# Overview of the Draft Carbon Monoxide (CO) Poisoning Message Mapping Guide

**CSTE Webinar
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**Mikyong (Meekie) Shin, DrPH, MPH, RN
Noreen Kloc, MPH
Centers for Disease Control and Prevention**

**National Center for Environmental Health**

# Agenda

- Carbon Monoxide (CO) poisoning background
- Message Mapping Guide (MMG) overview
- How to use the CO poisoning MMG to build a message
- Key CO poisoning information
- Objectives of the external review and timeline

# Audience

- State health department informatics and epidemiology staff involved with implementing the CO Poisoning MMG

# CO Poisoning Background

# CO Poisoning Background

- CO is a colorless, odorless, nonirritating gas that is produced through the incomplete combustion of carbon-containing substances.

- CO poisoning occurs from breathing in elevated air levels of CO.

- Power outage related CO poisoning during natural disasters has been well documented.*

- Unintentional non-fire related (UNFR) CO poisoning death is one of the leading accidental deaths in the United States.

* Power outage related CO exposure https://www.cdc.gov/co/studies.htm

# CO Poisoning Surveillance Data

- No active national surveillance system for CO poisoning.

- Estimates and surveillance activities rely on data sources that were not primarily designed for CO poisoning surveillance.

- The CDC National Environmental Tracking Network collects and disseminates <u>unintentional</u> CO poisoning data (hospitalizations, emergency department visits, and deaths) in a standard way to monitor trends and better understand the health consequences of CO poisoning across the United States.

- CO poisoning: a nationally notifiable condition since 2014.*

* COP 2018 Case Definition  https://wwwn.cdc.gov/nndss/conditions/carbon-monoxide-poisoning/case-definition/2019/

5

# Summary of CO Poisoning Surveillance Data
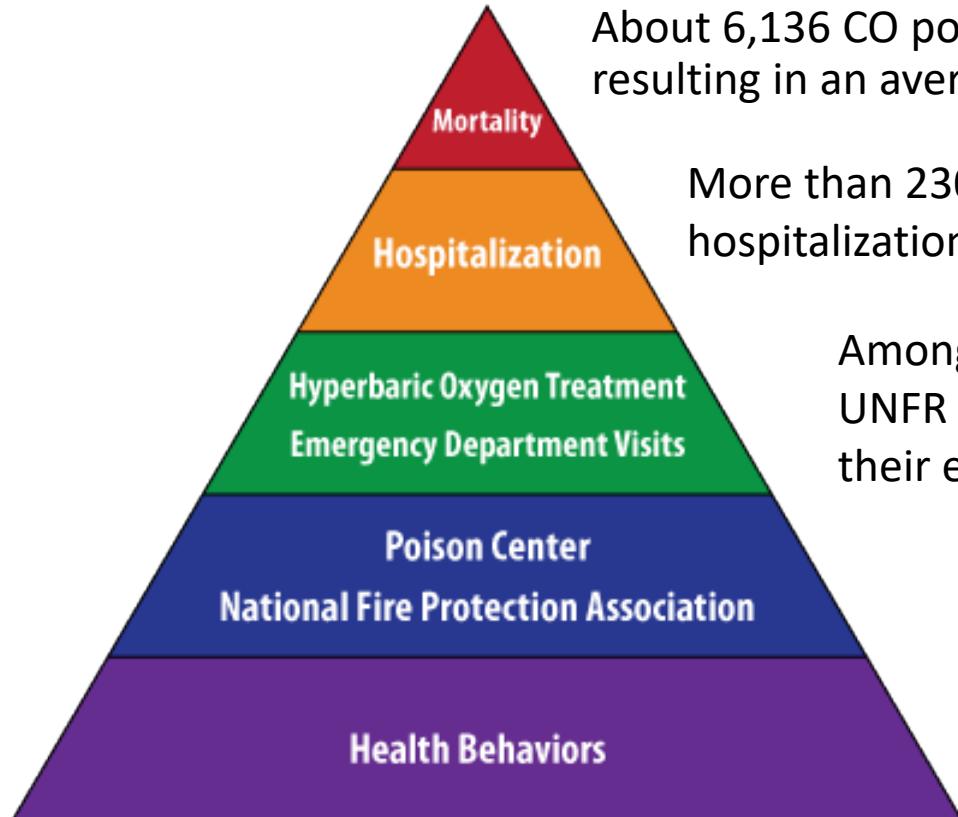


About 6,136 CO poisoning fatalities during 1999 to 2012 resulting in an average of 438 deaths annually.

More than 230,000 ED visits (772 visits/million) and more than 22,000 hospitalizations (75 stays/million) were related to UNFR CO poisoning in 2007.

Among the 864 patients reported to receive hyperbaric oxygen treatment for UNFR CO poisoning, only 10% of patients reported the presence of a CO alarm at their exposure location during 2008-2010.

The 68,316 CO exposures reported to poison centers during 2000--2009 represented 0.29% of all poison exposures reported in National Poison Data System.

41.6% of occupied U.S. households with working CO alarm, American Housing Survey, 2011.

CO Poisoning, Routine Surveillance, https://www.cdc.gov/co/surveillance/routine.htm

# 18-EH-01 CSTE Position Statement*:

Tier 1 or Tier 2 surveillance: ☒Confirmed, ☒Probable

| Tier 1 |
| --- |
| **Case Classifications using clinical, laboratory, epidemiologic, and exposure data**<br><br>***Confirmed:***<br>Confirmed laboratory evidence **OR**<br>presumptive or supportive clinical evidence AND confirmatory exposure evidence<br><br>***Probable*:**<br>presumptive laboratory evidence **OR**<br>presumptive clinical evidence AND possible exposure evidence, **OR**<br>presumptive or supportive clinical evidence AND epidemiologic linkage |

# 18-EH-01 CSTE Position Statement*

## Tier 1 Confirmed

**Case Classifications using clinical, laboratory, epidemiologic, and exposure data**

*Confirmed:*
Confirmed laboratory evidence **OR** presumptive or supportive clinical evidence AND confirmatory exposure evidence

*Confirmatory laboratory evidence:*
A person who does not smoke, or a child (age < 14 years) whose smoking status is unknown, and has a carboxyhemoglobin (COHb) level of ≥ 5.0% as measured in a blood sample

*Presumptive clinical evidence:* Loss of consciousness OR Death

*Supportive clinical evidence:* A person with signs or symptoms consistent with CO poisoning, which may include elevated pulse CO-oximetry measurement and/or non-specific symptoms such as nausea, vomiting, confusion, shortness of breath, and chest pain

A person who had an exposure to an elevated level of CO based on a dedicated or multi-gas meter/instrument (e.g., fire department notation) for a known duration that is consistent with CO poisoning.

# 18-EH-01 Position Statement*

Tier 2 surveillance: ☒Confirmed, ☒Probable

| Tier 2 |
|---|
| **Case Classification using administrative data** |

***Confirmed:***

- Hospital discharge and ED records: explicit ICD-10-CM with CO poisoning
- Death Certificates: explicit ICD-10 CO poisoning as a cause of death or a significant condition contributing to death

***Probable*:**

- Hospital discharge and ED records: ICD-10-CM with CO poisoning by motor vehicle exhaust
- Poison Control Center Records: exposure to CO **AND** a moderate or major medical outcome, or death
- Workers compensation records: paid claim containing a finding, problem, diagnosis, or other indication of exposure to CO or CO poisoning

# Why Implement the CO Poisoning MMG?

- Allow jurisdictions to map variables so that CDC can receive and compile data electronically.

- Improve data transmission and consolidate data streams to reduce burden on jurisdictions in reporting cases.

- Provide standardized data elements and valid values for variables – saving extensive time and resources to capture information.

- Support linkage of records to find a new or prevalent case.

- Helps calculate more accurate counts and rates of morbidity and mortality.

# CO Poisoning Draft MMG Overview

- Generic MMG data elements

- Draft CO Poisoning MMG—Based on 2018 CSTE Position Statement
  - Surveillance (demographics, data reporting source, exposure source, intent, fire-related, extreme-weather, power outage, site of exposure, etc.)
  - Incident/outbreak information (Epi-linked, date, etc.)
  - Carboxyhemoglobin level value in Test Type repeating group
  - Pulse CO-oximetry measurement value in Test Type repeating group
  - Treatment information
  - CO epidemiology (alarm, smoking status, marijuana smoking status)
  - Industry and occupation repeating group

# Improvement of CO Poisoning Surveillance

- Collect clinical, laboratory, epidemiologic, and exposure data.

- Provide standardized criteria for case identification and classification for CO poisoning.

- Plan for prevention program, identification of high-risk areas and population sub-groups.

- Investigation of novel exposure pathways and previously unknown determinants/poisoning scenarios.

# CO Poisoning Message Mapping Guide (MMG) Overview

# MMG Overview

Includes data elements to be used in HL7 case notifications sent to CDC

ID, age, sex, hospitalized...          Lab test results, epi exposure ...

Generic V2 MMG **+** CO Poisoning MMG **=** HL7 message

# CO Poisoning MMG Layout

| Data Element (DE) Name | DE Identifier Sent in HL7 | DE Code System | Data Element Description | Data Type | CDC Priority | May Repeat | Value Set Name (VADS Hyperlink) |
|---|---|---|---|---|---|---|---|
| Data Reporting Source | INV1303 | N/A | What is the facility reporting the data or the data source for case ascertainment? | Coded | P | Y | Data Reporting Source (CO) |
| Intent of Exposure | 92945-5 | LN | Was the intent of the carbon monoxide exposure self-harm/assault (intentional) or accidental (unintentional)? | Coded | P | N | Intent of Exposure (CO) |
| Fire Related Exposure | TBD | | Was the carbon monoxide exposure related to a fire? | Coded | P | N | Yes No Unknown (YNU) |
| Power Outage Event | 397789006 | SCT | Was the carbon monoxide exposure related to an event causing a power outage? | Coded | P | N | Yes No Unknown (YNU) |
| Extreme Weather | 92943-0 | LN | Was the carbon monoxide exposure related to an extreme weather event? | Coded | P | N | Extreme Weather Type (CO) |
| Extreme Weather Type | TBD | N/A | Identify the extreme weather event occurring when the patient was exposed to | Coded | P | Y | Extreme Weather Type (CO) |

Introduction | MMG Column Descriptions | **CO Poisoning Data Elements** | CO Poisoning TS

15

# CO Poisoning MMG Layout with HL7 Columns

| A | B | E | F | G | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Data Element (DE) Name** | **DE Identifier Sent in HL7 Message** | **Data Type** | **CDC Priority** | **May Repeat** | **HL7 Message Context** | **HL7 Data Type** | **HL7 Usage** | **HL7 Cardina lity** | **HL7 Implementation Notes** | **Repeating Group Element** | **Sample Segment** |
| Data Reporting Source | INV1303 | Coded | P | Y | OBX segment with OBX- | CWE | RE | [0..*] | | NO | OBX|nn|CWE|INV1303^Data Reporting Source^N/A||C0814525^Medical |
| Intent of Exposure | 92945-5 | Coded | P | N | OBX segment with OBX-3.1=92945-5 OBX 5 value | CWE | RE | [0..1] | | NO | OBX|nn|CWE|92945-5^Intent of Exposure^LN||361390002^Unintentional^SCT||||||F |
| Fire Related Exposure | TBD | Coded | P | N | | | | | | | |
| Power Outage Event | 3977889006 | Coded | P | N | OBX segment with OBX-3.1=39778900 | CWE | RE | [0..1] | | NO | OBX|nn|CWE|397789006^Power Outage Event^SCT||Y^Yes^HL70136||||||F |
| Extreme Weather | 92943-0 | Coded | P | N | OBX segment with OBX- | CWE | RE | [0..1] | | NO | OBX|nn|CWE|92943-0^Extreme Weather^LN||N^No^HL70136||||||F |
| Extreme Weather | TBD | Coded | P | Y | OBX segment | CWE | RE | [0..*] | | NO | OBX|nn|CWE|TBD^Extreme |

Introduction | MMG Column Descriptions | **CO Poisoning Data Elements** | CO Poisoning TS | ⊕

# CO Poisoning MMG with GenV2 Data Elements

| Data Element (DE) Name | DE Identifier Sent in HL7 Message | DE Code System | Data Element Description | Data Type | CDC Priority | May Repeat | Value Set Name (VADS Hyperlink) | Value Set Code |
|---|---|---|---|---|---|---|---|---|
| Case Disease Imported Code | 77982-7 | LN | Indication of where the disease/condition was likely acquired. | Coded | P | N | Disease Acquired Jurisdiction | PHVS_DiseaseAcquiredJurisdiction_NND |
| Imported Country | INV153 | PHINQUES | If the disease or condition was imported, indicates the country in which the disease was likely acquired. | Coded | P | N | Country | PHVS_Country_ISO_3166-1 |
| Imported State | INV154 | PHINQUES | If the disease or condition was imported, indicates the state in which the disease was likely acquired. | Coded | P | N | State | PHVS_State_FIPS_5-2 |
| Imported City | INV155 | PHINQUES | If the disease or condition was imported, indicates the city in which the disease was likely acquired. | Coded | P | N | City | PHVS_City_USGS_GNIS |
| Imported County | INV156 | PHINQUES | If the disease or condition was imported, contains the county of origin of the | Coded | O | N | County | PHVS_County_FIPS_6-4 |

Introduction | MMG Column Descriptions | **CO Poisoning Data Elements** | CO Poisoning TS | ⊕

# CO Draft MMG Highlights (May Repeat=Y)

## Data Reporting Source

- Hospital (Hospital discharge),
- Emergency room (Emergency department),
- Poison control center,
- Laboratory (Laboratory report),
- Vital statistics (Death certificate),
- Provider report (clinician report),
- Medical examiner report,
- Urgent care,
- Hyperbaric facility,
- Electronic medical record,
- Workers compensation record,
- Unknown,
- Other (     )

## Signs and Symptoms

- Headache,
- Dizziness/vertigo,
- Loss of consciousness,
- Nausea,
- Vomiting,
- Confusion,
- Shortness of breath,
- Chest pain,
- Other (     )

# CO Draft MMG Highlights (Existing Code, YNU or New Code)

**Smoking Status**
**(PHVS_SmokingStatus_CDC)**
- Current some day smoker
- Former smoker
- Never smoker
- Smoker, current status unknown
- Current every day smoker
- Unknown if ever smoked

- **Fire-related Exposure**
  - Yes / No /Unknown
- **Power outage event**
  - Yes/ No /Unknown
- **Extreme weather**
  - Yes/ No /Unknown

**Intent of Exposure**
- Intentional
- Unintentional
- Unknown

# CO Draft MMG Highlights (Text or Numeric Information)

- **Incident Name (Case Outbreak Name in GenV2)**
  (Text)

- **Event Notes**
  (Text)

- **Carboxyhemoglobin Level**
  (Numeric ---999.9 %)

- **Pulse CO-oximetry Measurement**
  (Numeric---999.9%)

# Sample Test Scenarios and Messages will be Available

- https://wwwn.cdc.gov/nndss/case-notification/message-mapping-guides.html, and select "MMGs in Development"
- Included in the same workbook as the MMG

| Data Element (DE) Name | DE Identifier Sent in HL7 | DE Code System | Data Element Description | Data Type | CDC Priority | May Repeat | Value Set Name (VADS Hyperlink) | CO Poisoning Test Message 1 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Case from a poison center (probable). Case had a confirmed lab criteria at the Emergency (confirmed). Died (Death certificate Dx-confirmed). |
| Data Reporting Source | PHC2193 | CDCPHIN | What is the facility reporting the data or the data source for case ascertainment? | Coded | P | Y | Data Reporting Source (CO) | Emergency room, Poison control center, Vital statistics (Death certificate) |
| Poison Control Center Record | 92942-2 | LN | Patient with a poison control record indicating exposure to carbon monoxide. | Coded | P | N | Poison Control Center Record (CO) | Major medical outcome |
| Treatment Site | 93046-1 | LN | If patient has a poison control record, indicate where the treatment was managed. | Coded | P | N | Treatment Site (CO) | Transported to health-care facility |
| Intent of Exposure | 92945-5 | LN | Was the intent of the carbon monoxide exposure self-harm/assault (intentional) or accidental (unintentional)? | Coded | P | N | Intent of Exposure (CO) | Unintentional |

21

# CO Poisoning Sample HL7 Message

| Data Element (DE) Name | DE Identifier Sent in HL7 | DE Code System | Data Element Description | Data Type | CDC Priority | May Repeat | Value Set Name (VADS Hyperlink) | CO Poisoning Test Message 1 |
|---|---|---|---|---|---|---|---|---|
| Generator Location | INV1296 | PHINQUE | If the exposure source is generator, where was it placed while it was running? | Coded | P | N | Generator Location (CO) | PHC2173=Inside in the living space, basement or enclosed porch |
| Generator Distance | INV1297 | PHINQUE | How many feet was the generator placed from the (house/attached | Coded | P | N | Generator Distance (CO) | PHC2168=10 – < 15 feet |
| Carbon Monoxide Alarm Present | INV1293 | PHINQUE | Patient was in a location where a carbon monoxide detector was present. | Coded | P | N | Yes No Unknown (YNU) | N=No |
| Carbon Monoxide Alarm Sounded | INV1294 | PHINQUE | The carbon monoxide detector's alarm sounded. | Coded | P | N | Yes No Unknown (YNU) | N=No |

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MSH|^~\&|SendAppName^2.16.840.1.114222.TBD^ISO|Sending-Facility^2.16.840.1.114222.TBD^ISO|PHINCDS^2.16.840.1.114222.4.3.2.10^ISO|PHIN^2.
NOTF_ORU_v3.0^PHINProfileID^2.16.840.1.114222.4.10.3^ISO~Generic_MMG_V2.0^PHINMsgMapID^2.16.840.1.114222.4.10.4^ISO~Carbon_Monoxide_
PID|1||COPoisoning_TC01^^^SendAppName&2.16.840.1.114222.nnnn&ISO||~^^^^^^S||19490401|M||2106-3^White^CDCREC|^^^42^17350||||eng^
OBR|1||PA1001^SendAppName^2.16.840.1.114222.TBD^ISO|68991-9^Epidemiologic Information^LN|||20190309||||||||PA1001||||20190309|||F||||||
OBX|1|CWE|INV1296^Generator Location^PHINQUESTION||PHC2173^Inside in the living space, basement or enclosed porch^CDCPHINVS|||||||F
OBX|2|CWE|INV1297^Generator Distance^PHINQUESTION||PHC2168^10 - < 15 feet^CDCPHINVS|||||||F
OBX|3|CWE|INV1293^Carbon Monoxide Alarm Present^PHINQUESTION||N^No^HL70136|||||||F
OBX|4|CWE|INV1294^Carbon Monoxide Alarm Sounded^PHINQUESTION||N^No^HL70136|||||||F|
OBX|5|CWE|95875007^Carbon Monoxide Elevated Exposure^SCT||N^No^HL70136|||||||F
```

# Objectives of the External Review and Timeline

# What We Expect From The External Review

- Any critical and important information not included in the current draft MMG?

- Any data elements or value sets that you cannot collect/capture with your current system?

- Any structure/format issues (data type or repeat option)?

- Any potential implementation issues related to the data elements requested?

- Any elements or values that need more clarification?

# COP MMG Timeline

- **7/25/2019**: External review for draft MMG began

- **8/08/2019**: Webinar to present draft MMG for feedback

- **8/22/2019**: External review for draft MMG closes

- **September 2019**: CDC review of feedback and update of MMG

- **October 2019:** Pilot Test-Ready CO Poisoning MMG

# How to submit feedback

- Please provide feedback by 8/22/2019

- To report your feedback, please use the CO Poisoning MMG feedback document: https://wwwn.cdc.gov/nndss/case-notification/message-mapping-guides.html, click "MMGs in Development" tab

- Email feedback to: edx@cdc.gov

- Subject line: "Draft CO Poisoning MMG Feedback"

- Feedback will be reviewed by CDC; outcome of reconciliation available
  - To submit a request for reconciled feedback, please contact edx@cdc.gov, subject line "Request for COP Reconciled Feedback"

# Questions?

Environmental Public Health Tracking
Mi Kyong (Meekie) Shin, Epidemiologist
trackingsupport@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY:  1-888-232-6348    www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

# Tracking Program-CO poisoning related Deaths, 2000-2014, United States



Unknown mechanism or intent
6%

Nonfire_unintentional
18%

Fire unintentional
24%
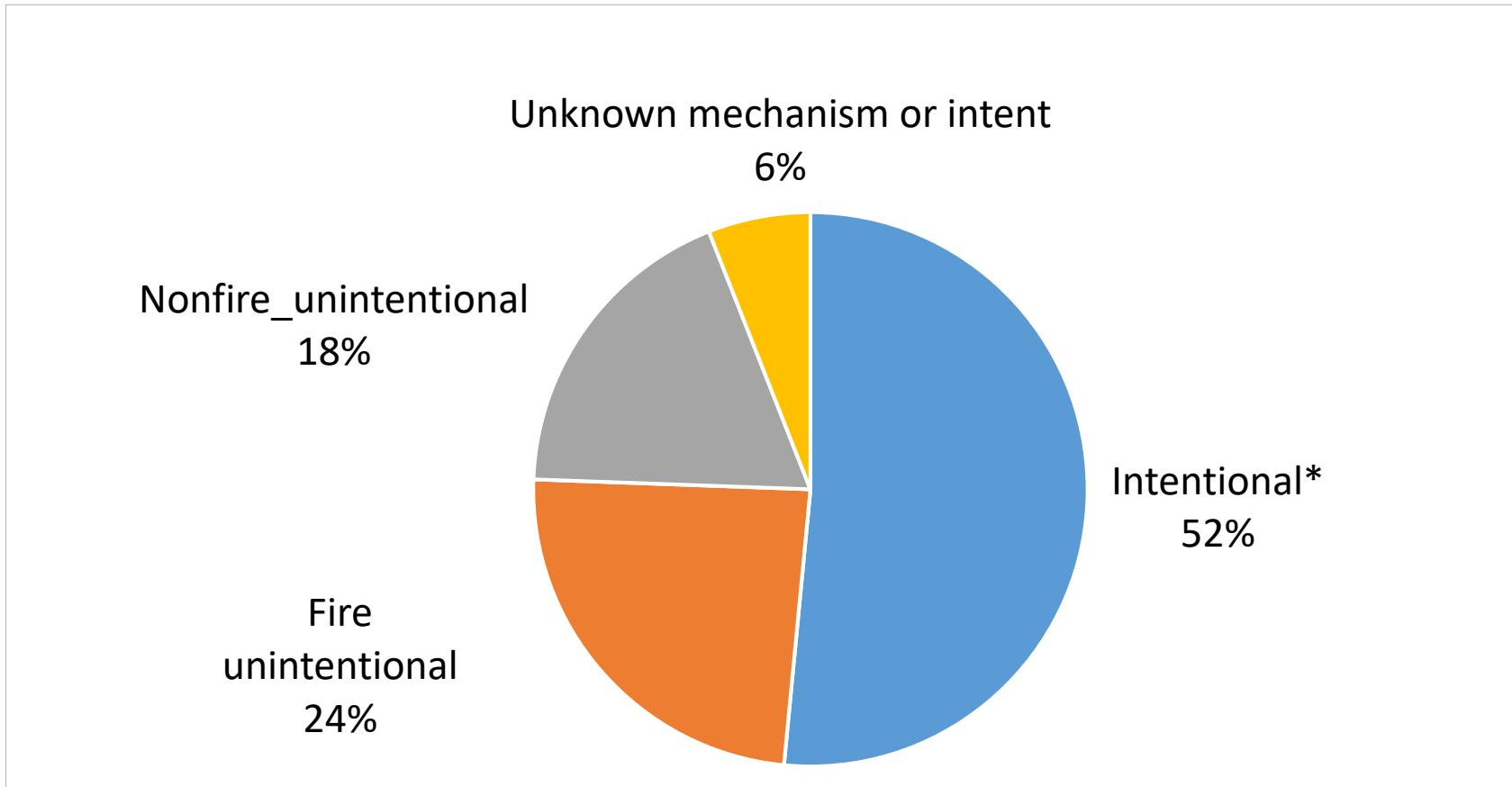
Intentional*
52%

Tracking program, data source: US Death certificates from NCHS

*Intentional: Any underlying or contributing causes (X60-Y09) and legal intervention and operations of war (Y35-Y36):  X60-X84: Intentional self-harm, X85-Y09: Assault, Y35,Y36: Legal intervention and operations of war

# Tracking Program
# CO Poisoning Related Deaths, 2000-2014, United States

| Year | Frequency | Percent |
|------|-----------|---------|
| 2000-04 | 6,399 | 37.6% |
| 2005-09 | 5,852 | 34.4% |
| 2010-14 | 4,759 | 28.0% |

n=17,010



Legend:
- Unknown intent
- Nonfire_unintent
- Fire_unintent

2000-04: Unknown intent 12.88, Nonfire_unintent 34.88, Fire_unintent 52.24
2005-09: Unknown intent 12.1, Nonfire_unintent 39.92, Fire_unintent 47.98
2010-14: Unknown intent 11.83, Nonfire_unintent 40.09, Fire_unintent 48.08

%
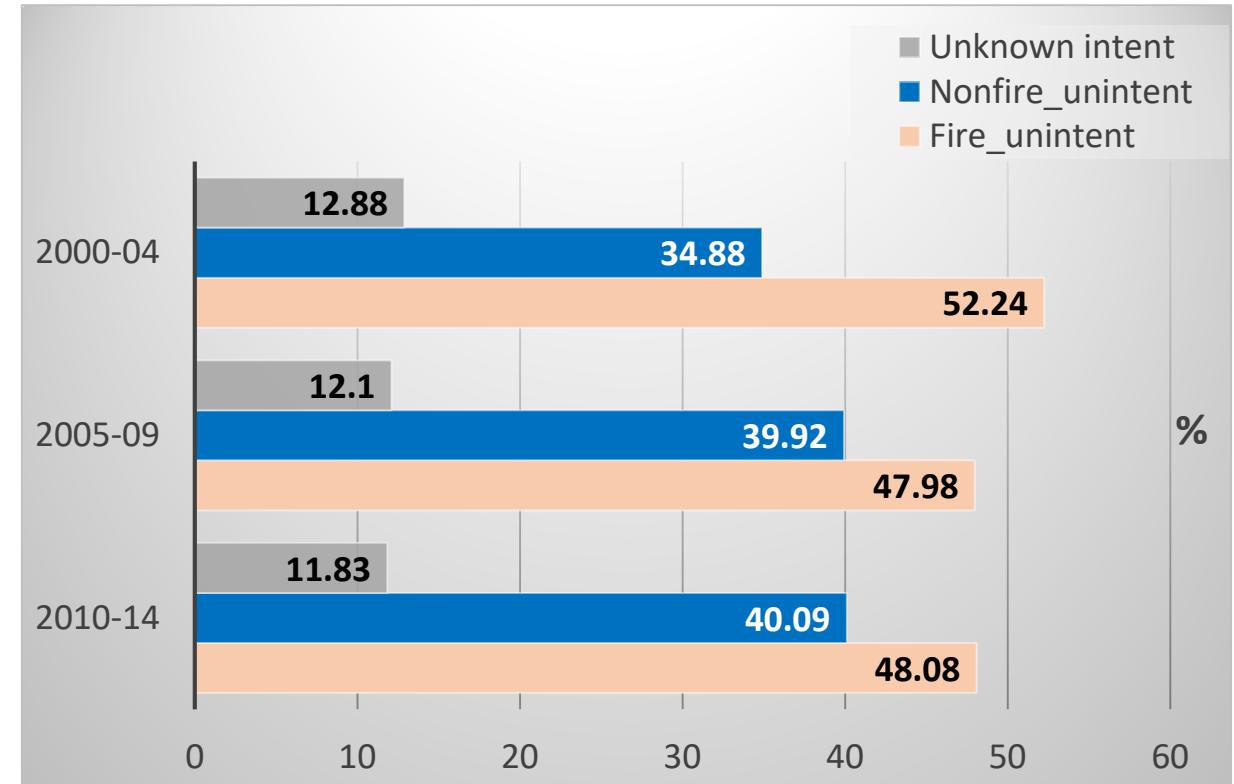
# Tracking program-Age-adjusted Rate of Emergency Department Visits and Hospitalizations for CO Poisoning, 2000-2016
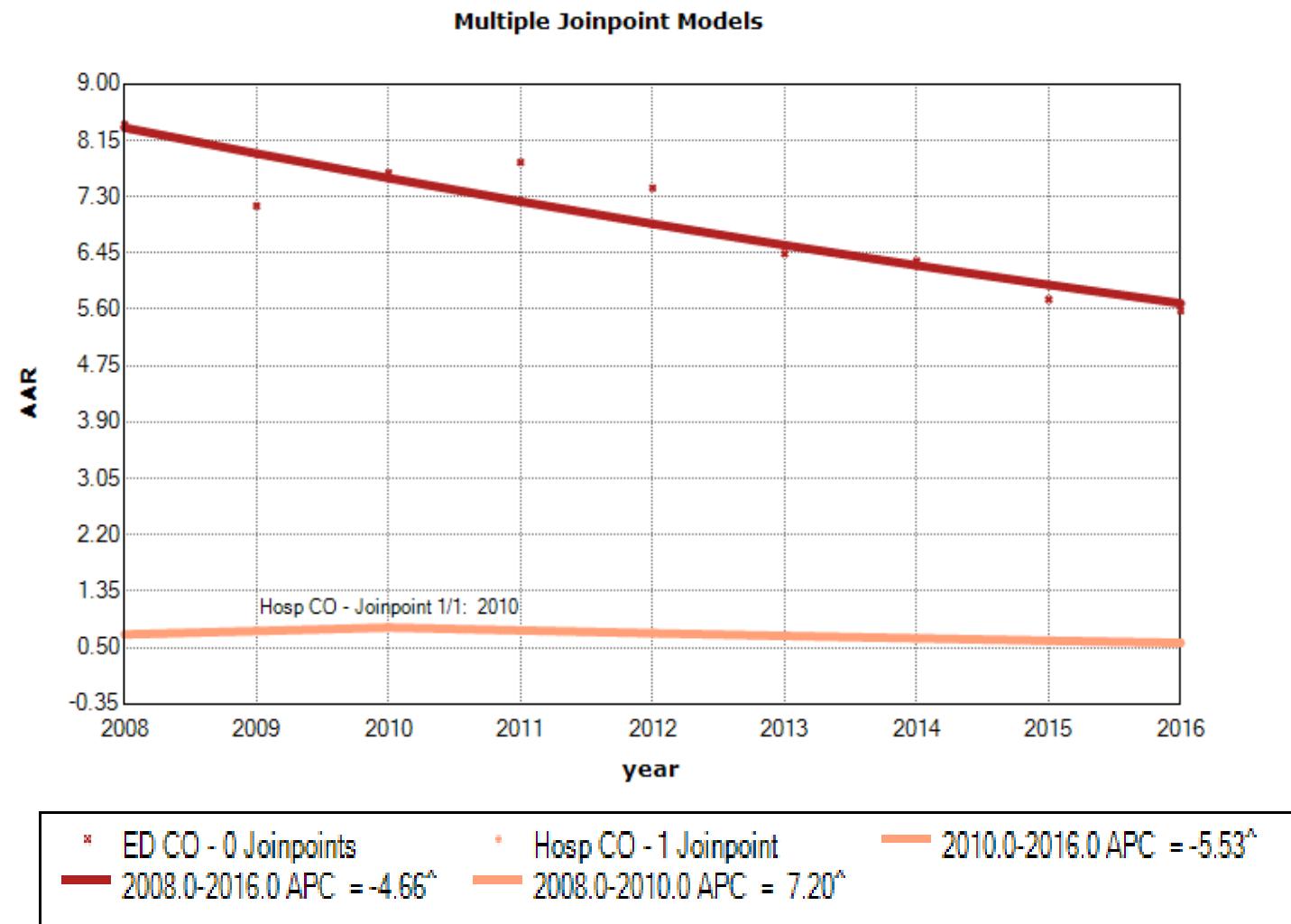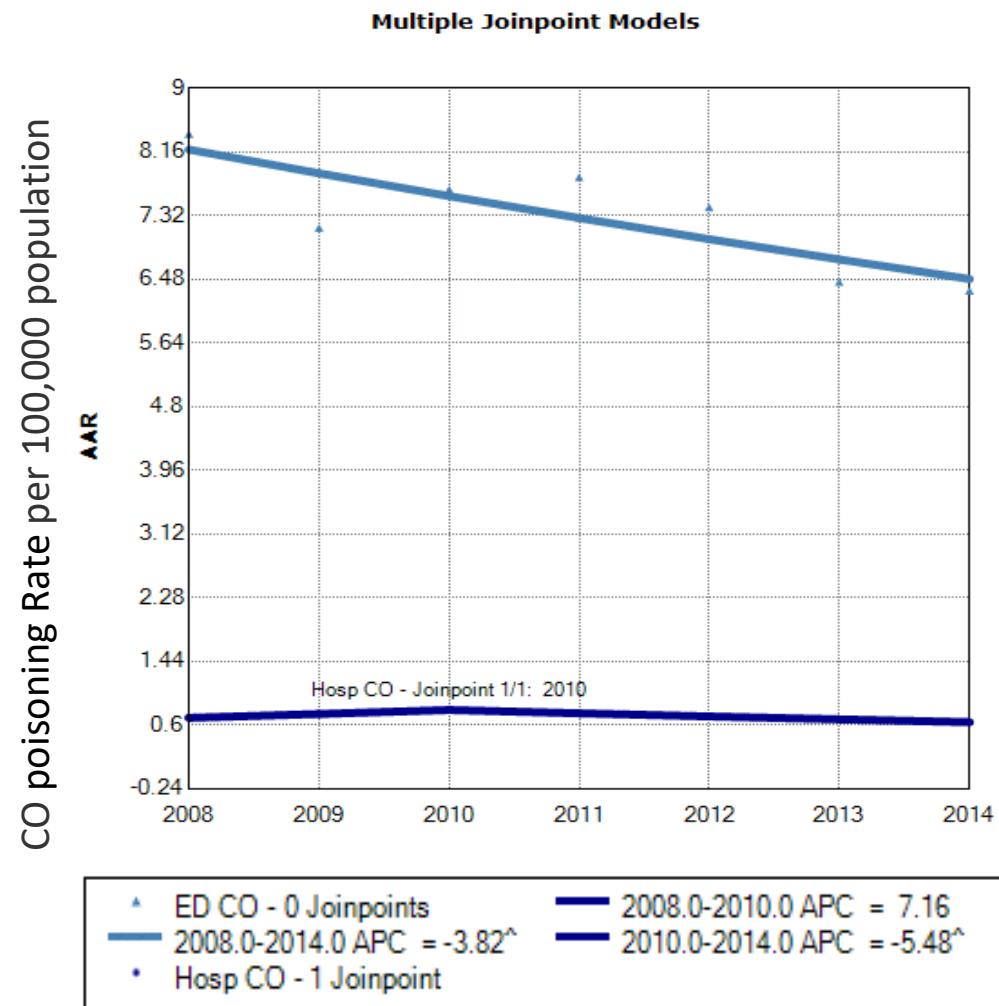


Hospitalization data: AZ, CO, CT, FL, IA, KS, KY, ME, MN, NJ, NM, NY, OR, RI, UT, VT, WA, WI

ED data: AZ, CT, FL, IA, KY, ME, MN, NJ, NY, RI, UT, VT, WI