

# CAMBRIDGE OPIOID OVERDOSE DATA REPORT 2024



Cambridge  
Public Health  
Department

 **CHA**  
Cambridge  
Health Alliance



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## INTRODUCTION

Substance use disorder and its impact on individuals and communities cannot be overstated. In 2023, 79,358 people in the U.S. died from an opioid overdose;<sup>1</sup> the deaths were largely driven by opioid misuse, including heroin, opioid-based prescription drugs, and synthetic opioids such as fentanyl. Massachusetts has the eighteenth-highest opioid overdose mortality rate in the country as of 2023.<sup>2</sup> At the state level, Massachusetts has responded by providing services including the Massachusetts Substance Use Helpline and education for prescribers and providers, as well as guidance and infrastructure for municipalities to receive and implement funds and programming from earmarked state funds and the Opioid Abatement Settlement. Locally, city and community partners offer a wide range of services across the continuum of care for substance use disorder prevention, intervention, harm reduction, treatment, and recovery support.

This Cambridge opioid overdose data report is a result of an ongoing multi-year surveillance effort. The report is designed to provide residents, first responders, city officials, health professionals, and the media with data to better understand how the opioid crisis is affecting Cambridge. We have used these reports in the past to inform the city's prevention and response strategies and help relevant community stakeholders monitor progress in curbing the epidemic. Currently, Cambridge is receiving funds from the Opioid Abatement Settlement to support citywide harm reduction, prevention, and recovery initiatives. The findings in these ongoing reports may be used to guide decisions for the implementation and evaluation of the city programs and interventions that use these opioid abatement dollars. More information about the abatement funds and city efforts to incorporate lived experience feedback may be found [on our website](#).

The Cambridge Public Health Department receives data from several sources, including Pro EMS first response services, Cambridge Health Alliance, Mount Auburn Hospital, and the Access Drug User Health Program. The data collection and analysis process is continuously reviewed for improvement opportunities.

### Report Highlights

- Opioid Overdose Fatalities
  - There were 9 opioid-related overdose deaths among Cambridge residents.
  - There were 18 opioid-related overdose deaths that occurred in Cambridge, regardless of residency status.
  - The majority of fatalities involved people who were identified with at least one of the following demographic categories: White, male, and between the ages of 35-64.
- Non-Fatal Overdose Incidents
  - There were 116 documented overdose incidents that occurred in Cambridge.
  - Thirty-one percent of the people who overdosed in Cambridge were residents, according to ambulance data.

- Demographics for these incidents were similar to those among opioid overdose fatalities.
- Naloxone Distribution and Administration
  - The Cambridge Public Health Department (CPHD) distributed 1,684 doses of naloxone with the support of the state Community Naloxone Program.
  - Instructors from CPHD and Somerville Health and Human Services partnered to deliver 21 training sessions for 175 participants.
  - Naloxone was administered in 72% of recorded opioid overdose incidents by first responders, bystanders, or other healthcare or public safety professionals to save a life in Cambridge.
  - 13% of recorded overdose reversals by naloxone were administered by bystanders.

# STATE DATA

## Fatal Overdoses

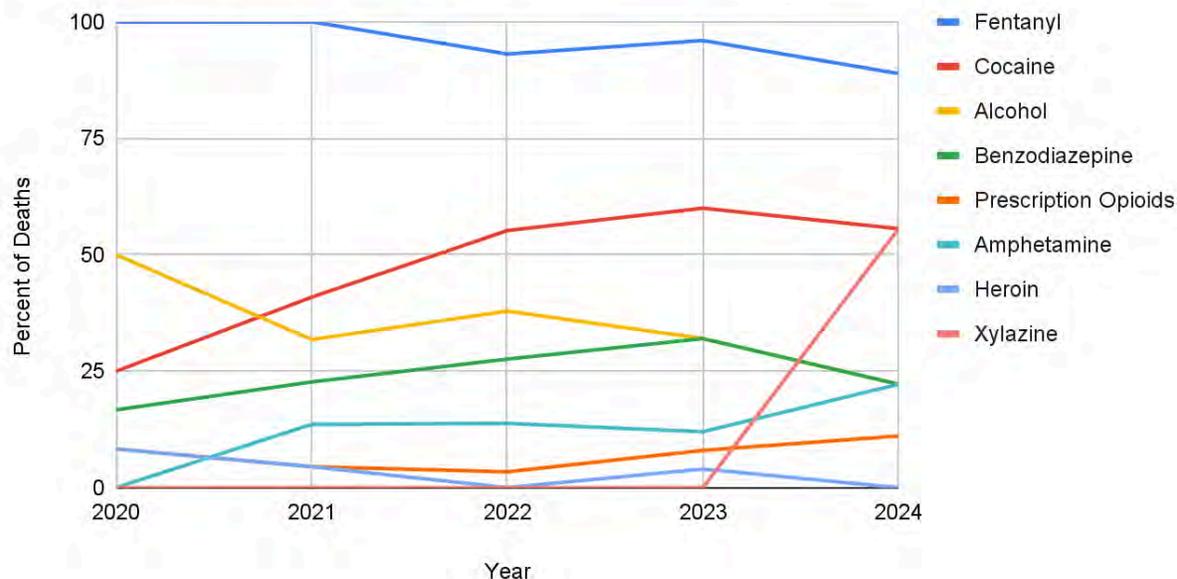
The Massachusetts Department of Public Health collects and analyzes data on opioid-related overdose deaths among all Commonwealth residents. At the time of publication for this report, 2024 state data was preliminary and may be subject to change. Currently released data reports from the state are available at [mass.gov/lists/current-overdose-data](https://mass.gov/lists/current-overdose-data).

Statewide, there were 1,336 opioid-related overdose deaths among Massachusetts residents in 2024, representing a 37.1% decrease from cases in 2023 (2,125 cases).<sup>3</sup> This follows national trends showing overdose declines in 2024<sup>4</sup>. There are many potential factors that may have contributed to this decline, including the impact of harm reduction strategies that help keep people alive in the event of an overdose.

Among Cambridge residents, there were nine opioid-related overdose deaths in 2024<sup>5</sup>. Compared to deaths from all causes among Cambridge residents, opioid-related overdose deaths made up 1.8% of fatalities in 2024. Eighteen people died of an opioid-related overdose in Cambridge, regardless of residency status. For both categories, most deaths were among White people and among men. All deaths occurred among people ages 25-64. Further demographic information will not be publicly disclosed by the Cambridge Public Health Department due to small numbers among some demographic categories, but will be used internally to inform program development and policy decisions as needed.

Available state data also includes toxicology data at the municipal level. All opioid-related overdose deaths among Cambridge residents in 2024 had a toxicology screen available. For eight of the nine deaths (88.9%), fentanyl was detected in the screen. Cocaine and xylazine, a sedative commonly found in the illicit opioid supply since late 2022, were each found in 55.6% of screens. Other substances present in these toxicology screens included alcohol, benzodiazepines, amphetamines, and other prescription opioids. **Figure 1** shows toxicology data for Cambridge from 2020 through 2025. In previous reports, only state-level data was readily available.

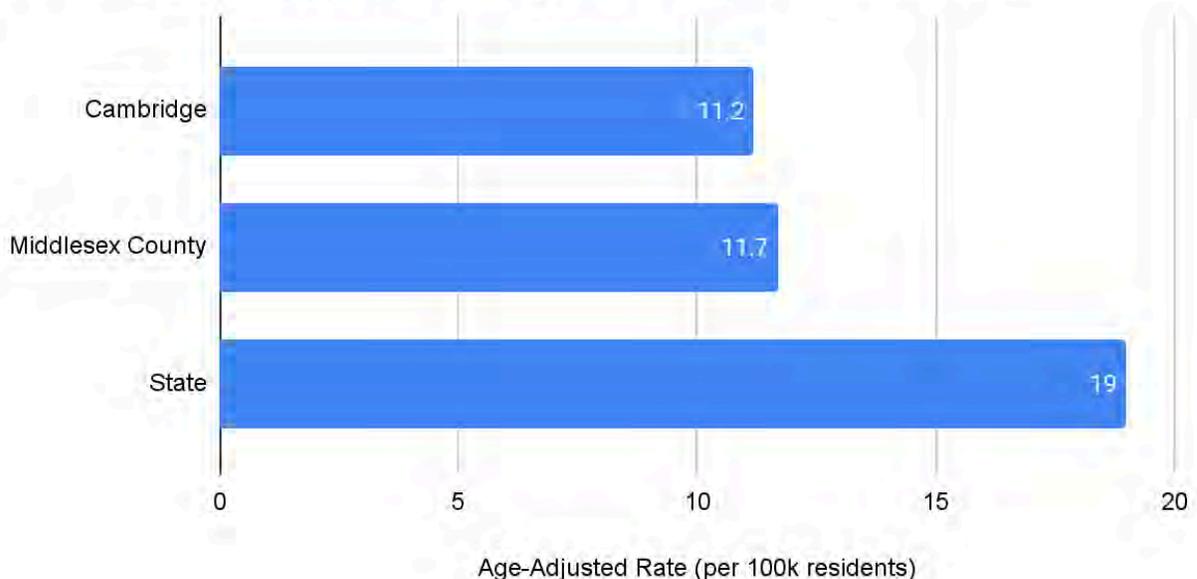
Figure 1. Percent of Opioid-Related Overdose Deaths with Specific Substances Present, 2020-2024



Data Source: Massachusetts Department of Public Health

Data on age-adjusted rates for opioid-related deaths per 100,000 residents is available at the municipal, county, and state level for 2024. As depicted in **Figure 2**, the opioid overdose-related death rate in Cambridge was below that of Massachusetts and of Middlesex County<sup>3</sup>. As can be seen in [previous opioid reports](#), Cambridge usually surpasses the county-level rate, and this is the first time since 2020 that Cambridge has been below Middlesex County.

Figure 2. Age-Adjusted Opioid-Related Death Rate in Cambridge, Middlesex County, and Massachusetts, 2024



Data Source: Massachusetts Department of Public Health

#### Opioid-Related Emergency Events

State data also includes information on opioid-related EMS incidents, including 911 calls and emergency department visits in which opioids are involved, across the state by city and town<sup>3</sup>. In Cambridge, there were 296 suspected opioid-related incidents with paramedic response in 2024, and 96 Cambridge residents received care for an opioid-related incident in an emergency department.

Of note, these are different metrics compared to data reported within Cambridge. While state data includes all data from EMS services that involve a potential opioid incident (including those that do not involve a clinical overdose, such as opioid intoxication), Cambridge reporting only includes those responded to by Pro EMS and those involving a suspected overdose. For hospital-related data, the state Department of Public Health has access to data reported across all Massachusetts hospitals, while the Cambridge Public Health Department only has data-sharing agreements with Cambridge Health Alliance and Mount Auburn Hospital. Therefore, data in this section and that of the subsequent sections should not be compared.

For a more expansive picture on general substance use trends in Cambridge and across the state, including alcohol and other substances, please refer to the [Bureau of Substance Addiction Services \(BSAS\) Dashboard](#).

# EMERGENCY MEDICAL SERVICES DATA

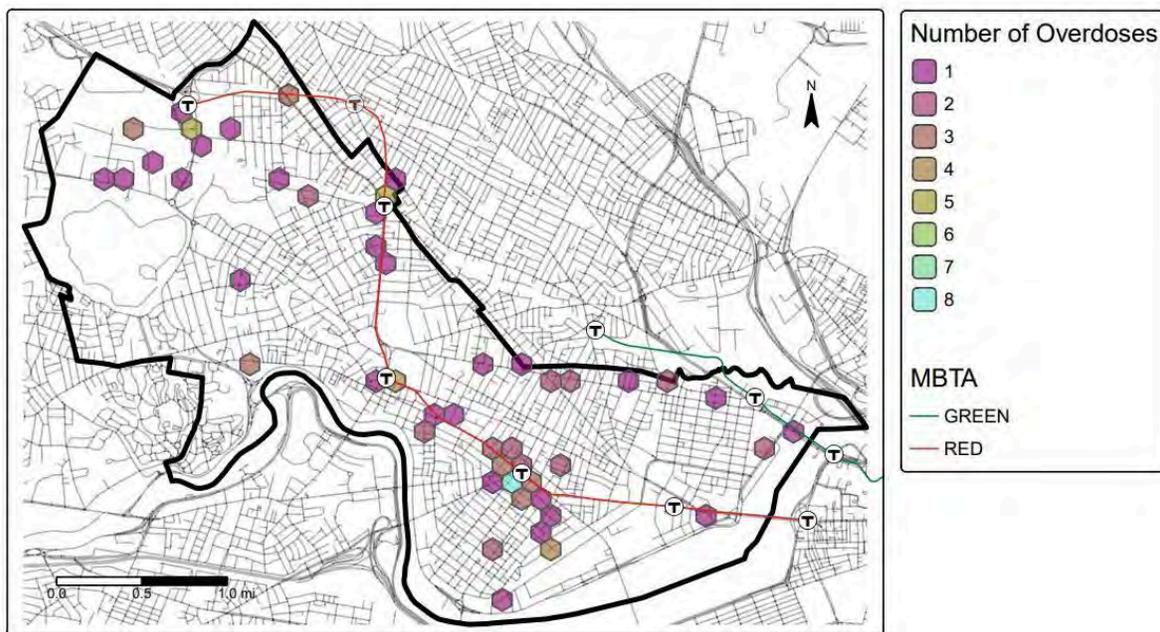
## Geography of Overdoses

In Cambridge, first responders from Pro EMS ambulance service and the Cambridge Fire Department are often the first emergency personnel to arrive at the site of an overdose. Data from Pro EMS (which includes fire department data) are invaluable for pinpointing where opioid overdoses occur in the city, determining how frequently naloxone is administered, and learning what populations are at greatest risk. In 2024, Pro EMS responded to 116 overdose incidents. Of note, most of the incidents reported by Pro EMS are nonfatal overdoses, but some incidents reported below include incidents for which the patient is declared dead on arrival (DOA). In such cases, it is imperative to refrain from assuming that the death was caused by the opioid overdose and not from another cause, as this determination can only be made by the state Office of the Chief Medical Examiner.

**Figure 3** shows the density of opioid-related overdoses in Cambridge in 2024, based on spatial analysis of Pro EMS data.

[How to read the maps in this report: The heat maps are primarily intended as visual tools, and exact overdose counts should not be estimated from the results. Blue and green areas indicate the highest density of overdose incidents in 2024. Color categories can be interpreted relative to one another, with pink areas having more incidents than dark orange, dark orange more than lighter orange and yellow, and so on. Dark pink areas indicate the lowest density of overdose incidents.]

Figure 3. 2024 Opioid-Related Overdoses, Cambridge, MA



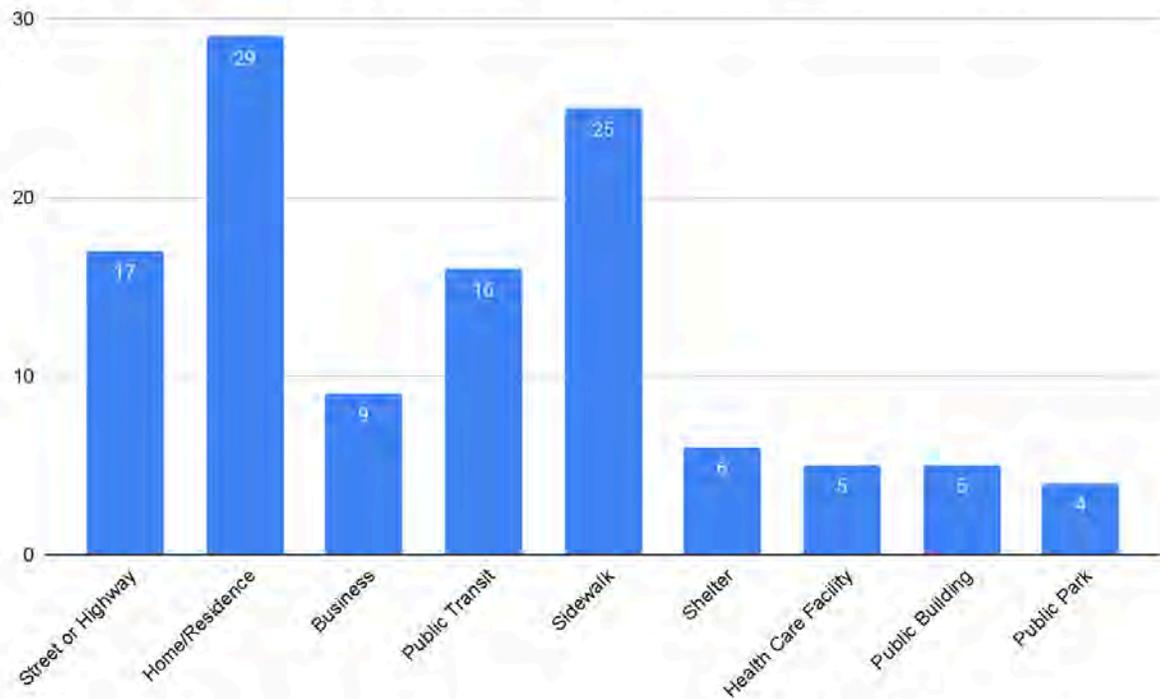
Data Source: Pro EMS Ambulance Service  
Map layers sourced from: City of Cambridge, MBTA, MassGIS

Commercial districts had the highest density of opioid-related overdoses in Cambridge. These incidents were clustered primarily in Central Square, Harvard Square, Alewife, and Porter Square on the Red Line, and near Lechmere on the Green Line.

**Figure 4** shows the types of places where opioid-related overdoses occurred in Cambridge in 2024, based on Pro EMS data. Of the 116 ambulance pickups for opioid-related overdoses in 2024, the majority (65.5%) occurred in public places, such as on the street, in a public building or park, at a business, or in a T station. About 5% of ambulance pickups were from a shelter.

Private residences, including houses and apartment buildings, made up a quarter of ambulance pickups. Whereas opioid-related overdoses in public spaces tended to occur repeatedly in the same locations in Cambridge, such as commercial squares with high foot traffic, overdoses in private residences occurred in homes scattered across the city.

Figure 4. Ambulance Pickups of Suspected Overdoses by Location, 2024



Data Source: Pro EMS Ambulance Service

In 2024, Pro EMS ambulance service transported the majority of opioid-related overdose cases to CHA Cambridge Hospital (57%), followed by Mount Auburn Hospital (25%) and Mass General Hospital (10%). Pro EMS typically transports people who have experienced a suspected overdose to the nearest hospital, unless the person expresses a preference for another facility (**Table 1**).

Table 1: Cambridge Opioid-Related Overdose Cases Transported by Pro EMS by Hospital Destination, 2024

Hospital Destination	Incidents	
	Frequency	Percent
CHA Cambridge Hospital	66	56.90%
Mount Auburn Hospital	29	25.00%
Mass General Hospital	12	10.34%
Other Hospital	4	3.45%
Patient Refusal, No Transport	4	3.45%
Dead at Scene, No Transport	1	0.86%

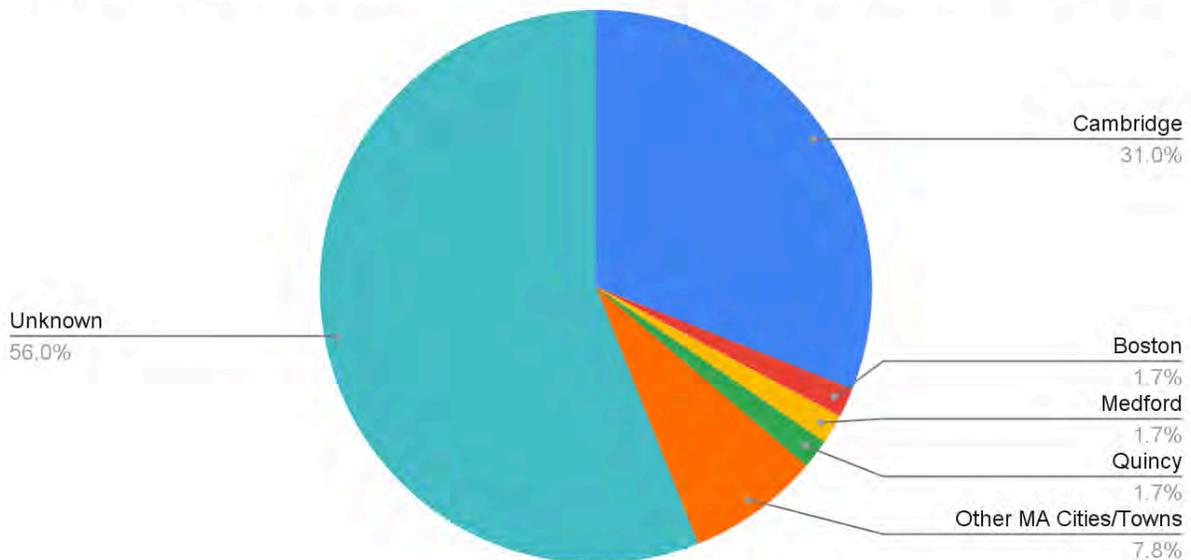
Note: May not add up to 100% due to rounding.

Data Source: Pro EMS Ambulance Service

### Cambridge Residency

Most reports of opioid-related ambulance pickups in 2024 did not include data on residence for the person who overdosed (56%). This may be due to a number of factors: the person who overdosed may be unable to provide that information due to lack of consciousness or awareness; they may be unwilling to share that information; there may be no identifying documents on the person, or; they may be experiencing homelessness at the time of the incident. Cambridge residents accounted for 31% of all opioid-related ambulance pickups in Cambridge (**Figure 5**). Of incidents that included residential data, 71% involved Cambridge residents.

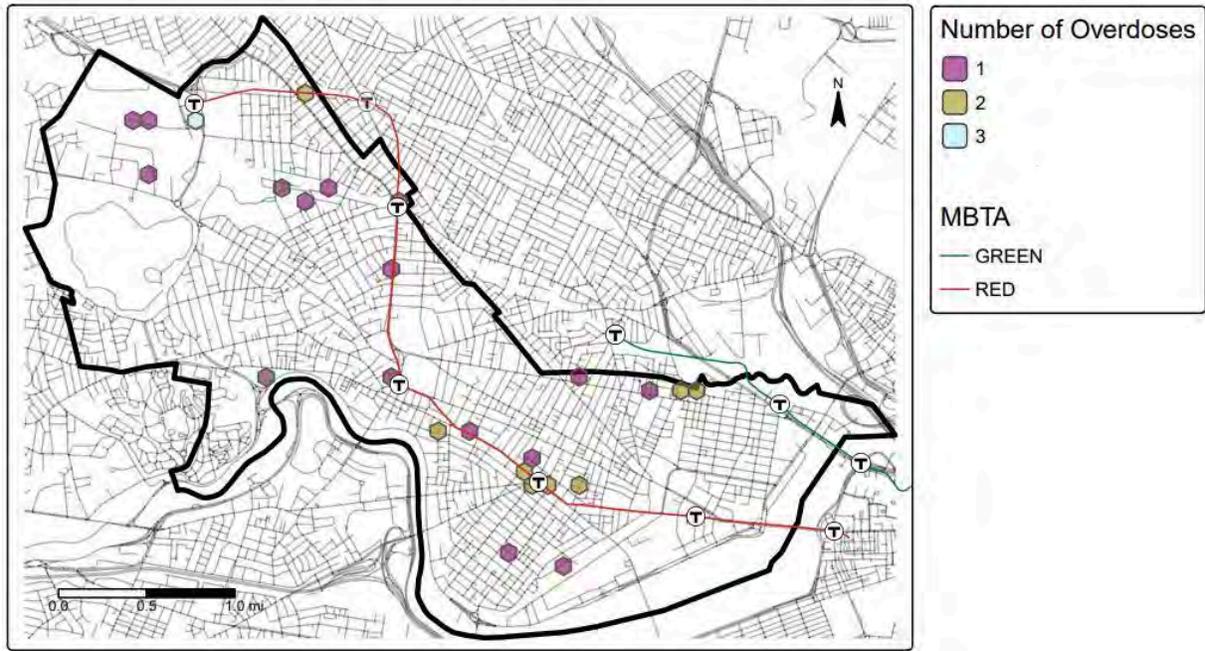
Figure 5. Opioid-Related Overdoses in Cambridge by Residence, 2024



Data Source: Pro EMS Ambulance Service

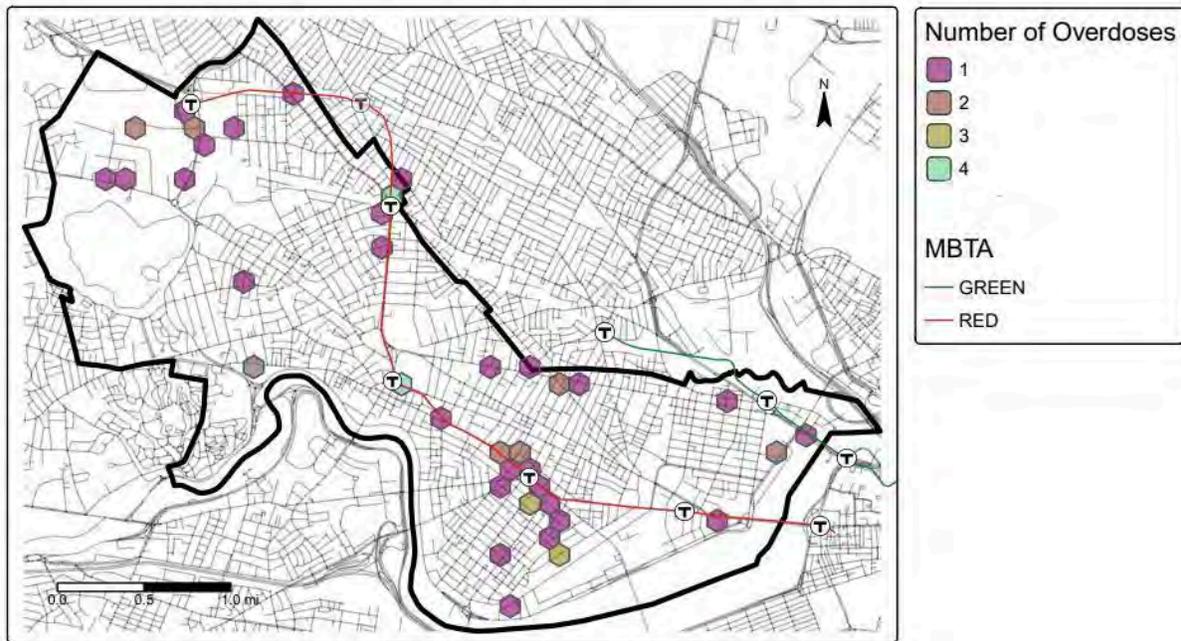
When comparing heat maps of opioid-related overdoses by Cambridge residency status, ambulance pickups for Cambridge residents covered a broader geography than non-residents (**Figure 6**). Ambulance pickups for non-residents were more concentrated in and around commercial districts, notably Alewife, Porter Square, Harvard Square, and Central Square (**Figure 7**).

Figure 6. 2024 Opioid-Related Incidents by Cambridge Residency, Cambridge, MA



Data Source: Pro EMS Ambulance Service  
Map layers sourced from: City of Cambridge, MBTA, MassGIS

Figure 7. 2024 Opioid-Related Incidents by Non-Cambridge Residency, Cambridge, MA

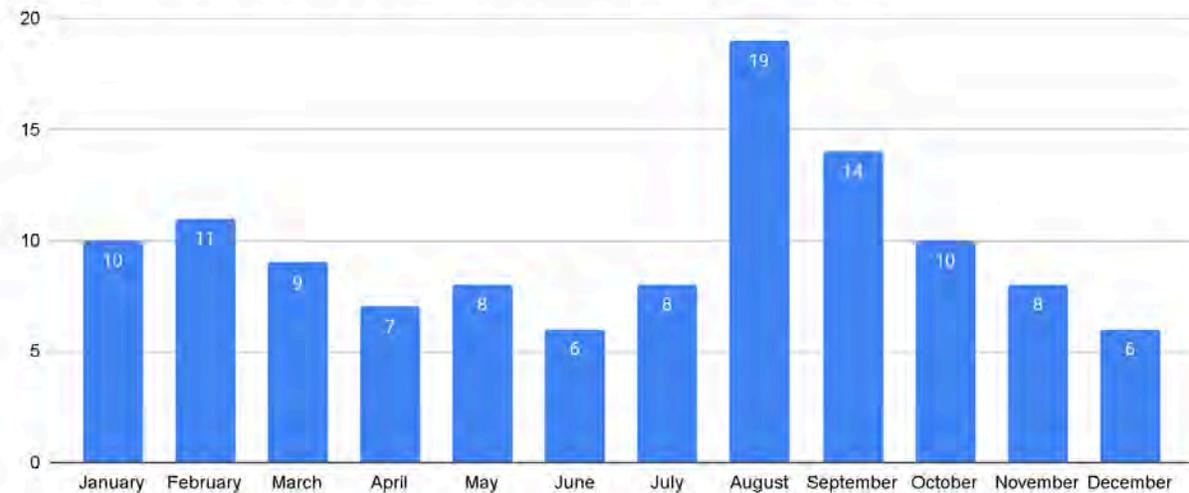


Data Source: Pro EMS Ambulance Service  
 Map layers sourced from: City of Cambridge, MBTA, MassGIS

### Seasonality

Time trends for opioid-related pickups (**Figure 8**) show that counts varied by month across 2024. There was a peak in opioid-related incidents in August, with 19 incidents reported that month.

Figure 8. Opioid-Related Overdoses in Cambridge by Month, 2024



Data Source: Pro EMS Ambulance Service

## Demographics

For the 116 opioid overdose incidents that occurred in 2024, the people who overdosed were predominately White and male (both 68.1%), with many of them being age 35-54 at the time of the incident (45.7%). Further breakdowns by race/ethnicity, sex, and age group are shown in **Table 2** below. Of note, these demographics should not be compared to similar demographics for Cambridge residents, as not all people who overdose in Cambridge are Cambridge residents. Additionally, in many overdose incidents, paramedics must make a judgement call based on physical appearance to determine an individual's race/ethnicity and sex, which may not align with how the individual would identify themselves. When comparing race and ethnicity, only incidents involving White, Black or African American, or Hispanic or Latino individuals are included, as other groups did not meet the threshold for inclusion ( $n < 5$ ) to help protect the privacy of those individuals. Finally, it should be noted that there are likely duplicate individuals represented in this data who overdosed more than once in 2024.

Table 2: Demographics of Cambridge Opioid-Related Overdose Cases Transported by Pro EMS by Race/Ethnicity, Sex, and Age Group, 2024

<b>Race and Ethnicity</b>	<b>Frequency</b>	<b>Percentage</b>
White	79	68.10%
Black or African American	25	21.55%
Hispanic or Latino	7	6.03%
Other/Unknown	5	4.31%
<b>Sex</b>	<b>Frequency</b>	<b>Percentage</b>
Male	79	68.10%
Female	36	31.03%
Unknown	1	0.86%
<b>Age Group</b>	<b>Frequency</b>	<b>Percentage</b>
0-14	0	0%
15-24	7	6.03%
25-34	16	13.79%
35-44	28	24.14%
45-54	25	21.55%
55-64	22	18.97%
65+	5	4.31%

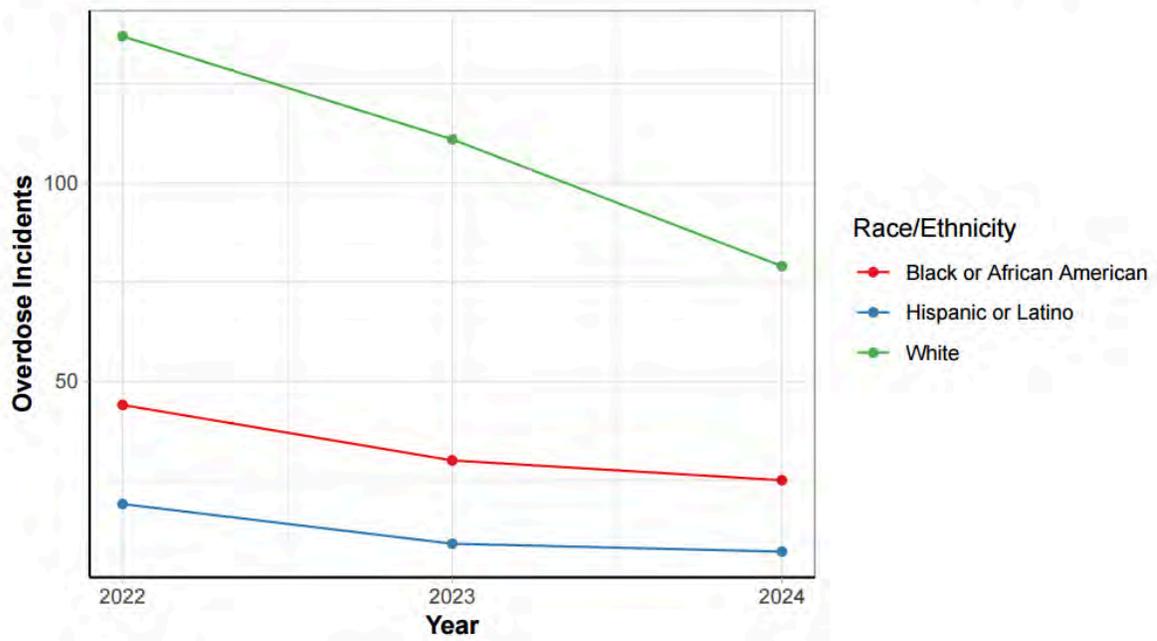
Unknown	13	11.21%
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Note: May not add up to 100% due to rounding.

Data Source: Pro EMS Ambulance Service

**Figures 9-11** below compare overdose data by race and ethnicity, sex, and mean age from 2022 to 2024. Among these groups, all showed declines in overdose incidents over time; however, those declines were sharper for incidents involving White individuals. Overdoses by sex show variation between male and female individuals, with sharper and more consistent declines for males. From 2022 to 2024, the mean age of overdose incidents has increased.

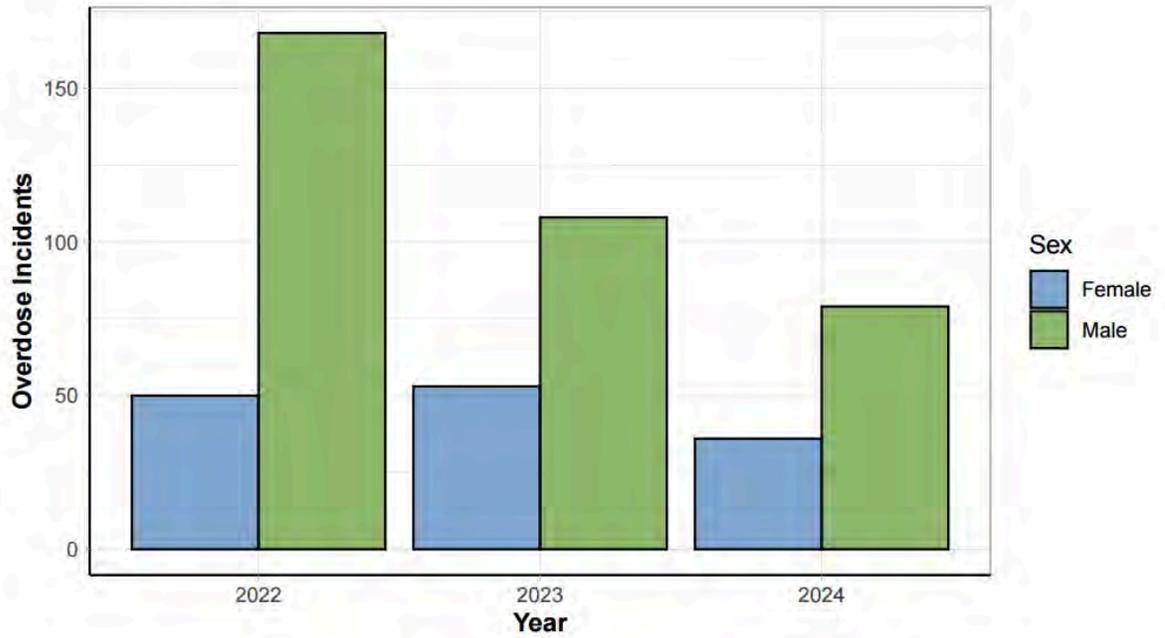
Figure 9. Overdose by Race/Ethnicity, 2022-2024



Note: Some groups have been hidden due to small numbers (n < 5)

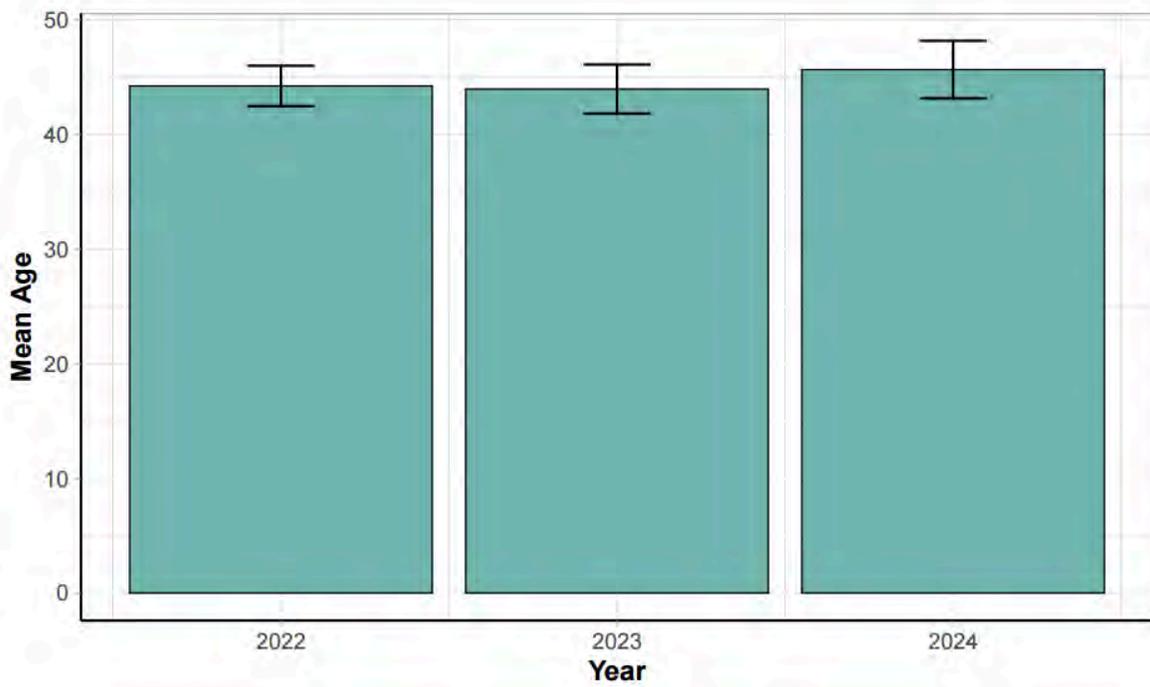
Data Source: Pro EMS Ambulance Service

Figure 10. Overdose by Sex, 2022-2024



Data Source: Pro EMS Ambulance Service

Figure 11. Overdose by Mean Age, 2022-2024



Data Source: Pro EMS Ambulance Service

# CAMBRIDGE HEALTH ALLIANCE AND MOUNT AUBURN HOSPITAL DATA

## Hospital Visits

Cambridge Health Alliance (CHA) and Mount Auburn Hospital (MAH) are two of the primary health care systems that serve Cambridge. To better understand how the opioid crisis affects Cambridge residents, the health department investigated opioid-related hospital visits at MAH and CHA health care sites in Cambridge. As a disclaimer, due to inconsistencies in how hospital encounters are coded between different providers and health care sites, some over- or under-reporting is to be expected, and this report should serve as a snapshot of overdose data from hospital settings in Cambridge. Additionally, these numbers should not be compared to the Pro EMS data, which includes people who are not Cambridge residents.

In 2024, 53 Cambridge residents visited CHA or MAH health care sites for opioid-related incidents a total of 55 times (**Table 3**). Only 2, or 3.8%, of these individuals had documented multiple opioid-related visits.

Table 3: Cambridge Health Alliance and Mount Auburn Hospital Encounters for Opioid-Related Overdoses, 2024

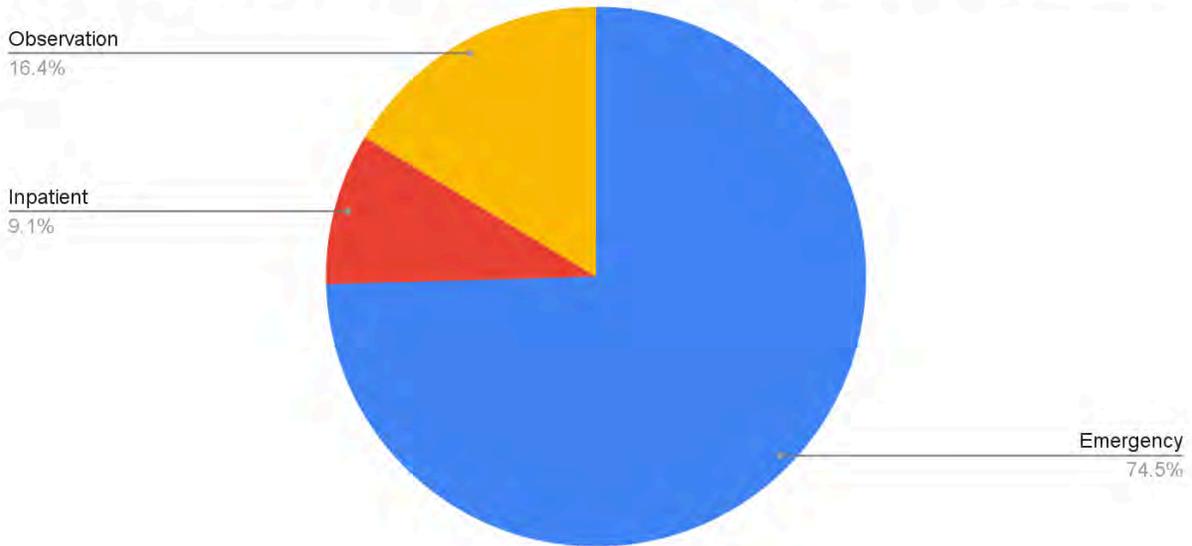
	CHA	MAH	Total
<b>Number of Opioid-Related Overdoses</b>	38	17	55
<b>Number of Unique Individuals</b>	36	17	53

Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024  
Mount Auburn Hospital, Business Intelligence Unit, 2024

In 2024, 74.5% of encounters were discharged directly from the emergency department, 9.1% were admitted to the hospital as inpatients, and 16.4% were admitted to the hospital on observation status (**Figure 12**).

Figure 12. Opioid-Related Overdoses by Encounter Type at CHA/MAH, 2024



Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024  
 Mount Auburn Hospital, Business Intelligence Unit, 2024

Following an emergency department visit or hospitalization, most opioid-related visits (89%) resulted in patients being discharged to “home,” which generally refers to the patient being properly discharged (in other words, not leaving on their own before being cleared by a medical provider) without being immediately transported to another facility (**Table 4**).

Table 4: Opioid-Related Overdoses by Discharge Location from CHA/MAH, 2024

Discharge Location	Percentage
Home	89.09%
Left Against Medical Advice	1.82%
Left ED Without Being Seen	3.64%
Patient Death	0%
Transferred/Admitted to Other Facility	5.45%

Note: May not add up to 100% due to rounding.

Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024  
 Mount Auburn Hospital, Business Intelligence Unit, 2024

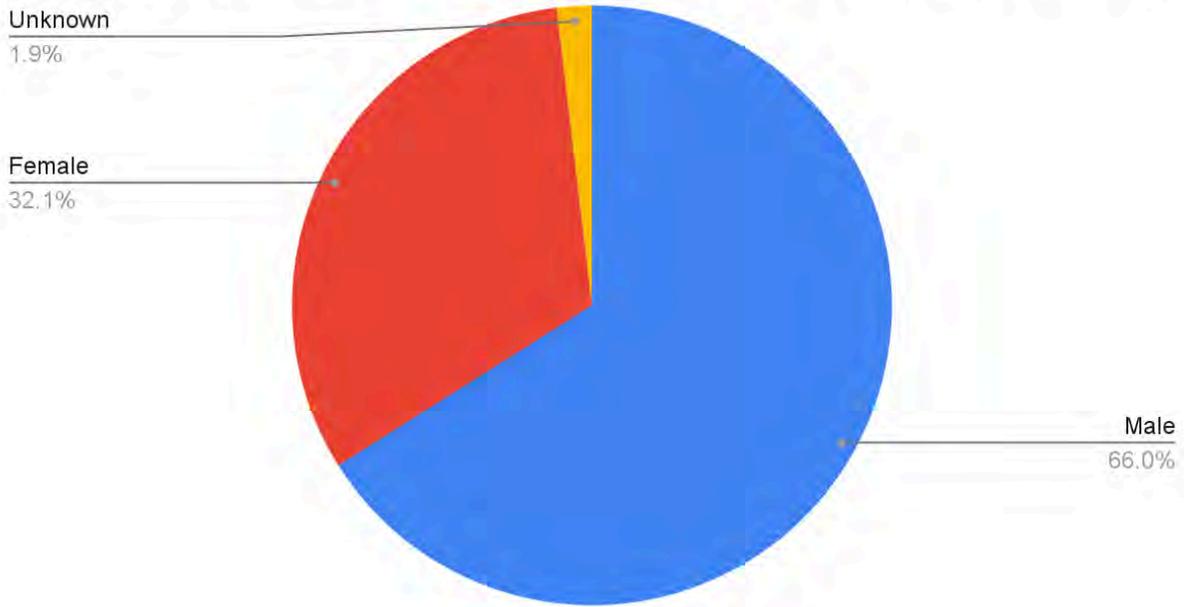
## Demographics

In 2024, 53 Cambridge residents received care at CHA and MAH sites for opioid-related overdoses. This group was predominantly male (66%) and White (69.8%), and disproportionately represented residents in the 35-44 age category (37.7%).

White patients were disproportionately represented among the CHA and MAH overdose cases. In 2020, White residents comprised 57.3% of the city's population, but made up 69.8% of the overdose cases in 2024. Black residents, who comprise 10.6% of the city's population, accounted for 11.3% of the cases. Hispanic residents, who comprise 9.1% of the city's population, accounted for 5.7% of the cases.

Demographic data is further broken down and compared to similar demographics across all Cambridge residents (using data from the most recent US Census, conducted in 2020) in **Figures 13-20**<sup>6</sup>. These comparisons provides a visual representation of how certain demographics are disproportionately represented in the opioid overdose hospital data.

Figure 13. Opioid-Related Overdoses by Sex at CHA/MAH, 2024



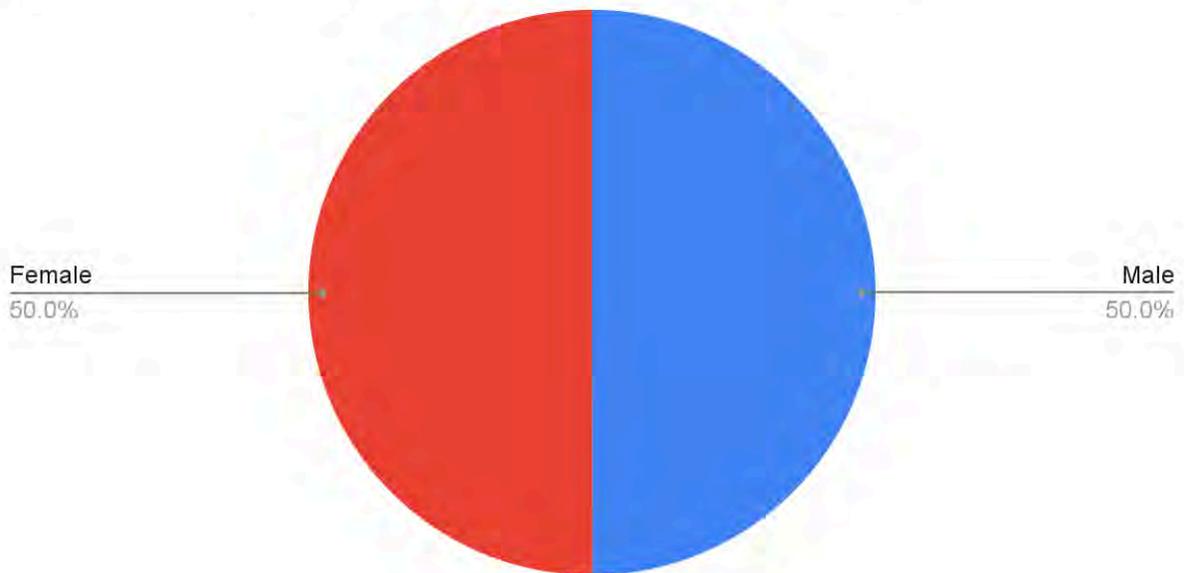
Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024

Mount Auburn Hospital, Business Intelligence Unit, 2024

Figure 14. Cambridge Residents by Sex, 2020

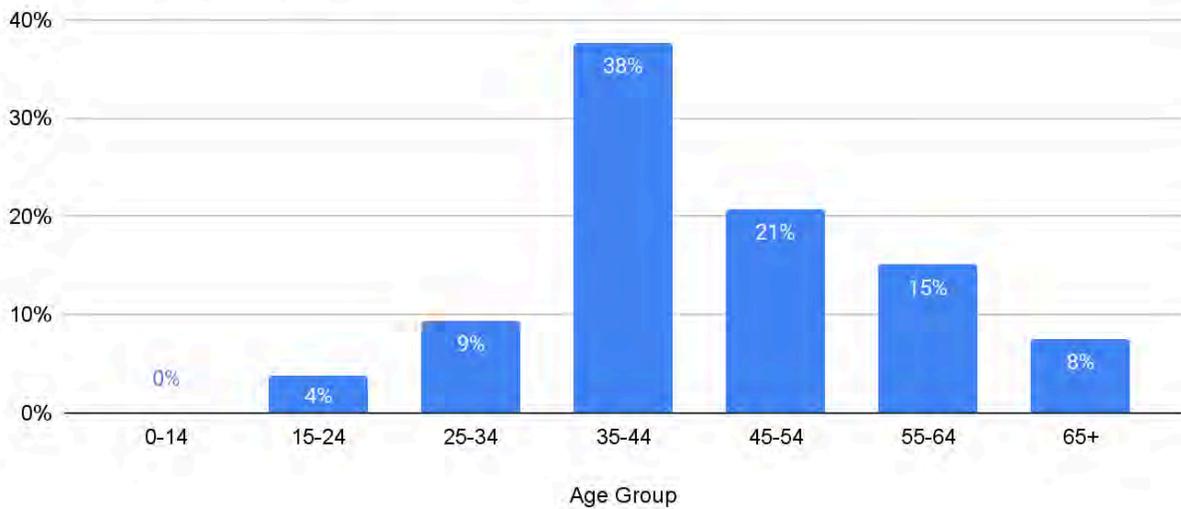
Note: 50.03% of Cambridge residents are female and 49.97% are male



Data Source: United States Census, 2020

Figure 15. Opioid-Related Overdoses by Age Group at CHA/MAH, 2024

Note: 5.66% of patient ages were unknown or undocumented

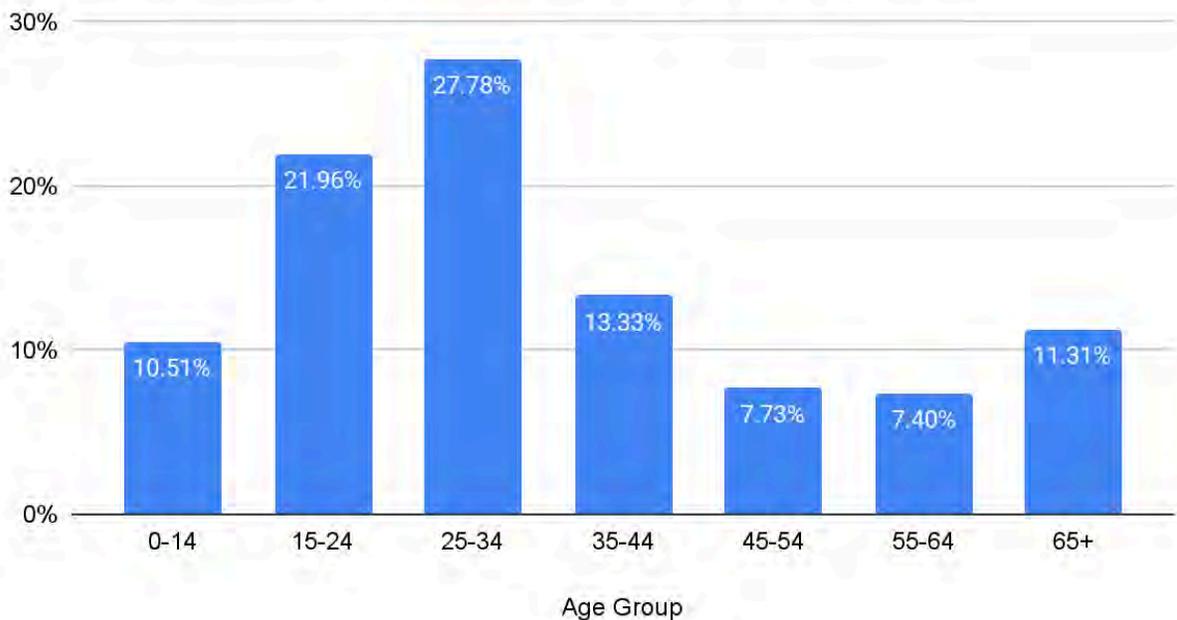


Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024

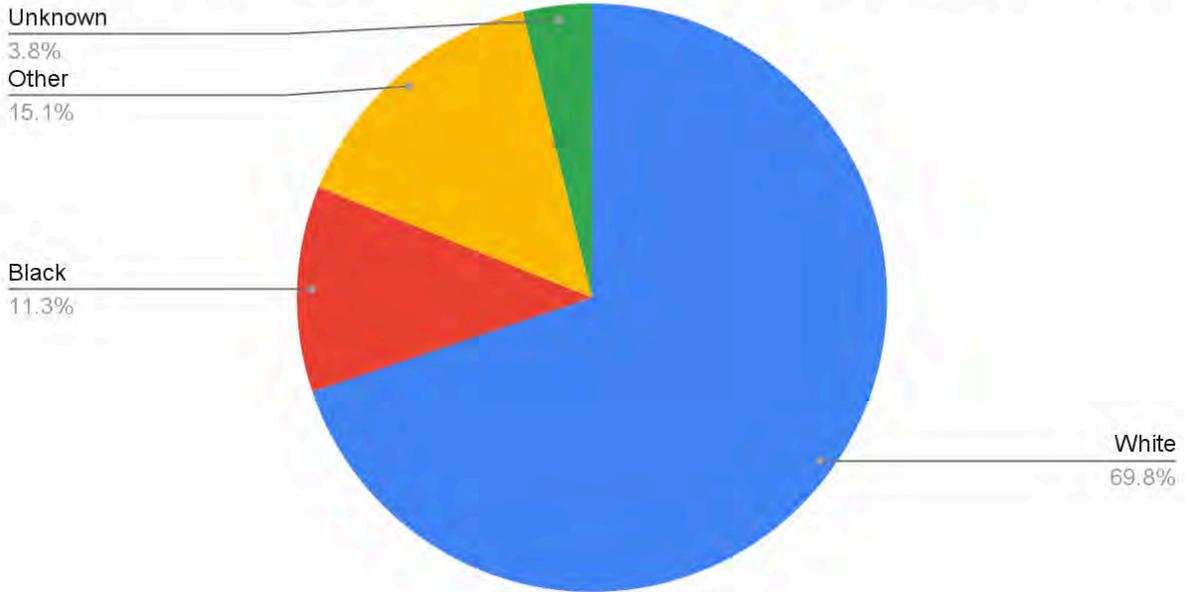
Mount Auburn Hospital, Business Intelligence Unit, 2024

Figure 16. Cambridge Residents by Age Group, 2020



Data Source: United States Census, 2020

Figure 17. Opioid-Related Overdoses by Race at CHA/MAH, 2024

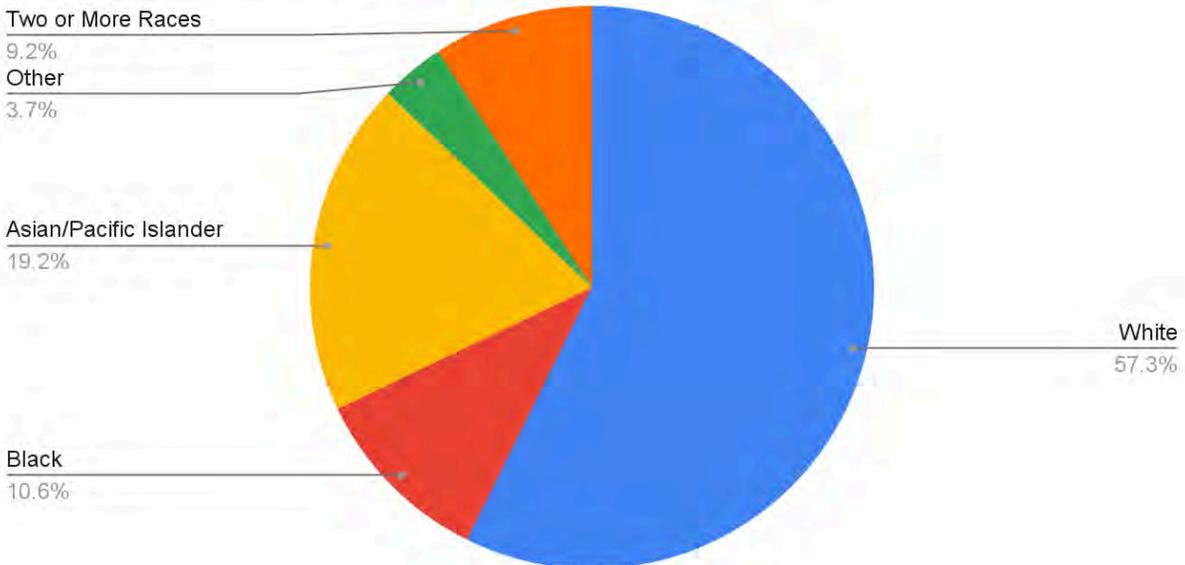


Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024

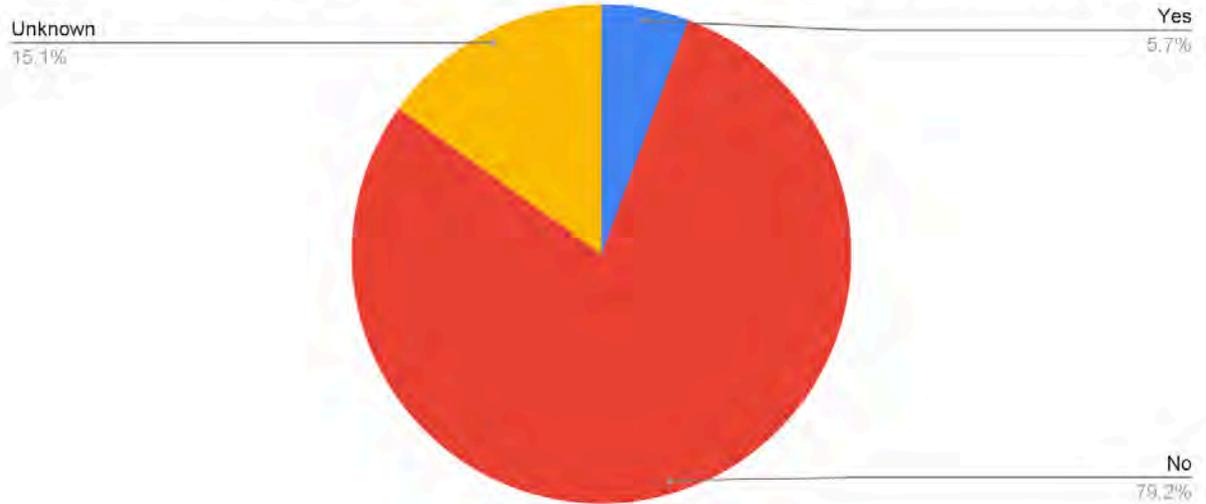
Mount Auburn Hospital, Business Intelligence Unit, 2024

Figure 18. Cambridge Residents by Race, 2020



Data Source: United States Census, 2020

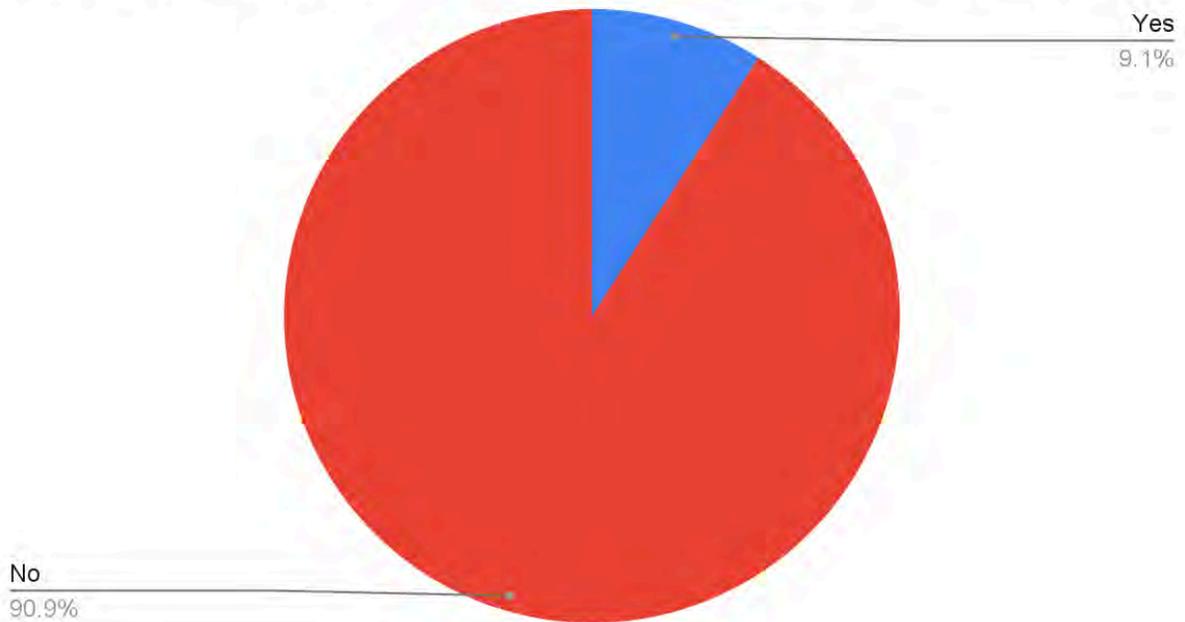
Figure 19. Opioid-Related Overdoses by Hispanic Ethnicity at CHA/MAH, 2024



Data Sources:

Cambridge Health Alliance, Business Analytics Unit, 2024  
Mount Auburn Hospital, Business Intelligence Unit, 2024

Figure 20. Cambridge Residents by Hispanic Ethnicity, 2020



Data Source: United States Census, 2020

## MASSACHUSETTS OVERDOSE EDUCATION AND NALOXONE DISTRIBUTION PROGRAM DATA

Naloxone (also known by the brand name Narcan) is a medication that can reverse an opioid overdose. It blocks opioids from attaching to opioid receptors in the brain. The Cambridge Public Health Department (CPHD) distributes free naloxone to community members at distribution events and upon request. CPHD is a designated Community Naloxone Program (CNP) organization. The CNP is a program of the Massachusetts Department of Public Health and provides qualifying partners with full or partially subsidized naloxone to distribute within their local communities. In 2024, CPHD distributed 1,684 doses of CNP-provided naloxone at full subsidy.

Cambridge is fortunate to also have an Overdose Education and Naloxone Distribution (OEND) site. AIDS Action Committee’s Access Drug User Health Program, located in Central Square, offers a variety of services, including harm reduction tools such as naloxone, testing strips, and sterile use supplies; HIV/HCV/STI testing; and overdose response training sessions for individuals who are likely to experience or witness an overdose.

CPHD collaborates with Somerville Health and Human Services (HHS) to provide overdose prevention training across both cities. Monthly virtual training sessions are open to the general public and ad hoc sessions can be requested by any Cambridge- or Somerville-based business or organization. In 2024, CPHD and Somerville HHS instructors led 21 overdose prevention training sessions for 175 total participants. At in-person training sessions, free naloxone is provided to participants.

For more information, please visit [Stop an Overdose with Naloxone on Mass.gov](https://www.mass.gov/info-details/stop-an-overdose-with-naloxone).

### Administration of Naloxone

**Table 5** lists known naloxone administrations at opioid-related incidents in Cambridge. When responding to a suspected opioid-related incident, Pro EMS records whether naloxone was administered and who administered it. If known, Pro EMS also records whether a bystander administered naloxone to someone experiencing a suspected overdose prior to EMS arrival. In 2024, 72% of opioid overdose incidents recorded by Pro EMS included documented use of naloxone. Of note, available data only records one administrator.

Table 5: Known Naloxone Administrations for Opioid-Related Overdoses in Cambridge when 911 was called, 2024

Administrator	Frequency	Percentage
Pro EMS	50	60.24%
First Responder	10	12.05%
Fire Department	10	12.05%
Bystander	11	13.25%
Other Healthcare Professional	2	2.41%

Data Source: Pro EMS Ambulance Service

## RESOURCES

CPHD encourages residents to learn more about how they can help prevent death from overdose. Depending on your role in the community, there are different ways you can help stem the tide of the opioid epidemic. Below is a list of available resources at the local, state and national levels.

**The Massachusetts Substance Use Helpline:** Provides free, confidential information and referrals to over 600 treatment programs funded or licensed by the state. (800) 327-5050 | [helplinema.org](http://helplinema.org)

**SafeSpot:** Teams of trained operators available 24/7 for people in Massachusetts who use drugs to call and have virtual supervision when using alone to help prevent overdose deaths. (800) 972-0590 | [safe-spot.me](http://safe-spot.me)

**Learn to Cope:** A support group for parents and other family members coping with a loved one addicted to opioids or other drugs. (508) 738-5148 | [learn2cope.org](http://learn2cope.org)

**SADOD:** Provides resources, information, and assistance to people who have been affected by the death of a loved one from a substance-use-related cause. [sadod.org](http://sadod.org)

**Access Drug User Health Program:** Free, safe, and confidential space for drug users to access resources and services, including free naloxone. (617) 470-6547 | [fenwayhealth.org/aac/programs-services](http://fenwayhealth.org/aac/programs-services)

**PAATHS:** One-stop shop for information about or access to addiction treatment services. (855) 494-4057 | [boston.gov/government/cabinets/boston-public-health-commission/recovery-services/find-your-path-recovery](http://boston.gov/government/cabinets/boston-public-health-commission/recovery-services/find-your-path-recovery)

**Cambridge Police Special Investigations Unit:** Conducts investigations and assists overdose victims seeking treatment and recovery services. (617) 349-3360

**Narcotic Anonymous:** Support meetings. (866) 624-3578 | [nera.org](http://nera.org)

Alcoholics Anonymous: Support meetings. (617) 426-9444 | [aaboston.org](http://aaboston.org)

**Massachusetts Behavioral Health Help Line:** Connect with qualified professionals for mental health assessments, crisis services, substance use treatment, referrals and more, with options in your own community. (833) 773-2445 | [masshelpline.com](http://masshelpline.com)

**Community Behavioral Health Centers:** Urgent and outpatient mental health and substance use services at more than 25 locations in Massachusetts, including at CHA Cambridge Hospital. [mass.gov/community-behavioral-health-centers](http://mass.gov/community-behavioral-health-centers)

**SAMHSA National Helpline** (800) 662-4357 | [findtreatment.gov](http://findtreatment.gov)

**988 Lifeline:** The 988 Suicide & Crisis Lifeline provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States and its territories. 988 | [988lifeline.org](https://988lifeline.org)

**Cambridge Public Health Department:** Free overdose prevention training and harm reduction services, including free Narcan and fentanyl test strips.  
[cambridgepublichealth.org/services/overdose-prevention](https://cambridgepublichealth.org/services/overdose-prevention)

## METHODS

The Cambridge Public Health Department assessed existing community-level data sources to develop a timelier, more comprehensive overdose surveillance system.

### Pro EMS Data Analysis

All EMS incidents that were likely related to opioids were pulled from the Pro EMS FirstWatch system. When this data sharing agreement was first established, epidemiologists at the Cambridge Public Health Department used narrative reports for each incident, as well as documented vital signs and naloxone response, to categorize each incident by overdose status. This method of classification was used from January 1, 2017 to May 17, 2017. From May 17, 2017 to December 2019, a machine learning algorithm was used to classify EMS incidents. Using natural language processing models in the programming language R,<sup>7</sup> the narrative text of new incidents were compared to previously manually classified data. In December 2019, it was discovered that data formatting changes required system revisions, prompting a return to manual labeling until February 2020. From February 2020 to present, the system revisions were completed and automatic reporting resumed.

A corpus of approximately 1,500 manually-classified incidents was used to generate a document matrix to train a Support Vector Machine (SVM), which is a type of supervised learning model.<sup>8</sup> New data were classified using this model. Epidemiologists at CPHD verified incidents that were not conclusively labeled. The current algorithm has an accuracy of 87.56%, a sensitivity of 68.75%, and a specificity of 95.04%. For more information, please contact the [Division of Epidemiology and Data Services](#).

### Hospital Data Analysis

CPHD received data from CHA and MAH as a set of CSV files, one for each hospital. The classification for this category included hospital visits for which a relevant diagnosis code was applied to the encounter. This classification follows the same reporting structure used by the Massachusetts Department of Public Health. Fields were matched across both hospitals to ensure standardization across the variables as the two hospitals did not always use the same designations. The data was then filtered to only include records with Cambridge-area zip codes.

### A Note on Opioid-Related Fatalities

Pro EMS, CHA, and MAH datasets utilized for this report may include records of fatalities during opioid-related incidents. As such, the maps, tables, and figures in this report represent all documented opioid incidents, not just incidents without fatalities. These instances were included so that the report shows all readily-available data on where opioid incidents are occurring in Cambridge, when they are happening, and who they are happening to. Importantly, these datasets do not include all opioid-related fatalities in Cambridge or among Cambridge residents. A documented fatality during an opioid overdose does not necessarily mean that the fatality was caused by the overdose itself and not another cause. This determination can only be made by the state Office of the Chief Medical Examiner, which is why opioid-related fatalities are only reported in the State Data section of this report.

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## ENDNOTES

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