Nonfatal, Unintentional Poisonings
MINNESOTA HOSPITAL DISCHARGE DATA 2012-2017

Key Findings

▪ Nonfatal, unintentional poisonings decreased slightly from 2016 to 2017 for the first time in many years
▪ Males continue to experience more overdoses than females
▪ Nonfatal, unintentional poisonings are highest for 1-4, 25-29, and 50-59 year olds, but are the result of different types of poisonings
▪ The Seven-County Metro and Greater Minnesota differ in nonfatal, unintentional poisoning trends across age groups

Annual Poisoning Counts

From 2012 to 2014, the number of nonfatal, unintentional poisonings remained consistent. There was an increase in the number of poisonings in 2015 and 2016. However, from 2016 to 2017, the number of poisonings again remained consistent (Figure 1). The change and increase in the number of poisonings from 2014 to 2016 may be attributable to the change in disease classification codes, making it difficult to make comparisons across this time period. Further analysis is needed to understand this increase and the effect of the switch to ICD-10-CM. However, it may also be related to an increase in fentanyl and fentanyl analog overdoses, as the analysis of death certificate data has shown that synthetic opioid overdoses have approximately doubled during those years1.

Figure 1: The number of nonfatal, unintentional poisonings appears consistent, but the transition from ICD-9-CM to ICD-10-CM makes comparisons difficult
Gender

The data show that men had a greater number of poisonings than women consistently from 2012 to 2017 (Figure 2). The switch from ICD-9-CM to ICD-10-CM may account for the large increase in poisonings from 2015 to 2017. The previously mentioned increase in overdose deaths that involved fentanyl and fentanyl analogs may also be a driver of the increase in poisonings. It is also important to highlight the fact that unintentional, nonfatal poisonings appear to decrease slightly from 2016 to 2017 for the first time in many years.

Figure 2: Males have more poisonings, and the difference in number between males and females increased following the transition to ICD-10-CM

Unintentional, nonfatal poisonings from 2012-2017 (Years 2015-2017 are dotted, indicating the switch in disease classification codes in quarter 4 of 2015).

Age

For each year, we see a trimodal trend with three peaks among the age groups. Two peaks within adults can be seen within the data - one at the 25-29 age group and the other at the 50-59 age group (Figure 3). The data show a continued increase in poisonings in the 25-29 age group, while the first decrease in poisonings in the 50-59 age group was observed from 2016 to 2017; this remains even after the previously mentioned change in disease classification codes. The rise seen in the 25-29 age group may be due to an increase in overdoses of fentanyl and fentanyl analogs, as they have continued to increase in Minnesota. The decrease in the 50-59 age group could possibly be associated with the result of a leveling-off of prescription opioid overdoses in this group. A third important peak can also be seen in the 1-4 age group, which may be due to household poisonings by children.
Figure 3: Poisonings peak in the 1-4, 25-29, and 50-59 year age group, but are the result of different types of poisonings

Unintentional, nonfatal poisonings from 2012-2017 (Years 2015-2017 are dotted, indicating the switch in disease classification codes in quarter 4 of 2015).

Manner

In the previous results, only unintentional poisonings were presented. The analysis below aims to compare the trend of nonfatal, unintentional poisonings among all ages with that of nonfatal, assaultive, self-inflicted, and undetermined poisonings. As previously discussed, unintentional poisonings show a trimodal trend of three peaks across the age groups with two of the distinct peaks at age groups 25-29 and 50-59 (Figure 4). This trimodal trend is unique to unintentional poisonings and may be directly related to drug overdoses. Self-inflicted poisonings show one large peak of poisonings in the 15-19 age group and decrease as age increases. Assaultive and undetermined poisonings remain fairly consistent across age groups.
Seven-County Metro vs. Greater Minnesota

The Seven-County Metro region differs slightly compared to Greater Minnesota. Both regions show a multi-modal curve, but with different shapes. The Metro Region shows a clear trimodal curve with two of the distinct peaks at age groups 25-29 and 50-59. Conversely, the Greater Minnesota area shows a higher concentration of poisonings among the younger age groups, and declines gradually as age increases, with only a slight peak at the 50-59 age group (Figure 5).
Conclusion

This report describes the trends of unintentional, nonfatal poisonings in Minnesota from 2012 to 2017. The change in disease classification codes in the fourth quarter of 2015 makes it difficult to combine all years for analysis, but observations can be made on the four years using ICD-9-CM codes and the two years using ICD-10-CM codes. In doing so, it can be seen that men have higher overall poisoning counts than women, but that poisonings appear to decrease from 2016 to 2017 for the first time in many years. Additionally, a trimodal curve is observed for unintentional poisonings with two of the peaks in the 25-29 and 50-59 year age groups; the latter two peaks may be related to drug overdoses. The continued rise in poisonings in the 25-29 year age group from 2016 to 2017 may be due to an increase in fentanyl and fentanyl analog overdoses, as previous literature has shown that these types of overdoses have steadily risen in recent years. The distribution by age can be seen in both the Seven County Metro and the Greater Minnesota area, which has higher concentrations of poisonings among children.

This report shows a brief summary of trends that can be observed, but further analysis should be conducted on the data to look at the causes of those trends. Drastically higher poison counts in men as compared to women have not historically been the trend, but differences in counts appear to increase across years in this report. Further analysis is needed to determine whether this new trend occurs due to the change in classification codes or due to a rise in opioid use. Further investigation should also occur on the rise of poisonings among younger age groups and...
the lowering of poisonings among older age groups in recent years (2016-2017). This trend could be caused by an increase in fentanyl overdoses and the leveling-off of prescription drug overdoses. Future studies should attempt to uncover the significance behind the trends observed.

Methods

MIDAS Poisoning Data

The data collected for this report were extracted from the Minnesota Injury Data Access System (MIDAS) and used to analyze hospital discharge data for injuries. MIDAS captures data on all hospital-treated poisonings, which includes drug-related poisonings or overdoses, along with all household, food, and chemical-related poisonings. It does not allow the data to be sorted by type of poisonings, meaning the data included in this analysis reflects all poisonings. However, the website does allow users to categorize data by various topics, including year, location, mechanism/cause of injury, type of injury, manner of injury, type of care, outcome, and gender. This report used data that were filtered to include only poisonings under mechanism/cause, nonfatal under outcome, and unintentional under manner and intent. Each analysis selected these filters and used the compare option under each category to compare the area of interest, such as gender and manner. The data were also filtered to only contain information on unintentional and nonfatal poisonings. The full list of poisonings included can be seen in the Appendix. The yearly analysis used the same categories, but changed the dataset year. Following extraction, the data were then moved to Excel to be reorganized into tables and graphs. This report aims to provide an epidemiologic overview of unintentional, nonfatal poisonings from 2012 to 2017 in Minnesota. MIDAS (http://www.health.state.mn.us/injury/midas/injury/index.cfm) is publicly available.

Transition in Classification of Disease Codes (ICD-9-CM and ICD-10-CM)

The International Classification of Diseases (ICD) is the most widely-used method for classifying health conditions and was used in the categorization of hospital discharge data in MIDAS. Through the third quarter of 2015, diseases were classified under the ninth edition of ICD codes (ICD-9-CM), but beginning in the fourth quarter of 2015, diseases have been updated to the tenth edition of ICD codes (ICD-10-CM). The switch from ICD-9-CM to ICD-10-CM required changes to the methods for defining and accounting for poisonings. Therefore, the data may show certain uncharacteristic spikes from 2014 to 2016, and trends over this transition should be interpreted cautiously.²
Appendix

The codes below indicate which types of poisonings were included for analysis.

**E8500**
Accidental poisoning by heroin

**E8501**
Accidental poisoning by methadone

**E8502**
Accidental poisoning by other opiates and related narcotics

**E8503**
Accidental poisoning by salicylates

**E8504**
Accidental poisoning by aromatic analgesics, not elsewhere classified

**E8505**
Accidental poisoning by pyrazole derivatives

**E8506**
Accidental poisoning by antirheumatics (antiphlogistics)

**E8507**
Accidental poisoning by other non-narcotic analgesics

**E8508**
Accidental poisoning by other specified analgesics and antipyretics

**E8509**
Accidental poisoning by unspecified analgesic or antipyretic

**E8510**
Accidental poisoning by barbiturates

**E8520**
Accidental poisoning by chloral hydrate group

**E8521**
Accidental poisoning by paraldehyde

**E8522**
Accidental poisoning by bromine compounds

**E8523**
Accidental poisoning by methaqualone compounds

**E8524**
Accidental poisoning by glutethimide group

**E8525**
Accidental poisoning by mixed sedatives, not elsewhere classified

**E8528**
Accidental poisoning by other specified sedatives and hypnotics

**E8529**
Accidental poisoning by unspecified sedative or hypnotic

**E8530**
Accidental poisoning by phenothiazine-based tranquilizers

**E8531**
Accidental poisoning by butyrophenone-based tranquilizers

**E8532**
Accidental poisoning by benzodiazepine-based tranquilizers

**E8538**
Accidental poisoning by other specified tranquilizers

**E8539**
Accidental poisoning by unspecified tranquilizer

**E8540**
Accidental poisoning by antidepressants

**E8541**
Accidental poisoning by psychodysleptic [hallucinogens]

**E8542**
Accidental poisoning by psychostimulants

**E8543**
Accidental poisoning by central nervous system stimulants

**E8548**
Accidental poisoning by other psychotropic agents

**E8550**
Accidental poisoning by anticonvulsant and antiparkinsonism drugs

**E8551**
Accidental poisoning by other central nervous system depressants

**E8552**
Accidental poisoning by local anesthetics

**E8553**
Accidental poisoning by parasympathomimetics [cholinergic]

**E8554**
Accidental poisoning by parasympatholytics [anticholinergics and antimuscarinics] and spasmolytic

**E8555**
Accidental poisoning by sympathomimetic [adrenergic]

**E8556**
Accidental poisoning by sympatholytics [antiadrenergic]

**E8558**
Accidental poisoning by other specified drugs acting on central and autonomic nervous systems

**E8559**
Accidental poisoning by unspecified drug acting on central and autonomic nervous systems

**E856**
Accidental poisoning by antibiotics

**E857**
Accidental poisoning by other anti-infectives

**E8580**
Accidental poisoning by hormones and synthetic substitutes

**E8581**
Accidental poisoning by primarily systemic agents

**E8582**
Accidental poisoning by agents primarily affecting blood constituents

**E8583**
Accidental poisoning by agents primarily affecting cardiovascular system

**E8584**
Accidental poisoning by agents primarily affecting gastrointestinal system
NONFATAL, UNINTENTIONAL POISONINGS

E8585 Accidental poisoning by water, mineral, and uric acid metabolism drugs
E8586 Accidental poisoning by agents primarily acting on the smooth and skeletal muscles and respiratory system
E8587 Accidental poisoning by agents primarily affecting skin and mucous membrane, ophthalmological, otorhinolaryngological, and dental drugs
E8588 Accidental poisoning by other specified drugs
E8589 Accidental poisoning by unspecified drug
E8600 Accidental poisoning by alcoholic beverages
E8601 Accidental poisoning by other and unspecified ethyl alcohol and its products
E8602 Accidental poisoning by methyl alcohol
E8603 Accidental poisoning by isopropyl alcohol
E8604 Accidental poisoning by fusel oil
E8608 Accidental poisoning by other specified alcohols
E8609 Accidental poisoning by unspecified alcohol
E86010 Accidental poisoning by synthetic detergents and shampoos
E8611 Accidental poisoning by soap products
E8612 Accidental poisoning by polishes
E8613 Accidental poisoning by other cleansing and polishing agents
E8614 Accidental poisoning by disinfectants
E8615 Accidental poisoning by lead paints
E8616 Accidental poisoning by other paints and varnishes
E8619 Accidental poisoning by unspecified cleansing and polishing agents, disinfectants, paints, and varnishes
E8620 Accidental poisoning by petroleum solvents
E8621 Accidental poisoning by petroleum fuels and cleaners
E8622 Accidental poisoning by lubricating oils
E8623 Accidental poisoning by petroleum solids
E8624 Accidental poisoning by other specified solvents, not elsewhere classified
E8629 Accidental poisoning by unspecified solvent, not elsewhere classified
E8630 Accidental poisoning by insecticides of organochlorine compounds
E8631 Accidental poisoning by insecticides of organophosphorus compounds
E8632 Accidental poisoning by carbamates
E8633 Accidental poisoning by mixtures of insecticides
E8634 Accidental poisoning by other and unspecified insecticides
E8635 Accidental poisoning by herbicides
E8636 Accidental poisoning by fungicides
E8637 Accidental poisoning by rodenticides
E8638 Accidental poisoning by fumigants
E8639 Accidental poisoning by other and unspecified agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers
E8640 Accidental poisoning by corrosive aromatics not elsewhere classified
E8641 Accidental poisoning by acids not elsewhere classified
E8642 Accidental poisoning by caustic alkalis not elsewhere classified
E8643 Accidental poisoning by other specified corrosives and caustics not elsewhere classified
E8644 Accidental poisoning by unspecified corrosives and caustics not elsewhere classified
E8650 Accidental poisoning by meat
E8651 Accidental poisoning by shellfish
E8652 Accidental poisoning from other fish
E8653 Accidental poisoning from berries and seeds
NONFATAL, UNINTENTIONAL POISONINGS

E8654 Accidental poisoning from other specified plants
E8655 Accidental poisoning from mushrooms and other fungi
E8658 Accidental poisoning from other specified foods
E8659 Accidental poisoning from unspecified foodstuff or poisonous plant
E8660 Accidental poisoning by lead and its compounds and fumes
E8661 Accidental poisoning by mercury and its compounds and fumes
E8662 Accidental poisoning by antimony and its compounds and fumes
E8663 Accidental poisoning by arsenic and its compounds and fumes
E8664 Accidental poisoning by other metals and their compounds and fumes
E8665 Accidental poisoning by plant foods and fertilizers
E8666 Accidental poisoning by glues and adhesives
E8667 Accidental poisoning by cosmetics
E8668 Accidental poisoning by other specified solid or liquid substances
E8669 Accidental poisoning by unspecified solid or liquid substance
E867 Accidental poisoning by gas distributed by pipeline
E8680 Accidental poisoning by liquefied petroleum gas distributed in mobile containers
E8681 Accidental poisoning by other and unspecified utility gas
E8682 Accidental poisoning by motor vehicle exhaust gas
E8683 Accidental poisoning by carbon monoxide from incomplete combustion of other domestic fuels
E8688 Accidental poisoning by carbon monoxide from other sources
E8689 Accidental poisoning by unspecified carbon monoxide
E8690 Accidental poisoning by nitrogen oxides
E8691 Accidental poisoning by sulfur dioxide
E8692 Accidental poisoning by freon
E8693 Accidental poisoning by lacrimogenic gas [tear gas]
E8694 Second hand tobacco smoke
E8698 Accidental poisoning by other specified gases and vapors
E8699 Accidental poisoning by unspecified gases and vapors
E9500 Suicide and self-inflicted poisoning by analgesics, antipyretics, and antiinflammatories
E9501 Suicide and self-inflicted poisoning by barbiturates
E9502 Suicide and self-inflicted poisoning by other sedatives and hypnotics
E9503 Suicide and self-inflicted poisoning by tranquilizers and other psychotropic agents
E9504 Suicide and self-inflicted poisoning by other specified drugs and medicinal substances
E9505 Suicide and self-inflicted poisoning by unspecified drug or medicinal substance
E9506 Suicide and self-inflicted poisoning by agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers
E9507 Suicide and self-inflicted poisoning by corrosive and caustic substances
E9508 Suicide and self-inflicted poisoning by arsenic and its compounds
E9509 Suicide and self-inflicted poisoning by other and unspecified solid and liquid substances
E9510 Suicide and self-inflicted poisoning by gas distributed by pipeline
E9511 Suicide and self-inflicted poisoning by liquefied petroleum gas distributed in mobile containers
E9518 Suicide and self-inflicted poisoning by other utility gas
E9520 Suicide and self-inflicted poisoning by motor vehicle exhaust gas
E9521 Suicide and self-inflicted poisoning by other carbon monoxide
E9528 Suicide and self-inflicted poisoning by other specified gases and vapors
E9529 Suicide and self-inflicted poisoning by unspecified gases and vapors
E9620
Assault by drugs and medicinal substances

E9621
Assault by other solid and liquid substances

E9622
Assault by other gases and vapors

E9629
Assault by unspecified poisoning

E972
Injury due to legal intervention by gas

E9796
Terrorism involving biological weapons

E9797
Terrorism involving chemical weapons

E9800
Poisoning by analgesics, antipyretics, and antirheumatics, undetermined whether accidentally or purposely inflicted

E9801
Poisoning by barbiturates, undetermined whether accidentally or purposely inflicted

E9802
Poisoning by other sedatives and hypnotics, undetermined whether accidentally or purposely inflicted

E9803
Poisoning by tranquilizers and other psychotropic agents, undetermined whether accidentally or purposely inflicted

E9804
Poisoning by other specified drugs and medicinal substances, undetermined whether accidentally or purposely inflicted

E9805
Poisoning by unspecified drug or medicinal substance, undetermined whether accidentally or purposely inflicted

E9806
Poisoning by corrosive and caustic substances, undetermined whether accidentally or purposely inflicted

E9807
Poisoning by agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers, undetermined whether accidentally or purposely inflicted

E9808
Poisoning by arsenic and its compounds, undetermined whether accidentally or purposely inflicted

E9809
Poisoning by other and unspecified solid and liquid substances, undetermined whether accidentally or purposely inflicted

E9810
Poisoning by gas distributed by pipeline, undetermined whether accidentally or purposely inflicted

E9811
Poisoning by liquefied petroleum gas distributed in mobile containers, undetermined whether accidentally or purposely inflicted

E9818
Poisoning by other utility gas, undetermined whether accidentally or purposely inflicted

E9820
Poisoning by motor vehicle exhaust gas, undetermined whether accidentally or purposely inflicted

E9821
Poisoning by other carbon monoxide, undetermined whether accidentally or purposely inflicted

E9828
Poisoning by other specified gases and vapors, undetermined whether accidentally or purposely inflicted

E9829
Poisoning by unspecified gases and vapors, undetermined whether accidentally or purposely inflicted
References


