

Trends in Kratom-Related Poisonings in Michigan, 2018-2025.

Background

Kratom is the common term used to refer to the plant and leaf of the *Mitragyna speciosa*, tropical evergreen tree indigenous to Southeast Asia that has been used for centuries for many medicinal purposes. Kratom has traditionally been used as a remedy for common ailments, an opium substitute, a method to combat fatigue and to increase productivity and as a social activity. Kratom use has become increasingly prevalent in North America since the 2000s either for recreational purposes, pain management, mitigating withdrawal symptoms and harm reduction.^{1,2}

Kratom can produce dose-dependent opioid- and stimulant-like effects. Kratom may have a potential role in harm reduction as it can serve as an alternative to opioids or stimulants to reduce use or treat withdrawal symptoms.³ Kratom may be particularly helpful as an alternative in polysubstance use disorder cases. However, with a lack of overarching legislative and regulatory oversight, potential for misuse and dependence can occur.

Kratom contains multiple psychoactive alkaloids including, chiefly myraginine and to a lesser extent 7-hydroxymyraginine (7-OH).^{1,2} Kratom products are typically less than 2% 7-OH, however, commercially sold synthetic kratom products have 7-OH concentrations up to 98% 7-OH.⁴ Pharmacologically, 7-OH acts as a full opioid agonist and therefore carries a much higher risk of respiratory depression and other harmful effects.

Kratom has not been approved by the Food and Drug Administration (FDA) for any medical use, however, it has been listed on the U.S. Drug Enforcement Agency's Drugs of Concern registry.^{2,5} Recently, the FDA issued a press release recommending the scheduling of certain 7-OH-containing products.⁶ The FDA also released a report assessing the substance with available epidemiological data.⁷ Use of synthesized 7-OH products is a more recent trend and are currently being sold in smoke shops, gas stations and online in the form of tablets, shots, gummies and candies.⁸

Methodology

This report analyzes data from the Michigan Poison & Drug Information Center (MiPDC) from 2018 to 2025. MiPDC is an accredited poison center with America's Poison Centers that is housed within the Department of Emergency Medicine at the Wayne State University School of Medicine. The MiPDC provides around-the-clock clinical management guidance on poisoning emergencies for the public, emergency responders and health care professionals across Michigan as well as 24/7 on-call clinical consultations from board-certified toxicologists.⁹ Poison centers also respond to informational requests from the public, first responders, law enforcement and health professionals. However, only reported exposures are analyzed in this report. Information collected from each call is

entered into a toxicology data management system that adheres to the National Poison Data System (NPDS) coding guidelines.¹⁰ The NPDS is a central data repository that collects case information from all regional poison centers. NPDS supports identification and management of exposures, product safety evaluations, real-time toxicosurveillance, public health information and epidemiological studies.

Collected variables include basic demographic characteristics including age and sex, the specific substances involved in each case, reason of the exposure, the clinical effects or symptoms experienced by the individual, as well as the medical outcome of the case categorized by severity. Table A1 in the appendix shows the complete definitions for all medical outcome categories. Clinically significant medical outcomes are defined as a case with a medical outcome of moderate, major, or death. Adults are defined as any individual aged 18 years or older. Reason is classified according to NPDS coding categories. For a full list of these categories and definitions see Table A2 in the appendix. Three flags were created for this dataset identifying cases in which substances of interest were included along with a kratom exposure. These flags include opioids, psychostimulants and cannabis. These flags were created by a key word search on the substances listed in each case. Table A3 shows a complete list of the specific terms used to generate these flags.

Kratom cases are defined in this report as any case reported into MiPDC that has a substance listed containing the keyword “kratom.” The MiPDC considers the relevance of substances to the symptoms an individual is experiencing. As such, a variable was created to flag cases in which kratom was one of the first three substances listed in a case exposure. This flag was present in 493 of 506 (97%) kratom-related cases. Additional consideration was given to 7-OH specific exposures, as NPDS added specific coding for 7-OH products beginning in February 2025. Thirteen cases were identified with these specific product codes.^a Polysubstance cases are defined as any case with more than one related substance reported. Differences between single-substance and polysubstance exposures are analyzed by medical outcome, sex and age. Pearson’s chi-squared test is used to compare differences in categorical groups and Fisher’s exact test is used in cases in which cell counts are below five. The Wilcoxon rank-sum test is used to compare continuous age.

Limitations

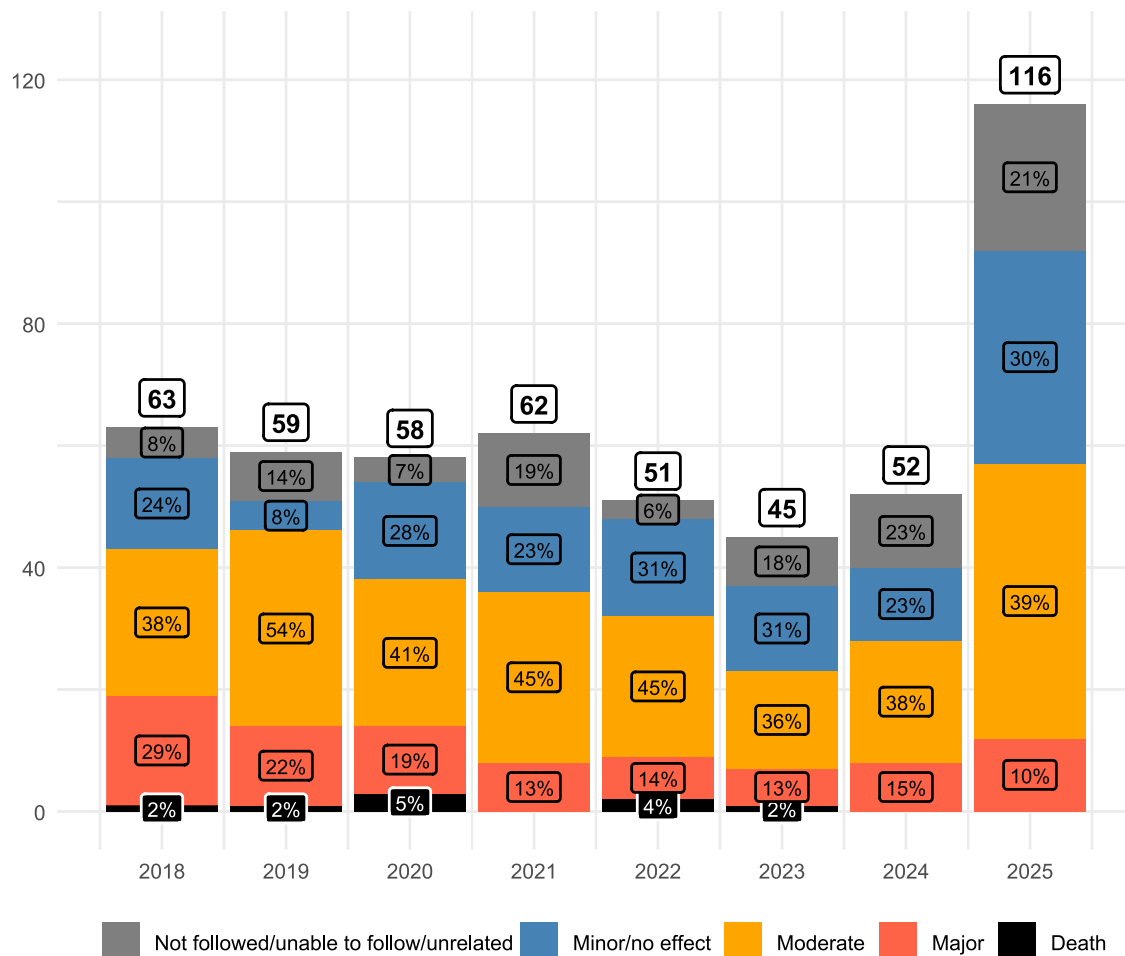
- Poison center exposure data are primarily derived from voluntary, passive and/or self-reporting by individuals with substance exposures (with or without subsequent symptoms) or directly from health care professionals at health facilities who seek clinical expertise from a toxicologist. Included cases likely represent acute, less severe exposure events, as more severe symptoms may necessitate emergency medical care.

^a This report was initially published indicating only one 7-OH case identified with these product codes; further investigation and clarification of product codes led to the identification of 13 cases and this report was revised and reissued accordingly.

- Not all adverse exposures to kratom are reported to MiPDC. The data shown here do not reflect the true statewide incidence of kratom exposures and likely represents an underestimation of the injury or morbidity burden.
- Location of cases are reported based on where the exposure occurred, not where the individual resides.
- Screening for Kratom and 7-OH is not readily available at all institutions. 7-OH-specific cases are also reported under the generic code for kratom in NPDS. There may have been cases that involved 7-OH specifically, but that information is unknown unless the individual contacting MiPDC shares product specific information or if clinicians are able to send confirmatory testing of patient samples. The true extent of cases related to 7-OH cannot be determined from MiPDC data.

Results and Discussion

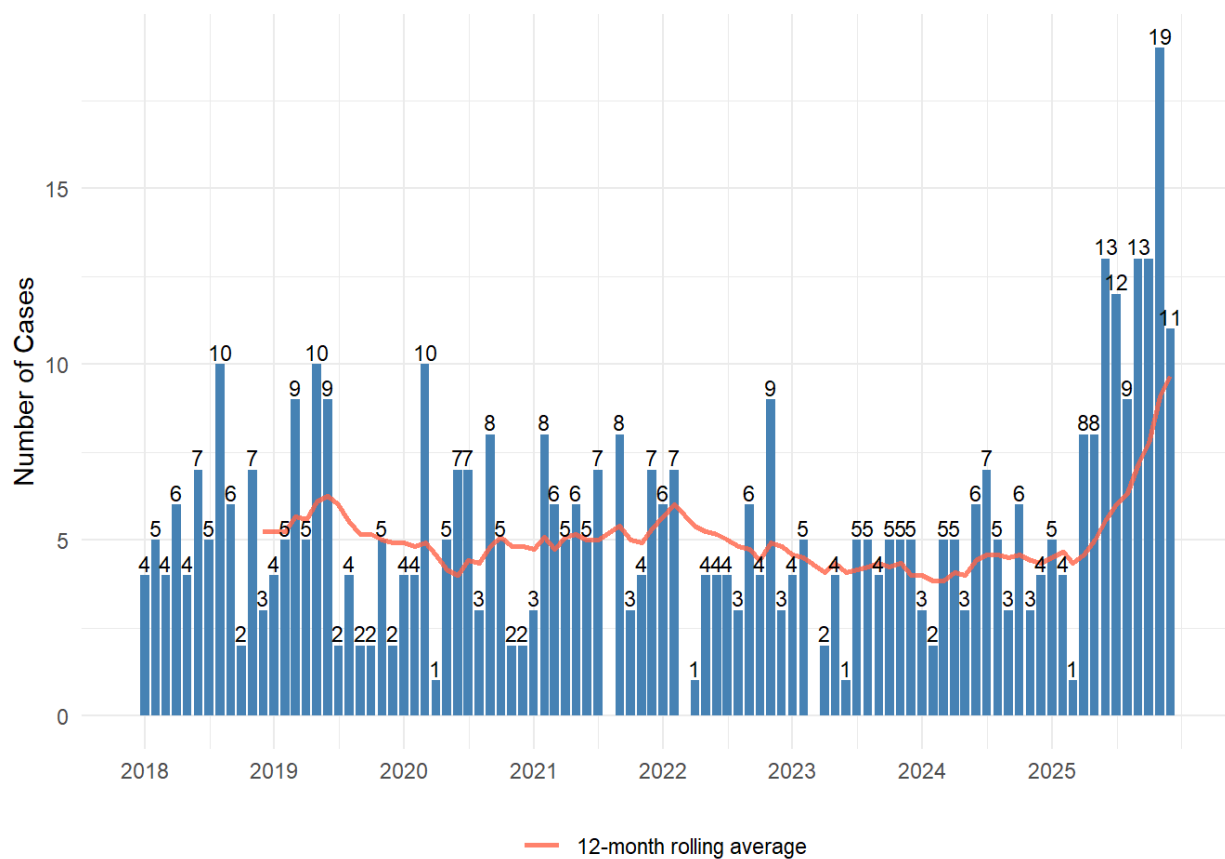
Figure 1. *Kratom-related MiPDC cases by year and medical outcome, Michigan, 2018-2025.*



Over the preceding seven years, kratom-related cases have remained relatively stable, with a slight decrease observed in 2022 and 2023. Notably, however, case counts rose from 52 cases in 2024 up to 116 cases in 2025 representing a 123% increase (Figure 1).

Medical outcomes among kratom-related cases have remained consistent, with recent data demonstrating a lower proportion of cases associated with clinically significant medical outcomes. In 2019, 46 of 59 (78%) kratom-related cases had a clinically significant medical outcome (Figure 1). Comparatively, in 2025, 57 of 116 (49.1%) kratom-related cases had a clinically significant outcome (Figure 1). Current trends reveal no indication of worsening medical outcomes in recent years.

Figure 2. *Kratom-related MiPDC cases, by month, with 12-month rolling average, Michigan, 2018-2025.*



Historically, the monthly counts of kratom-related case exposures have followed no noticeable trend. Beginning in early 2025, however, case counts have been consistently greater than the 12-month rolling average. November of 2025 observed the most cases reported in a single month with nineteen (Figure 2). This rise indicates an upward trend in case counts and warrants further scrutiny and continued monitoring.

Table 1. *Kratom-Related MiPDC cases by age, adult/minor and sex, Michigan, 2018-2025.*

| Characteristic | N = 506 ¹ |
|----------------------|----------------------|
| Age category (years) | |
| 0-19 | 69 (14%) |
| 20-39 | 277 (55%) |
| 40-59 | 107 (21%) |
| 60+ | 36 (7.1%) |
| Unknown Age | 17 (3.4%) |
| Age (years) | 32 (24, 41) |
| Unknown | 26 (5.1%) |
| Adult/Minor | |
| Ages 0-17 | 59 (12%) |
| Ages 18+ | 436 (86%) |
| Unknown | 11 (2.2%) |
| Sex | |
| Female | 154 (30%) |
| Male | 350 (69%) |
| Unknown | 2 (0.4%) |

¹ n (%); Median (Q1, Q3)

Kratom-related cases were most common among individuals aged 20-39 years with 277 of 506 (55%) cases, followed by those aged 40-59 years with 107 of 506 (21%) cases (Table 1). The median age observed was 32 years. Most cases occurred among adults (≥ 18 years), with 436 of 506 (86%) cases and males with 350 of 506 (69%) cases. (Table 1).

Table 2. *Kratom-related MiPDC cases by reason, medical outcome and substance flags, Michigan, 2018-2025.*

| Characteristic | N = 506 ¹ |
|--------------------------------------|----------------------|
| Reason | |
| Intentional | 361 (71%) |
| Unintentional | 73 (14%) |
| Unknown reason | 31 (6.1%) |
| Adverse reaction | 25 (4.9%) |
| Other | 16 (3.2%) |
| Medical Outcome Category (collapsed) | |
| Minor/no effect | 127 (25%) |
| Moderate | 212 (42%) |
| Major | 83 (16%) |

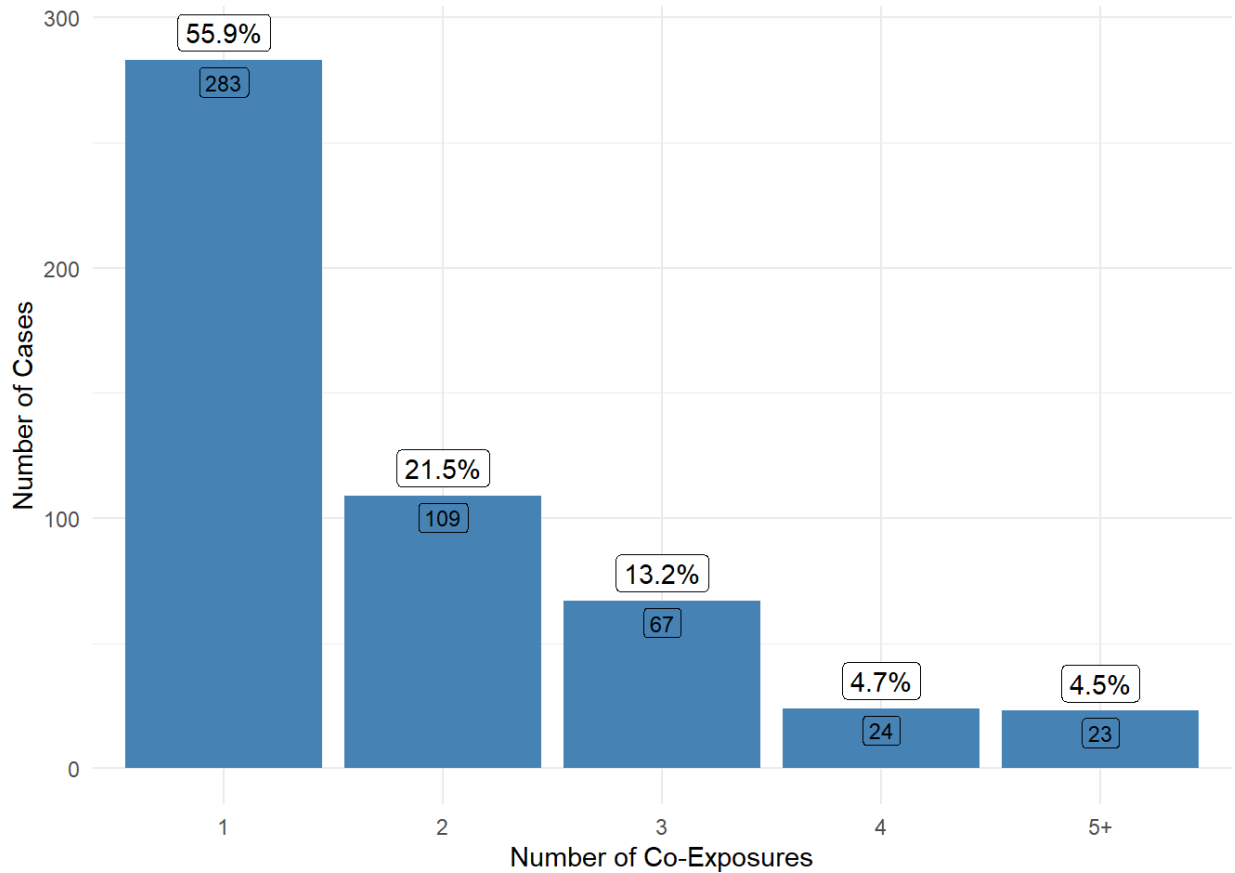
| | |
|---|-----------|
| Death | 8 (1.6%) |
| Not followed/unable to follow/unrelated | 76 (15%) |
| Opioid co-exposure | 21 (4.2%) |
| Cannabis co-exposure | 45 (8.9%) |
| Psychostimulant co-exposure | 20 (4.0%) |
| Kratom as Primary Substance | 493 (97%) |

¹ n (%)

361 of 506 (71%) reported kratom-related cases were intentional exposures, with only 73 of 506 (14%) exposures classified as unintentional. 303 of 506 (59.9%) kratom-related cases were associated with moderate, major, or death medical outcomes, with a plurality of cases reported as moderate (42%). 127 of 506 (25%) cases were reported with minor or no medical outcome. Eight cases (1.6%) resulted in death (Table 2).

Kratom was listed as a primary substance in 493 of 506 (97%) cases. 45 of 506 (8.9%) cases were reported along with a cannabis-related substance; 21 of 506 (4.2%) cases reported an opioid; and 20 of 506 (4%) reported a psychostimulant (Table 2).

Figure 3. Number of reported co-exposures in kratom-related MiPDC cases, Michigan, 2018-2025.



In 283 of 506 (55.9%) cases, kratom was the sole substance reported. An additional 34.8% of cases reported 2-3 substances with 109 of 506 cases (21.5%) reporting two co-exposures and 67 of 506 (13.2%) reporting three co-exposures. Only 23 of 506 (4.5%) cases reported five or more substances related to the exposure (Figure 3).

Table 3. Most commonly co-occurring substances among kratom-related MiPDC cases, Michigan, 2018-2025.

| Characteristic | N = 506 ¹ |
|------------------------------------|----------------------|
| Ethanol (Beverages) | 61 (12%) |
| Benzodiazepines | 41 (8.1%) |
| Cannabis: Dried Plant | 30 (5.9%) |
| Amphetamines and Related Compounds | 18 (3.6%) |
| Cocaine | 12 (2.4%) |
| Diphenhydramine Alone | 12 (2.4%) |
| Atypical Antipsychotics | 10 (2.0%) |
| Methamphetamines | 10 (2.0%) |

| | |
|--------------------------|-----------|
| Other or Unknown Opioids | 10 (2.0%) |
| Gabapentin | 8 (1.6%) |

¹ n (%)

Ethanol was the most common co-occurring substance reported in 61 of 506 (12%) kratom-related cases followed by benzodiazepines in 41 of 506 (8.1%) cases. The category “Cannabis: Dried Plant” was the third most common co-occurring substance and occurred in 30 of 506 (5.9%) cases (Table 3).

Table 4. *Most common related clinical effects among kratom-related MiPDC Cases, Michigan, 2018-2025.*

| Characteristic | N = 506 ¹ |
|-------------------------|----------------------|
| Tachycardia | 156 (31%) |
| Agitation | 129 (25%) |
| Hypertension | 70 (14%) |
| Confusion | 67 (13%) |
| Nausea | 52 (10%) |
| Vomiting | 51 (10%) |
| Other - Neurological | 49 (9.7%) |
| Tremor | 49 (9.7%) |
| Electrolyte abnormality | 47 (9.3%) |
| CNS Depression (Mild) | 38 (7.5%) |

¹ n (%)

Tachycardia was reported in 156 of 506 (31%) cases. Agitation was the second most commonly occurring symptom in 129 of 506 (25%) cases, followed by hypertension in 70 of 506 (14%) and confusion in 67 of 506 (13%) cases. Other common effects included nausea, vomiting, tremor, other neurological effects, electrolyte abnormality and CNS depression (mild) (Table 4). Mild CNS depression is defined as “fatigue, drowsiness, normal sleep from which the patient can be awakened with minimal stimulation.”¹⁰

Table 5. *Medical outcome and demographic comparison of single-substance and polysubstance kratom-related MiPDC Cases, Michigan, 2018-2025.*

| Characteristic | Single-Substance N = 283 ¹ | Polysubstance N = 223 ¹ | p-value ² |
|---|--|---------------------------------------|----------------------|
| Clinically Significant Medical Outcome | 173 (61%) | 170 (76%) | <0.001 |
| Medical Outcome Category (Collapsed) | | | <0.001 |
| Not followed/unable to follow/unrelated | 53 (19%) | 23 (10%) | |
| Minor/no effect | 84 (30%) | 43 (19%) | |

| | | | |
|----------------------|-------------|-------------|------|
| Moderate | 109 (39%) | 103 (46%) | |
| Major | 36 (13%) | 47 (21%) | |
| Death | 1 (0.4%) | 7 (3.1%) | |
| Age Category (years) | | | 0.13 |
| 0-19 | 46 (16%) | 23 (10%) | |
| 20-39 | 145 (51%) | 132 (59%) | |
| 40-59 | 57 (20%) | 50 (22%) | |
| 60+ | 24 (8.5%) | 12 (5.4%) | |
| Unknown Age | 11 (3.9%) | 6 (2.7%) | |
| Age (years) | 32 (24, 42) | 32 (24, 40) | >0.9 |
| Unknown | 17 (6%) | 9 (4%) | |
| Adult/Minor | | | 0.03 |
| Ages 0-17 | 42 (15%) | 17 (7.6%) | |
| Ages 18+ | 234 (83%) | 202 (91%) | |
| Unknown | 7 (2.5%) | 4 (1.8%) | |
| Sex | | | 0.9 |
| Female | 84 (30%) | 70 (31%) | |
| Male | 198 (70%) | 152 (68%) | |
| Unknown | 1 (0.4%) | 1 (0.4%) | |

¹ n (%); Median (Q1, Q3)

² Pearson's Chi-squared test; Fisher's exact test; Wilcoxon rank sum test

A higher proportion of polysubstance cases reported a clinically significant medical outcome with 170 of 223 (76%) polysubstance cases reporting a medical outcome of moderate, major or death, compared to 173 of 283 (61%) single-substance cases. A moderate outcome was reported in 103 of 223 (46%) polysubstance cases compared to 109 of 283 (39%) single-substance cases; a major outcome was reported in 47 of 223 (21%) of polysubstance cases compared to 36 of 283 (13%) single-substance cases; and 7 of 223 (3.1%) polysubstance cases resulted in death compared to 1 of 283 (0.4%) single-substance cases. These differences were statistically significant (Table 5).

Polysubstance cases represented smaller proportions of the youngest and oldest age groups. Twelve of 223 (5.4%) polysubstance cases occurred among those aged 60 or more years compared to 24 of 283 (8.5%) single substance cases. 23 of 223 (10%) polysubstance cases occurred among individuals aged 0-19 years compared to 46 of 283 (16%) single-substance cases. Median age among polysubstance and single-substance cases were the same at 32 years (Table 5).

Summary

Current MiPDC data demonstrate that while reported kratom exposures have been historically consistent, recent data from 2025 highlight that cases are on the rise. It is unclear whether this trend will persist beyond 2025 or whether the trend is related to recent mainstream concern regarding the popularization of 7-OH. Despite recent upward exposure trends, worsening medical outcomes were not evident. Data from 2025 demonstrates a low percentage of major medical outcomes and no deaths. Most reported cases occur in adults, with exposures in minors appearing minimally. Most exposures were intentional and reported a moderate or minor medical outcome or no effect. Nearly half of cases reported involved co-exposures, most commonly ethanol, benzodiazepines and cannabis. Clinical effects most commonly included tachycardia, agitation, confusion and hypertension. Compared to single-substance exposures, polysubstance cases had a higher proportion of clinically significant medical outcomes. Seven of the total eight deaths reported among all cases occurred in polysubstance cases. Case exposures involving kratom will continue to be monitored in Michigan on a quarterly basis.

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Appendix

Table A1. *Definitions of MiPDC medical outcome terminology.*

| Medical Outcome | Description | Medical Outcome Category | Clinically Significant |
|------------------------|--|---------------------------------|-------------------------------|
| No effect | The patient developed no symptoms as a result of the exposure. | Minor/no effect | No |
| Minor effect | The patient exhibited some symptoms as a result of the exposure, but they were minimally bothersome to the patient. | Minor/no effect | No |
| Moderate effect | The patient exhibited symptoms as a result of the exposure (includes complications of the exposure) which are more pronounced, more prolonged or more of a systemic nature than minor symptoms. Usually, some form of treatment is or would have been indicated. | Moderate | Yes |
| Major effect | The patient has exhibited symptoms as a result of the exposure (includes complications of the exposure) which were life-threatening or resulted in significant residual disability or disfigurement. | Major | Yes |
| Death | The death occurred as a direct result of the exposure, or a | Death | Yes |

| Medical Outcome | Description | Medical Outcome Category | Clinically Significant |
|--|--|---|-------------------------------|
| | complication directly related to the exposure. | | |
| Not followed, judged as nontoxic exposure | The patient was not followed because per clinical judgment the exposure was likely to be nontoxic because: the agent involved was nontoxic, the amount implicated in the exposure was insignificant (nontoxic) and/or the route of exposure was unlikely to result in a clinical effect. | Not followed/unable to follow/unrelated | No |
| Not followed, minimal clinical effects possible | The patient was not followed because, per clinical judgment, the exposure was likely to result in only minimal toxicity of a trivial nature. | Not followed/unable to follow/unrelated | No |
| Unrelated effect | Based upon all the information available the exposure was probably not responsible for the effect(s). | Not followed/unable to follow/unrelated | No |
| Unable to follow, judged as a potentially toxic exposure | The patient was lost to follow-up and per clinical judgement the exposure was significant and could have resulted in a moderate, major or fatal outcome. | Not followed/unable to follow/unrelated | Yes |

Table A2. *Definitions of MiPDC reason terminology.*

| Reason | Description |
|------------------|--|
| Unintentional | Exposure to a substance that is not intended. This category may include environmental or occupational exposure, therapeutic (dosing) error, incorrect use of a substance, bites/stings/ or food poisoning. |
| Intentional | Abuse, misuse or suspected suicide involved in substance exposure, |
| Adverse Reaction | Unwanted effects due to allergies, hypersensitivity, or idiosyncratic response to ingredients, food, or other substance. |

| Reason | Description |
|---------|--|
| Other | Exposure was due to contaminants or tampering, malicious exposure from another’s intent to harm or withdrawal management after discontinuing use of a substance. |
| Unknown | Reason for exposure cannot be determined or is not appropriate for the other categories. |

Table A3. Substance flag categories and key words.

| Substance | Text |
|----------------------|--|
| Psychostimulant Flag | Cocaine Methamphetamine |
| Opioids Flag | Codeine Heroin Methadone Fentanyl Oxycodone Oxymorphone Hydrocodone Morphine Tramadol Hydromorphone |
| Cannabis Flag | Marijuana: Dried Plant Marijuana: Edible Preparation Marijuana: Other or Unknown Preparation Marijuana: Concentrated Extract (Including Oils and Tinctures) eCigarettes: Marijuana Device Flavor Unknown Marijuana: Oral Capsule or Pill Preparation Marijuana: Undried Plant eCigarettes: Marijuana Device With Added Flavors Marijuana: Pharmaceutical Preparation eCigarettes: Marijuana Device Without Added Flavors eCigarettes: Marijuana Liquid Flavor Unknown Marijuana: Topical Preparation eCigarettes: Marijuana Liquid Without Added Flavors |
| Kratom Flag | Kratom |
| 7-OH Flag | 8649141 8649729 8680989 8681005 8681052 8681028 8681060 8681010 8647807 |