



# Guidance for Certification of Deaths in the Event of a Natural, Human-Induced, or Chemical/Radiological Disaster

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# Vital Statistics Reporting Guidance



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## A Reference Guide for Certification of Deaths in the Event of a Natural, Human-induced, or Chemical/Radiological Disaster

### Executive Summary

Death certificates are the fundamental and primary source of official mortality statistics in the United States. Disaster-

Federal disaster declarations and other notifications, such as local National Weather Service extreme weather warnings or watches and emergency management alerts, can be used to determine whether a disaster has occurred in a jurisdiction. Once a disaster is recognized, determining whether a death is disaster-

- <https://www.cdc.gov/nchs/data/nvss/vsrg/vsrg01.pdf>

# Overview

- Importance of Disaster Mortality Data
- Types of Disaster-related Deaths
- Determining a Disaster-related Death
- Completing the Death Certificate for Disaster-related Deaths
- Extra Practice Exercises

# Intended Audience

## Primary

- Medicolegal Death Investigators
- Medical Examiners
- Coroners
- Physicians
- Nurses
- Justices of the Peace

## Secondary

- Public health professionals
- Emergency management
- Vital Registrars
- Medical students

# Importance of Disaster Mortality Data

# Disasters

*A serious disruption of the functioning of society, causing widespread human, material, or environmental losses that **exceed the local capacity** to respond and **calls for external assistance**.*

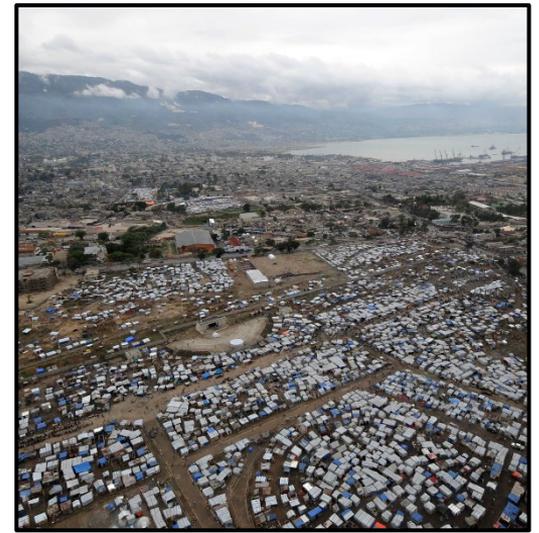
Natural Hazards



Human-induced



Complex Emergencies



\*Photos by iStock

# Disaster Examples

- Natural hazards:
  - incidents such as hurricanes, forest fires, floods, tornados, earthquakes, landslides, ice storms, and volcanic eruptions.
- Human-induced disasters:
  - result from human actions or technological failures such as industrial explosions or chemical release (e.g., the Elk River Chemical spill in West Virginia in 2014), chemical or biological contamination of the environment such as oil spills like Deepwater Horizon, transportation incidents, and disasters like the Flint Water Crisis.
- Complex emergencies:
  - emergencies that can be slow to take effect and can extend over a long period such as war, drought, and famine.

# The Role of Death Certificates

- Provide information on the different ways disasters can lead to death
- Provide critical, actionable data during response and recovery activities
- Help develop future prevention strategies to reduce morbidity and mortality from disasters
- Needed by families recovering from a disaster



**Urgent**



**Response**



**Non-Urgent**



**Research**

# Disaster-related Mortality Surveillance

Primary data source: death certificates

- Disaster mortality surveillance uses death certificate data to
  - Assess the scope of a disaster incident
  - Identify common risk factors for disaster-related deaths
  - Develop evidence-based public health interventions
- Challenges from inconsistent reporting of disaster-related death
  - Difficult to generate reliable and accurate mortality statistics
    - Difficult to identify the most frequent causes of death associated with disaster incident
    - Difficult to estimate the disaster-related death toll

# How do we identify disaster-related deaths accurately?



# Discrepancies in Reporting Disaster-related Deaths by Different Sources

Disaster	Red Cross	FEMA (Approved Funeral Expenses)	NOAA- NWS Storm Data	Other Agency (EOC, ME)*	Vital Stats (Search w/o names)
Hurricane Harvey, TX (2017)	75	70	60	94	69
Hurricane Sandy, NJ (2012)	34	61	12	75	24
April 27 Tornado, GA (2011)	15	9	15	15	6
Hurricane Ike, TX (2008)	38	104	20	74	4

\* EOC = Emergency Operations Center and ME = Medical Examiners Office

# Potential Reasons for Discrepancies in Reporting Disaster-related Deaths

- Delays in reporting death data
- Inconsistent reporting
- Duplicate reporting
- Incomplete information on the death certificate
- Inaccurate coding of death records
- Lack of sufficient death scene investigation information to attribute death to the disaster

# Types of Disaster-related Deaths

# Direct and Indirect Disaster-related Deaths

- **Directly-related disaster death**
  - Caused by the forces of the disaster (e.g., strong wind) or direct consequences of these forces (e.g., structural collapse, flying debris, or radiation exposure)
- **Indirectly-related disaster death**
  - Disaster led to unsafe or unhealthy conditions (e.g., hazardous roads) or a loss or disruption of usual services (e.g., power outage) that contributed to the death

# “But for” Principle

“But for the [disaster], would they have died when they did?”

# Common Causes of Directly-related Disaster Deaths\*

- Fire or smoke inhalation
- Burns
- Crushing
- Drowning
- Electrocution
- Falls
- Hyperthermia (heat)
- Hypothermia (cold)
- Radiation or chemical poisoning
- Suffocation
- Traumatic injury
- Blunt-force trauma
- Penetrating injury

\*Not an exhaustive list

# Common Circumstances Leading to Indirectly-related Disaster Deaths\*

- Loss/disruption of public utilities
- Loss/disruption of transportation-related services
- Loss/disruption of usual access to medical or mental healthcare
- Preparation for disaster
- Social disruption, including riots or anarchy
- Return to unsafe, unhealthy structures or environment
- Use of temporary sheltering or provisions; displacement
- Acute exacerbation of chronic condition(s)
- Cleanup after disaster
- Escaping or fleeing the disaster
- Evacuation
- Exposure to industrial or chemical hazards
- Psychosocial stress or anxiety

\*Not an exhaustive list

# Determining a Disaster-related Death

# Discrepancies Among Different States: Designation of Deaths as being Related to a Disaster



- An 86-year-old man with lung cancer in State #1
- Loss of electricity due to the hurricane
- Unable to use supplemental home oxygen
- Put on partially functioning ventilator in a hospital
- Cause of death: Lung cancer
- No mention of relation of death to hurricane



- 67-year-old woman with emphysema in State #2
- Loss of electricity due to hurricane
- Unable to use supplemental home oxygen
- Cause of death: Complications of emphysema
- Relation of death to hurricane documented

# Determination of Disaster-related Deaths Flowchart

- National Weather Service
- Emergency management official warnings or watches
- Official alerts (e.g., state of emergency, FEMA declaration)

**Step 1:** Consider whether the death occurred during a disaster.

**Step 2:** If yes to Step 1, explore whether the death was directly or indirectly related to the disaster. Apply the evidence, including the death scene investigation, autopsy, and laboratory findings.

- Traumatic injury
- Burn or smoke inhalation
- Chemical or toxic exposure
- Drowning
- Electrocution
- Hyperthermia or hypothermia
- Radiation effects
- Suffocation
- Evacuation
- Loss or disruption of health, utilities, or transportation
- Preparation for disaster
- Repair or cleanup activities
- Returning to unsafe or unhealthy environments or structures

This can be done in Part I, Part II, or in the Describe How Injury Occurred field (e.g., Hurricane Sandy, Joplin Tornado)

**Step 3:** If yes to Step 2, record the disaster type and name and circumstance of death on the death certificate

**Physicians:** Report all suspected non-natural deaths, including disaster-related deaths, to Medical Examiners, Coroners, and Justices of the Peace and contact vital statistics

# Key Questions for Disaster-related Consideration

- *Was the death caused by the actual forces of the disaster (e.g., wind, rain, flood, earthquake, or blast wave) or by the direct consequences of these forces (e.g., structural collapse, chemical spill, or flying debris)?*
  - If so, this is a **directly-related** disaster death
- *Did the forces of the disaster lead to unsafe or unhealthy conditions that caused a loss or disruption of usual services (e.g., utilities, transportation, environmental protection, medical care, police/fire) AND did these losses or disruption contribute to the death?*
  - If so, this is an **indirectly-related** disaster death
- *Did the forces of the disaster lead to temporary or permanent displacement, property damage, or other personal loss or stress AND did these losses or disruptions contribute to the death?*
  - If so, this is an **indirectly-related** disaster death

# Disaster-related Deaths

- Disaster-related deaths may occur
  - Before the incident
  - During the incident
  - Immediately after the incident
  - Months or years after the incident
- Fatal **occupation-related** injuries
  - Occur during the course of providing services
  - Need to be documented on the death certificate

# Disaster-relatedness of Poisonings and Natural Deaths

- Chemical poisoning deaths can be disaster-related:
  - Carbon monoxide poisoning associated with generator use during power outage
  - Exposure to chlorine gas released from hurricane-damaged storage tanks during repairs
- Natural deaths can also be disaster-related:
  - Exacerbated chronic conditions
    - Asthma-related deaths associated with wildfires
  - Diabetic ketoacidosis from lack of insulin
  - Cardiovascular incidents associated with hurricanes

# Examples of Indirectly-related Disaster Deaths

- An elderly person who has a heart attack after evacuating to a shelter during a hurricane
  - A death resulting from a car crash that occurred while evacuating a storm
  - A person who dies after not receiving dialysis for several days because of power outages after a hurricane
- ❖ If unable to determine whether a death is disaster-related, but it's likely or probable that it might be, then still document the disaster type and name and the circumstance of death on the death certificate.

# Completing the Death Certificate for Disaster-related Deaths

# Who Should Certify Disaster-related Deaths?

- Medical examiners/coroners/justices of the peace (ME/C/JP):
  - Deaths directly related to disasters
  - Deaths indirectly related to disasters and due to injuries, poisonings, and complications thereof
- Physicians
  - Deaths that are indirectly-related to disasters and due to natural causes
    - ❖ Sudden or unexpected death may need to be referred to the ME/C.
    - ❖ When in doubt, consult the ME/C

## Filling out Part I

- Cause of death **disease(s)** or **conditions(s)** reported as precisely as possible
  - Immediate cause (final disease or condition resulting in death) listed on line “a”
  - Sequentially list conditions leading to the immediate cause of death
  - Underlying cause (disease or injury that initiated the incidents resulting in death) on the **last line**
- Report one incident on each line even if incidents occurred simultaneously
- The disaster type and name can be included in Part I
  - “Condition” can be circumstance of death and disaster name and type

# Filling out Part I

## CAUSE OF DEATH (See instructions and examples)

32. **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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

IMMEDIATE CAUSE (Final disease or condition resulting in death) →

a. **Asphyxia**

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. **Smoke inhalation from Woolsey Wildfire**

Due to (or as a consequence of):

c.

Due to (or as a consequence of):

d.

**PART II.** Enter other significant conditions contributing to death but not resulting in the underlying cause given in Part I.

**Asthma**

WAS AN AUTOPSY PERFORMED?

Yes  No

WERE AUTOPSY FINDINGS COMPLETE THE CAUSE OF DEATH?

Yes  No

H

## Filling out Part II

- Include other significant **conditions** or incidents contributing to death but not resulting in the underlying cause.
  - Contributing conditions do not have to be a disease.
- Other conditions include clinical and non-clinical information.
- Disaster type, name, and circumstance can be included in Part II.

# Filling out Part II

CAUSE OF DEATH (See instructions and examples)		Approximate interval: Onset to death
32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.		
IMMEDIATE CAUSE (Final disease or condition resulting in death) →	a. <b>Right parietal epidural hematoma</b> Due to (or as a consequence of):	
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b>	b. <b>Right parietal skull fracture</b> Due to (or as a consequence of):	
	c. <b>Blunt impact to head</b> Due to (or as a consequence of):	
	d. _____ Due to (or as a consequence of):	
PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I		33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Moore tornado</b>		34. WERE AUTOPSY FINDINGS AVAILABLE TO CORROBORATE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No
35. DID THE DECEASED SUFFER FROM ANY OF THE FOLLOWING CONDITIONS? <input type="checkbox"/> Yes <input type="checkbox"/> Partially <input type="checkbox"/> No <input type="checkbox"/> Unknown	36. IF FEELING OF DIZZINESS, LIGHT-HEADEDNESS, OR OTHER SYMPTOMS PREVIOUS TO THE ONSET OF THE INJURY, WERE THEY: <input type="checkbox"/> Present <input type="checkbox"/> Absent <input type="checkbox"/> Unknown	37. MANNER OF DEATH <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
38. DEGREE OF INJURY (Mild, Moderate, Severe, Fatal)	39. TIME OF INJURY	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) <b>Home</b>
42. LOCATION OF INJURY (Street, Highway, etc.)	43. DESCRIBE HOW INJURY OCCURRED: <b>Attempt to escape the Moore tornado, fell down 15 wooden stairs in home</b>	44. IF THE DECEASED WAS IN A VEHICLE, TYPE OF VEHICLE AND TYPE OF OCCUPANCY: <input type="checkbox"/> Driver <input type="checkbox"/> Passenger <input type="checkbox"/> Other

# Filling out Part II – Natural Death Example 1

## CAUSE OF DEATH (See instructions and examples)

32. **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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

IMMEDIATE CAUSE (Final disease or condition -----> resulting in death)

a. **Chronic kidney failure**

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. **Type II Diabetes**

Due to (or as a consequence of):

c. \_\_\_\_\_

Due to (or as a consequence of):

d. \_\_\_\_\_

Approximate interval:  
Onset to death

**PART II.** Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

**Unable to receive dialysis for 6 days due to Hurricane Maria related power outage at local treatment center.**

TEST PERFORMED?

No

DOES ANY FINDINGS AVAILABLE TO

CAUSE OF DEATH?  Yes  No

## 37. MANNER OF DEATH

Natural  Homicide

Accident  Pending Investigation

Suicide  Could not be determined

# Filling out Part II – Natural Death Example 2

## CAUSE OF DEATH (See instructions and examples)

32. **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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

IMMEDIATE CAUSE (Final disease or condition resulting in death) ----->

a. **Myocardial Infarction**

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. **Atherosclerosis**

Due to (or as a consequence of):

c.

Due to (or as a consequence of):

d.

Approximate interval:  
Onset to death

**PART II.** Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

**EMS unable to respond to 911 call due to flooded roads after Hurricane Matthew**

TEST PERFORMED?

No

WHY FINDINGS AVAILABLE TO

CAUSE OF DEATH?  Yes  No

## 37. MANNER OF DEATH

Natural

Homicide

Accident

Pending Investigation

Suicide

Could not be determined

## Filling out “Describe How Injury Occurred” Box

- Circumstances surrounding the injury or external cause of death
- Details depend on the type of injury and disaster involved
  - Example: Drowned in a flooded residence during Hurricane Ike storm surge
- Work related injuries
  - Mark “Yes” in the “Injury at work?” field
- Enter “Place of Injury” if known
- Include disaster name and type as well as circumstance of death

# Filling out Describe How Injury Occurred Box

CAUSE OF DEATH (See instructions and examples)			Approximate interval: Onset to death
<p>32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.</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 <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b></p>	a.	<b>Cerebral contusion</b>	.....
		Due to (or as a consequence of):	.....
	b.	<b>Fractured skull</b>	.....
		Due to (or as a consequence of):	.....
	c.	<b>Blunt impact to head</b>	.....
		Due to (or as a consequence of):	.....
	d.	<b>Car crashed into tree</b>	.....
<p><b>PART II.</b> Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I</p> <p><b>Fractured sternum, pneumothorax, Hurricane Ike</b></p>			<p>33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>35. DID YOU SUFFER FROM ANY OF THE FOLLOWING CONDITIONS?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>36. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within 1 year before death</p> <p><input type="checkbox"/> Pregnant within 1 year before death</p> <p><input type="checkbox"/> Pregnant within 1 year before death</p> <p><input type="checkbox"/> Pregnant within 1 year before death</p>	<p>37. MANNER OF DEATH</p> <p><input type="checkbox"/> Natural <input type="checkbox"/> Homicide</p> <p><input checked="" type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation</p> <p><input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined</p>	
<p>38. DATE OF INJURY (Mo/Day/Yr) (Spell Month)</p>	<p>39. TIME OF INJURY</p>	<p>40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area)</p> <p><b>Highway</b></p>	<p>41. INJURY AT WORK? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>42. LOCATION OF INJURY: State: _____ City or Town: _____</p> <p>Street &amp; Number: _____ Apartment No.: _____ Zip Code: _____</p>			
<p>43. DESCRIBE HOW INJURY OCCURRED:</p> <p><b>Unrestrained driver of a car while evacuating for Hurricane Ike. Car slid off wet road and struck tree.</b></p>			<p>44. 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>

## Discussion Scenario A: Landslide at Construction Site

A landslide occurred near a local construction site where a road was being built 4 miles outside of Oso, Washington. The Fire and Rescue team found the body of a 29-year-old male buried under five meters of earth. The decedent was confirmed to be one of the construction workers.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related data would you include on the death certificate?
  - **Answer: Disaster type and name should be included in Part I, disaster type, name, and circumstance of death should also be included in the “Describe how injury occurred” box.**

# Scenario A: Death Certificate

CAUSE OF DEATH (See instructions and examples)		Approximate interval: Onset to death
<p>32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.</p> <p>IMMEDIATE CAUSE (Final disease or condition -----&gt; resulting in death)</p> <p>Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b></p>		
a.	<b>Hemothorax and hemooperitoneum</b> Due to (or as a consequence of):	
b.	<b>Crushed chest and abdomen</b> Due to (or as a consequence of):	
c.	<b>Oso, Washington landslide</b> Due to (or as a consequence of):	
d.		
<b>PART II.</b> Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I		33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No
		34. WERE AUTOPSY FINDINGS AVAILABLE TO
35. DID THE DECEASED SUFFER FROM ANY OF THE FOLLOWING CONDITIONS? <input type="checkbox"/> Yes <input type="checkbox"/> Partially <input type="checkbox"/> No <input type="checkbox"/> Unknown		<b>37. MANNER OF DEATH</b> <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
38. DATE OF INJURY (Month Year)	39. TIME OF INJURY	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) <b>Construction Site</b>
42. LOCATION OF INJURY (State)		41. INJURY AT WORK? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
43. DESCRIBE HOW INJURY OCCURRED: <b>Construction worker found buried under 5 meters of earth after <u>March 2014 Oso landslide in Washington</u></b>		

## Scenario B: Disaster-related Chemical Exposure

A 33-year-old asthmatic worker at a water treatment facility developed respiratory distress and died at a hospital after being exposed to chlorine when a pipe leading from a chlorine tank cracked during the Northridge, California, earthquake, according to the medical record. Emergency management reports confirm that the chemical release was caused by the earthquake.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related details would you include on the death certificate?
  - **Answer: Chemical name and disaster type and name should be reported in the cause of death section. Disaster type, name, and circumstance of death should be reported in the “Describe how injury occurred” box. Check “yes” for “Injury at work.”**

# Scenario B: Death Certificate

CAUSE OF DEATH (See instructions and examples)		Applicant's Initials
32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.		
IMMEDIATE CAUSE (Final disease or condition resulting in death) →	a. <b>Acute respiratory failure</b>	
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b>	b. <b>Chlorine inhalation</b>	
	c. _____	
	d. _____	
<b>PART II.</b> Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I		33. W _____
<b>Asthma, Northridge, California earthquake</b>		34. _____ FINDINGS AVAILABLE
37. MANNER OF DEATH		
<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		
38. DATE OF INJURY (Mo/Day/Yr)	39. TIME	41. INJURY AT WORK? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area)		
<b>At work in a water treatment facility</b>		
42. LOCATION OF INJURY: State: _____ City or Town: _____		
43. DESCRIBE HOW INJURY OCCURRED:		44. IF TRANSPORTATION INJURY, SPECIFY:
<b>Pipe connecting to tank of chlorine cracked during Northridge, California, earthquake and released chlorine gas into facility where he was working</b>		<input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify)

# Scenario C: Carbon Monoxide Poisoning During Natural Disaster

A 39-year-old female died during Hurricane Sandy in her home. The storm caused a regional blackout and she had used charcoal in her fireplace for heat. According to emergency medical services (EMS) officials, high carbon monoxide (CO) levels were detected in the home.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related details would you include on the death certificate and where would you document them?
  - **Answer: Disaster type and name and circumstance of death should be included in Part II and in the “Describe how injury occurred” box**

# Carbon Monoxide (CO) Poisoning Notations

- SOURCE OF CARBON MONOXIDE: Gas range, generator, charcoal grill
- LOCATION OF THE SOURCE: Basement, outside near window, house, garage, automobile
- CIRCUMSTANCE(S): Indicate if the carbon monoxide death is disaster-related and the circumstances (e.g., power outage, using alternative heat source during snowstorm, no carbon monoxide detector in home).
- MANNER: Consider intentional poisoning.

# Scenario C: Death Certificate Example

CAUSE OF DEATH (See instructions and examples)		Approximate
32. PART I. Enter the <u>chain of events</u> —diseases, injuries, or complications—that directly caused the death. Do not include respiratory arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Use separate lines if necessary.		
IMMEDIATE CAUSE (Final disease or condition resulting in death) →	a. <b>Carbon monoxide poisoning</b> Due to (or as a consequence of):	<ul style="list-style-type: none"><li>■ Source of carbon monoxide</li><li>■ Location of the source</li><li>■ Circumstance(s)</li><li>■ Manner</li></ul>
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b>	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. Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I		33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Hurricane Sandy</b>		34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No
		37. MANNER OF DEATH <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
38. DATE OF DEATH (M/D/YYYY)	39. TIME OF DEATH	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) <b>Decedent's home</b>
42. LOCATION OF DEATH: State: _____ City: _____	41. INJURY OCCURRED IN: <input type="checkbox"/> Home <input type="checkbox"/> Other	
43. DESCRIBE HOW INJURY OCCURRED: <b>Carbon monoxide source was charcoal use in the fireplace of the home due to power outage after Hurricane Sandy</b>		44. IF INJURY OCCURRED IN A HOME, CHECK ONE: <input type="checkbox"/> In a home <input type="checkbox"/> In a building <input type="checkbox"/> In a vehicle <input type="checkbox"/> In a public place

## Scenario D: Human-induced Incident

A 39-year-old male was within 4 miles of an improvised nuclear device that was detonated near a construction site in a major metropolitan area. The incident was confirmed by the local emergency manager and FBI as an act of terrorism. The decedent was exposed to a radiation dose of 8 grays (800 rem) as a result of prompt radiation and radioactive fallout. He also had minor traumatic injuries and thermal burns on 15% of his total body surface area. He self-evacuated to a hospital 50 miles away. He developed acute radiation syndrome, starting with intractable vomiting approximately 1 hour after the explosion, followed by bone marrow depletion of granulocyte progenitors on day 2 of hospitalization. He survived for 23 days before dying from gram-negative sepsis, despite receiving granulocyte colony-stimulating factors, broad-spectrum antibiotics, and multiple transfusions.

# Scenario D: Death Certificate Example

<p><b>CAUSE OF DEATH (See instructions and examples)</b></p> <p>32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.</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 <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b></p>		<p>Approximate interval: Onset to death</p>
<p>a. <b>Gram-negative sepsis</b> Due to (or as a consequence of):</p> <p>b. <b>Aplastic anemia</b> Due to (or as a consequence of):</p> <p>c. <b>Acute radiation syndrome</b> Due to (or as a consequence of):</p> <p>d. <b>Terrorism: nuclear device detonation</b> Due to (or as a consequence of):</p>		
<p><b>PART II.</b> Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I</p> <p><b>Thermal burns, cutaneous radiation injury, cutaneous lacerations</b></p>		<p>33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>35. DID THE DECEASED ...</p> <p>36. IF FE ...</p>		<p><b>37. MANNER OF DEATH</b></p> <p><input type="checkbox"/> Natural <input checked="" 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>38. D ... (M)</p> <p>39. TI</p>		<p>40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area)</p> <p><b>Outdoor construction site</b></p>
<p>42. LOCATION IN ... State: ... City: ...</p>		<p>41. INJUR ... ?</p>
<p>43. DESCRIBE HOW INJURY OCCURRED:</p> <p><b>Intentional detonation of a nuclear device by another person as an act of terrorism</b></p>		<p>44. IF TRA ... ION IN ... IFY:</p>

## Scenario D: Comments

- Energy from the detonation of a nuclear weapon is released as a blast, extreme heat, prompt radiation, and delayed radiation in fallout.
- **Initial deaths** would occur at or near ground zero from
  - Blast injuries
  - Heat or thermal injury
  - Prompt radiation injury
- **Delayed deaths** may occur from
  - Initial blast injuries
  - Acute radiation syndrome

# Key Points for Disaster-related Death Certification

- Be aware of natural and human-induced disaster incidents
- Consider causes of death that can be indirectly-related to the disaster
- Identify all disaster-related deaths
  - Deaths can occur before, during, and after a disaster.
  - For example, trauma from a car crash when exceeding the local capacity to respond while evacuating, drowning during a flood, cancer from significant radiation exposure
- Record the disaster type, name, and circumstance of death on the death certificate
  - Part I, Part II, or “Describe How Injury Occurred” box (if applicable)

# Extra Practice Exercises

# Scenario I: Tornado Incident

EMS reported that a 13-year-old female fell during the Moore tornado outbreak in Oklahoma. Her family witnessed her running down wooden basement stairs to escape the impending tornado. She fell approximately 15 steps headfirst, resulting in right parietal epidural bleed and skull fracture.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related data would you include on the death certificate?
  - **Answer: Disaster type and name and circumstance of death should be included in Part II and the “Describe How Injury Occurred” box**



## Scenario II: Hurricane Incident

A 28-year-old male died when a tree fell on him during Hurricane Sandy. He suffered multiple traumas, including a fractured skull causing cerebral contusion. Emergency medical service and police reports indicated he thought the hurricane had passed and was walking his dogs.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related details would you include on the death certificate and where would you document them?
  - **Answer: Disaster type and name and circumstance of death should be included in Part I and the “Describe How Injury Occurred” box**

# Scenario II: Death Certificate Example

CAUSE OF DEATH (See instructions and examples)		Approximate interval: Onset to death
32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.		
IMMEDIATE CAUSE (Final disease or condition resulting in death) →	a. <b>Cerebral contusion</b> Due to (or as a consequence of):	
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b>	b. <b>Fractured skull, facial and clavicle fractures</b> Due to (or as a consequence of):	
	c. <b>Blunt impact to head</b> Due to (or as a consequence of):	
	d. <b>Hurricane Sandy</b>	
PART II. Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I		33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No
		34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No
35. DID THE DECEASED SUFFER FROM ANY OF THE FOLLOWING CONDITIONS? <input type="checkbox"/> Yes <input type="checkbox"/> Partially <input type="checkbox"/> No <input type="checkbox"/> Unknown	36. IF FEELING OF WEARINESS OR FATIGUE WAS PRESENT, WAS IT: <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe <input type="checkbox"/> Unknown if present	37. MANNER OF DEATH <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
38. DID THE DECEASED SUFFER FROM ANY OF THE FOLLOWING INJURIES? (M)	39. TIME OF INJURY (M)	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) <b>Outside on sidewalk</b>
42. LOCATION OF INJURY: Street	City	41. INJURY TO HEAD? <input type="checkbox"/> Yes <input type="checkbox"/> No
43. DESCRIBE HOW INJURY OCCURRED: <b>Walking dogs during Hurricane Sandy. Tree limb broke, striking decedent on head</b>		44. IF THE DECEASED WAS IN A VEHICLE AT THE TIME OF THE INJURY, ENTER THE TYPE OF VEHICLE AND THE TYPE OF COLLISION: <input type="checkbox"/> Car <input type="checkbox"/> Truck <input type="checkbox"/> Van <input type="checkbox"/> Motorcycle <input type="checkbox"/> Other

## Scenario III: Extreme Winter Cold and Chronic Conditions

An 85-year-old male with a history of Alzheimer's disease and arteriosclerosis died from hypothermia after he wandered away from his home for an hour during a severe 2012 Nor'easter snowstorm, reported by local news.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related details would you include on the death certificate and where would you document them?
  - **Answer: Disaster type and name and circumstance of death should be included in Part I and “Describe How Injury Occurred” box**

# Scenario III: Death Certificate Example

<b>CAUSE OF DEATH (See instructions and examples)</b>		Approximate interval: Onset to death	
32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.			
IMMEDIATE CAUSE (Final disease or condition resulting in death) ----->	a. <b>Environmental hypothermia</b> Due to (or as a consequence of):		
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b>	b. <b>Nor'easter snowstorm</b> Due to (or as a consequence of):		
	c. _____ Due to (or as a consequence of):		
	d. _____ Due to (or as a consequence of):		
<b>PART II.</b> Enter other <u>significant conditions contributing to death</u> but not resulting in the underlying cause given in PART I		33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Arteriosclerotic heart disease; Alzheimer's disease</b>		34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No	
35. DID THE DECEASED ... <input type="checkbox"/> Yes <input type="checkbox"/> Partially <input type="checkbox"/> No <input type="checkbox"/> Unknown	36. IF FEELING ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ...	<b>37. MANNER OF DEATH</b> <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	
38. DATE OF INJURY (M/D/YYYY)	39. TIME OF INJURY (HH:MM)	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) <b>Wooded park area</b>	41. INJURY? <input type="checkbox"/> ... <input type="checkbox"/> ... ?
42. LOCATION IN: State: _____ City: _____	43. DESCRIBE HOW INJURY OCCURRED: <b>Wandered away from house and was found outside during the nor'easter snowstorm</b>		44. IF TRIP ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ... <input type="checkbox"/> ...

## Scenario IV: Bombing or Blast Deaths

A 41-year-old firefighter responded to a 911 call at the starting line of the Hawaii Ironman racing incident, where an improvised explosive device went off. After she arrived, a second device was detonated, and the firefighter sustained fatal abdominal trauma. The incident was confirmed by the local emergency manager and local FBI to be an act of terrorism. She died immediately at the scene of abdominal hemorrhage from her wounds.

- Is this death disaster-related?
  - **Answer: Yes**
- What disaster-related details would you include on the death certificate and where would you document them?
  - **Answer: Disaster type and name and circumstance of death should be included in Part I and the “Describe How Injury Occurred” box**

# Scenario IV: Death Certificate Example

<b>CAUSE OF DEATH (See instructions and examples)</b>		App. im inte. at: O
32. <b>PART I.</b> 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. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.		
IMMEDIATE CAUSE (Final disease or condition resulting in death) →	a. <b>Abdominal hemorrhage and perforation</b> Due to (or as a consequence of):	
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the <b>UNDERLYING CAUSE</b> (disease or injury that initiated the events resulting in death) <b>LAST</b>	b. <b>Penetrating ballistic debris from exploded improvised explosive device</b> Due to (or as a consequence of):	
	c. <b>Terrorism</b> Due to (or as a consequence of):	
	d. _____ Due to (or as a consequence of):	
33. W _____		
34. _____ Y FINDINGS AVAILA		
35. DID _____		
36. IF FE _____		
<b>37. MANNER OF DEATH</b>		
<input type="checkbox"/> Natural <input checked="" type="checkbox"/> Homicide		
<input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation		
<input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined		
38. DATE OF INJURY (Mo/Day/Yr) (Spell Month)	39. TIME OF INJURY	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area)
		<b>Outdoor sporting event</b>
41. INJURY AT WORK?		
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
42. LOCATION OF INJURY: State: _____	City or Town: _____	
Street & Number: _____	Apartment No.: _____	
43. DESCRIBE HOW INJURY OCCURRED:		44. IF TRANSPORTATION INJURY, SPECIFY:
<b>Firefighter responding to discovery of <u>improvised explosive device</u> was struck by <u>explosion</u> of secondary device near starting line of the <u>Hawaii Ironman Race</u></b>		<input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify)

# Conclusion

- This training is important to:
  - Improve the accuracy and completeness of information on the death certificate.
  - Ensure greater consistency for capturing disaster-related deaths before, during, and after a disaster by providing guidance that will aid in ensuring disaster-relatedness is reflected appropriately on the death certificate.

**Thank you for participating in this training.**

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