



HOW BEST TO CERTIFY DEATHS DUE TO SUBSTANCE USE

Adele Lewis, MD
Deputy State Chief Medical Examiner
<https://www.tn.gov/health/section/OSCME>

Purpose of Death Certificate: Not Simply to Confirm Death

- The entries for cause of death, manner of death, how injury occurred, and location of injury are analyzed and assigned ICD-10 code(s)
- These codes are the source of mortality data on local, regional, state, and federal levels and are crucial in surveillance; data are used to assign grant funds, direct prevention efforts, and identify emerging threats

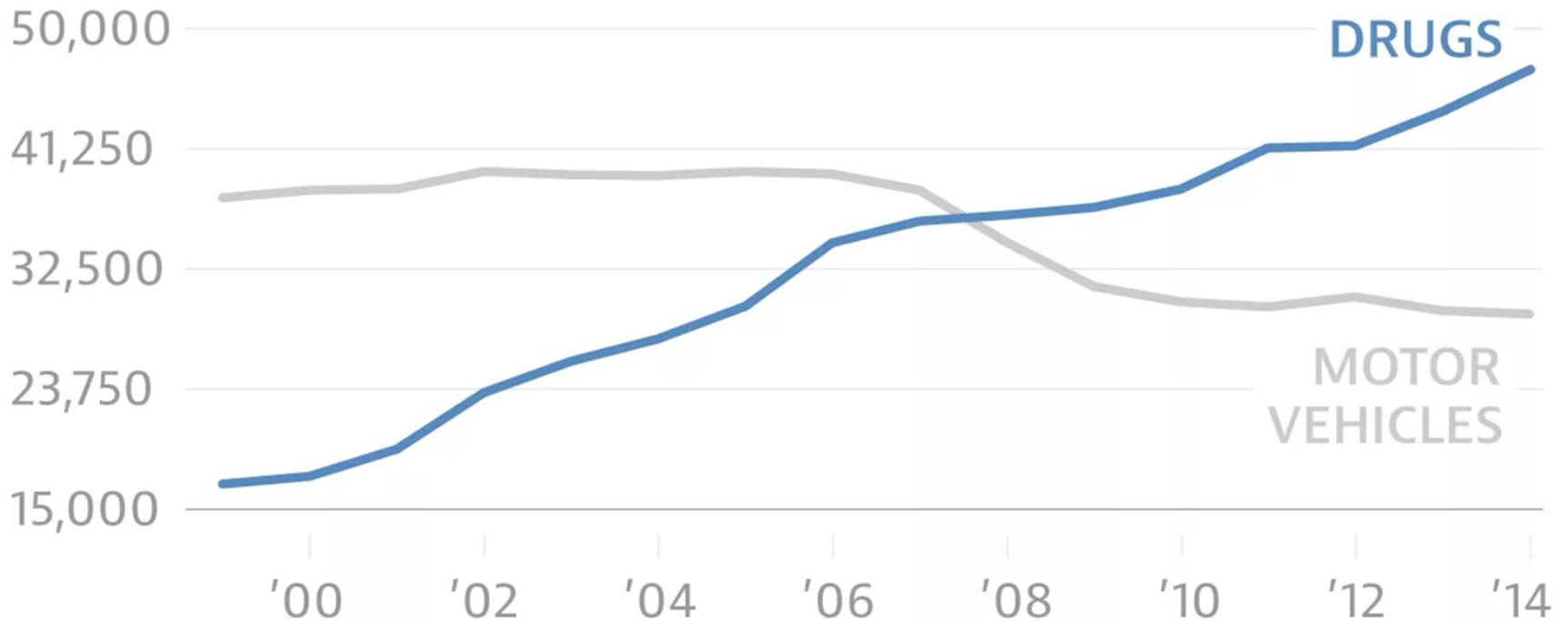
Accuracy and Timeliness in Death Certification

- The death certificate must be completed before final disposition of the body; delay in completing and signing may interfere with funeral arrangements
- Significant implications in death benefits paid to families (for example, workers' compensation claims; double indemnity payments in cases of accidental death)
- The death certificate is the source of information for regional, state, and national mortality data, which in turn is used for funding and directing research and public health efforts

28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.		Approximate interval: Onset to death
IMMEDIATE CAUSE (Final disease or condition resulting in death)	a. _____ Due to (or as a consequence of)	
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST	b. _____ Due to (or as a consequence of):	
	c. _____ Due to (or as a consequence of):	
	d. _____ Due to (or as a consequence of):	
PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.		29a. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No
		29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No
30. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined	31. DID TOBACCO USE CONTRIBUTE TO DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> Probably <input type="checkbox"/> No <input type="checkbox"/> Unknown	32. IF FEMALE: <input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death <input type="checkbox"/> Unknown if pregnant within the past year
33. IF TRANSPORTATION INJURY, SPECIFY: <input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____	34a. DATE OF INJURY (Month, Day, Year)	34b. TIME OF INJURY
	34c. INJURY AT WORK? <input type="checkbox"/> Yes <input type="checkbox"/> No	34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify)
	34e. DESCRIBE HOW INJURY OCCURRED	
	34f. LOCATION OF INJURY (Street and Number, City or Town, State)	



Overdose vs MVA Deaths: US, 2000-2014



Data: CDC

Interpretation of Postmortem Toxicology Can Be Challenging

- Tolerance
 - With prolonged, sustained use comes tolerance
 - Frequently death after hospitalization or incarceration is related to previously tolerant individual using same dose as prior to drug withdrawal
- Drug-drug interactions/synergy
- Postmortem redistribution
- Specimen type/site

Toxicology Testing/Ancillary Studies

- If case not referred to regional forensic center:
- Best specimen for postmortem toxicology testing is blood from femoral artery or vein
 - Subclavian blood may also be used but runs the risk of contamination with heart blood or pleural fluid
 - Many drugs undergo postmortem redistribution, which can falsely elevate levels if blood drawn from heart:
 - Diffuse from areas of high concentration (e.g., liver, stomach) to central vessels and heart

Drugs Implicated in Lethal Overdoses

- Top ten drugs, in order of frequency, involved in lethal overdoses, United States, 2014:

- heroin
- cocaine
- oxycodone
- alprazolam
- fentanyl
- morphine
- methamphetamine
- methadone
- hydrocodone
- diazepam

- Top drug classifications involved in lethal overdoses, Tennessee, 2013-2016:

Overdose Death	2013	2014	2015	2016
All Drug	1,166	1,263	1,451	1,631
Opioid	754	861	1,034	1,186
Prescription Opioids (Natural, semi-synthetic and synthetic)	637	697	848	1,009
Pain Relievers (per CDC Definition, includes methadone)	578	603	689	739
Heroin	63	147	205	260
Fentanyl	53	69	169	294
Methadone	86	71	67	82
Benzodiazepine	371	388	492	573
Opioid and Benzodiazepine	340	352	447	522

Polypharmacy Involved in Roughly Half of All Drug Overdose Deaths

- All drugs which contributed to death should be listed on death certificate for accuracy in coding and monitoring trends in drug use and abuse

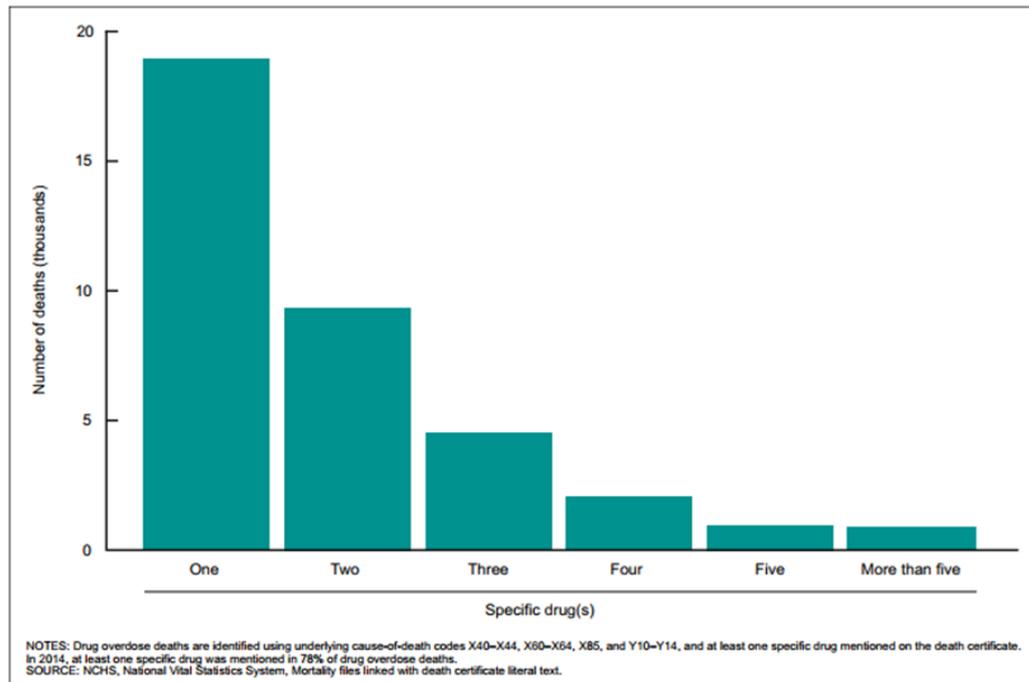


Figure 4. Number of drug overdose deaths, by the number of specific drugs involved: United States, 2014

List All Drugs Contributing to Death: Examples

28. **PART I.** Enter the chain of events (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.

IMMEDIATE CAUSE

(Final disease or condition resulting in death)

Sequentially list conditions, if any, leading to the cause listed on line a. Enter the

UNDERLYING CAUSE

(disease or injury that initiated the events resulting in death) **LAST**

→ a. ACUTE COMBINED DRUG INTOXICATION (HEROIN, DIAZEPAM)
Due to (or as a consequence of)

b. _____
Due to (or as a consequence of):

c. _____
Due to (or as a consequence of):

d. _____

28. **PART I.** Enter the chain of events (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.

IMMEDIATE CAUSE

(Final disease or condition resulting in death)

Sequentially list conditions, if any, leading to the cause listed on line a. Enter the

UNDERLYING CAUSE

(disease or injury that initiated the events resulting in death) **LAST**

→ a. MULTIDRUG TOXICITY (TRAMADOL, COCAINE, GABAPENTIN)
Due to (or as a consequence of)

b. _____
Due to (or as a consequence of):

c. _____
Due to (or as a consequence of):

d. _____

“Presumed” or “Probable”

- It is acceptable to use “presumed” or “probable” based on history, scene findings, urine drug screen, etc. when more definitive evidence is lacking and cannot be obtained:

28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.	
IMMEDIATE CAUSE (Final disease or condition resulting in death)	a. <u>PRESUMED COCAINE INTOXICATION</u> Due to (or as a consequence of)
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST	b. _____ Due to (or as a consequence of):
	c. _____ Due to (or as a consequence of):
	d. _____

Manner of Death: General Principles

- The most appropriate manner of death for drug overdose deaths is usually “Accident”; deaths due to acute drug intoxications are never “Natural”

Manner of Death: Drug-Related Deaths

- The majority of drug overdose deaths are best classified as “Accident”, as the fatal outcome is unintentional
 - If the lethal drug was administered by another with the consent of the deceased, a classification of “Accident” should not preclude prosecution
 - If the lethal drug was administered by another with the intent to cause harm to the decedent, the manner of death is best listed as “Homicide”
- These principles apply to an acute overdose of a given substance, not to an adverse effect of medication or to diseases caused by chronic, long-term use

Manner of Death: Accident

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		Approximate interval: Onset to death	
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	a. <u>Acute combined drug toxicity (oxycodone, butalbital, chlordiazepoxide)</u>		
	Due to (or as a consequence of)		
	b. _____		
	Due to (or as a consequence of):		
c. _____			
Due to (or as a consequence of):			
d. _____			
<p>PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>30. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>	
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year) <u>April 3, 2018</u></p>	<p>34b. TIME OF INJURY <u>7:45 am</u></p>	
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) <u>Office</u></p>	
	<p>34e. DESCRIBE HOW INJURY OCCURRED <u>Took too many drugs</u></p>		<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State) <u>123 River Road, Decatur, TN</u></p>

Manner of Death: Suicide

- Classifying a death as “Suicide” requires a burden of proof greater than “more likely than not”; overdose deaths categorized as suicides should have a history of suicidal threats or ideation, or evidence of intent to cause self-harm, such as a suicide note found at the scene

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IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. <u>ACETAMINOPHEN TOXICITY</u> Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST	Due to (or as a consequence of)	
	b. _____ Due to (or as a consequence of):	
	c. _____ Due to (or as a consequence of):	
	d. _____ Due to (or as a consequence of):	
PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.		29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
		29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
30. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input checked="" type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined	31. DID TOBACCO USE CONTRIBUTE TO DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown	32. IF FEMALE: <input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death
33. IF TRANSPORTATION INJURY, SPECIFY: <input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____	34a. DATE OF INJURY (Month, Day, Year) <u>March 23, 2018</u>	34b. TIME OF INJURY <u>3:20 am</u>
	34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) <u>RESIDENCE</u>
	34e. DESCRIBE HOW INJURY OCCURRED <u>INTENTIONALLY OVERDOSED ON PILLS</u>	34f. LOCATION OF INJURY (Street and Number, City or Town, State) <u>123 MAIN STREET GALLATIN TN</u>

Manner of Death: Natural

- Drug-related deaths should only be classified as “Natural” if they:
 - Are the result of long-term use, abuse, or dependence, and no single incident can be identified as leading directly to death; OR
 - Example: cocaine-related cardiomyopathy; endocarditis due to intravenous drug abuse
 - Are a known adverse effect of a drug being administered for a natural process; AND
 - Examples: amiodarone-induced pulmonary toxicity; Stevens-Johnson syndrome related to sulfonamide administration
 - Toxicology testing does not show levels of drugs or alcohol sufficient to account for death

Manner of Death: Natural

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		Approximate interval: Onset to death	
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	a. <u>CIRRHOSIS</u>		
	Due to (or as a consequence of)		
	b. <u>CHRONIC ETHANOLISM</u>		
	Due to (or as a consequence of):		
c. _____			
Due to (or as a consequence of):			
d. _____			
<p>PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in PART I.</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>30. MANNER OF DEATH</p> <p><input checked="" type="checkbox"/> Natural <input type="checkbox"/> Homicide</p> <p><input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation</p> <p><input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably</p> <p><input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death</p> <p><input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year</p> <p><input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>	
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator</p> <p><input type="checkbox"/> Passenger</p> <p><input type="checkbox"/> Pedestrian</p> <p><input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year)</p>	<p>34b. TIME OF INJURY</p>	
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify)</p>	
	<p>34e. DESCRIBE HOW INJURY OCCURRED</p>		<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State)</p>

How Injury Occurred: Examples

- If the route of administration is known, include this information on the death certificate:
 - Inhaled cocaine
 - Injected fentanyl
 - Took morphine pills
 - Inhaled crushed oxycodone tablets
- If the route of administration is not clear, broader language should be used:
 - Used heroin
 - Oxymorphone toxicity
 - Diazepam and tramadol overdose

How Injury Occurred

- “Use”, “abuse”, and “dependence” will be coded differently

34e. DESCRIBE HOW INJURY OCCURRED

Used cocaine

34e. DESCRIBE HOW INJURY OCCURRED

Acute and chronic heroin abuse

34e. DESCRIBE HOW INJURY OCCURRED

Benzodiazepine dependence

ICD-10 Code will Incorporate Specific Drugs and Intent

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		<p>Approximate interval: Onset to death</p>	
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	<p>a. <u>Acute combined drug toxicity (oxycodone, oxymorphone, temazepam)</u> Due to (or as a consequence of)</p>		
	<p>b. _____ Due to (or as a consequence of):</p>		
	<p>c. _____ Due to (or as a consequence of):</p>		
	<p>d. _____ Due to (or as a consequence of):</p>		
<p>PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.</p> <p>History of polysubstance abuse _____</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>30. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>	
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year) December 4, 2018</p>	<p>34b. TIME OF INJURY 4:58 pm</p>	
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) Farm</p>	
	<p>34e. DESCRIBE HOW INJURY OCCURRED Crushed and inhaled pills</p>		<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State) 123 Maple Street, Union City, TN</p>

Scenario 1

- 35 year old found dead at home
- Multiple pill and whisky bottles present
- Toxicology testing:

<u>Compound</u>	<u>Result</u>	<u>Units</u>	<u>Matrix Source</u>
Ethanol	56	mg/dL	Femoral Blood
Blood Alcohol Concentration (BAC)	0.056	g/100 mL	Femoral Blood
Diazepam	60	ng/mL	Femoral Blood
Nordiazepam	150	ng/mL	Femoral Blood
Oxycodone - Free	340	ng/mL	Femoral Blood
Oxymorphone - Free	28	ng/mL	Femoral Blood

- What is cause of death? What is the manner of death? How did the injury occur?

Scenario 1: Death Certificate

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		<p>Approximate interval: Onset to death</p>	
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	a. <u>Acute intoxication (ethanol, diazepam, oxycodone, oxymorphone)</u>		
	Due to (or as a consequence of)		
	b. _____		
	Due to (or as a consequence of):		
c. _____			
Due to (or as a consequence of):			
d. _____			
<p>PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
		<p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>30. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>	
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year) November 5, 2018</p>	<p>34b. TIME OF INJURY 9:21 am</p>	
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) Residence</p>	
	<p>34e. DESCRIBE HOW INJURY OCCURRED Took pills and drank alcohol</p>		<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State) 123 Elm Street, Celina, TN</p>

Scenario 2

- 29 year old with history of polysubstance abuse found dead at home with a needle and syringe and burnt spoon nearby
- Initial toxicology:

<u>Compound</u>	<u>Result</u>	<u>Units</u>	<u>Matrix Source</u>
Codeine - Free	10	ng/mL	Femoral Blood
Morphine - Free	170	ng/mL	Femoral Blood

Scenario 2, continued

- Additional toxicology testing performed on vitreous humor

Positive Findings:

<u>Compound</u>	<u>Result</u>	<u>Units</u>	<u>Matrix Source</u>
Codeine - Free	10	ng/mL	Femoral Blood
Morphine - Free	170	ng/mL	Femoral Blood
6-MAM - Free	15	ng/mL	Vitreous Fluid

- Heroin is rapidly metabolized to 6-monoacetylmorphine (6-MAM) and morphine; codeine is a frequent contaminant of illicit heroin
- 6-MAM is pathognomonic for heroin use and is more easily detected in urine and vitreous humor than in blood
- What is cause of death? What is the manner of death? How did the injury occur?

Scenario 2: Death Certificate

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		<p>Approximate interval: Onset to death</p>
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death)</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	<p>a. HEROIN OVERDOSE</p> <p>Due to (or as a consequence of)</p>	
	<p>b.</p> <p>Due to (or as a consequence of):</p>	
	<p>c.</p> <p>Due to (or as a consequence of):</p>	
	<p>d.</p> <p>Due to (or as a consequence of):</p>	
<p>PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
		<p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>30. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year) March 23, 2018</p>	<p>34b. TIME OF INJURY 3:20 am</p>
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) RESIDENCE</p>
	<p>34e. DESCRIBE HOW INJURY OCCURRED INJECTED HEROIN</p>	<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State) 123 MAIN STREET GALLATIN TN</p>

Scenario 3

- Otherwise healthy 17 year-old found unresponsive; friends reported that they were “partying” and heard decedent snoring loudly
- Emergency department urine drug screen positive for opiates and benzodiazepines
- Pronounced brain dead after 8-day ICU stay; admission blood specimens was discarded without further testing
- What is cause of death? What is the manner of death? How did the injury occur?

Scenario 3: Death Certificate

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		<p>Approximate interval: Onset to death</p>		
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	<p>a. <u>PROBABLE OPIATE AND BENZODIAZEPINE TOXICITY</u> Due to (or as a consequence of)</p> <p>b. _____ Due to (or as a consequence of):</p> <p>c. _____ Due to (or as a consequence of):</p> <p>d. _____ Due to (or as a consequence of):</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>		
<p>PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>		
<p>30. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>		
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year) June 3, 2018</p>	<p>34b. TIME OF INJURY 3:35 pm</p>	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) RESIDENCE</p>
<p>34e. DESCRIBE HOW INJURY OCCURRED USED DRUGS</p>			<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State) 123 OAK AVENUE, SPARTA, TN</p>	

Scenario 4

- 27 year old former heroin user found dead in hotel
- Autopsy reveals multiple vegetations on tricuspid valve leaflets; blood culture positive for *Staphylococcus aureus*
- Toxicology testing negative
- What is cause of death? What is the manner of death? How did the injury occur?

Scenario 4: Death Certificate

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		Approximate interval: Onset to death	
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	a. <u>Infectious endocarditis (Staphylococcus aureus)</u> Due to (or as a consequence of)		
	b. <u>Intravenous substance abuse, remote</u> Due to (or as a consequence of):		
	c. _____ Due to (or as a consequence of):		
	d. _____ Due to (or as a consequence of):		
<p>PART II. <u>Other significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I.</p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>30. MANNER OF DEATH</p> <p><input checked="" type="checkbox"/> Natural <input type="checkbox"/> Homicide <input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>	
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year)</p>	<p>34b. TIME OF INJURY</p>	
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify)</p>	
	<p>34e. DESCRIBE HOW INJURY OCCURRED</p>		<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State)</p>

- By definition, there is no injury in natural deaths; leave injury details blank

Scenario 5

- 27 year old former heroin user found dead in hotel
- Autopsy reveals multiple vegetations on tricuspid valve leaflets; blood culture positive for *Staphylococcus aureus*
- Toxicology:

Positive Findings:

<u>Compound</u>	<u>Result</u>	<u>Units</u>	<u>Matrix Source</u>
Ethanol	163	mg/dL	Femoral Blood
Blood Alcohol Concentration (BAC)	0.163	g/100 mL	Femoral Blood
Morphine - Free	100	ng/mL	Femoral Blood
7-Amino Clonazepam	11	ng/mL	Femoral Blood
Alprazolam	29	ng/mL	Femoral Blood
Ethanol	170	mg/dL	Vitreous Fluid
Morphine - Free	16	ng/mL	Vitreous Fluid
6-MAM - Free	45	ng/mL	Vitreous Fluid

- What is cause of death? What is the manner of death? How did the injury occur?

Scenario 5: Death Certificate

- Death cannot be classified as “Natural” due to presence of significant levels of heroin, ethanol, alprazolam, and active metabolite of clonazepam

<p>28. PART I. Enter the <u>chain of events</u> (diseases, injuries, or complications) that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. Enter only one cause on a line.</p>		Approximate interval: Onset to death	
<p>IMMEDIATE CAUSE (Final disease or condition resulting in death) →</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST</p>	a. <u>Acute multidrug intoxication (heroin, ethanol, alprazolam, clonazepam)</u>		
	Due to (or as a consequence of)		
	b. _____		
	Due to (or as a consequence of):		
c. _____			
Due to (or as a consequence of):			
d. _____			
<p>PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in PART I.</p> <p><u>Infective endocarditis (Staphylococcus aureus) due to chronic IV drug abuse</u></p>		<p>29a. WAS AN AUTOPSY PERFORMED? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>29b. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>30. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	<p>31. DID TOBACCO USE CONTRIBUTE TO DEATH?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Probably <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>	<p>32. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Unknown if pregnant within the past year <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p>	
<p>33. IF TRANSPORTATION INJURY, SPECIFY:</p> <p><input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify) _____</p>	<p>34a. DATE OF INJURY (Month, Day, Year) <u>April 3, 2018</u></p>	<p>34b. TIME OF INJURY <u>7:45 am</u></p>	
	<p>34c. INJURY AT WORK? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>	<p>34d. PLACE OF INJURY –at home, farm, street, factory, office, building, etc. (Specify) <u>Hotel room</u></p>	
	<p>34e. DESCRIBE HOW INJURY OCCURRED <u>Acute and chronic IV drug abuse</u></p>		<p>34f. LOCATION OF INJURY (Street and Number, City or Town, State) <u>123 Main Street, Celina TN</u></p>

References

- Drugs most frequently involved in drug overdose deaths: United States, 2010-2014. Accessed at:
https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_10.pdf
- National Association of Medical Examiners: A guide for manner of death classification. Accessed at:
<https://netforum.avectra.com/public/temp/ClientImages/NAME/4bd6187f-d329-4948-84dd-3d6fe6b48f4d.pdf>



THANK YOU