

Understanding Mortality Statistics: The Importance of Cause-of-Death Certification and Coding

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**Centers for Disease Control and Prevention
National Center for Health Statistics**



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Cause of death certification

- Physicians
 - Deaths due to natural causes
- Medical examiners/coroners
 - Injury deaths
 - Deaths occurring under suspicious circumstances
 - Sudden, unattended deaths

Evaluating Cause of Death Statistics

Accuracy of diagnosis

VS

Accuracy of certification

Standard format for reporting cause of death

Part I. Diseases, injuries, or complications that caused the death

Approximate
interval between
onset and death

| | | |
|--|---------------------------------|-------|
| Immediate cause | 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. _____ | _____ |

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

Standard format for reporting cause of death

Part I. Diseases, injuries, or complications that caused the death

Approximate
interval between
onset and death

| | | |
|--|---------------------------------|-------|
| Immediate cause | 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. _____ | _____ |

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

Standard format for reporting cause of death

Part I. Diseases, injuries, or complications that caused the death

Approximate
interval between
onset and death

| | | |
|---|---------------------------------|-------|
| Immediate cause | 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. _____ | _____ |

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

Underlying Cause of Death

- The disease that initiated the train of morbid events leading directly to death

or...

- The circumstances of the accident or violence that produced the fatal injury

Standard format for reporting cause of death

Part I. Diseases, injuries, or complications that caused the death

Approximate
interval between
onset and death

| | | |
|--|---------------------------------|-------|
| Immediate cause | 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. _____ | _____ |

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

General Instructions

- Events and conditions should be logically linked in terms of time, etiology and pathology
- Underlying cause should be on the last used line in Part I
- One cause on each line in Part I

General Approach

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|---|-------|
| Immediate cause | a. <u>Condition which directly preceded death</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. <u>Antecedent condition</u> | _____ |
| | Due to (or as a consequence of) | |
| | c. <u>Underlying cause</u> | _____ |
| | 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.

A 60-year-old male with a long history of chronic alcoholism developed cirrhosis. Terminally, the patient had hepatic encephalopathy, which dominated the clinical picture, but there was also some gastrointestinal bleeding (varices) and pneumonia, which complicated clinical management and were also thought to have contributed to death.

Immediate cause of death – Part I, line (a)

- The disease or complication which directly preceded death
- There must always be an entry on line I(a)
- Avoid writing “cardiac arrest” or “cardiopulmonary arrest”

Example 1 – Immediate cause

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

Immediate cause a. Hepatic encephalopathy 15 days
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. _____

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

Antecedent causes – Part I, lines (b), (c) and (d)

- Reported conditions should be in a logical sequence in terms of time, etiology and/or pathology
- Terminate the sequence with the underlying cause of death – leave unused lines blank

Example 1 – Antecedent causes

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|----------------|
| Immediate cause | a. <u>Hepatic encephalopathy</u> Due to (or as a consequence of) | <u>15 days</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. | b. <u>Cirrhosis of liver</u> Due to (or as a consequence of) | <u>5 years</u> |
| | 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.

Example 1 – Antecedent causes

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|----------------|
| Immediate cause | a. <u>Hepatic encephalopathy</u> Due to (or as a consequence of) | <u>15 days</u> |
| Sequentially list antecedent causes, if any, leading to the immediate cause with underlying cause last | b. <u>Cirrhosis of liver</u> Due to (or as a consequence of) | <u>5 years</u> |
| | c. <u>Chronic alcoholism</u> Due to (or as a consequence of) | <u>years</u> |
| | d. _____ _____ | _____ |
| | _____ | _____ |

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

Other significant conditions – Part II

- Other important diseases or conditions that were present at the time of death and that may have contributed to death, but were not directly related to the underlying cause of death should be reported in Part II

Example 1 – Other significant conditions

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|----------------|
| Immediate cause | a. <u>Hepatic encephalopathy</u> Due to (or as a consequence of) | <u>15 days</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. | b. <u>Cirrhosis of liver</u> Due to (or as a consequence of) | <u>5 years</u> |
| | c. <u>Chronic alcoholism</u> Due to (or as a consequence of) | <u>years</u> |
| | d. _____ | _____ |
| | _____ | _____ |

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

Bleeding esophageal varices, pneumonia

Example 2

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|-----------------|
| Immediate cause | a. <u>Acute renal failure</u> Due to (or as a consequence of) | <u>5 days</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. | b. <u>Hyperosmolar nonketotic coma</u> Due to (or as a consequence of) | <u>8 days</u> |
| | c. <u>Diabetes mellitus, non-insulin dependent</u> Due to (or as a consequence of) | <u>15 years</u> |
| | d. _____ | _____ |
| | _____ | _____ |

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

A 80-year-old male with congestive heart failure is hospitalized with leg pain and edema and is subsequently diagnosed with deep venous thrombosis. Death occurred as the result of a pulmonary embolism. The patient had a history of poorly-controlled hypertension, prostate cancer and a previous myocardial infarction.

Example 3

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|--|---------------|
| Immediate cause | a. <u>Pulmonary embolism</u> | <u>30 min</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. <u>Acute iliofemoral deep venous thrombosis</u> | <u>5 days</u> |
| | Due to (or as a consequence of) | |
| | c. <u>?</u> | <u></u> |
| | Due to (or as a consequence of) | |
| d. <u></u> | <u></u> | |

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

Example 3a

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|---------------|
| Immediate cause | a. <u>Pulmonary embolism</u> Due to (or as a consequence of) | <u>30 min</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. | b. <u>Acute iliofemoral deep venous thrombosis</u> Due to (or as a consequence of) | <u>5 days</u> |
| | c. <u>Congestive heart failure</u> Due to (or as a consequence of) | <u>4 yrs</u> |
| | d. <u>Hypertension</u> | <u>years</u> |

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

Poorly differentiated adenocarcinoma of the prostate, old myocardial infarction

Example 3b

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

Immediate cause a. Pulmonary embolism 30 min
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. Acute iliofemoral deep venous thrombosis 5 days
Due to (or as a consequence of)

c. Congestive heart failure 4 years
Due to (or as a consequence of)

d. Old myocardial infarction years

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

Poorly differentiated adenocarcinoma of the prostate, hypertension

Example 3c

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|--|---------------|
| Immediate cause | a. <u>Pulmonary embolism</u> | <u>30 min</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. <u>Acute iliofemoral deep venous thrombosis</u> | <u>5 days</u> |
| | Due to (or as a consequence of) | |
| | c. <u>Poorly differentiated adenocarcinoma of the prostate</u> | <u>years</u> |
| | 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.

Congestive heart failure, old myocardial infarction, hypertension

Example 4

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|---------------|
| Immediate cause | a. <u>Metabolic derangement</u> Due to (or as a consequence of) | <u>2 days</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. | b. <u>Diabetic ketoacidosis (new onset diabetes)</u> Due to (or as a consequence of) | <u>2 days</u> |
| | c. <u>Probable pancreatitis</u> Due to (or as a consequence of) | <u>2 wk</u> |
| | d. <u>Possibly due to hypertriglyceridemia from low carbohydrate diet - speculative</u> | <u>4 wk</u> |

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

Hypertension

General Approach for Injury

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|---------------------------------|-------|
| Immediate cause | a. <u>Fatal derangement</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. <u>Bodily trauma</u> | _____ |
| | Due to (or as a consequence of) | |
| | c. <u>Injury event</u> | _____ |
| | 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.

Describe how injury occurred

- Ran over by farm tractor
- Deceased was experiencing dizziness from new medication. Apparently fell, struck head, suffocated face down in carpet.
- Decedent was eating and a piece of meat became lodged in throat
- Victim was overcome by carbon monoxide poison, which was produced by a portable generator
- Assaulted with a baseball bat and knife resulting in fatal injuries to head

Example 5

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|--|---------------|
| Immediate cause | a. <u>Left intrathoracic hemorrhage</u> Due to (or as a consequence of) | <u>20 min</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. | b. <u>Transection of left subclavian vein</u> Due to (or as a consequence of) | <u>20 min</u> |
| | c. <u>Stab wound of left shoulder</u> Due to (or as a consequence of) | <u>20 min</u> |
| | d. _____ | _____ |
| | _____ | _____ |

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

Example 6

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|--|----------------|
| Immediate cause | a. <u>Methicillin-resistant staph aureus sepsis</u> Due to (or as a consequence of) | <u>2 days</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. | b. <u>MRSA pneumonia</u> Due to (or as a consequence of) | <u>5 days</u> |
| | c. <u>Cutaneous burn wound infection</u> Due to (or as a consequence of) | <u>10 days</u> |
| | d. <u>3rd degree thermal burns</u> | <u>14 days</u> |

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

Example 7

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---------------------------------|----------------|
| Immediate cause | a. <u>Asphyxia</u> | <u>unknown</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. <u>Drowning</u> | <u>unknown</u> |
| | 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.

Alcohol intoxication at 0.31 grams percent

Some Common Problems

- Mechanisms or modes of dying
 - Cardiac or respiratory arrest
 - Cardiopulmonary arrest
 - Asystole
- Reporting symptoms, ill-defined conditions or lab findings
- Lack of specificity

Some common problems (cont.)

- Multiple conditions on one line
- Incorrect causal sequences
- Reporting terminal conditions (e.g., heart failure, renal failure, septicemia, pneumonia, pulmonary embolism, prematurity, etc.) that have more than one possible cause as the underlying cause

Example (bad) 8

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|--|-------|
| Immediate cause | a. <u>Cardiac/pulmonary arrest, advance dementia</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. <u>Diphtheria, aortic stenosis, CVA, CAD</u> | _____ |
| | Due to (or as a consequence of) | |
| | c. <u>Pacemaker</u> | _____ |
| | 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.

Example (bad) 9

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|------------------|
| Immediate cause | a. <u>Cardiac arrhythmia -> standstill</u> Due to (or as a consequence of) | <u>immediate</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. | b. <u>Tacky-brady mostly brady, syndrome</u> Due to (or as a consequence of) | <u>years</u> |
| | c. <u>Arteriosclerotic vascular disease with</u> Due to (or as a consequence of) | <u>years</u> |
| | d. <u>Chronic atrial fibrillation</u> | |

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

Hypothyroidism

Example (bad) 10

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|------------------------------------|-------|
| Immediate cause | a. <u>Respiratory failure/ARDS</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. <u>Septic shock</u> | _____ |
| | 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.

Immunodeficiency

Example (bad) 12

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|---------------------------------|-------|
| Immediate cause | a. <u>End stage COPD</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. <u>Hx CAD</u> | _____ |
| | Due to (or as a consequence of) | |
| | c. <u>Anemia</u> | _____ |
| | Due to (or as a consequence of) | |
| | d. <u>Elevated BUN</u> | _____ |

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

Example (bad) 13

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|---|--------------|
| Immediate cause | a. <u>Cardiopulmonary arrest</u> Due to (or as a consequence of) | <u>none</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. | b. <u>Inanition</u> Due to (or as a consequence of) | <u>2 mos</u> |
| | c. <u>Multisystem failure</u> Due to (or as a consequence of) | <u>2 mos</u> |
| | d. _____ _____ | _____ |
| | _____ | _____ |

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

Congestive heart failure, renal failure

Example (bad) 14

Part I. Diseases, injuries, or complications that caused the death.

Approximate interval between onset and death

| | | |
|--|--|-----------------|
| Immediate cause | a. <u>Cardiogenic shock</u> Due to (or as a consequence of) | <u>12 hours</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. | b. <u>COPD</u> Due to (or as a consequence of) | <u>years</u> |
| | c. <u>Mania</u> Due to (or as a consequence of) | <u>years</u> |
| | d. <u>Lithium toxicity</u> | <u>5 days</u> |

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

Example (bad) 15

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|--|-------|
| Immediate cause | a. <u>Complications of left hip FX</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. _____ | _____ |

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

Example (bad) 16

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|--|-------|
| Immediate cause | a. <u>Polypharmacy</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. <u>Cardiomegaly with left ventricular hypertrophy</u> | _____ |
| | Due to (or as a consequence of) | |
| | c. <u>Pul Ed</u> | _____ |
| | Due to (or as a consequence of) | |
| | d. <u>Remote FX of cervical vertebrae column</u> | _____ |

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

Example (bad?) 17

Part I. Diseases, injuries, or complications that caused the death.

Approximate
interval between
onset and death

| | | |
|--|---|-------|
| Immediate cause | a. <u>Gunshot wound, self-inflicted to head</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. <u>Terminal cancer of the lungs</u> | _____ |
| | 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.

How extensive are the problems?

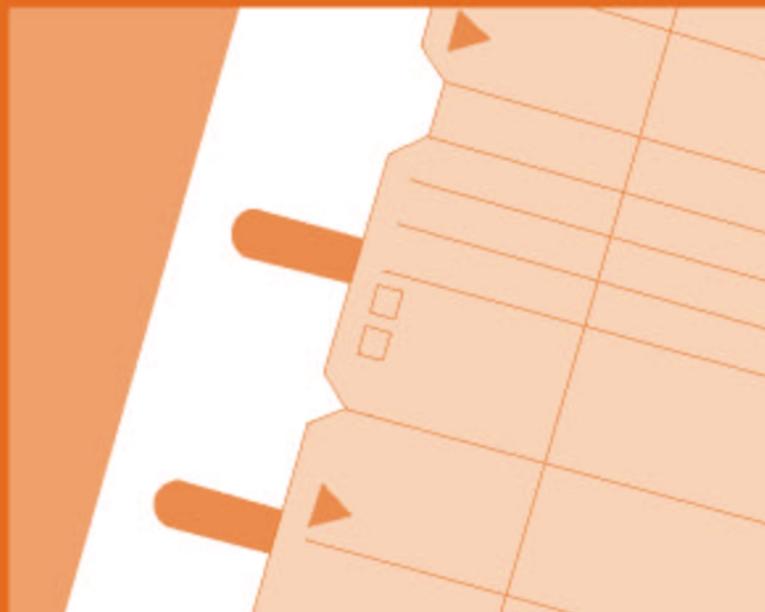
- Mechanisms or modes of dying and ill-defined conditions as the underlying cause - 2%
- Reporting terminal conditions that have more than one possible cause as the underlying cause - 11%
- Multiple conditions per line (Part I) – 10%
- Incorrect causal sequences - 25%



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Physicians' Handbook on Medical Certification of Death

2003 Revision



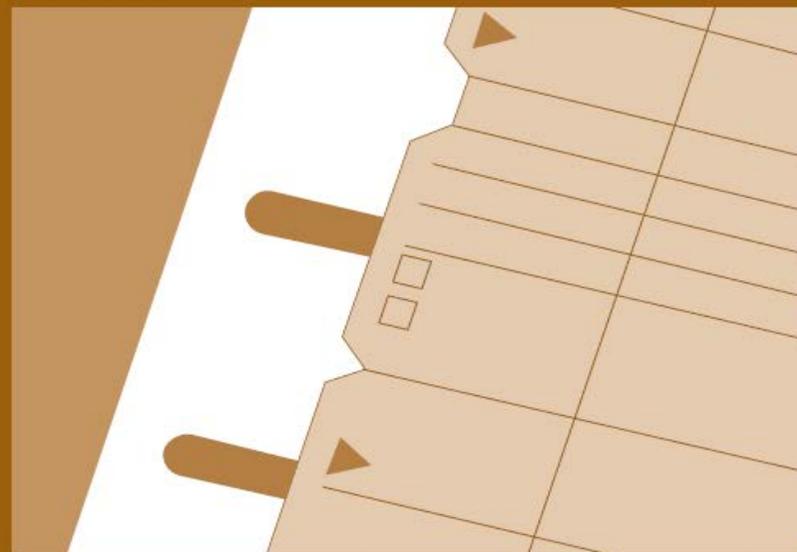
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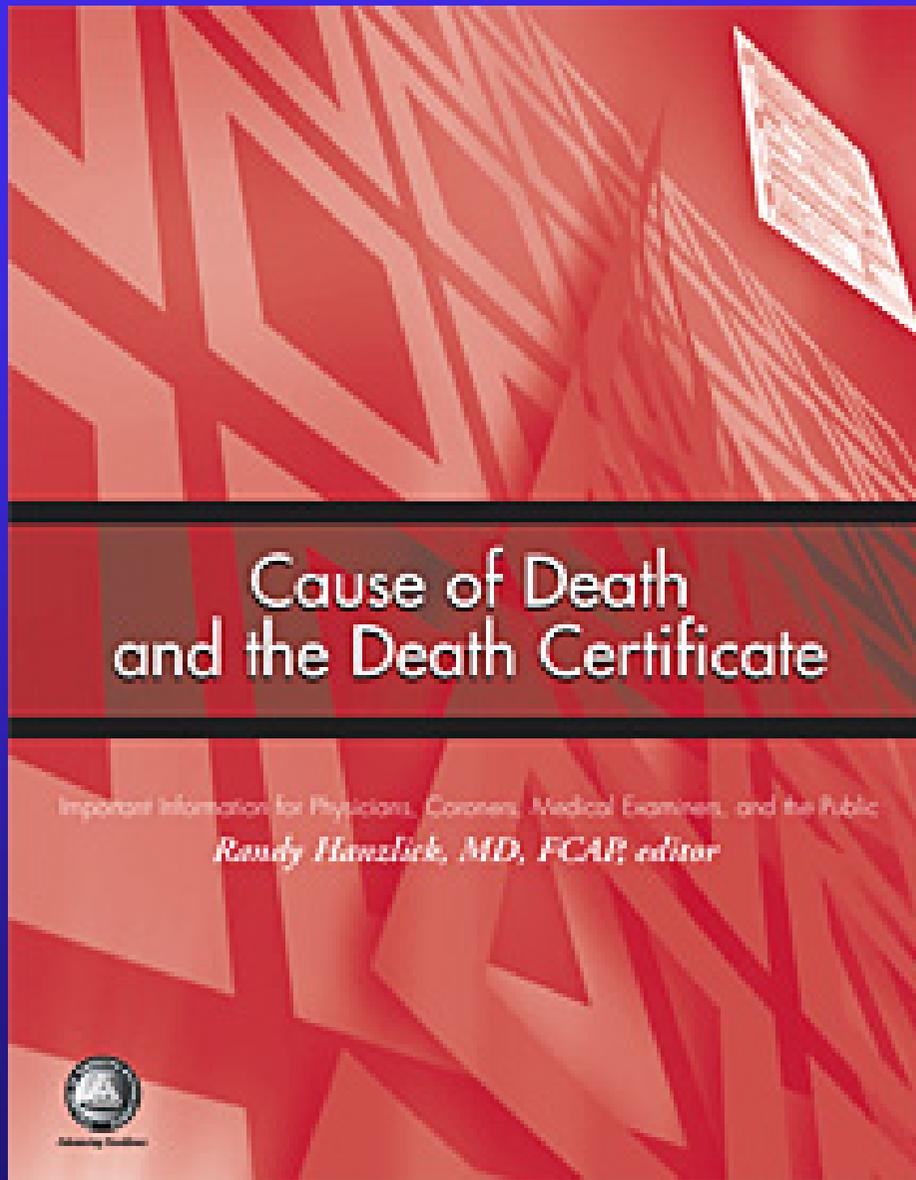
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Medical Examiners' and Coroners' Handbook on Death Registration and Fetal Death Reporting

2003 Revision



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- <http://www.cdc.gov/nchs/about/major/dvs/handbk.htm>
- <http://www.thename.org/>

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