

Minhaj FS, Leonard JB, Seung H, Anderson BD, Klein-Schwartz W, King JD. In Vitro Analysis of N-acetylcysteine (NAC) Interference with the International Normalized Ratio. *Clinical Toxicology* 2021; DOI: 10.1080/15563650.2021.1979232.

Gardner-Yelton SE, **Leonard JB**, de la Uz CM, Wadia RS, Barnes SS. Flecainide Toxicity Secondary to Accidental Overdose: A Pediatric Case Report of Two Brothers. *Case Reports in Critical Care* 2021; DOI: 10.1155/2021/6633859.

Kim HK, **Leonard JB**, Corwell BN, Connors NJ. Safety and Efficacy of Pharmacologic Agents Used for Rapid Tranquilization of Emergency Department Patients with Acute Agitation or Excited Delirium. *Expert Opinion on Drug Safety* 2021; DOI: 10.1080/14740338.2021.1865911

Leonard JB, Minhaj FS, Paterson E, Klein-Schwartz W. Exposures in Pregnant Patients Reported to United States Poison Centers. *Clinical Toxicology* 2021; DOI: 10.1080/15563650.2021.1968420.

Minhaj FS, Leonard JB, Klein-Schwartz W. Clinical Effects and Outcomes of Perampanel Overdoses Reported to U.S. Poison Centers. *Clinical Toxicology* 2021; DOI: 10.1080/15563650.2021.1945083.

Minhaj FS, Leonard JB, Seung H, Klein-Schwartz W. Time to Peak INR Rise in Acute and Acute on Chronic Warfarin Overdoses. *Journal of Cardiovascular Pharmacology* 2021; 78(3): 474-9.

Minhaj FS, Leonard JB. A Description of the Clinical Course of Severe Benzonatate Poisonings Reported in the Literature and to NPDS: A Systematic Review Supplemented with NPDS Cases. *Human & Experimental Toxicology* 2021; DOI: 10.1177/09603271211030560.

Minhaj FS, Leonard JB. Dangers of the TikTok Benadryl Challenge. *Contemporary Pediatrics Journal* 2021; 38(1).

Minhaj FS, Leonard JB. Evaluation of Level of Care for Toxic Alcohol Ingestions Receiving Fomepizole: A Case Series. *American Journal of Emergency Medicine* 2021; DOI: 10.1016/j.ajem.2021.03.016.

Posters

Minhaj FS, Leonard JB, Seung H, Ryan E, King JD. Determination of Risk Factors Associated with Toxic Alcohol Ingestion. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

Bourgeois K, **Leonard JB, Minhaj FS, Anderson BD.** Identifying Risk Factors for Severe Outcomes in Metformin Poisoning. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

Millwee E, Minhaj FS, Downs J, Leonard JB. Tea for Two: Forget the Mountain Wild Honey – Suspected Grayanotoxin Poisoning in a Nepali Couple. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

Leonard JB, Minhaj FS, Hu K, King JD, Heavner M. Fluid Volume and Balance Within the First 72 Hours of Hospitalization for Calcium Channel Blocker or Beta Blocker Overdose: A Case Series. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021

Paterson E, Leonard JB, Minhaj FS, Klein-Schwartz W. Self-harm Exposures in Pregnant and Non-pregnant Cases Reported to US Poison Centers: A Case-control Study. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

Husak N, Minhaj FS, Anderson BD, Leonard JB, King JD. Severe Bupropion Overdose Mimicking Brain Death Necessitating Prolonged Extracorporeal Membrane Oxygenation. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021

Husak N, Leonard JB, Minhaj FS, Klein-Schwartz W. Skeletal Muscle Relaxants. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

Minhaj FS, Klein-Schwartz W, Anderson BD, King JD. Esophageal Perforation Linked to Kratom Exposure. North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

Presentations

Paterson, E. Program Evaluation Workshop. North American Congress of Clinical Toxicology, Virtual Meeting. Presentation. Oct. 17, 2021.

Leonard JB. TCAs and Bupropion Poisoning. Academic Toxicology Education Alliance of the Mid-Atlantic (A-TEAM), Virtual Meeting. Presentation. January and monthly, 2021.

Minhaj FS, Leonard JB. Not Status Asthmaticus. Poison Control Center Grand Rounds Case Conference: Academic Toxicology Education Alliance of the Mid-Atlantic (A-TEAM), Virtual Meeting. Presentation. March 2021.

Paterson, E. Peer Learning Session - Ideas for Partnering with Local Poison Control Centers. 2021 Safe Kids Worldwide Injury Prevention Convention (PrevCon). Virtual. July 15, 2021.

Maryland Poison Center Staff 2021

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Medical Toxicologist

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Professor Emeritus

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Clinical Toxicologist

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Emily Paterson, BS, CHES®

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LAN Administrator

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Acknowledgments

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- University of Maryland School of Pharmacy
- University System of Maryland
- Maryland Department of Health
- U.S. Department of Health and Human Services, Health Resources and Services Administration
- Maryland Institute for Emergency Medical Services Systems (MIEMSS)
- Priority Partners MCO
- Safe Kids Maryland State and Local Coalitions
- PharmCon, Inc.
- Baltimore County Department of Aging
- Partnership for a Safer Maryland



CALL

410-706-7604

OR VISIT

www.mdpoison.com

to see how you can
support the
Maryland Poison Center.

