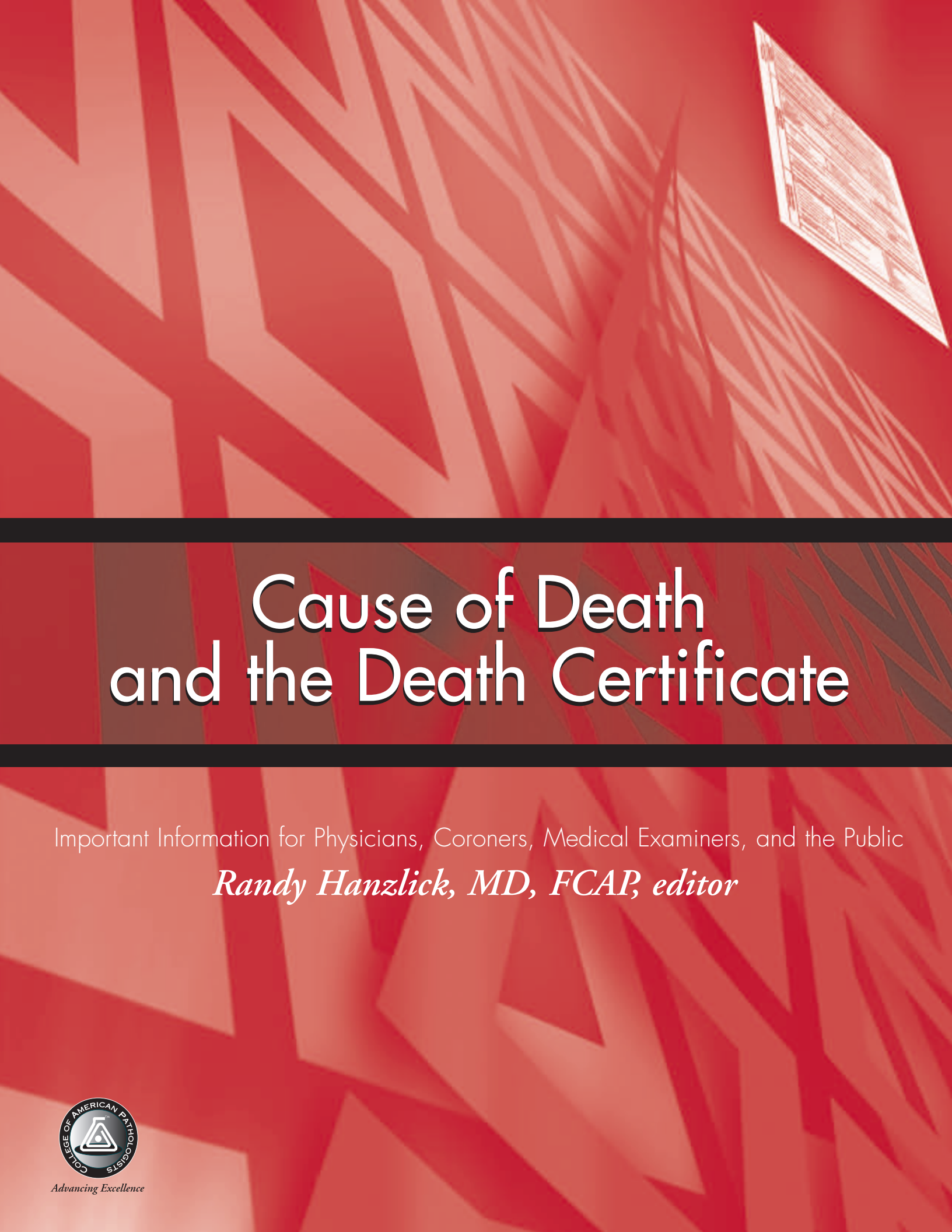

# Cause of Death and the Death Certificate

Important Information for Physicians, Coroners, Medical Examiners, and the Public

*Randy Hanzlick, MD, FCAP, editor*

College of American Pathologists
*Advancing Excellence*

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## Important Information for Physicians, Coroners, Medical Examiners, And the Public

*Advancing Excellence*

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**Prepared by the Forensic Pathology, Autopsy, and Neuropathology Committees of the College of American Pathologists in conjunction with the National Association of Medical Examiners**

**Randy Hanzlick, MD, Editor**



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# Table of Contents

# Preface

This book is intended for persons who must prepare, review, or interpret cause-of-death statements appearing on death certificates or other medical documents, such as autopsy reports. It is a comprehensive summary derived from previous publications, including:

- *The Medical Cause of Death Manual*. College of American Pathologists, 1994.
- *Cause-of-Death Statements and Certification of Natural and Unnatural Deaths: Protocol and Options.* College of American Pathologists, 1997.
- *Physician's Handbook on Medical Certification of Death.* 2003 Revision. DHHS, CDC, NCHS, 2003.
- *Medical Examiners' and Coroners' Handbook on Death Registration and Fetal Death Reporting.* 2003 Revision. DHHS, CDC, NCHS, 2003.

Since the publication of the College of American Pathologists (CAP) manuals referenced above, some processes and strategies for death certification and registration have changed. For example, the Federal Government issued a new U.S. Standard Certificate of Death in 2003, and the approach to certification of sudden unexplained infant deaths has changed in at least some parts of the country. This book includes updated information on these and many other issues, and has been broadened in content to provide information not only useful to physicians, medical examiners, and coroners, but to the public as well. Most individuals will eventually experience the death of a loved one; when this occurs, knowledge of death certification and registration processes can help people deal with death by having advance knowledge of what to expect—or even what *should* be expected—when a death certificate is prepared.

*Cause of Death and the Death Certificate* is organized as follows:

- **Part I**. A *Summary of Basic Principles* to allow quick review of concepts.
- **Part II.** *Protocol for Writing Cause-of-Death Statements for Natural Causes*
- **Part III**. An updated version of *The Medical Cause of Death Manual,* which contains more in-depth discussion of death certification principles.
- **Part IV**. An updated version of *Cause-of-Death Statements and Certification of Natural and Unnatural Deaths: Protocol and Options,* including discussion and examples of specific types of deaths that pose dilemmas or involve special considerations in regard to completing the cause-of-death statement.
- **Part V**. *A Guide for Manner of Death Classification*, prepared by the National Association of Medical Examiners (2002).
- **Part VI.** *Current Issues.*
- **Part VII**. *Glossary.*
- **Part VIII**. *Bibliography and Suggested Reading.*

There is some intentional redundancy from one part of this book to another, but each part also contains information, additional principles, or examples that are unique from other parts. Various readers will probably find some parts of the book more useful or focused than others, relevant to personal need and interest.

It is once again my pleasure to serve as editor of this CAP publication, prepared by the CAP Autopsy, Forensic Pathology, and Neuropathology committees, in conjunction with the National Association of Medical Examiners. It is hoped that this book will improve death certification practice and further the mission of the National Center for Health Statistics.

*Randy Hanzlick, MD, Editor*

# Part I
# Summary of Basic Principles

*Part I contains:*
- *Background information on the history of the death certificate*
- *Responsibilities of various parties in regard to the death certificate*
- *Basic principles for completing cause-of-death statements*

*Part I is provided as a brief, yet comprehensive, general summary of death certification issues, and may be useful for quick review and basic courses or lectures about death certification.*

## What is the Death Certificate?

Each state has vital statistics regulations that require that a death certificate be completed and officially filed when the death of a human being occurs.

The *death certificate* serves multiple purposes, including:
- Legal documentation that the named person is dead
- Information about the deceased, such as age, race, sex, date of birth, birth place, and other basic descriptive information
- Information that may be used to evaluate the cause, manner, and circumstances of death
- Information that may be used to settle the deceased's estate
- Information about disposition of the remains, such as where burial occurred, and the funeral director or other agent responsible for making that disposition
- Information that may be used by the government, public health agencies, other state or federal agencies, or researchers to plan or fund programs designed to analyze, reduce, or prevent mortality

In some states, the death certificate is first filed at the county level, then at the state level. In other states, the death certificate is filed directly with the state. No matter which occurs in your state, the death certificate information is eventually forwarded to the National Center for Health Statistics (NCHS), which keeps data for the death of every person in the United States (and associated territories and possessions). These NCHS data are used by researchers and government to plan and fund programs and research that have national impact on the nation's health and safety. For these reasons, it is very important that death certificate information be accurate, not to mention that survivors of the deceased should also have an accurate understanding of the cause and circumstances of death.

It is usually the funeral director's responsibility (or other person assuming responsibility for disposition such as burial, cremation, other) to ensure that all parts of the death certificate are completed and that the completed death certificate is officially filed as required in the state. Usually, the funeral director (or other responsible person) will complete all parts of the death certificate, except the part that describes the cause and circumstances of death. The person who completes and signs that part of the death certificate will usually be:

- The physician who was treating the person and knows his/her medical history and other important information (if not a medical examiner or coroner's case)
- A medical examiner or coroner if the death is officially investigated by a medical examiner or coroner's office
- A nurse in certain settings, if allowed to do so by the state, and usually in settings such as hospices or terminal care facilities, and often only when there is no physician available

In some medical examiner or coroner cases, the medical examiner or coroner will review the death certificate as signed by a physician and then co-sign the certificate if it is correctly and accurately completed. If death follows a live birth, a death certificate is completed. A separate fetal or stillbirth certificate is used for stillbirth cases, in which live birth did not occur.

## What is the Origin of the Death Certificate?

The World Health Organization (WHO) is a specialized agency of the United Nations, whose overall goal is for the people of all nations to attain the highest possible level of health. To achieve its goals, WHO must understand why people are dying in order to identify ways to improve health and prevent death. The United States is one of 192 member "states" (countries or nations) that form the WHO. As a "signatory" of the WHO, The United States must agree to follow various rules and regulations developed by the WHO. One of the things the WHO does is to develop standardized ways to collect health and cause-of-death information so information from multiple countries may be compared. Thus, each member "state" of the WHO has developed a standard model death certificate that is based on WHO requirements.

The National Center for Health Statistics (NCHS, administratively part of the Centers for Disease Control and Prevention, Atlanta, Georgia, but based in Hyattsville, Maryland) publishes a "U.S. Standard Certificate of Death," the most recent version having been approved in 2003. Through a cooperative agreement between the various states and NCHS, states agree to base their individual state death certificates on the U.S. model. In this way, information for different states may be compared, all states collect data in a similar format, and NCHS is then able to prepare national statistics, which can be compared with other countries around the world.

Thus, each state has a standard certificate of death that is required by state law or vital statistics regulations to be used in that state. Each state's death certificate may vary a little from the other states in size and content, but each state does collect information in a format similar to all other states.

When a death certificate is officially filed at the county or state level, it is considered to have been "registered." Thus, there are two phases in completing the death certificate:

- **Certification.** Completing the cause and circumstances of death information and having the certificate be signed by the physician, medical examiner, or coroner who serves as the "certifier" of death.
- **Registration.** The process of officially filing the death certificate with the county or state, which is usually done by the funeral director.

There are two things that drive the process and make it successful:

- Funeral directors must complete their duties to be paid for their services by the family, and part of their duties include filing of the death certificate. This provides an incentive for funeral directors to complete the filing (registration) process.
- The National Center for Health Statistics, through the cooperative agreement with the states, pays the states for the death information they provide to NCHS. To be paid, the state must provide the data in an acceptable format, and that format is based on the U.S. Standard Certificate of Death.

So, there are incentives to collect death information in a standard format and to get the information filed (registered) with the state so it can be forwarded to the federal level.

## Importance of the Death Certificate

The death certificate records the fact that a given person has died. It is useful to the family to settle the estate, clarify the circumstances of death, and come to closure. It is a permanent record that may also be used in legal proceedings to prove that a person is dead.

The death certificate is also a source for local, state, national, and international mortality statistics used for public health purposes and by the government for the planning and funding of programs and research. Further, death certificate data are useful to the medical profession for identifying disease etiologies, evaluating diagnostic or therapeutic techniques, examining medical or mental health conditions that may be found in specific groups of people, and pointing to areas where medical research may have the greatest impact on reducing mortality.

As discussed below, what starts off in the certifier's hands (the death certificate) is passed through many other hands and is used for a multitude of purposes, ultimately at the national and even international levels. It should be self-evident that specific information is more valuable than general information, and that accuracy and completeness is of the utmost importance to the various users of death certificate information.

## Physician Responsibilities

If death will not be certified by a medical examiner or coroner, it is the responsibility of the attending physician to complete the cause-of-death section of the death certificate. In some states, failure to do so may be a violation of state law or vital records code. Regardless of whether state law requires it, the attending physician has the professional responsibility of completing the death certificate and should not shirk that duty. Completion of the death certificate may be considered as part of the patient's end-of-life care.

Some states allow ready access to copies of death certificates, while most do not. Regardless of whether death certificates are regarded as open or closed records, the certifier of death should report the cause of death as objectively, completely, and accurately as possible based on information available at the time.

Physicians also need to be aware of:

- State and local regulations regarding deaths that must be reported to the medical examiner or coroner
- How to complete the relevant portions of the death certificate (topic of this book)
- How to make the signed death certificate available to the funeral director for filing
- How to assist local or state registrars by promptly responding to queries or other inquiries
- State or local laws that require a death certificate to be filed within a specified number of days following death (usually 2 to 10 days)
- How to file a supplemental report or amendment of the cause of death if autopsy or other information shows the cause of death to be significantly different from what was originally reported on the death certificate
- Ways to write cause-of-death statements that communicate the same essential information as a concise clinical history would, while telling the story of the patient's death in a logical, clear, and medically sound sequence (topic of this book)
- Applicable state laws regarding death certificates, medical examiners, and coroners

## Responsibilities of Various Parties

As outlined in the NCHS publication, *Physicians' Handbook on Medical Certification of Death* (available at www.cdc.gov), the responsibilities of various parties usually adhere to the following outline.

**Funeral Director**

- Obtains personal facts about the decedent
- Obtains certification of the cause of death from the certifying physician, coroner, or medical examiner
- Obtains authorization for final disposition of the body, in accordance with state law
- Completes the personal and disposition sections of the death certificate
- Files the completed certificate with the local or state vital records registrar's office per state law

**Certifier of Death (Physician, Medical Examiner, or Coroner)**

- Completes the cause-of-death section of the death certificate and signs certificate
- Completes information on decedent name (in margin) as well as date, time, and place of death
- Forwards signed certificate to the funeral director

**Local Registrar, City or County Health Department**

- Verifies completeness and accuracy of certificate
- Queries incomplete or inconsistent information
- If authorized by state law, makes copy or index for local use
- If authorized by state law, issues authorization to funeral director for final disposition
- Sends certificate to state registrar
- Uses data in allocating medical and nursing services (health department)
- Follows up on infectious diseases (health department)
- Plans programs (health department)
- Measures effectiveness of service (health department)
- Conducts research studies (health department)

**State Registrar or Office of Vital Statistics**

- Queries incomplete or inconsistent information
- Maintains files for permanent reference and serves as source of certified copies
- Develops vital statistics for use in planning, evaluating, and administering state and local health activities and for research studies
- Compiles health-related statistics for state and civil divisions in the state for groups interested in the fields of medical science, public health, demography, and social welfare
- Sends data for all deaths filed to the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS)

**CDC-NCHS**

- Evaluates quality of state mortality statistics and works with states to assure quality
- Compiles national mortality data and runs edits to fully process data
- Prepares and publishes national mortality statistics
- Constructs official U.S. life tables and actuarial tables
- Conducts health and social research studies
- Conducts research and methodological studies on vital statistics methods
- Maintains a continuing technical assistance program to improve quality and usefulness of data
- Provides leadership in development of standard certificates, reports, and model laws

## Approach to Learning About Cause-of-Death Statements

To learn how to write high-quality and complete cause-of-death statements, important concepts will be covered in the following order:

- Certifier of death
- Underlying cause of death
- Other significant conditions
- Immediate cause of death
- Intermediary (or intermediate) causes of death
- Manner of death
- Additional examples
  - – Sequential Part I format
  - – Single line Part I format
- Qualifying the cause of death
- Generic cause of death

Then, the above concepts will be expanded in the context of certain case types or topics that may pose dilemmas when writing cause-of-death statements. Topics include:

- External causes such as injury or poisoning
- How injury occurred
- Place of injury
- Address where injury occurred
- Injury at work
- Terminal events, nonspecific processes, and mechanisms of death

Additional topics are presented that are not integral parts of the cause-of-death statement itself, but are important to understand. These include:

- Name of deceased
- Dates and times
- Pronouncement of death
- Interval between onset and death
- Role of tobacco
- Pregnancy status
- Autopsy performance and utilization
- Queries conducted by registrar
- Amending (changing) a death certificate; supplemental reports
- General “rules”

## What Does a Death Certificate Look Like?

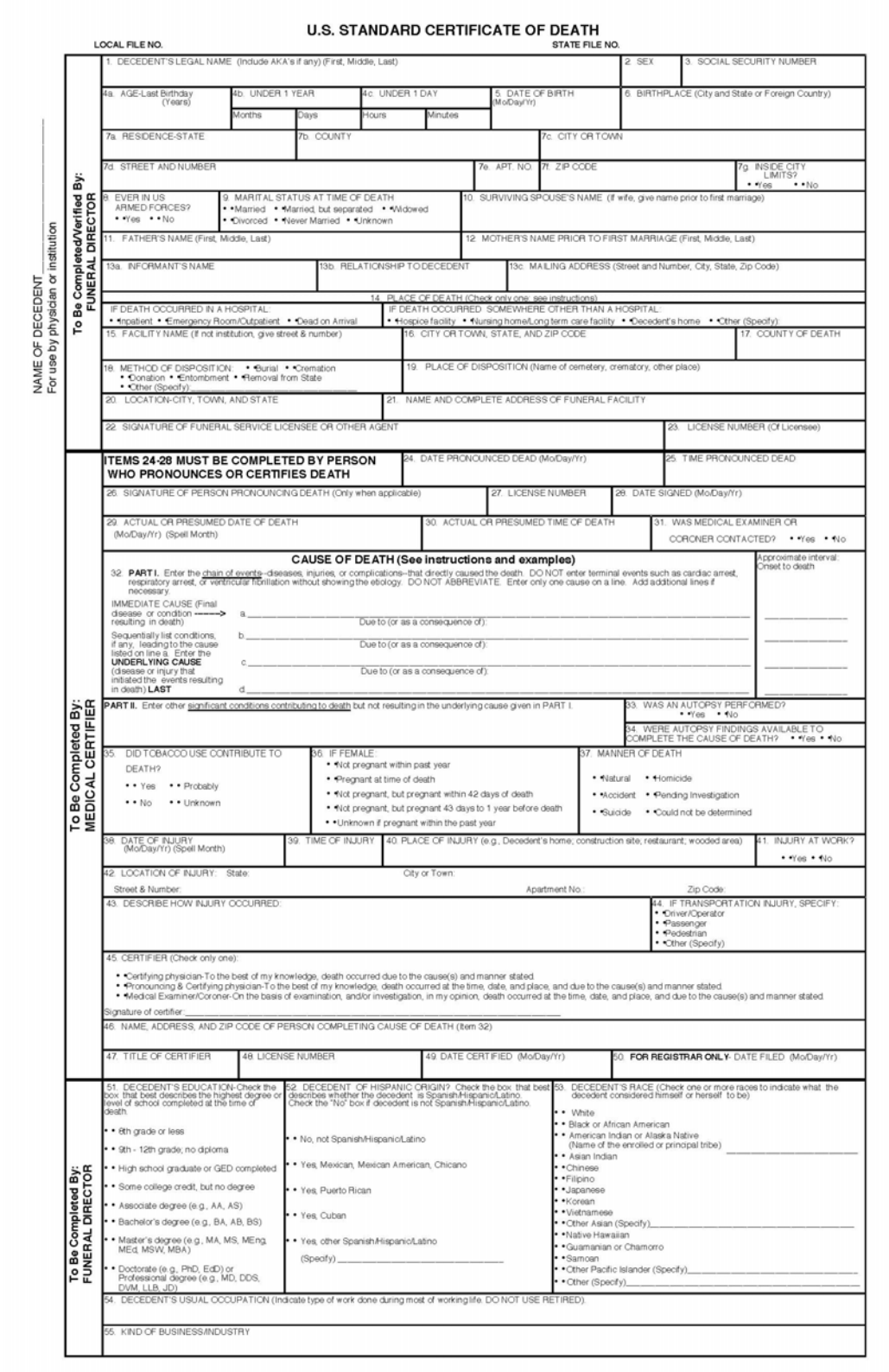
A copy of the 2003 U.S. Standard Certificate of Death appears on the following page. It is printed on a legal-sized piece of paper and designed with perforations, allowing the lower section to be torn off.

The main thing to realize is that there are three sections, as follows:

1. **Demographic and personal information about the deceased,** as well as disposition of the remains, all to be completed by the funeral director.

2. **The cause-of-death section,** to be completed by the medical examiner, coroner, or physician who will certify the death and sign the death certificate. This basic summary will concentrate on section 2.

3. **An administrative section,** to be completed by the funeral director, which contains race, ethnicity, education, and occupational information.



## U.S. STANDARD CERTIFICATE OF DEATH

LOCAL FILE NO. STATE FILE NO.

NAME OF DECEDENT
For use by physician or institution

**To Be Completed/Verified By: FUNERAL DIRECTOR**

1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last) | 2. SEX | 3. SOCIAL SECURITY NUMBER

4a. AGE-Last Birthday (Years) | 4b. UNDER 1 YEAR: Months, Days | 4c. UNDER 1 DAY: Hours, Minutes | 5. DATE OF BIRTH (Mo/Day/Yr) | 6. BIRTHPLACE (City and State or Foreign Country)

7a. RESIDENCE-STATE | 7b. COUNTY | 7c. CITY OR TOWN

7d. STREET AND NUMBER | 7e. APT. NO. | 7f. ZIP CODE | 7g. INSIDE CITY LIMITS? • Yes • No

8. EVER IN US ARMED FORCES? • Yes • No | 9. MARITAL STATUS AT TIME OF DEATH • Married • Married, but separated • Widowed • Divorced • Never Married • Unknown | 10. SURVIVING SPOUSE'S NAME (If wife, give name prior to first marriage)

11. FATHER'S NAME (First, Middle, Last) | 12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)

13a. INFORMANT'S NAME | 13b. RELATIONSHIP TO DECEDENT | 13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)

14. PLACE OF DEATH (Check only one; see instructions)

IF DEATH OCCURRED IN A HOSPITAL: • Inpatient • Emergency Room/Outpatient • Dead on Arrival

IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: • Hospice facility • Nursing home/Long term care facility • Decedent's home • Other (Specify)

15. FACILITY NAME (If not institution, give street & number) | 16. CITY OR TOWN, STATE, AND ZIP CODE | 17. COUNTY OF DEATH

18. METHOD OF DISPOSITION: • Burial • Cremation • Donation • Entombment • Removal from State • Other (Specify)

19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)

20. LOCATION-CITY, TOWN, AND STATE | 21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY

22. SIGNATURE OF FUNERAL SERVICE LICENSEE OR OTHER AGENT | 23. LICENSE NUMBER (Of Licensee)

**To Be Completed By: MEDICAL CERTIFIER**

**ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH**

24. DATE PRONOUNCED DEAD (Mo/Day/Yr) | 25. TIME PRONOUNCED DEAD

26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable) | 27. LICENSE NUMBER | 28. DATE SIGNED (Mo/Day/Yr)

29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Spell Month) | 30. ACTUAL OR PRESUMED TIME OF DEATH | 31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? • Yes • No

**CAUSE OF DEATH (See instructions and examples)**

Approximate interval: Onset to death

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. _____ 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.

33. WAS AN AUTOPSY PERFORMED? • Yes • No

34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? • Yes • No

35. DID TOBACCO USE CONTRIBUTE TO DEATH? • Yes • Probably • No • Unknown

36. IF FEMALE: • Not pregnant within past year • Pregnant at time of death • Not pregnant, but pregnant within 42 days of death • Not pregnant, but pregnant 43 days to 1 year before death • Unknown if pregnant within the past year

37. MANNER OF DEATH • Natural • Homicide • Accident • Pending Investigation • Suicide • 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) | 41. INJURY AT WORK? • Yes • No

42. LOCATION OF INJURY: State: City or Town: Street & Number: Apartment No.: Zip Code:

43. DESCRIBE HOW INJURY OCCURRED:

44. IF TRANSPORTATION INJURY, SPECIFY: • Driver/Operator • Passenger • Pedestrian • Other (Specify)

45. CERTIFIER (Check only one):

• Certifying physician-To the best of my knowledge, death occurred due to the cause(s) and manner stated.
• Pronouncing & Certifying physician-To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner stated.
• Medical Examiner/Coroner-On the basis of examination, and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner stated.

Signature of certifier: _____

46. NAME, ADDRESS, AND ZIP CODE OF PERSON COMPLETING CAUSE OF DEATH (Item 32)

47. TITLE OF CERTIFIER | 48. LICENSE NUMBER | 49. DATE CERTIFIED (Mo/Day/Yr) | 50. **FOR REGISTRAR ONLY**- DATE FILED (Mo/Day/Yr)

**To Be Completed By: FUNERAL DIRECTOR**

51. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death. • 8th grade or less • 9th - 12th grade; no diploma • High school graduate or GED completed • Some college credit, but no degree • Associate degree (e.g., AA, AS) • Bachelor's degree (e.g., BA, AB, BS) • Master's degree (e.g., MA, MS, MEng, MEd, MSW, MBA) • Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)

52. DECEDENT OF HISPANIC ORIGIN? Check the box that best describes whether the decedent is Spanish/Hispanic/Latino. Check the "No" box if decedent is not Spanish/Hispanic/Latino. • No, not Spanish/Hispanic/Latino • Yes, Mexican, Mexican American, Chicano • Yes, Puerto Rican • Yes, Cuban • Yes, other Spanish/Hispanic/Latino (Specify) _____

53. DECEDENT'S RACE (Check one or more races to indicate what the decedent considered himself or herself to be) • White • Black or African American • American Indian or Alaska Native (Name of the enrolled or principal tribe) _____ • Asian Indian • Chinese • Filipino • Japanese • Korean • Vietnamese • Other Asian (Specify)_____ • Native Hawaiian • Guamanian or Chamorro • Samoan • Other Pacific Islander (Specify)_____ • Other (Specify)_____

54. DECEDENT'S USUAL OCCUPATION (Indicate type of work done during most of working life. DO NOT USE RETIRED).

55. KIND OF BUSINESS/INDUSTRY

REV. 11/2003

## The Cause-of-Death Section

This basic summary will concentrate on the cause-of-death section because it is the part of the death certificate completed by the attending physician, medical examiner, or coroner. The following generic template will be used to provide examples of *cause-of-death statements.* Note that the cause-of-death statement contains Part I and Part II. The use of Part I and Part II will be described in further detail below. This general template for the cause-of-death statement is applicable to each state.

| | |
|---|---|
| Part I | A. |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

The items shown above are the critical ones in terms of the cause-of-death statement itself. Other related items, such as dates, places, times, role of tobacco, pregnancy information, and other items in the cause-of-death section, will be discussed individually because they are not as integrally related to the cause-of-death statement itself, and there are rules and procedures that need to be discussed for each item.

In general, the cause-of-death section is designed to record a sequence of conditions in Part I and to list other significant contributing conditions in Part II.

| | |
|---|---|
| Part I | A. **Most recent condition** |
| | Due to, or as a consequence of:<br>B. **An older condition** |
| | Due to, or as a consequence of:<br>C. **An even older condition** |
| | Due to, or as a consequence of:<br>D. **Oldest condition (what started it all)** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Something that contributed to death but did not cause the sequence listed above in Part I** |

## General Concepts Applicable to All Death Certificates

### Certifier of Death

The certifier of death is the physician, coroner, or medical examiner who completes the cause-of-death section of the death certificate and signs the certificate to attest that the named decedent died of the causes stated, and at the place, date, and time stated. The cause of death reported is the best opinion of the certifier, based on available information, and may be changed later, if needed. There is little liability in serving as certifier unless one is arbitrary or capricious.

### Underlying Cause of Death

The *underlying cause of death* is the disease or injury (or poisoning) that initiated the chain of events that led directly and inevitably to death.

**Case Scenario 1.** A 68-year-old man with well-documented coronary artery disease, requiring nitroglycerin, is found dead in bed. An autopsy is not performed, and it is unknown whether he had an acute myocardial infarction or a fatal dysrhythmia without infarction. The family was well known to the personal physician who had been treating him, and there was no evidence of injury or foul play. Based on information known to the physician, the underlying cause of death is coronary artery atherosclerosis, because it started the chain of events leading to death.

| | |
|---|---|
| Part I | A. **Coronary artery atherosclerosis** |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

When writing cause-of-death statements, the certifier should try to write only one condition on each line used in Part I, as shown above. When more than one condition is listed on a given line, the person coding the cause of death for mortality statistics purposes may be confused about which is the most important. As with all rules, the one-condition-per-line rule occasionally needs to be broken or liberally interpreted to accurately report the cause of death. Some subsequent examples will illustrate this "bending of the rules."

## Other Significant Conditions (Part II)

*Other significant conditions* are pre-existing or coexisting diseases or injuries that contributed to death but did not result in the underlying cause of death. They may also include conditions that resulted from the underlying cause of death but could not be reported in Part I because of space limitations. Subsequent examples below will illustrate these points.

**Case Scenario 2.** The history is exactly the same as Scenario 1, except the man also has a significant history of hypertension, based on blood pressure recordings and EKG and x–ray findings that show left ventricular hypertrophy. The physician believes that coronary artery atherosclerosis was the most significant clinical problem, but that the enlarged heart from long-standing hypertension exacerbated the condition by increasing oxygen and blood flow demand.

| | |
|---|---|
| Part I | A. **Coronary artery atherosclerosis** |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Hypertension** |

The hypertension was a coexisting condition that contributed to death but did not result in the coronary artery atherosclerosis. Thus, hypertension is reported in Part II as an other significant condition.

## Immediate Cause of Death

An underlying cause of death may result in a subsequent, more acute condition that actually causes death. An *immediate cause of death* is the final disease, injury, or complication—resulting from the underlying cause of death—that directly caused death.

**Case Scenario 3.** A 55-year-old woman had a long-standing history of hypertension. Over the years, she developed progressive renal failure, which ultimately required dialysis. Dialysis became progressively less effective, and she died with severe uremia.

| | |
|---|---|
| Part I | A. **Dialysis-dependent renal failure** |
| | Due to, or as a consequence of:<br>B. **Hypertension** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

Dialysis-dependent renal failure is the *immediate* cause of death, and hypertension is the *underlying* cause of death. Hypertension started the chain of events and led to renal failure, which directly caused death and therefore is the *immediate* cause of death.

**Case Scenario 4.** A 54-year-old woman had been treated for hypertension for more than 10 years. She arrived at the emergency room complaining of severe headache. She soon became unresponsive and died. Autopsy showed an intracerebral hemorrhage in the basal ganglia, which had ruptured into the ventricular system of the brain.

| | |
|---|---|
| Part I | A. **Intra-cerebral hemorrhage** |
| | Due to, or as a consequence of:<br>B. **Hypertension** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

Intracerebral hemorrhage, especially in the basal ganglia region, is a known complication of hypertension. Hypertension is the *underlying* cause of death, and intracerebral hemorrhage (stroke) is the *immediate* cause of death.

## Intermediary Cause of Death

For some deaths, the sequence of disease (or injury) involves conditions that occur at a time between the underlying and immediate causes of death. These are often referred to as *intermediate* or *intermediary* causes of death.

**Case Scenario 5.** An elderly woman with senile dementia is bedridden. She develops decubitus ulcers, which are difficult to prevent and treat. Eventually, she develops wound infection with fatal systemic sepsis.

| | |
|---|---|
| Part I | A. **Systemic bacterial sepsis** |
| | Due to, or as a consequence of:<br>B. **Infected decubitus ulcers** |
| | Due to, or as a consequence of:<br>C. **Bedridden state from senile dementia** |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

In this example, infected decubitus ulcers are an *intermediary* cause of death. Systemic bacterial sepsis is the *immediate* cause of death, and senile dementia is the *underlying* cause of death. For practical purposes, "Bedridden state from senile dementia" may be regarded as one condition and is an example of lightly "bending the rules."

It should be apparent from the above examples that the *underlying* cause of death should always be present on the lowest line that is used when completing Part I of the cause-of-death statement. So, the underlying cause is "underlying" in two senses: it is the underlying process that started the chain of events leading to death, and it physically underlies any intermediary or immediate causes of death also listed in Part I of the cause-of-death statement. It's the "bottom line."

## Manner of Death

In 1910, *manner of death* was added to the U.S. Standard Certificate of Death to assist nosologists, who code and classify deaths for statistical purposes. The categories of manner of death are:

- Natural
- Homicide
- Suicide
- Accident
- Undetermined (or "Could not be Determined")

Practical, functional, *medical* (not legal) definitions for each manner of death are:

- **Natural.** Death is due solely to natural disease and/or the aging processes.
- **Homicide.** Death results from an intentional or volitional act of one person against another.
- **Suicide.** Death results from an intentional self-inflicted act intended to due self harm, cause one's own death, or put one's self at imminent risk of injury or death.
- **Accident.** Death results from an injury, poisoning, or intoxication that was unintentional.
- **Undetermined (or "Could not be Determined").** Insufficient information is available to assign a manner of death or to distinguish between two or more possible manners of death.

Full discussion of manner of death is beyond the scope of Part I of this book. For more detailed discussion of the issues, see *A Guide for Manner of Death Classification,* published by the National Association of Medical Examiners (NAME), reprinted in Part V of this book.

In general, if an injury or poisoning caused or contributed to death, even if underlying disease was substantial, preference is given to a non-natural manner of death when classifying manner of death. Basically, if it were determined that death would not have occurred when it did had the injury or poisoning not occurred, a non-natural manner of death would be assigned. In most states, deaths due to non-natural causes must be investigated and certified by the medical examiner or coroner. Know your local laws.

A box exists on the death certificate to indicate manner of death. In some states, the manner of death is written in text form, as shown below. In other states, the box contains a list of options, and the appropriate manner of death is checked. The U.S. Standard Certificate of Death has check boxes.

| | |
|---|---|
| Part I | A. **Cardiac tamponade** |
| | Due to, or as a consequence of:<br>B. **Rupture of myocardium** |
| | Due to, or as a consequence of:<br>C. **Myocardial Infarction** |
| | Due to, or as a consequence of:<br>D. **Coronary artery atherosclerosis** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

| |
|---|
| Manner of Death<br>**Natural** |

Note that this example contains the *underlying* cause of death (coronary artery disease), the *immediate* cause of death (cardiac tamponade), and two *intermediary* causes of death (myocardial infarct and rupture of myocardium).

**Additional Examples**

**Case Scenario 6.** An elderly woman with senile dementia is bedridden. She develops decubitus ulcers, which are difficult to prevent and treat. Eventually, she develops wound infection with fatal systemic sepsis. She also had diabetes, with associated vascular disease and predisposing her to infections.

| | |
|---|---|
| Part I | A. **Systemic bacterial sepsis** |
| | Due to, or as a consequence of:<br>B. **Pseudomonas infection of decubitus ulcers** |
| | Due to, or as a consequence of:<br>C. **Immobility and bedridden state** |
| | Due to, or as a consequence of:<br>D. **Senile dementia** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Diabetes mellitus** |

| |
|---|
| Manner of Death<br>**Natural** |

This is an example of a s*equential Part I format*, in which Part I contains the underlying, immediate, and intermediary causes of death. Also, Part II has been used to report an other significant condition. The manner of death (natural) is indicated. Note that the cause-of-death statement was reported in a slightly different way than it was in

Scenario 5 (page 14), which was a very similar case. Immobility and bedridden state were indicated as an intermediary cause of death, with senile dementia being listed as the underlying cause. Many times, the format of the cause-of-death statement is a matter of style rather than substance, and several acceptable options may exist for reporting the cause of death.

In general, to assist in coding and classification, an attempt should be made to report only one condition per line in Part I. It is perfectly fine to list more than one condition in Part II as other significant conditions. The next example illustrates these principles.

**Case Scenario 7.** A person 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.

| | |
|---|---|
| Part I | A. **Hepatic encephalopathy** |
| | Due to, or as a consequence of:<br>B. **Cirrhosis of liver** |
| | Due to, or as a consequence of:<br>C. **Chronic alcoholism** |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Bleeding esophageal varices, pneumonia** |

| |
|---|
| Manner of Death<br>**Natural** |

Note the following in the example above:

- A sequential Part I format has been used
- Only one condition is listed per line in Part I.
- Bleeding varices contributed to death and resulted from the chronic alcoholism, but did not result in the chronic alcoholism. It is therefore appropriate to report bleeding varices in Part II.
- Pneumonia contributed to death and resulted from the chronic alcoholism, but did not result in the chronic alcoholism. It is therefore appropriate to report pneumonia in Part II.
- It is acceptable to report more than one condition in Part II.

In some cases, there is insufficient information to prepare a sequential Part I format.

**Case Scenario 8.** An elderly man has terminal lung cancer (small cell) with metastases to the brain. He dies and an autopsy is not performed because death was expected and his terminal disease is known. In such cases, a s*ingle line Part I format* may be used as below, so-called because only one line (Line A) is used in Part I.

| | |
|---|---|
| Part I | A. **Small cell carcinoma of lung with metastasis to brain** |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

| |
|---|
| Manner of Death<br>**Natural** |

**Qualifying the Cause of Death**

It is acceptable to use the word “probable” or “presumed” to qualify a cause of death when certainty about the cause of death is lacking.

**Case Scenario 9.** A 67-year-old man has known coronary artery disease. At home, he has chest pain and goes to the emergency room, dying before a diagnosis can be made.

| | |
|---|---|
| Part I | A. **Probable acute myocardial infarct** |
| | Due to, or as a consequence of:<br>B. **Coronary artery atherosclerosis** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

| |
|---|
| Manner of Death<br>**Natural** |

### Generic Cause of Death

It is acceptable to be generic when a specific natural cause of death is not known.

**Case Scenario 10.** A 92-year-old woman dies in her sleep. Her only known medical condition is diabetes mellitus, for which she was taking oral medications.

| | |
|---|---|
| Part I | A. **Unspecified natural causes** |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Diabetes mellitus** |

| |
|---|
| Manner of Death<br>**Natural** |

"Unspecified natural causes" should only be used when absolutely necessary, and it should be realized that for statistical coding purposes, death would be attributed to diabetes mellitus because it is the only specific condition listed on the death certificate. If a condition did not contribute to death, do not report it in the cause-of-death statement unless state or local regulations require otherwise.

## Deaths Due to External Causes Such as Injury or Poisoning

When death results from external causes such as injury or poisoning, the manner of death is not natural, and additional information must be completed on the death certificate. If you are not serving as a medical examiner or coroner, you may not be authorized to complete such death certificates. Know the laws and procedures in your state. Usually, such deaths must be certified by a medical examiner or coroner. The items that follow are required when the manner of death is homicide, suicide, accident, or undetermined (and external causes are involved).

## The Cause-of-Death Statement

Similar to the concept of immediate, intermediary, and underlying cause of death, deaths due to injury or poisoning (overdose or fatal drug toxicities, poisons, etc) can often be reported by including the following in the cause-of-death statement:

- **Fatal derangement** as the immediate cause of death
- **Bodily trauma** as an intermediary cause of death
- **Injury event** as the underlying cause of death

| | |
|---|---|
| Part I | A. **Intra-thoracic hemorrhage** |
| | Due to, or as a consequence of:<br>B. **Penetrating wound of left lung** |
| | Due to, or as a consequence of:<br>C. **Stab wound of left anterior chest** |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Pneumothorax** |

| |
|---|
| Manner of Death<br>**Homicide** |

| | |
|---|---|
| Part I | A. **Peritonitis** |
| | Due to, or as a consequence of:<br>B. **Laceration of jejunum** |
| | Due to, or as a consequence of:<br>C. **Blunt force trauma of abdomen** |
| | Due to, or as a consequence of:<br>D. **Fall from height** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

| |
|---|
| Manner of Death<br>**Accident** |

## Describe How Injury Occurred

When death results from external causes such as injury or poisoning, information must be provided to describe how the injury occurred. The newest version of the U.S. Standard Certificate of Death now has more space to describe how injury (or poisoning) occurred

than previous versions. The way in which injury occurred should be as complete as possible but should not allude to specific persons. For example, one should not indicate "shot by wife." The non-natural *manner of death* also needs to be specified, of course.

| | | |
|---|---|---|
| Part I | A. **Intra-thoracic hemorrhage** | |
| | Due to, or as a consequence of:<br>B. **Perforating wounds of heart and left lung** | |
| | Due to, or as a consequence of:<br>C. **Gunshot wound of posterior thorax** | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Pneumothorax** | |
| Manner of Death<br>**Homicide** | | Describe How Injury Occurred<br>**Shot by other(s) with rifle** |

A similar format can be followed for at least some types of poisonings. For example:

| | | |
|---|---|---|
| Part I | A. **Probable cardiac dysrhythmia** | |
| | Due to, or as a consequence of:<br>B. **Chlorinated hydrocarbon toxicity** | |
| | Due to, or as a consequence of:<br>C. **Inhalation of paint fumes** | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Accident** | | Describe How Injury Occurred<br>**"Huffing." Sprayed paint into paper bag and inhaled toxic fumes.** |

In some cases, injuries may be so extensive or so complicated that it may be necessary to be somewhat generic, such as using a single line Part I format and indicating the cause of death as simply "Gunshot wound of torso" or "Cocaine poisoning." Judgment is required to be specific, yet not oversimplify or randomly select one immediate cause while ignoring others that may have been equally or more important.

### Place of Injury

A box exists in the cause-of-death section to indicate the type of place where a fatal injury occurred. These should be somewhat generic and should not include the specific names of a business or establishment. Typical examples of entries for place of injury are:

- In own home
- Another's house
- Parking lot
- Fast food restaurant
- Interstate highway ramp
- Four-lane roadway
- Car in driveway
- Wooded area
- Office building
- Vacant house
- River
- Lake

In some instances, it may be necessary to specify that a person was "found" at a certain location. For example, if a body were shot and then later dumped in the woods, it may be desirable to specify "Found in woods."

### Location of Injury

This item should include the street name and address, city or town (mailing address if an unincorporated area), state, and zip code of the place where injury occurred or where the dead body of a fatally injured person was "found."

### Injury at Work

This item should be answered "Yes," "No," or rarely "Unknown." Whether or not an injury is regarded as occurring at work may not be as straightforward as it seems. To assist in completing this item, the following guidelines may be used, as developed by the National Association of Public Health Statistics and Information Systems (NAPHSIS), the National Center for Health Statistics (NCHS), the National Institute of Occupational Safety and Health (NIOSH), and other centers within the CDC.

**Injury at Work**

Injury while working or in vocational training on job premises
Injury while on break or at lunch or in parking lot on job premises
Injury while working for pay or compensation, including at home
Injury while working as a volunteer law enforcement official, etc
Injury while traveling on business, including to/from business contacts

**Injury <u>Not</u> at Work**

Injury while engaged in personal recreational activity on job premises
Injury while a visitor (not on official work business) to job premises
Homemaker working at homemaking activities
Student in school
Working for self for no profit (mowing yard, repairing own roof, hobby)
Commuting to or from work

## Example of Completion of All Injury-Related Items

Below is an example of a case involving injury in which all required injury-related items are reported in the cause-of-death section of the death certificate.

| | | | |
|---|---|---|---|
| Part I | A. **Splenic rupture with intra-abdominal hemorrhage** | | |
| | Due to, or as a consequence of:<br>B. **Contusion of spleen** | | |
| | Due to, or as a consequence of:<br>C. **Blunt force trauma of abdomen** | | |
| | Due to, or as a consequence of:<br>D. **Motor vehicle crash** | | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | | |
| 37. MANNER OF DEATH<br>**Accident** | 38. DATE OF INJURY<br>**Jan. 19, 1995** | 39. TIME OF INJURY<br>**Approx. 2:30 a.m.** | |
| 40. PLACE OF INJURY<br>**City street** | | 41. INJURY AT WORK?<br>**No** | |
| 42. LOCATION OF INJURY<br>**619 Slippery Trail**<br>**Catapolis, Georgia 33996** | | 43. DESCRIBE HOW INJURY OCCURRED<br>**Driving car. Struck curb.**<br>**Vehicle struck a tree.** | |

## Terminal Events, Nonspecific Processes, and Mechanisms of Death

*Terminal events* are final common pathways to death and include such conditions as:

- Cardiac arrest
- Respiratory arrest
- Cardiopulmonary arrest
- Asystole
- Ventricular fibrillation
- Electromechanical dissociation

These terminal events do not provide useful information and should not be included in cause-of-death statements.

A *nonspecific anatomic process* is a complication or sequel of an underlying causes of death and may be a macroscopic or microscopic alteration that may have functional consequences and more than one possible cause. A typical example is cirrhosis, which can be the end result of more than one disease.

A *nonspecific physiologic derangement* (may also be referred to as a *mechanism of death*) is a nonspecific functional disturbance that is a complication of an underlying cause of death and that may have more than one cause. A typical example is hemorrhage.

It is appropriate to include important nonspecific processes and derangements in cause-of-death statements as an immediate or intermediary cause of death, but the underlying cause of death also needs to be reported.

The following list includes just some of the nonspecific processes and derangements that do not stand on their own as an underlying cause of death. If such conditions are reported on the death certificate, a specific underlying cause of death should also be reported, when possible.

Abscess
Abdominal hemorrhage
Adhesions
Adult respiratory distress syndrome
Acute myocardial infarction
Altered mental status
Anemia
Anoxia
Anoxic encephalopathy
Arrhythmia
Ascites
Aspiration
Atrial fibrillation
Bacteremia
Bedridden
Biliary obstruction
Bowel obstruction
Brain injury
Brain stem herniation
Carcinomatosis
Cardiac dysrhythmia
Cardiomyopathy
Cellulitis
Cerebral edema
Cerebrovascular accident
Cerebellar tonsillar herniation
Chronic bedridden state
Cirrhosis
Coagulopathy
Compression fracture
Congestive heart failure
Convulsions
Decubiti
Dehydration
Dementia (when not otherwise specified)
Diarrhea
Disseminated intravascular coagulopathy
Dysrhythmia
End-stage liver disease
End-stage renal disease
Epidural hematoma
Exsanguination
Failure to thrive
Fracture
Gangrene
Gastrointestinal hemorrhage
Heart failure
Hemothorax
Hepatic failure
Hepatitis
Hepatorenal syndrome
Hyperglycemia
Hyperkalemia
Hypovolemic shock
Hyponatremia
Hypotension
Immunosuppression
Increased intracranial pressure
Intracranial hemorrhage
Malnutrition
Metabolic encephalopathy
Multi-organ failure
Multi-system organ failure
Myocardial infarction
Necrotizing soft-tissue infection
Old age
Open (or closed) head injury
Paralysis
Pancytopenia
Perforated gallbladder
Peritonitis
Pleural effusions
Pneumonia
Pulmonary edema
Pulmonary embolism
Pulmonary insufficiency
Renal failure
Respiratory arrest
Seizures
Sepsis
Septic shock
Shock
Starvation
Subdural hematoma
Subarachnoid hemorrhage
Sudden death
Thrombocytopenia
Uncal herniation
Urinary tract infection
Ventricular fibrillation
Ventricular tachycardia
Volume depletion

A nonspecific process or derangement may be included in the cause-of-death statement if it meets the following criteria:

- It is a recognized, potentially fatal complication of the underlying cause of death.
- It comprises part of the sequence of conditions that led to death.
- It is not a symptom or sign.
- Its existence in the patient would not be apparent unless stated in the cause of death.
- Its inclusion does not represent oversimplification of the facts.
- An etiologically specific, underlying cause of death is also reported, when possible.

**Case Scenario 11**. A chronic alcoholic man developed cirrhosis, portal hypertension, asterixis, hyperammonemia, and hepatic encephalopathy, which resulted in respiratory arrest and asystole.

When formulating the cause-of-death statement for Scenario 11, some of the conditions may be excluded by applying the “rules” outlined above:

- Chronic alcoholism
- Cirrhosis
- Portal hypertension
- ~~Asterixis~~ (A sign)
- ~~Hyperammonemia~~ (Existence apparent and its an oversimplification)
- Hepatic encephalopathy
- ~~Respiratory arrest~~ (Terminal event)
- ~~Asystole~~ (Terminal event)

Chronic alcoholism is the underlying cause of death that resulted in all of the other conditions. Cirrhosis is a nonspecific process, and hepatic encephalopathy is a nonspecific derangement. Their inclusion in the cause-of-death statement tells why this patient died of chronic alcoholism, compared to other possibilities, such as bleeding varices. Whether to include portal hypertension in the cause-of-death statement would be a matter of personal preference.

A reasonable cause-of-death statement for Scenario 11 is:

| | | |
|---|---|---|
| Part I | A. **Hepatic encephalopathy** | |
| | Due to, or as a consequence of:<br>B. **Cirrhosis of liver** | |
| | Due to, or as a consequence of:<br>C. **Chronic alcoholism** | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Natural** | | Describe How Injury Occurred |

One can read this cause-of-death statement without any history and know the patient's clinical course and specifically why and how he died from chronic alcoholism.

## Ancillary Information

### Name of Deceased

Because physician or hospital records may not include the complete or full name of the deceased, and because families may wish to have the name of the deceased shown as the deceased may have wanted it (such as including a nickname), it is best to write the deceased's name in the margin of the certificate, as it appears in your records, in the place provided in the margin of the death certificate. The funeral director may then complete the deceased's name in the box provided in Section 1 of the death certificate.

## Dates and Times

In most items requiring a date, it is acceptable to use than standard Month/Day/Year format. However, to avoid confusion with other date formats, the following should be reported by spelling out the month and using the 4-digit year, such as January 22, 2005:

- Date of death
- Date pronounced dead
- Date death certificate signed

For date of death, the date may be specified as "Actual," "Approximate," or "Found." Try to be as accurate as possible. If unqualified, the date indicated is assumed to be "Actual."

It is best to use the military time system: 0000 is midnight, and 2359 is 1 minute before midnight. 0000 is the start of the day. So, if a person died at midnight (0000) between January 21 and January 22, the date of death would be January 22.

## Pronouncement of Death

The date and time that the decedent was pronounced dead should always be known. Enter the date using the Month/Day/Year format, such as September 6, 2005. Enter the time using military time.

## Interval Between Onset and Death

Adjacent to each line in Part I of the cause-of-death statement is a place to indicate the known or approximate interval between the onset of each condition and death. A major use of this information is to assist the nosologist, who codes the causes of death, by assuring that they are listed in the correct order: most recent first, then older conditions on each subsequent line below.

| | | |
|---|---|---|
| Part I | | Approximate interval between onset and death |
| | A. **Pulmonary embolism** | **Minutes** |
| | Due to, or as a consequence of:<br>B. **Deep leg vein thrombosis** | **Several days** |
| | Due to, or as a consequence of:<br>C. **Pathologic fracture of left femoral neck** | **5 days** |
| | Due to, or as a consequence of:<br>D. **Osteoporosis** | **Years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

It is acceptable to use “approximately” or “unknown,” if needed. Generic terms, such as seconds, minutes, hours, days, weeks, months, years, or decades, will provide useful information if such generic intervals are the best that can be stated. Try to be as specific as possible when reporting the interval between the onset of each condition and death.

**Tobacco Use**

Tobacco use or exposure is associated with many health problems and is also a subject of great political interest. For these reasons, the U.S. Standard Certificate of Death contains a specific box to indicate whether tobacco use or exposure caused or contributed to death. The options are:

- Yes
- No
- Probably
- Unknown

Typical examples might include a smoker who developed emphysema or lung caner thought to have resulted from such smoking. If injuries resulted from smoking, such as a house fire caused by smoking or an explosion triggered by lit tobacco, “Yes” should be reported. In states that do not have the specific box for tobacco use, instructions provided by the state may require that tobacco use be reported in Part II or elsewhere on the certificate.

**Pregnancy Status**

Maternal mortality data are used by multiple agencies, and maternal mortality is one measure of the overall quality of the health care delivery system. The U.S. Standard Certificate of Death has a specific box to indicate pregnancy status. Some states incorporate the box on their death certificates, while others request pregnancy information in another item such as Part II. If the state’s death certificate follows the U.S. Standard format, the certifier should report the appropriate selection from the following list of choices:

- Not pregnant within the past year
- Pregnant at time of death
- Not pregnant, but pregnant within 42 days of death
- Not pregnant, but pregnant within 1 year before death
- Unknown if pregnant within the past year

For males, the item is left blank. For females of non-childbearing age, the “Not pregnant within the past year” option should be checked. In states that do not have the specific box for pregnancy status, report pregnancy status following instructions for your state’s death certificate.

## Autopsy Performance and Utilization, Coroner Notification

In the "Was an Autopsy Performed" box, indicate whether an autopsy was performed (Yes or No). Even if the autopsy was a partial (limited) one, the Autopsy box should read "Yes." "Partial Autopsy" or "Limited Autopsy" may be indicated if space allows. If only an external postmortem examination of the body was conducted, the autopsy box should read "No."

In the "Were Autopsy Findings Available to Complete the Cause of Death" box, indicate whether autopsy findings were available and were used to complete the cause-of-death statement on the death certificate (Yes or No).

In the "Was Medical Examiner or Coroner Notified" box, indicate whether the coroner (or medical examiner) was notified of the death (Yes or No).

## Queries Conducted by Registrars

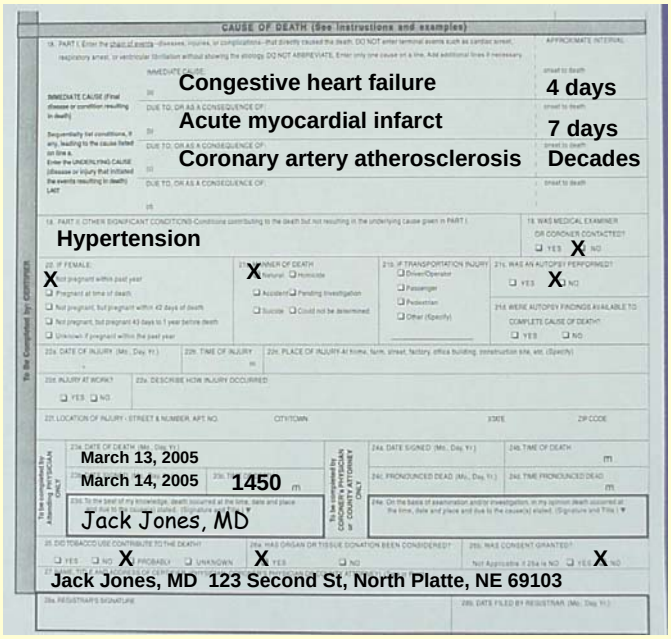
A query occurs when the registrar must contact the certifier or funeral director to inquire about the accuracy or completeness of information on the death certificate. Registrars conduct queries of various extent based on staffing, funding, and the quality of certificates in a given region. In some states, queries are limited only to death certificates that have major problems or missing information, or if a cause of death is so unusual that verification of the cause is needed (such as anthrax). In other states, queries are more extensive and are geared toward collection of more specific or complete information than originally provided. If you are queried by the registrar, you should respond promptly and cooperate with the registrar in addressing the issues.

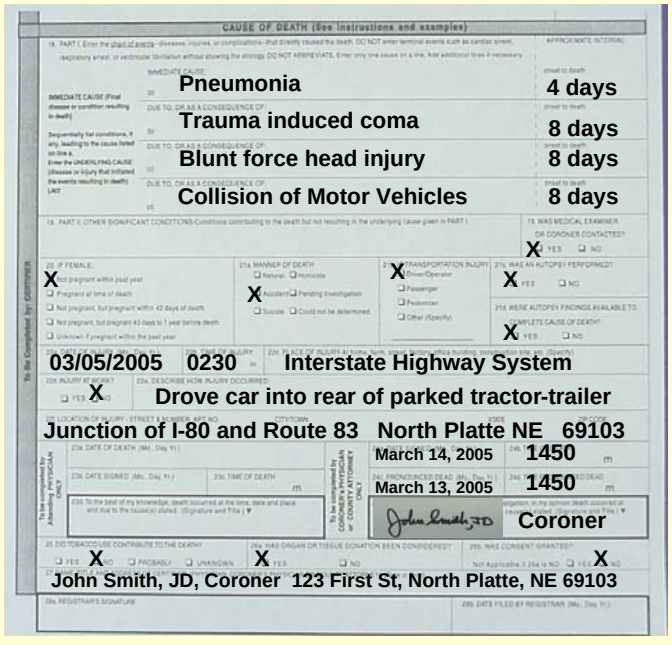
## Amending (Changing) a Death Certificate, Supplemental Reports

Each state has procedures to follow if information on the death certificate needs to be changed (amended) or if a supplemental report is required on a death certificate originally filed with the cause of death listed as "Pending." Some states have specific forms for these purposes, while in other states, the certifier may write a letter to the registrar indicating which items need to be changed or updated and what the deletions and changes will be. Know which procedures are required in your state. In most states, amendments must be made within six months to a year or the updated information will not get carried through to the national level. Try to avoid having to make amendments or filing supplemental reports, when possible. If they are required, do them as quickly as possible following the death.

## Examples

Using the Nebraska death certificate as an example (it is very similar to the U.S. Standard Certificate of Death), below are sample death certifications for a natural death and for an injury-caused death:



### General "Rules"

- Make sure the death certificate form is the current one required by the state.
- Make legible entries in permanent black ink.
- Do not abbreviate unless specific item instructions request abbreviations.
- Do not make alterations, erasures, or use whiteout.
- Forward the certificate to the funeral director within the time frame required by the state.

## Closing Thoughts

There are general "rules" that should be followed, when possible, but it is not always possible to follow all "rules" and report the death as it needs to be reported. Recognizing that it is not always possible to adhere strictly to the "rules," the following are goals that one should try to attain:

- Try to use a sequential Part I format when sufficient information exists to do so.
- Always try to cite a specific underlying cause of death.
- When an external cause is listed in Part I or Part II, indicate the appropriate non-natural manner of death, and complete all injury related items.
- Try to limit conditions to one condition per line in Part I.
- Recognize that a descriptive phrase may be construed as a single condition, such as "Coronary Artery Disease aggravated by Cocaine Intoxication, " or "Acute Myocardial Infarction complicated by Drowning." This little "trick" can be very useful when writing cause-of-death statements.

Also, remember that there are a variety of case types that can "slip through the cracks," with failure to appropriately report the death to the coroner or medical examiner, because death is often delayed and it is forgotten that death resulted from an external cause. Typical examples are:

- A fall with hip fracture or head injury
- Post-traumatic seizure disorder
- Complications of paralysis from an old injury
- Subdural, subarachnoid, or epidural hemorrhage that may have been due to an injury and without an established natural cause
- Pulmonary embolism from immobility due to an injury
- Pneumonia as a complication of injury or poisoning
- Peritonitis following ruptured viscera that may have had a traumatic cause
- Complications of prolonged coma following a drug overdose or old injury

- Sepsis following an injury (such as a burn) or poisoning
- Complications of medical treatment or diagnosis that may be considered non-natural

The most important thing to remember is that content (substance) is more important than form. The major goal is to get the important conditions listed in the cause-of-death statement in a logical sequence, with an appropriate manner of death and injury information, as applicable. At the same time, an effort should be made to apply general principles for format, recognizing that standard formats will not always work.

# Part II
# Protocol for Writing Cause-of-Death Statements for Natural Causes

*The following protocol is included in this book because:*

- *The protocol is historic in the sense that it was among the first guidelines for death certification other than those prepared by the federal government*
- *It contains practical information for the certification of deaths due to natural causes*
- *It reinforces principles contained in other parts of this book*

*Originally prepared by the Autopsy Committee of the College of American Pathologists, the protocol was the basis for the "Practice Protocol for Writing Cause-of-Death Statements for Natural Causes," published in the* Archives of Internal Medicine *in 1996 (Volume 156, pages 25-26). The protocol is printed here in its original form, with minimal edits, and is still applicable today. It serves as a brief set of guidelines for certifying deaths due to natural causes and may be especially helpful for physicians who do not serve in the capacity of a medical examiner or coroner. The protocol may be useful for those who need to develop relatively succinct institutional policies, procedures, or guidelines.*

## Introduction

The physician's role in completing death certificates varies among institutions and medical specialty areas. These guidelines are generally applicable and are offered as a basic approach for *any physician* who must, on occasion, write the cause of death on a death certificate or other medical report. The guidelines pertain mainly to deaths resulting from *natural causes* (diseases) and include information about the cause of death as it relates to autopsy reporting.

The death certificate serves two basic purposes: it documents the fact of death for legal and other uses, and it provides data for vital statistics and public health policy. Uniformity and consistency in the approach to writing cause-of-death statements serve both purposes and are especially helpful to the latter. This protocol is offered to promote uniformity and consistency when writing cause-of-death statements. For additional information and examples concerning completion of the death certificate, readers should consult the handbooks prepared by the National Center for Health Statistics (see Part VIII, "Bibliography and Suggested Reading").

## Prerequisites

**Be familiar with the concept of a cause-of-death statement.** A cause-of-death statement consists of the wording written in the format used on a death certificate to indicate the cause(s) of death and other significant conditions that contributed to death.

**Be familiar with the death certificate form(s) used in your locality,** especially the space on the form for the cause-of-death statement and the small number of other information items that the physician who signs the death certificate is required to complete.

**Be familiar with local regulations and procedures for completing and filing the death certificate.** Specifically, know the requirements for timely completion of the death certificate, the options for filing a certificate as "pending" for completion at a later date, and the provisions and requirements for amending a death certificate once it has been filed. Instruction manuals can usually be obtained from the state vital statistics office or the local death certificate or vital records registrar who, in most areas, is a county-level agent within the health department or county government.

**It is essential that you be familiar with local laws that describe the types of death that must be reported to the medical examiner, coroner, or other such authority in your locality.** In general, these are deaths that are known or suspected to have resulted from the immediate or delayed effects of intentional or unintentional injury (or poisoning), regardless of the interval between onset and death, or deaths that are sudden and unexpected and for which no reasonably certain explanation is available. Because statutes may also require the investigation of specific types of deaths (such as deaths in legal custody, on-the-job deaths, anesthetic- or therapy-related deaths, and various others), knowledge of local law is essential. Know to whom such deaths should be reported and whether deaths are to be reported to the medical examiner or coroner in the county (or other jurisdiction) where the *death* occurred, or the county (or other jurisdiction) where the *events leading to death* occurred.

**Be familiar with the concept of manner of death.** Manner of death is a classification of death based on the type of conditions that cause death and the circumstances under which they occur. In addition to the cause of death, the manner of death is stated in a separate place on the death certificate. Deaths that are solely due to disease or the aging process are regarded as being **natural** in manner. Deaths resulting from injury or poisoning (external causes) are *unnatural* and are **homicidal, suicidal,** or **accidental** in manner, depending on whether the injury or poisoning is intentional or unintentional, and whether it is self-inflicted or inflicted by another person or external condition. Deaths in which the manner cannot be determined are usually described as **undetermined** in manner. In general, deaths that are known or suspected of being other than natural in manner should be reported to, and will usually be investigated and certified by, the medical examiner or coroner. Most physicians who are not serving as a medical examiner or coroner will be

concerned primarily with death certificates for persons whose manner of death is natural—the subject of this protocol.

**Know how to properly indicate a natural manner of death** on the death certificate used in your locality.

## Preliminary Steps

When faced with the foreseeable duty of completing a death certificate, do the following:

1. Determine whether the death is reportable to the medical examiner (or coroner) or other such authority; if it is reportable, verify whether it has been reported. If the death is reportable but has not been reported, you should report it. If you are in doubt as to whether the death is reportable, report it. The medical record should reflect when, to whom, and by whom a death has been reported. If the medical examiner (or coroner) declines to accept a case for investigation, documentation in the medical record of a waiver number provided by the medical examiner (or coroner) may also be helpful.

2. If the medical examiner (or coroner) accepts the case for official investigation, he or she will complete and sign the death certificate; you do not need to proceed any further except to comply with procedural instructions issued by the medical examiner (or coroner), under provisions of local law.

3. If the death does not come under the jurisdiction of the medical examiner (or coroner), or if the medical examiner (or coroner) has been notified of the death and declines to accept the case, determine whether another physician is required (by law or by hospital policy) or would be better qualified to complete the death certificate. Aside from possibly having a legal obligation to certify the death, the decedent's attending, pronouncing, or personal physician may have more comprehensive knowledge of the patient's medical problems and history, and be able to more accurately state the likely cause of death. If such a physician can be found, encourage the physician to complete and sign the death certificate; if there is no such physician, proceed as outlined below.

## Completing the Cause-of-Death Statement

If you complete the cause-of-death section of the death certificate and sign your name on the death certificate, you are attesting that, to the best of your knowledge, the person named on the certificate died from the cause(s) of death stated. You thus become the certifier of death. The stated cause of death represents your *opinion*; however, if your opinion should change, the death certificate can be amended at a later time.

Before it is completed, the portion of the death certificate that contains the cause-of-death statement usually resembles the diagram below.

| | |
|---|---|
| Part I | A. |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

A cause-of-death statement can consist of two parts. Part I is a series of lines on which causes of death can be entered, one below the other, to indicate a sequence of causes that led to death. Part I consists of lines A through D in the previous example. Part II allows the certifier to cite other significant conditions, pre-existing conditions, or coexisting conditions that contributed to death. Part I must be completed in all cases; Part II is used only when applicable. Although Part I consists of multiple lines, it is not always necessary to use all of the lines, and, in fact, some cause-of-death statements can consist of a single line. In Part I, each line that is used should contain only one disease (condition). In Part II, more than one condition may be listed as other significant conditions.

If necessary, the certifier may insert additional lines into Part I of the cause-of-death statement.

The **underlying cause of death** is the disease (condition) that started the train of morbid events that lead to death. It is the one disease (condition) that occurred first in time and that initiated and was ultimately responsible for any subsequent disease, condition, or complication that resulted in death. It is “the cause of death boiled down” or “the bottom line.” The underlying cause of death should be stated as etiologically specific as possible. Other words have been used to describe the underlying cause of death, but using words such as “proximate” can have specific legal meaning and should be avoided.

The **immediate cause of death** is the final disease (complication) that resulted from the underlying cause of death. It is the last (most recent) event that occurred before death.

An **intermediate cause of death** is a disease (condition) or complication that occurs sometime between the underlying cause of death and the immediate cause of death. Other words have sometimes been used to describe an intermediate cause of death, but using words such as "intervening" can have specific legal meaning and should be avoided.

The underlying cause of death, an intermediate cause of death, and an immediate cause of death have a sequential cause-and-effect relationship when read from bottom to top in Part I of the cause-of-death statement. They are placed in Part I of the cause-of-death statement, with the most recent condition (the immediate cause of death) at the top (on line A), and with each antecedent condition, going backward in time, on progressively lower lines so that the underlying cause of death appears on the lowest line completed.

Underlying, intermediate, and immediate causes of death should only be written in Part I of the cause-of-death statement. This concept is illustrated in the diagram below:

| | |
|---|---|
| Part I | A. **Immediate Cause** (eg, Upper gastrointestinal hemorrhage) |
| | Due to, or as a consequence of:<br>B. **Intermediate Cause** (eg, Ruptured esophageal varices) |
| | Due to, or as a consequence of:<br>C. **Intermediate Cause** (eg, Cirrhosis of the liver) |
| | Due to, or as a consequence of:<br>D. **Underlying Cause** (eg, Chronic alcoholism) |

Of course, the words "immediate cause," "intermediate cause," and "underlying cause" in the previous example are for illustrative purposes only and are not written on the death certificate—only the causes themselves are written.

It is not always necessary to use all of the lines (lines A-D) in Part I. The following examples are additional formats that may be used to complete Part I of the cause-of-death statement:

| | |
|---|---|
| Part I | A. **Immediate Cause** (eg, Pneumocystis carinii pneumonia) |
| | Due to, or as a consequence of:<br>B. **Intermediate Cause** (eg, Acquired immunodeficiency syndrome) |
| | Due to, or as a consequence of:<br>C. **Intermediate Cause** (eg, Human immunodeficiency virus infection) |
| | Due to, or as a consequence of:<br>D. |

| | |
|---|---|
| Part I | A. **Immediate Cause** (eg, Spontaneous pneumothorax) |
| | Due to, or as a consequence of:<br>B. **Intermediate Cause** (eg, Chronic obstructive pulmonary disease) |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |

| | |
|---|---|
| Part I | A. **Underlying Cause** (eg, Alzheimer's dementia)<br>(also serves as the Immediate Cause) |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |

The single line Part I format shown in the last example (Alzheimer's dementia) should only be used when the underlying cause of death is known and there is insufficient information to cite a separate immediate cause of death. In such a case, it would also be acceptable to write "Complications of Alzheimer's dementia" as the underlying cause of death.

All cause-of-death statements must include an underlying cause of death in Part I. Regardless of the number of lines completed in Part I, the lowermost completed line in Part I contains the underlying cause of death and is the most important line in the cause-of-death statement.

**Other significant conditions** are coexisting or pre-existing conditions that contributed to death but do not result in the underlying cause of death listed in Part I. Other significant conditions are cited in Part II. For example, if hypertension (with left ventricular hypertrophy) and diabetes (with small vessel disease) contributed to heart disease and death in a person whose major problem was chronic ischemic heart disease from coronary artery disease, the cause-of-death statement might be completed as shown below:

| | |
|---|---|
| Part I | A. **Chronic ischemic heart disease** |
| | Due to, or as a consequence of:<br>B. **Atherosclerotic coronary artery disease** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Hypertension, diabetes mellitus** |

In this example, hypertension and diabetes are coexisting conditions that contributed to death, and although they are risk factors for atherosclerotic coronary artery disease, they are not causes of atherosclerotic coronary artery disease. Thus, in a case such as this one, they are most appropriately cited as other significant conditions. Some states may require that selected conditions, such as recent pregnancy, be listed as other significant conditions even if the condition did not contribute to death. Such local requirements should be followed, when applicable.

In summary, a cause-of-death statement must include an underlying cause of death and may include an immediate cause of death, one or more intermediate cause(s) of death, and one or more other significant conditions. Any of these may consist of an injury or poisoning (external causes). In general, when an injury or poisoning is involved, the death is not due solely to natural causes and should be reported to the medical examiner (or coroner).

## Case Example of a Cause-of-Death Statement

**Case history.** A 47-year-old male had a well-documented history of alcohol abuse and alcohol withdrawal seizures. A previous liver biopsy showed micronodular cirrhosis and metastatic carcinoma that was subsequently shown to originate in the colon. His alcohol abuse continued; he was ultimately admitted to the hospital with asterixis and was found to have hepatic encephalopathy. He lapsed into hepatic coma, developed respiratory arrest, ventricular fibrillation, and cardiac arrest, and then died. An autopsy confirmed the cirrhosis and also disclosed a small, localized, papillary carcinoma of the thyroid in addition to the colon carcinoma, with extensive liver metastases.

| | |
|---|---|
| Part I | A. **Hepatic encephalopathy** |
| | Due to, or as a consequence of:<br>B. **Cirrhosis of liver** |
| | Due to, or as a consequence of:<br>C. **Chronic alcoholism** |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Adenocarcinoma of colon, metastatic to liver** |

**Analysis and comment.** The underlying cause of death (ie, the specific disease or condition that started the train of morbid events leading to death) is "Chronic alcoholism." Alcoholism resulted in "Cirrhosis of the liver," which serves as an intermediate cause of death, which, in turn, culminated in the complication of "Hepatic encephalopathy," which serves as the immediate cause of death. As this example shows, it is not always necessary to use all of the lines that are available in Part I.

Cirrhosis of the liver and hepatic encephalopathy are nonspecific processes because they can have more than one cause, but their presence in this cause-of-death statement is clearly explained by a specific underlying cause of death (chronic alcoholism) on a lower line in the cause-of-death statement. The underlying cause of death should be stated as etiologically specific as possible, as should any intermediate and immediate cause of death.

The patient's liver failure may well have been partially related to the coexistence of metastatic adenocarcinoma in the liver. However, the metastatic carcinoma did not cause the chronic alcoholism. Therefore, it is appropriately listed as an other significant condition because it was coexisting and probably contributed to hepatic insufficiency and death. The thyroid carcinoma did not contribute to death and is therefore not included in the cause-of-death statement (unless required in the state where the death is reported).

Mechanistic terminal events, such as respiratory arrest, cardiac arrest, asystole, ventricular fibrillation, electromechanical dissociation, and cardiopulmonary arrest, have an almost limitless differential diagnosis. They are agonal or terminal pathophysiologic or biochemical derangements that are common final pathways that explain how a cause of death exerts its lethal effect. In general, mechanistic terminal events should not be used in cause-of-death statements because they are extremely nonspecific and are of little value for mortality statistics that are derived from death certificates.

In the example, one could argue that hepatic encephalopathy (a nonspecific process) is a mechanism and need not appear in the cause-of-death statement. However, the words "hepatic encephalopathy" do conjure up a relatively small set of differential diagnoses, and their presence in the cause-of-death statement in this case is helpful by indicating that death occurred in an encephalopathic fashion, as opposed to a hemorrhagic fashion from ruptured varices. Thus, although not absolutely necessary, inclusion of "hepatic encephalopathy" in the cause-of-death statement in this case does provide some useful information—much more than would be gained by adding "cardiac arrest" as the immediate cause of death.

There is often more than one acceptable way to write a cause-of-death statement. For this case scenario, the underlying cause of death could be written as "Alcoholic cirrhosis" because alcoholic cirrhosis is a single condition that is etiologically specific.

Judgment is required when writing a cause-of-death statement. A good rule is to include sufficient information to tell a story about the sequence of diseases (conditions), nonspecific processes, and complications leading to death, being sure not to omit an underlying cause of death that is stated as etiologically specific as possible.

## Common Mistakes

**Reversing the order of immediate, intermediate, and underlying cause of death**. Because the lines in Part I are lettered A through D from top to bottom, many certifiers inadvertently place the first disease (or condition) to occur (the underlying cause of death) on the top line (A) and then list subsequent diseases (conditions) on progressively lower lines (B, C, D). Thus, the cause-of-death statement reads backwards, and the nosologist who codes the cause of death for vital statistics may code the underlying cause of death incorrectly. Certifiers should be aware of this potential problem and remember that the most recent disease (condition)—the immediate cause of death—should be listed on the top line, and the underlying cause of death should be listed on the last line completed in Part I.

**Citing mechanistic terminal events.** Unfortunately, when physicians cite mechanisms, they tend to omit a more specific underlying cause of death in the cause-of-death statement. In general, terminal events, such as asystole, electromechanical dissociation, cardiac arrest, respiratory arrest, and cardiopulmonary arrest, should not be cited in cause-of-death statements.

**Citing a nonspecific process as the underlying cause of death.** Cause-of-death statements often include a structural or functional nonspecific process with multiple possible causes, such as "gastrointestinal hemorrhage." Unfortunately, a specific underlying cause of death is sometimes omitted. It is acceptable, and often necessary, to include nonspecific processes in cause-of-death statements (particularly as an intermediate or immediate cause of death), but they should not be cited as an underlying cause of death and should not be included in cause-of-death statements unless they are further qualified by citing a more specific cause on a lower line or by stating that a more specific cause is not known (see "Other Considerations"). Remember, the underlying cause of death should be etiologically specific.

**Listing more than one condition per line in Part I.** To assist nosologists in the classification and coding of causes of death, official guidelines advise against listing more than one condition per line in Part I of the cause-of-death statement. Thus, although one may be tempted to attribute an underlying cause of death to "hypertensive and atherosclerotic heart disease," or an immediate cause of death in a patient with AIDS to "*Pneumocystis carinii* pneumonia and disseminated *Mycobacterium avium intracellulare* infection," official guidelines recommend against combining more than one condition per line. Instead, it is incumbent upon the certifier to select the *one* most important condition for listing in Part I and to list the other as an other significant condition. Following this recommendation does not violate the concept of an other significant condition since, although the condition listed in Part II may have been a *result of* the underlying cause of death, it does not *result in* the underlying cause of death.

**Losing sight of the underlying cause of death.** The clinical course is sometimes so protracted that the physician may lose sight of the underlying cause of the patient's problems. Thus, a certifier might attribute the underlying cause of death to a urinary tract infection, when in fact the urinary tract infection was caused by a catheter in a patient with a neurogenic bladder from multiple sclerosis. In such a case, multiple sclerosis is the underlying cause of death, and urinary tract infection is an intermediate or immediate cause of death. The certifier should distinguish between complications and the underlying cause of death, and the latter should appear on the lowermost completed line in Part I of the cause-of-death statement.

**Forgetting an injury or poisoning.** For patients who die of medical complications of an injury or poisoning, such as pneumonia following thermal burns or drug-induced coma, one may forget that the underlying cause of death was an injury (or poisoning), especially if the interval between the injury (or poisoning) and death was lengthy. Other common examples include pulmonary embolism after a fractured hip sustained in a fall or a fatal seizure disorder caused by remote head trauma, both of which have an injury as the underlying cause of death. Each time a death is to be certified, the potential certifier should evaluate whether an apparent medical cause of death is actually a complication of an injury or poisoning. If so, the death should be reported to the medical examiner, coroner, or other such authority.

**Inadequately documenting descriptive details of disease pathology.** The cause-of-death statement should include descriptive details relevant to the pathologic aspects of the cause of death. For example, deaths resulting from malignancies should include the primary site, grade, and cell type of the malignancy, if possible (eg, poorly differentiated adenocarcinoma of lung, right upper lobe). As another example, the cause-of-death statement for cerebrovascular deaths should specify not only the pathologic process (eg, cerebral infarction or intracerebral hemorrhage), if possible, but also the underlying cause of the process (eg, cerebral artery atherosclerosis). The wording in these two examples is preferable to "lung cancer" or "cerebrovascular accident," which provide little specific information.

## Other Considerations

### Qualifying the Underlying, Intermediate, or Immediate Cause of Death

It is acceptable to use "probable" or "presumed" in a cause-of-death statement to indicate some degree of uncertainty. As an example, if a person with no medical history or prior symptoms dies after having chest pain and EKG changes suggestive of infarction, but diagnostic criteria have not been fully met; the death has been reported to the medical examiner (or coroner), who for some reason has declined to accept jurisdiction in the case; permission for autopsy has been requested from but not granted by the next of kin; and you are faced with the duty of completing the death certificate, you may write "Probable atherosclerotic coronary artery disease" as the underlying cause of death.

| | |
|---|---|
| Part I | A. **Probable atherosclerotic coronary artery disease** |
| | Due to, or as a consequence of:<br>B. |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

The medical examiner (or coroner) should be notified and will usually investigate and certify a death when the underlying cause of death is not known, but such is not always the case. If the medical examiner (or coroner) will not be conducting an autopsy or signing the death certificate in such cases, permission for autopsy should be requested of the next of kin in order to determine a cause of death and provide more accurate information for completion of the death certificate. If permission for autopsy is not granted, the certifier may find it necessary to use a qualified cause-of-death statement such as the one in the example above.

Although qualifying words such as "probable" are not necessary, the qualifiers may assist the certifier and may be of help to any user of the cause-of-death statement by indicating uncertainty about the cause of death, when appropriate. Further, in the future, if nosologic codes were to incorporate the ability to code for degree of certainty regarding the cause-of-death statement, assessment of the degree of confidence in vital statistics may be facilitated, which may be of value to researchers and statisticians.

## Qualifying a Nonspecific Process

Every effort should be made, including performing an autopsy if possible, to identify an etiology-specific cause of death. If it is not possible to be etiologically specific when writing the underlying cause of death (not even to the point of stating that a condition is "probable" or "presumed"), the cause-of-death statement may include an indication that a specific cause is unknown or undetermined and due to natural causes, if injury and poisoning can be ruled out. Thus, if a person dies of upper gastrointestinal hemorrhage apparently caused by disease, the medical examiner (or coroner) has been notified but declines to investigate the death or sign the death certificate, permission for autopsy cannot be obtained, and the specific natural cause of the gastrointestinal hemorrhage is unknown or has not been determined with a reasonable degree of certainty, the immediate cause may be written as "Upper gastrointestinal hemorrhage," and the underlying cause indicated as "Undetermined natural cause."

| | |
|---|---|
| Part I | A. **Upper gastrointestinal hemorrhage** |
| | Due to, or as a consequence of:<br>B. **Undetermined natural cause(s)** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

If there was a history of gastric ulcer symptoms or some other inconclusive information pointing to ulcer disease as a likely cause for the hemorrhage, the nonspecific process could be qualified, as in the following cause-of-death statement:

| | |
|---|---|
| Part I | A. **Upper gastrointestinal hemorrhage** |
| | Due to, or as a consequence of:<br>B. **Probable gastric ulcer** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

Qualifying a nonspecific process is helpful because it assures a user of the cause-of-death statement that an underlying cause of death has not been omitted through the certifier's oversight or failure to recognize the underlying cause of death. Judgment is required to select the most appropriate statement of the cause of death, and qualifiers should be used only when necessary, as when an autopsy cannot be performed and sufficient information is not available.

**Risk Factors**

One of the motivating factors in developing a standard format for documenting causes of death was to ensure the acquisition of important epidemiologic data. Risk factors (such as intravenous drug abuse, cigarette smoking, obesity, and alcohol intoxication) are an important part of such databases. Consequently, as long as there is no conflict with local or state regulations and procedures, it may also be helpful to list relevant risk factors on the death certificate. However, existing guidelines and instructions are unclear as to when and how to report risk factors.

For example, if a person dies from human immunodeficiency virus (HIV) infection apparently contracted from intravenous drug abuse, how is this handled in the cause-of-death statement? Some states have modified their death certificate to allow for the inclusion of certain risk factors; other states have not. First, comply with any local death registration regulations that exist regarding risk factors. If guidelines for risk factors do not exist, or if they are inadequate, a risk factor known to have existed in the patient may be cited as an other significant condition.

| | |
|---|---|
| Part I | A. **Pneumocystis carinii pneumonia** |
| | Due to, or as a consequence of:<br>B. **Acquired immunodeficiency syndrome** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Intravenous drug abuse** |

As in this example, a risk factor may actually seem to be the underlying cause of death, but it is often quite difficult to prove a cause-and-effect relationship between a risk factor and death in a specific case, making one hesitant to cite the risk factor as the underlying cause of death. Other significant conditions, by definition, do not have a cause-and-effect relationship to the underlying cause of death, so it may seem incorrect to list a risk factor as an other significant condition when the risk factor may have been causally associated with death. Thus, some agreement on a conventional way to report risk factors is needed

to promote consistent reporting. The approach described above is offered as an option. Risk factors (such as obesity or smoking) for other underlying causes of death can be indicated in a similar fashion. Comply with local procedures if they exist. The new U.S. Standard Certificate has a specific place to indicate whether tobacco use caused or contributed to death.

If a risk factor is cited in the cause-of-death statement, it is advisable that there be documentation or reasonable probability that the risk factor existed.

## Completing a Death Certificate as "Pending"

If relevant information, such as autopsy reports, laboratory results, or medical records, will not be available by the death certificate filing deadline established by state vital records law, it is usually possible to file a pending certificate, which must be amended at a later date. Usually, a pending death certificate is completed as usual, but the cause of death is stated as "Pending further information." The death certificate in some states has been modified to allow specific indication that the cause of death is pending, such as providing a "Pending" option for manner of death. There is usually a requirement to complete the cause of death certificate within a specified time interval after the pending certificate is filed; consult your state or local vital records registrar for details. Filing a pending certificate in a timely fashion may assist the family by allowing them to proceed with personal matters brought about by the death, but pending certificates should not be used unless necessary.

## Correcting Errors: The Amendment Process

Most states have provisions and procedures to correct or update (amend) information on the death certificate. Amendment is usually a simple process and is encouraged in cases where it is warranted. Usually, amendments must be made in writing by the original certifier; there may be a requirement to make amendments within a specified time interval after the original death certificate was filed. Some states have a worksheet for making amendments. The local death certificate registrar can provide information about how to amend a death certificate.

If you become aware that a death certificate you have signed contains incorrect information, you should amend the death certificate to make it correct. If you become aware (by performing an autopsy or through other ways) that a death certificate completed by a certifier other than yourself is in error, you may contact the certifier and suggest that the certifier consider amending the death certificate.

An amended cause of death may involve causes that require that the death be reported to the medical examiner (or coroner). Be sure to consider this possibility when making amendments, and report appropriate cases to the medical examiner (or coroner).

Certifiers should be aware that a vital records registration or processing fee may be charged when an amendment is made, and that additional expense may be incurred by the funeral director or family.

## Interval Between Onset of Conditions and Death

For each condition listed in Part I of the cause-of-death statement, a space exists to indicate the approximate time interval between the onset of the condition and death. For each condition, the interval should be indicated as accurately as possible based on the certifier's assessment of available information. It is acceptable to list the interval as unknown or approximate, if such is the case. General intervals are also acceptable, such as seconds, minutes, hours, days, weeks, months, and several years. A range such as seconds to minutes, or other statement such as "Known for six years," may also be used. Stating the interval should not be approached casually—the information may be used to assess pre-existing conditions in some medicolegal settings or when insurance claims are processed. Stating the interval also serves as a check that the immediate, intermediate, and underlying causes of death have been written in the proper order.

The stated interval should be based on consideration of the clinical history, symptomatology, natural disease course, and knowledge of the potential uses of such information, not solely on the interval since diagnosis.

| | | |
|---|---|---|
| Part I | | Approximate interval between onset and death |
| | A. **Pneumocystis carinii pneumonia** | **3 weeks** |
| | Due to, or as a consequence of:<br>B. **Acquired immunodeficiency syndrome** | **3 years** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **5 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Intravenous drug abuse** | |

## The Cause of Death, Clinicians, and Autopsy Reporting

The autopsy is a useful tool to determine underlying, intermediate, and immediate causes of death and other significant conditions for the purpose of completing the death certificate. Permission for performing an autopsy should be requested by clinicians in cases where an autopsy may improve the accuracy of the death certificate. Some institutions may find it advantageous for the autopsy pathologist to certify the death when an autopsy is performed, making sure that the attending physician is consulted.

If an autopsy is performed, regardless of whether the death certificate is signed by a clinician or the autopsy pathologist, the death certificate should reflect relevant autopsy findings, if possible. A pending certificate may be filed if necessary, amending it at a later date.

A clinician who has obtained permission for autopsy and who will act as certifier should promptly contact the autopsy pathologist to discuss the autopsy findings so the death certificate can be accurately completed in a timely fashion. If the certifier does not contact the autopsy pathologist soon after autopsy findings are available, the autopsy pathologist should contact the certifier to discuss the autopsy findings.

If the death certificate has been signed prior to an autopsy, a copy of the death certificate should be provided to the pathologist to allow correlation with autopsy findings. If there is significant inconsistency between the autopsy findings and the cause of death on the death certificate, the pathologist should contact the certifier and suggest that the certifier amend the death certificate. If warranted, the certifier should amend the death certificate in such cases.

It is suggested that the autopsy report contain the cause-of-death statement that is written on the death certificate by the clinician, autopsy pathologist, or other certifier after necessary amendments, if any, have been made. Doing so will link autopsy findings with cause-of-death information from the death certificate, which may prove valuable for statistical analyses, autopsy-based studies, mortality reviews, and outcomes analysis. The autopsy pathologist and hospital may need to develop a procedure for obtaining a copy of the death certificate when an autopsy is performed.

## Other Details

The death certificate should not be used to make political or social statements—it should be completed objectively. The potential for survivors to perceive certain cause-of-death statements as intrusive or contrary to their interests should be considered but should not dictate the choice of wording in the cause-of-death statement.

The certifier is usually required to complete several items on the death certificate in addition to the cause-of-death statement. Consult the local vital records personnel for instructions, if necessary.

If the necessary equipment and software are not available to complete the death certificate electronically with a laser printer, type the death certificate using a black ribbon. If the certificate cannot be typed, hand print the certificate using black ink.

It is helpful to determine whether hospital policy addresses the circumstances under which the attending physician, pathologist, or other physician should or should not complete the death certificate of a hospitalized patient. If a policy does not exist or is ineffective in producing death certificates with cause-of-death statements of consistently good quality, work with hospital administration and the medical staff to develop an effective policy that is consistent with state or local laws and regulations and that includes quality assurance measures.

**Note.** The death certificate in most states is substantially based upon a U.S. Standard Certificate of Death developed by the National Center for Health Statistics and other interested parties, such as state vital record registrars. The standard certificate provides a reasonable vehicle to document causes of death. A major problem is that many physicians fail to use the vehicle as it was intended. This protocol was developed as an aid to individual certifiers and to provide basic information on the principles of death certification and promote uniformity and consistency in death certification practices.

# Part III
# The Medical Cause of Death Manual

*Part III is a revised version of* The Medical Cause of Death Manual: Instructions for Writing Cause of Death Statements for Deaths Due to Natural Causes, *originally published by the College of American Pathologists in 1994. It is included here because it contains some specific concepts and definitions that did not exist in print prior to its publication.* The Medical Cause of Death Manual *is geared toward the certification of natural deaths and, although the principles should be understood by any potential certifier of death, Part III may be most useful for physicians who are not working in the capacity of a medical examiner or coroner. Portions of* The Medical Cause of Death Manual *that are covered in Part IV of this book have been deleted from the version provided here.*

## Cause of Death: General Considerations

### Defining the Problem

The "cause of death" may vary, depending on each observer's own viewpoint of the situation. The trauma surgeon who is unsuccessful in controlling thoracic bleeding from a lacerated aorta in an auto crash victim might perceive hemorrhage as the cause of death. To the medical examiner who conducts the autopsy, the cause of that person's death might be blunt force trauma of the thorax. To an epidemiologist who studies mortality patterns, automobile accident might constitute the cause of death. In recognition of such varied viewpoints, Part III provides information to unify the viewpoint among persons who must formulate and put into words a cause of death for a death certificate, an autopsy report, or other medical document, using a format similar to the cause-of-death section on the death certificate.

To foster a unified viewpoint of the cause of death, certain concepts must be discussed, and certain terms must be defined in a manner that is clear to all readers. The emphasis on definitions may seem excessive, but they are provided with the goal of clarity and facilitation of communication regarding causes of death.

It is important to realize that causes of death, whether appearing on death certificates or elsewhere, may be systematically collected and used by governmental, public health, or other agencies for scientific study, decision making, planning, legislative change, or research and public health funding prioritization. It is therefore important that cause-of-death determinations be approached systematically and consistently, and that cause-of-death statements be meaningful. Therefore, concepts, definitions, and instructions designed to achieve such goals are provided.

Throughout Part III, the reader should remember that the term *cause of death* is used in the specific context of the death certificate format for indicating why a person has died, whether the cause of death is actually written or spoken.

## The Certifier of Death

The physician, coroner, or medical examiner who indicates the cause of death on a death certificate and signs the certificate attesting to the cause of death is referred to as the *certifier*. The certifier may or may not be the same person who was responsible for the care of the patient (the *attending physician*) or who pronounced the person dead (the *pronouncing physician*). The certifier is responsible for completing only a few items on the death certificate—the most important items being the cause(s) and circumstances of death.

Some physicians are hesitant to certify death if they do not know an exact cause of death. Such hesitancy is usually unwarranted. Although the cause of death should ideally be accurate and specific, legally it is not a guarantee of accuracy. When the certifier indicates a cause of death and signs the death certificate, the certifier bases the cause of death on available information and designates that the cause of death was due to the stated causes to the best of the certifier's knowledge. In essence, the cause of death as stated is the best opinion of the certifier. It is the certifier's duty to indicate a cause of death as accurately and as specifically as possible. Every effort should be made to base the cause of death on all information that is available from medical records, the attending and pronouncing physicians (if other than the certifier), and other sources (such as an autopsy report), if necessary. As will be subsequently discussed, the death certificate format allows for uncertainty, qualification, or probability when a cause of death is indicated, in recognition that medicine is not an exact science and an exact cause of death is sometimes elusive.

## Philosophical and Ethical Issues

Physicians serve as advocates for patients, but advocacy does not mean that the certifying physician should be untruthful or incomplete when stating a cause of death. The death of a patient is often perceived as a failure of medical science, the physician, the patient, or society. It is the certifying physician's duty to accurately document such failures on behalf of all of these parties.

The certifier must recognize the potential effects of cause-of-death wording. For example, attributing death to chronic alcoholism may embarrass or upset family members; citing drug abuse as a cause of death might provide information that can be used to contest, reduce, or negate life insurance benefits. However, factors such as family reputation and estate finances should not obscure the cause of death with the use of inaccurate language.

Rarely is the death certificate used as the sole source of information for legal or insurance purposes. Although the death certificate is a legal document, in many states its use in certain court or legal proceedings is restricted to providing proof of death, and the cause of death as indicated on the death certificate may not be admissible in legal proceedings as proof of the cause of death. These facts emphasize the point that, while certifiers should recognize the potential legal aspects of death certificates and the cause-of-death wording, certifiers should concentrate most on the medical and scientific content of the stated cause of death for reasons of accuracy, rather than legality.

In some states, attending physicians may not be legally required to certify the death of a patient, and, for a variety of reasons, some physicians prefer not to sign death certificates. Refusal to certify a death can cause delays for the family, funeral director, and other agencies. Further, certification may ultimately be performed by another certifier who has less knowledge of the patient's medical history, clinical course, agonal events, and actual cause of death. The attending physician should not abandon a patient's interests after the death of that patient, and, unless required otherwise by law, attending physicians should make every effort to ensure that the deaths of their patients are certified.

**Death Certificate Filing (Registration)**

The death certificate used in the 50 states usually contains space for demographic information about the decedent, as well as information about the decedent's parents, the informant, bodily disposition, the pronouncing physician, the certifier, and the cause and circumstances of death. The certifier completes the cause-of-death and certifier sections of the death certificate, while other parties and the funeral director usually complete the other portions (either before or after the cause of death is certified), depending on the case-specific circumstances and local procedures. The funeral director files the death certificate with a *registrar*, who may exist on the county level but often serves at the state level. Ultimately, the death certificate is filed at the state level, and, eventually, selected information is sent to the national level in electronic form for statistical purposes. Various degrees of coding and classification are conducted as the information passes along to the state and national levels. It may take a year or more for electronic information to be available at the national level. Only certain items of information are coded and passed "upward"; for some items, such as the name of the certifier or the name of the decedent, the original death certificate might be the only source where that information is documented.

Most states require that the death be certified and the certificate be filed with the registrar within a certain number of days following death (any time from 15 hours to 10 days; usually 48 to 72 hours), unless investigative needs require a longer period of time. Such time requirements might make the funeral director or certifier feel rushed and can interfere with accurate cause-of-death determination. This is especially true when longer periods of time might be required to review medical records, lab results, or an autopsy report. In most areas, there is an option to file a certificate with the cause or manner of

death listed as *pending* or *pending further study* (subject to updating at a later time). Usually, pending certificates must be finalized within a defined period of time; check with the registrar for details applicable to your area. The registrar should also be consulted for applicable details on how to file a pending certificate and subsequent supplemental report, and how to amend the certificate at a later time, if needed.

**Coding and Classification Issues**

Cause-of-death information on death certificates is used by government and other agencies to monitor morbidity and mortality as well as for scientific study, planning, public health strategies, legislative change, and research and public health funding prioritization. Therefore, it is important that the cause of death information be as accurate and complete as possible.

If a cause of death is stated improperly or not clearly, the person who classifies and codes the cause of death (a *nosologist*) uses a somewhat arbitrarily established system of rules to identify a cause of death for coding and official classification. Such factors might result in the death being coded to a cause that does not adequately reflect the real cause or circumstances of death. Or, if information is not clearly stated on the certificate, the registrar may need to conduct a query, in which the certifier has to be contacted by the registrar to clarify cause-of-death wording. Queries can consume the registrar's and certifier's valuable time. It is best to certify the death in an accurate and clear fashion on the first attempt.

Much of our cause-of-death determination and death registration procedure and policy is based on guidelines established by the World Health Organization (WHO). On the national level, death certificate information is collected and maintained by the National Center for Health Statistics in a format that enables compilation of national statistics, state-to-state comparisons, and comparisons to other countries that, like the United States, are signatories to the agreements of the WHO. The primary classification system for coding causes of death is based on the latest revision of the *International Classification of Diseases* (presently ICD-10), which is also based on WHO guidelines and recommendations.

Our national mortality statistics are derived from codes, which, in turn, have been derived from causes of death as written on death certificates by certifiers. The value of an accurately and clearly stated cause of death to ensure proper coding and classification of deaths cannot be overstated.

## Updating and Changing (Amending) a Cause of Death

After a death certificate is filed with the registrar by the funeral director, it can be corrected or changed (*amended*) by the certifier at a later date, if necessary. Or, for a certificate originally filed as pending, a supplemental report may need to be filed. Vital records registrars have specific procedures that must be followed; the registrar should be contacted for details if information on the death certificate is in need of change. It is important to correct death certificates in a timely fashion because updated information may not be carried to the state or national level after a certain amount of time (usually about one year) has passed since filing the death certificate. The best approach is to avoid the need for change by ensuring that the original death certificate is completed accurately, completely, and in a timely fashion, and that certificates are filed as pending only when necessary.

When the certifier becomes aware that the cause of death (or associated information) is erroneous or incomplete, or if more specific information becomes available, the certifier should contact the registrar to initiate the amendment process. When a physician who did not certify the death becomes aware that information on a death certificate is not correct or is incomplete (as might occur after an autopsy or if the patient had more than one physician), that physician should contact the original certifier and suggest that the death certificate be amended by the certifier, and perhaps, at the same time, offer some suggested wording as well.

Usually, amendments must be made in writing by the original certifier and within a defined period of time; check with the registrar for details. The original death certificate, after processing by the registrar, is usually filed at the state level in the state where death occurred. The registrar should be contacted to determine proper procedure for amending a death certificate, if instructions are not readily available (they often appear on or with the death certificate).

## When Duty Calls (What To Do)

When a physician who is not acting in the capacity of the medical examiner or coroner is faced with certifying a death, the following procedures should be followed.

**1. Evaluate whether the death is reportable to the medical examiner or coroner.** Each state has laws that require certain deaths to be reported to the medical examiner (ME) or coroner (C) for official medicolegal investigation. State laws vary substantially, and certifiers should be familiar with local law. In general, notification of the ME/C is required for deaths that are sudden, unexpected, and unexplained (lacking reasonable medical certainty); that occur when a person is in apparent good health; or if injury or poisoning is suspected or known as having caused or contributed to death. Deaths occurring under other specific circumstances, such as deaths of inmates, are frequently also reportable; again, familiarity with local law is essential. Local law should also be

consulted to determine whether the death is reportable to the ME/C in the county where death occurred or in the county where the incident that led to death occurred, which may differ. If it is unclear whether the death is reportable to the ME/C, it is wise to report it; there is no penalty for doing so. If the ME/C accepts the case and will certify the cause of death, there is no need for you to certify the death. If the ME/C will not certify the death or asks you to certify it, proceed to the next step.

**2. Evaluate whether there is a more appropriate certifier.** Physicians are sometimes asked to certify a cause of death for patients about whom they have little knowledge. For example, an on-call house officer who performs unsuccessful cardiopulmonary resuscitation on a patient may be asked to certify the death, although the patient's complete medical history is unknown to him or her. In this and other similar circumstances, an attempt should be made to identify and contact the attending physician or personal physician, who may be better able to accurately certify the cause of death. If a more suitable certifier does not exist or is not available, proceed to the next step.

**3. Certify the cause of death as accurately as possible.**

## The Pathologist and the Cause of Death

For hospitalized patients whose deaths need not be reported to the medical examiner or coroner, the attending physician (clinician) usually has responsibility for completing the cause of death section of the death certificate. Certain pathologists who are serving as medical examiners or coroners under the provisions of state or local law may be required by law to complete the cause-of-death section of the death certificate for some types of death. In some circumstances, hospital-based pathologists are required by hospital policy to certify deaths, especially when an autopsy is performed. Also, a pathologist who has performed an autopsy may become aware that the autopsy-based cause of death differs significantly from the cause of death that was suspected clinically and, perhaps, was written by the clinician on a death certificate that was filed before autopsy findings were available. The following general instructions might be helpful to those who face such circumstances.

- If an autopsy is to be performed, completion of the death certificate should be delayed (if practical) until sufficient autopsy findings are available. File an initial pending certificate if necessary, and complete a supplemental report after autopsy findings become available.
- If an autopsy is performed, the autopsy report should contain, if possible, the cause of death written in a format similar to that used on the death certificate.
- If a completed death certificate is available for review prior to completion of an autopsy report, the pathologist should evaluate whether the cause of death as stated on the death certificate is consistent with, and reflective of, autopsy findings. If there is significant discrepancy, the pathologist should contact the certifying physician and discuss possible amendment (change) of the death certificate.

- If a situation arises for the pathologist to certify the cause of death on the death certificate for a patient who had an attending physician, the certification should be performed in consultation with the attending physician, if possible.
- Hospitals should develop a strategy for certifying the deaths of patients when their attending physicians are not available to certify the death and the medical examiner or coroner also will not certify the death. The hospital pathologist can play an important role by helping develop the strategy and, perhaps, by certifying such deaths if approved to do so by the hospital.
- In addition to the many reasons for performing an autopsy, an autopsy should be requested if it might clarify the cause of death.

Pathologists should be familiar with instructions for writing the cause of death so the cause of death can be written in autopsy reports in the same format used on death certificates and for those occasions when the pathologist may be called upon to complete the death certificate. The pathologist can play a pivotal role in developing hospital strategies to ensure quality death certification.

**Perspective**

Although it may require a little time, thought, and circumspection, writing a cause of death is not a formidable task. The amount of information to be written is relatively small, and the endeavor is not time consuming once the writing has begun. Instructional manuals exist, as do resource persons such as registrars. Because they are in the business of death certification, medical examiners or coroners can be important allies and can sometimes provide valuable advice and guidance on how to state a cause of death—even for deaths that do not fall under their jurisdiction.

Attending physicians have an affirmative (and often legal) duty to ensure the certification of patient deaths. The cause of death on a death certificate or other similar document is the certifier's opinion; it is not etched in stone and it can be changed, if necessary. Although the certifier may face some pressure by the registrar, next of kin, or funeral director to complete the cause of death, certification can usually be delayed, if necessary, by filing a "pending" certificate and waiting until essential information is available to determine an accurate cause of death. Certification of the cause of death should be as prompt as possible, objective, and truthful.

Sooner or later, virtually anyone who writes causes of death will face dilemmas when selecting the wording. The circumstances surrounding some deaths simply do not allow for strict adherence to general instructions in all cases, and the certifier is sometimes faced with formulating a cause of death that may seem ambiguous or not entirely satisfactory. In such cases, the certifier should simply do the best he or she can and be able to explain why the wording in the stated cause of death was chosen. This is easiest to do when the basic concepts of death certification are understood.

## Forms, Formats, and Terminology

### The U.S. Standard Certificate of Death

The National Center for Health Statistics, in cooperation with state vital statistics offices and other interested organizations and individuals, periodically develops a *U.S. Standard Certificate of Death,* upon which the death certificates of the 50 states are based in design. The cause of death section of the standard certificate is based on guidelines established by the World Health Organization (WHO). Although death certificates vary in form in each state, the cause-of-death section that is to be completed by the certifier is quite similar in each of the 50 states. Items that may differ on death certificates can include information about conditions or circumstances under particular surveillance by an individual state, such as maternal deaths, alcohol-related fatalities, and other categories.

The focus of this discussion is the proper completion of the cause-of-death section as shown in Part I and Part II (other significant conditions) of the U.S. Standard Certificate of Death. The certifier is responsible for completing a relatively small portion of the death certificate, while other parties, such as the funeral director, complete many items. It is advisable to obtain a copy of the death certificate used in your state in order to be familiar with its format and the portions you may have to complete. Due to modifications of the standard form in each state, the numbers or letters that apply to each item of information may not correspond to the numbers and letters that appear on the U.S. Standard Certificate.

In order to better compare autopsy report data to death certificate data, and to ensure inclusion of cause-of-death information in other databases, it is desirable to indicate the cause of death in autopsy reports and other medical documents by using a format similar to the one designed for the U.S. Standard Certificate of Death.

## Generic Format for Writing the Cause of Death: The Cause-of-Death Statement

Shown below is a generic adaptation of the cause-of-death section from the U.S. Standard Certificate of Death:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. | Approximate interval between onset and death |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

This generic diagram will be used to introduce the various concepts and terminology related to the cause of death and to illustrate examples of how to write causes of death.

Note that the diagram consists of two major parts, which are appropriately named **Part I** (lines A-D) and **Part II** (other significant conditions). When a death is certified, Part I must be appropriately completed using the top line and the lower lines, as needed. For some deaths, it may be necessary to complete Part II (other significant conditions) in order to adequately state the cause of death.

In general, a cause of death stated by using the generic format shown in the diagram above is referred to as a *cause-of-death statement.*

## The Sequential Part I Format

Part I of the cause-of-death statement is constructed to allow an indication of a sequence of events where one condition results from another. The most recent condition is placed on the top line (A), then other antecedent conditions (ie, going backward in time) are entered on subsequently lower lines (B, then C, then D), as needed.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Most recent condition** (resulting from B) | Approximate interval between onset and death |
| | Due to, or as a consequence of:<br>B. **An antecedent (older) condition** (resulting from C) | |
| | Due to, or as a consequence of:<br>C. **An even older condition** (resulting from D) | |
| | Due to, or as a consequence of:<br>D. **The first (oldest) condition causing the others above** | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Variations in Part I of the cause-of-death section on the death certificates used in different states relate primarily to the number of lines available for use (there are usually three or four lines). It is not required nor is it always necessary to use all of the lines in Part I.

*All conditions listed in Part I have a sequential cause-and-effect relationship when read from the bottom to the top.* Variation in the number of lines used does not affect the concept of sequence. The lowest completed line in Part I contains the oldest condition, and the uppermost completed line in Part I contains the most recent condition (the condition occurring closest to the time of death).

## The Underlying Cause of Death

For deaths that result from disease (natural conditions), the National Center for Health Statistics defines the underlying cause of death as the disease (condition) that initiated the train of morbid events leading directly to death. The definition becomes clearer when put in the context of completing Part I of the cause-of-death statement.

If Part I is written as …

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Acute myocardial infarct** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Atherosclerotic coronary artery disease** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

... atherosclerotic coronary artery disease is the underlying cause of death because it is the disease (condition) that initiated the train of morbid events. Note that the underlying cause of death is the lowermost completed line in Part I. The underlying cause of death explains why death and the condition on the line above it (acute myocardial infarction) occurred. The underlying cause of death should be stated as etiologically specifically as possible.

As this example shows, it is not required, nor is it always necessary, to use all of the lines in Part I.

The most important concepts presented have to do with properly indicating the underlying cause of death. In general, the underlying cause of death has the greatest medical, legal, and epidemiologic importance—an easily remembered fact because, as in many important documents, it is the bottom line.

## Immediate Cause of Death

For deaths due solely to disease, the National Center for Health Statistics defines the *immediate cause of death* as the final disease or complication directly causing the death. The existence of an antecedent, or underlying cause, is implicit in the definition. Again, it is helpful to consider this definition in the context of completing Part I of the cause-of-death statement.

If more than one line is used when completing Part I, the top line (line A) is referred to as the immediate cause of death, which is the disease (condition) or complication of the underlying cause of death that occurred closest to the time of death (last).

The example from the previous page illustrates this concept:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Acute myocardial infarct** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Atherosclerotic coronary artery disease** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Thus, acute myocardial infarction is the immediate cause of death because it is the final complication of atherosclerotic coronary artery disease—the underlying cause of death. The immediate cause of death should be stated as etiologically specifically as possible. For example, in a patient whose underlying cause of death is human immunodeficiency virus infection, pneumocystis pneumonia is preferable to pneumonia as an immediate cause of death if pneumocystis is known to be the etiologic agent for the pneumonia.

Underlying and immediate causes of death are linked in a cause-and-effect relationship when read from bottom to top.

## Intermediate (Intermediary) Causes of Death

For deaths due solely to disease, an *intermediate (intermediary) cause of death* is a disease, condition, or complication that occurs somewhere in time between the underlying and immediate causes of death. Again, it is helpful to consider this definition in the context of completing Part I of the cause-of-death statement. If more than two lines are used when completing lines A through D in Part I, each line falling between the top line (the immediate cause of death) and lowermost completed line (the underlying cause of death) contains an intermediate cause of death.

The following example illustrates this concept:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Pulmonary infarct** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Pulmonary thromboembolism** | **Hours** |
| | Due to, or as a consequence of:<br>C. **Deep leg vein thrombosis** | **Days** |
| | Due to, or as a consequence of:<br>D. **Essential thrombocytosis** | **Months** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Thus, pulmonary infarct is the immediate cause of death, pulmonary thromboembolism and deep leg vein thrombosis are each an intermediate cause of death, and essential thrombocytosis is the underlying cause of death. Underlying, intermediate, and immediate causes of death are linked in a sequential cause-and-effect relationship when read from bottom to top.

An intermediate cause of death should be stated as etiologically specifically as possible, realizing that it is not always possible to be completely specific. As illustrated by the example above, thromboembolism is fairly specific and identifies the nature of the embolus (thrombotic) from other types (such as air embolism), and is preferable to the less-specific phrase “pulmonary embolus.”

## The Single Line Part I Format

In some circumstances, it is necessary or adequate to state the cause of death in a single line of Part I. The following case scenario is offered as an example.

**Case scenario.** A 70-year-old male had prostate cancer metastatic to the lungs. His condition deteriorated and death was expected. He died at home with no evidence of foul play. His personal physician was expected to sign the death certificate. An autopsy was not performed. His physician was confident that prostate cancer was responsible for death, but he was not sure what specific final complication caused death. The physician completed the cause-of-death statement as follows:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Prostate carcinoma with lung metastases** | Approximate interval between onset and death<br>**Approx 4 Years** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Due to a lack of information about a specific immediate cause of death, this *single line Part I format* is appropriate. “Prostate carcinoma with lung metastases” serves as both the immediate and underlying cause of death in this case but should be regarded as the underlying cause of death.

The single line Part I format should only be used when the underlying cause of death is known, but there is insufficient information available to accurately cite an immediate cause of death.

## Part II: Other Significant Conditions

Part II of the cause of death section contains a place to ascribe other significant conditions. These are conditions that were present at the time of death and contributed to death but did not result in the underlying cause of death listed in Part I. Basically, other significant conditions consist of coexisting conditions (which may have been pre-existing) that do not result in the underlying cause of death. An example of the intended use of Part II for citing other significant conditions is as follows.

**Case Scenario.** A person who has marked coronary artery disease and significant left ventricular hypertrophy from long-standing hypertension dies of documented coronary artery thrombosis with myocardial infarction.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Acute myocardial infarct** | Approximate interval between onset and death<br>**2 days** |
| | Due to, or as a consequence of:<br>B. **Coronary artery thrombosis** | **2 days** |
| | Due to, or as a consequence of:<br>C. **Atherosclerotic coronary artery disease** | **Decades** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Essential hypertension** | |

Based on the scenario, the coronary artery disease seems to be the major problem and can be considered the underlying cause of death. Hypertension can be regarded as an other significant condition, since it likely contributed to death by causing ventricular hypertrophy and increased oxygen demand, but did not, in and of itself, cause the coronary artery disease. Hypertension was coexisting but did not result in the coronary artery disease.

The underlying cause of death should never be listed in Part II as an other significant condition. In general, incidental conditions present at death that did not contribute to death should not be listed. In some states, local law or death registration policy requires that certain entities, such as a neoplasm, be listed as other significant conditions even if the cause of death is unrelated to the condition. Local laws and policies should be consulted and followed.

## General Rules for Part I and Part II

**Part I.** To assist in nosologic classification and coding, the National Center for Health Statistics (NCHS) recommends that only one condition be entered per line in Part I of the cause-of-death statement. Thus, when it seems that two or more conditions may have added together to constitute an immediate, an intermediate, or an underlying cause of death, it is incumbent upon the certifier to select only one for listing on each line of Part I and to list the other(s) as an other significant condition.

As an example, consider the person who appears to have died from a combination of cryptococcal myocarditis and pneumocystis pneumonia, both occurring as complications of human immunodeficiency virus infection (HIV). Instructions tell us *not* to list two conditions on one line in Part I. Further, cryptococcal myocarditis and pneumocystis pneumonia should not be listed on separate lines in Part I because one did not cause or result in the other. What should we do?

The best way to comply with recommendations is to include one of the conditions in Part I and to list the other in Part II as an other significant condition. Doing so is technically consistent with the definition of an other significant condition because, although cryptococcal infection and pneumocystis infection *resulted from* HIV, they did not *result in* the HIV infection (the underlying cause of death). In a case such as this one, the certifier must decide which of the two conditions was most significant as an immediate cause of death and list it in Part I as the immediate cause of death, while listing the other condition in Part II as an other significant condition. Thus, in some cases, an "other significant condition" may be the result of an underlying cause of death. The same principles may be applied when two conditions seem to add together as an intermediate cause of death or an underlying cause of death. An example cause-of-death statement for the case described is shown on the following page.

**Part II.** More than one condition may be listed as an other significant condition. However, only those conditions that contributed to death should be included in Part II as other significant conditions, unless otherwise required by local policy. Other significant conditions add together with the conditions listed in Part I to cause death, but they do not result in the condition listed as the underlying cause of death.

**Definition: The Cause-of-Death Statement**

For the purpose of communication, it is necessary to offer a definition. A cause-of-death statement is a cause of death written or otherwise stated in a format similar to that used on a death certificate. It must include an underlying cause of death and may include an immediate cause of death, one or more intermediate causes of death, and one or more other significant conditions.

A cause-of-death statement includes the information as it would be written in Part I and the other significant conditions portion (Part II) of the cause-of-death section of the U.S. Standard Certificate of Death.

Thus, the following diagram shows the format for writing *a cause-of-death statement,* regardless of whether the cause-of-death statement is written on a death certificate or in an autopsy report or other medical document:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Cryptococcal myocarditis** | Approximate interval between onset and death<br>**Days** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **4 years** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **6 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Pneumocystis pneumonia** | |

Other significant conditions do not result in the underlying cause of death, but in certain circumstances, as in the example above, they can be a result of the underlying cause of death when multiple conditions seem to have added together.

## Sample Cause-of-Death Statements

The following cause-of-death statements are offered without case histories to make a point: a well-constructed cause-of-death statement, in and of itself, tells a story and enables the reader to know the sequence, nature, and relationship of events that caused death.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Intracerebral hemorrhage, basal ganglia** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Essential hypertension** | **Decades** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Septic shock** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Infected decubitus ulcers of buttocks** | **Weeks** |
| | Due to, or as a consequence of:<br>C. **Complications of cerebral infarction (stroke)** | **5 years** |
| | Due to, or as a consequence of:<br>D. **Cerebral artery atherosclerosis** | **10 years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Insulin-dependent diabetes mellitus** | |

## Getting Specific: The Importance of Specificity

### Fatal Derangements

Any pathophysiologic process or event involved in dying or producing the death of a person is a *fatal derangement.* Fatal derangements can consist of the following:

- **Terminal events** (such as cardiac arrest)
- **Nonspecific processes** (such as cirrhosis or gastrointestinal hemorrhage)
- **Specific conditions** (such as adenocarcinoma of the stomach)

Each of the above terms will be defined and discussed in the pages that follow. The most important point to remember is that some fatal derangements should not be cited as an underlying cause of death, and some should not be included in a cause-of-death statement at all. In general, nonspecific processes and terminal events are of little value when stating an underlying cause of death because they fail to connote a specific etiology. When preparing a cause-of-death statement, the underlying cause of death should consist of a specific condition, if possible.

### Specific Conditions and the Cause-of-Death Statement

Death can result from the following categories of specific conditions:

- **Disease conditions**
- **External conditions,** which include all forms of physical injury and intoxications, poisonings, and adverse drug reactions
- **Combinations** of A and B

*Note:* Deaths resulting from external conditions or combinations of disease and external conditions present a separate set of issues and problems when writing cause-of-death statements. Part III of this book provides full instructions only for deaths that are due solely to disease conditions. In general, deaths involving external conditions should be reported to the medical examiner or coroner. Information about deaths involving external causes is presented in Part IV.

When the current fund of medical knowledge is considered, a specific condition has only one etiology (either proven or assumed based on current knowledge). For example, although several risk factors exist for the development of human immunodeficiency virus infection (eg, intravenous drug abuse, multiple sex partners, extensive blood transfusion), there is only one cause (human immunodeficiency virus), making it a specific condition in the light of present knowledge. In contrast, gastrointestinal hemorrhage is not a specific condition because it can result from ulcers, neoplasia, varices, and other causes.

An underlying cause of death should consist of a specific condition, if possible. For example, diabetes mellitus is a specific disease. The word “specific” is the operative

word and will be more fully discussed later, realizing that it is not always possible to be completely specific.

Some fatal derangements (such as cardiac arrest or asystole, for example) do not fit into any of the categories of specific conditions; therefore, they do not fulfill the criterion to be cited as an underlying cause of death.

Any condition listed in the cause-of-death statement—whether an immediate, intermediate, or underlying cause of death, or an other significant condition—should be stated as specifically as possible. Specificity is especially important in regard to the underlying cause of death.

**The Search for Specificity (SFS)**

When developing a cause-of-death statement, the certifier should always keep in mind that specific information is more useful than general information when analyzing individual deaths or when studying groups of deaths. For example, citing Trisomy 21 rather than chromosomal anomaly might be more useful to a patient's family when genetic counseling is considered; it might also be more useful to researchers who are studying the mortality of genetic disorders. Epidemiologists, researchers, and other users of cause-of-death statements can lump groups of specific information together to make general categories, if necessary, but they cannot discern specific information if only general information is supplied in a cause-of-death statement. Thus, a certifier should, as a first step in making a cause-of-death statement, remember the desirability of specificity.

Specificity is most important when stating the underlying cause of death. For example, if tempted to cite "Sepsis" in a cause-of-death statement, the certifier should ask, "Why did this patient have sepsis?" Usually in such cases, other, more specific conditions such as peritonitis will emerge. In turn, the certifier should then ask, "Why did the patient have peritonitis?" More specific conditions, such as ruptured appendiceal abscess or diverticular abscess, should then come to mind. Finally, through such questioning, the certifier should ultimately be able to cite an underlying cause of death for which there is only one etiology (either proven or assumed based on our current understanding) or a focused and small group of possible etiologies. This diligent search for a focused underlying cause of death is referred to as the *search for specificity* (SFS) and should be a thought process followed by anyone developing cause-of-death statements.

In general, after the cause-of-death statement is ascribed on a death certificate or other document, the user should be able to read the statement and be able to cite a relatively focused or specific reason for why the patient died. Sometimes, because medicine is not an exact science or because of insufficient information, it is not possible to be entirely specific. The approach to such cases will be discussed in a later section.

## The Specificity Paradox

Sometimes, a certifier might cite an underlying cause of death that is perceived by the certifier as being specific when, in fact, it is not. This is referred to as the *specificity paradox.* The following example is offered to make the point.

Myocardial infarction involves a specific target organ (the heart). Infarction is a defined pathologic process; there is often a well-defined clinical presentation. Myocardial infarction is often closely linked temporally with death. There are established criteria to make the clinical diagnosis, and the diagnosis of myocardial infarction connotes certain etiologies. Myocardial infarction therefore, on the surface, seems like a fairly specific condition when thinking about the cause of death. Certifiers should remember that an underlying cause of death starts the train of events that leads to death. Myocardial infarction is the result of certain conditions (such as coronary artery atherosclerosis, vasospasm, Takayasu disease, and other causes) that start the train of events that lead to myocardial infarction and death; it is not appropriately cited as the underlying cause of death in most cases. This specificity paradox is applicable to many death scenarios and must be considered when developing a cause-of-death statement, in order to avoid citing a nonspecific or inappropriate underlying cause of death.

The major point is that some fatal derangements may seem to be quite specific when, in fact, they are not etiologically specific and do not constitute a specific statement of the underlying cause of death.

## Examples of Specific Conditions

Although the list below is by no means exhaustive, it contains examples of specific conditions that are acceptable statements of an underlying cause of death. When examining these specific conditions, for each example it may be difficult to identify other wording that more specifically (and concisely) explains the underlying reason for why the person died, that is, the underlying cause of death.

*Examples of specific conditions for the underlying cause of death:*

- Ruptured cerebral artery berry aneurysm
- Alzheimer’s dementia
- Adenocarcinoma of prostate
- Atherosclerotic coronary artery disease
- Calcific aortic stenosis
- Rheumatic mitral valve disease
- Primary biliary cirrhosis
- Systemic lupus erythematosus
- Perforated gastric peptic ulcer

- Syphilitic aortitis
- Diabetes mellitus, insulin-dependent
- Asthma
- Idiopathic epilepsy
- Alpha-l-antitrypsin deficiency
- Trisomy 18
- Chronic alcoholism
- Meningococcal meningitis

**Nonspecific Processes**

Nonspecific processes are fatal derangements that involve pathophysiologic processes, but do not denote a specific underlying cause of death. Nonspecific processes may involve functional and/or structural defects. Usually, nonspecific processes are complications of an underlying cause of death. A few examples are indicated in the following list.

*Examples of nonspecific processes:*

- Gastrointestinal hemorrhage
- Bowel obstruction
- Cerebrovascular insufficiency
- Cirrhosis (not always due to alcoholism)
- Hepatic encephalopathy
- Pneumonia (in many cases there is an underlying cause)
- Pulmonary edema
- Abdominal hemorrhage
- Intracranial hemorrhage
- Peritonitis
- Renal failure
- Metabolic encephalopathy
- Sepsis
- Uncal herniation
- Congestive heart failure
- Multi-organ failure

Each of the nonspecific processes listed above has more than one cause. Nonspecific processes without further explanation should not be cited as an underlying cause of death (see “Qualifying a Specific Condition or Nonspecific Process”). Using a nonspecific process as an immediate or intermediate cause of death is acceptable, but a more specific

condition should be listed on a lower line in Part I of the cause-of-death statement, if possible—especially when stating the underlying cause of death.

**Terminal Events**

In general, because of their nonspecificity and involvement in nearly all deaths, terminal events are not useful in cause-of-death statements or for general mortality studies.

*Terminal events that should not be used in cause-of-death statements include:*

- Asystole
- Cardiac arrest
- Cardiopulmonary arrest
- Cardiorespiratory arrest
- Electromechanical dissociation
- Respiratory arrest

**Case Example and Analysis**

To better illustrate the concepts of fatal derangements, terminal events, nonspecific processes, specific conditions, the search for specificity, the specificity paradox, immediate cause of death, intermediate cause of death, and underlying cause of death, the following case scenario and analysis are offered.

**Case scenario.** A 25-year-old male contracted human immunodeficiency virus infection. Two years later, he developed opportunistic pulmonary infections and was diagnosed as having acquired immunodeficiency syndrome. His pulmonary infections were treated, but six months later he developed toxoplasmosis infection in the central nervous system. He suffered cerebellar tonsillar herniation, respiratory arrest, then ventricular fibrillation, then cardiac arrest, and could not be successfully resuscitated.

**Analysis.** Respiratory arrest, ventricular fibrillation, and cardiac arrest can be viewed as terminal events. The number of conditions that can cause these fatal derangements is myriad—so large, in fact, that mention of them on the death certificate provides little or no unique information about this particular death, nor does mention of them provide useful information for mortality studies (because their occurrence among deaths is nearly ubiquitous).

In comparison to the terminal events, tonsillar herniation does have a somewhat limited number of potential causes and seems fairly specific (specificity paradox) but, at best, is a nonspecific process because it can be caused by tumors, hemorrhage, physical injury, and infections. Mention of tonsillar herniation in a cause-of-death statement requires further explanation of why it occurred. Thus, tonsillar herniation should only be listed as an immediate cause of death in this case. Cerebral toxoplasmosis is a specific condition but

in this case has an underlying cause (HIV infection) that accounts for its existence. Further, cerebral toxoplasmosis explains why tonsillar herniation occurred. Thus, cerebral toxoplasmosis could be stated as an intermediate cause of death in this case (or as the immediate cause of death if it is decided not to include tonsillar herniation in the cause-of-death statement). HIV infection is the underlying cause of death because it initiated the train of morbid events. Acquired immunodeficiency syndrome (AIDS) could be listed as the underlying cause of death because, by definition, AIDS is due to HIV infection. However, it is preferable to cite HIV infection as the underlying cause of death since HIV infection and AIDS are not synonymous, and because there is a variable clinical course between the time of HIV infection and the development of AIDS.

It should be apparent that there is not a single, clear-cut, best way to write the cause-of-death statement in this case, and several acceptable alternatives exist. Two options for writing the cause-of-death statement in this case are shown on the following page. Often, there is more than one acceptable way to write the cause-of-death statement.

## Multiple Options for the Cause-of-Death Statement

For the preceding case scenario, there are several acceptable alternatives for writing the cause-of-death statement. Here are two:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Cerebellar tonsillar herniation** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Central nervous system toxoplasmosis** | **Days** |
| | Due to, or as a consequence of:<br>C. **Acquired immune deficiency syndrome** | **7 years** |
| | Due to, or as a consequence of:<br>D. **Human immunodeficiency virus infection** | **10 years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Central nervous system toxoplasmosis** | Approximate interval between onset and death<br>**Days** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **10 years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Each of the examples enables a reader to identify a specific underlying cause of death and the major, specific complication of the underlying cause of death. The top example provides more information than the lower example. Each example is acceptable because the important information (toxoplasmosis and HIV Infection) is included in the cause-of-death statement, either explicitly or implicitly (by definition), and in the proper sequence.

## Qualifying the Cause-of-Death Statement

### The Unqualified Cause-of-Death Statement

An unqualified cause-of-death statement is forthright and specific. It connotes that the cause-of-death statement has been made with a high degree of certainty about its accuracy. The following case scenario serves as an example.

**Case scenario.** A 53-year-old female complained of severe headache after intercourse and died unexpectedly. An autopsy confirmed subarachnoid hemorrhage resulting from a ruptured cerebral artery berry aneurysm.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Subarachnoid hemorrhage** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Ruptured cerebral artery berry aneurysm** | **Minutes/Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

The cause-of-death statement is *unqualified;* it connotes a high degree of certainty about its accuracy. Autopsy findings or other proof of the cause of death, although desirable, are not required to constitute a high degree of certainty (or reasonable degree of probability). The degree of certainty is based on all available information, including the medical history, presentation, the sequence of events, diagnostic studies, symptoms, signs, and the probability of certain conditions occurring in the context of the available information. Note the little "trick" used to indicate that the aneurysm existed for years, but the rupture existed for only minutes.

## Qualifying a Specific Condition or Nonspecific Process

It is not always possible to be certain (or even reasonably certain); therefore, the certifier may *qualify* a specific condition or nonspecific process as being "probable" or "presumed," regardless of whether the specific condition or nonspecific process is listed as an immediate cause of death, intermediate cause of death, underlying cause of death, or other significant condition. The following case scenario serves as an example.

**Case scenario.** A 58-year-old male had crushing chest pain while mowing the yard. The pain continued and an ambulance was called, but he died in the ambulance about 40 minutes after the onset of the pain. The coroner declined to investigate. An autopsy was not performed. He had no documented medical history of significance; there was no prior history of angina or cardiac symptoms, although he was overweight.

One acceptable option for writing the cause-of-death statement is:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Probable atherosclerotic coronary artery disease** | Approximate interval between onset and death<br>**Years** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In this example, a qualified specific condition has been used. Qualifying allows for an expression of uncertainty about the accuracy of specific conditions or nonspecific processes listed in the cause-of-death statement. The decision to qualify a nonspecific process or specific condition is based on the quality of available information and on the certifier's degree of certainty about the accuracy of the information.

## Citing a Nonspecific Process as the Underlying Cause of Death

A nonspecific process may be cited as the underlying cause of death when a specific condition has not been, or cannot be, determined, but only by qualifying the nonspecific process as being of an unknown, undetermined, probable, presumed, or unspecified etiology. The nonspecific process may be qualified within the same line or on a lower line in the cause-of-death statement. The following case scenario serves as an example.

**Case scenario.** A person with a vague history of gastric ulcer symptoms dies from an upper gastrointestinal hemorrhage, but a specific cause of the hemorrhage has not been determined with reasonable certainty. There is no evidence of non-natural causes.

Two of several options for Part I of the cause-of-death statement are:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Upper gastrointestinal hemorrhage, specific natural cause unknown** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. | |

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Upper gastrointestinal hemorrhage** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Presumed gastric ulcer** | **Unknown** |

When cited as the underlying cause of death, it is necessary to qualify a nonspecific process so a user of the cause-of-death statement will be able to distinguish whether insufficient information was available to the certifier, a degree of uncertainty existed, or that a specific underlying cause of death was not omitted through simple oversight or failure to search for specificity. It is also very important to realize that a nosologist will code the underlying cause of death differently for the two examples above, the lower example being coded to a more specific underlying cause of death. Judgment is required to select the best option without overstating or understating the facts.

Of course, if the gastrointestinal hemorrhage was possibly due to injury or poisoning (external conditions), the death should be reported to the medical examiner or coroner.

### Cause-of-Death's Rule of Thumb

In view of the various definitions and concepts related to nonspecific processes, specific conditions, qualifying, and the cause-of-death statement, a basic rule of thumb can be stated:

> **A cause-of-death statement must contain an underlying cause of death; if a specific condition cannot be cited as the underlying cause of death, the underlying cause of death should consist of a qualified specific condition or a qualified nonspecific process**.

## Risk Factors

### The Concept of Risk Factors

It is sometimes difficult to know when to stop or how far back to go when searching for specificity to determine the underlying cause of death. For example, if an intravenous drug abuser contracts human immunodeficiency virus (HIV) infection, one could claim that the underlying cause of death is intravenous drug abuse, rather than HIV infection. In another example, it could be claimed that the underlying cause of death in a smoker who dies of lung cancer is smoking, rather than lung carcinoma. Such examples can be taken to the point of absurdity. For example, for a person who dies from coronary artery atherosclerosis, one might contemplate chronic fatty food ingestion as the underlying cause of death.

The examples above describe risk factors for specific conditions; they are not, in and of themselves, specific conditions. *Risk factors can be medical, environmental, behavioral, or demographic in nature.* A cause-and-effect relationship between the risk factor and the specific condition is difficult, if not impossible, to prove in a specific case; whether to report risk factors on death certificates is a matter of some controversy. The following suggestions and comments are offered:

- The reporting of risk factors is encouraged.
- The death certificate in some states has a separate place to indicate the presence of certain risk factors. The U.S. Standard Certificate of Death now has a special item to indicate the role of tobacco use in contributing to death, so in states in which this item has been included on the death certificate, one need not worry about including tobacco use in the cause-of-death statement itself. Local instructions should be followed, if such is the case.
- If the certifier wishes to report a risk factor, the risk factor should be reported as an other significant condition and may be specified as a risk factor, if desired (see next page).

Reporting risk factors may be useful to certifiers who, for example, may not feel comfortable, accurate, or scientific in citing the risk factor as the underlying cause of death. The reporting of risk factors may also be of help to users of the cause-of-death statement. Further, risk factors are important from the standpoint of public health.

**Reporting of Risk Factors**

Official guidelines are needed to educate certifiers about which risk factors are important and how to report them on death certificates. In the meantime, risk factors can be reported, as shown in the following example:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Acute myocardial infarction** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Coronary artery atherosclerosis** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Risk factors: obesity, hypercholesterolemia** | |

The approach shown in the example can be used for many risk factors (such as alcohol intoxication) that may be associated with a particular underlying cause of death. Including the words “risk factor” in Part II is an option and a matter of personal preference. Because of the complexity and intangible nature of some risk factors, reporting will probably vary. Reporting of risk factors in Part II by the method shown above is a matter of convention, with the understanding that the risk factors may actually have contributed in some way to the development of the underlying cause of death.

Human immunodeficiency virus (HIV) infection poses a good example of the potential value of reporting risk factors. The citation of illicit intravenous drug use, multiple transfusions, or maternal-fetal contact in the cause-of-death statement certainly tells a more complete story than a cause-of-death statement that omits such risk factors and simply attributes death to AIDS. Further, more specific information is provided that could be of value for statistical purposes and public health monitoring and planning. Consistent reporting of such risk factors should be promoted. If a risk factor is cited, there should be documentation or reasonable probability that the risk factor existed in the patient.

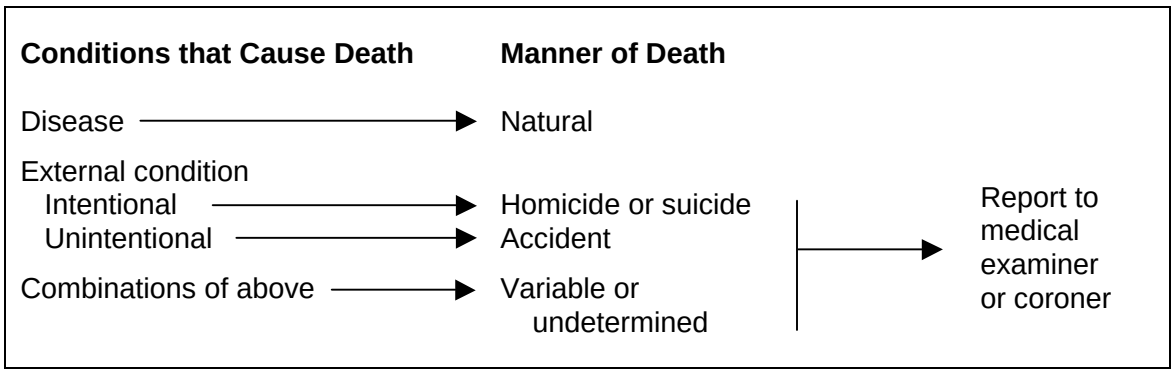
## Manner of Death

The manner of death is a classification of death based on the *type of condition(s)* that results in death (ie, disease conditions or external conditions such as injury or poisoning), and the *nature of the circumstances* that resulted in the condition(s).

Deaths due solely to disease are considered to be due to natural conditions, or of a **natural** manner of death. Deaths resulting from external causes (injury or poisoning) are either unintentional, in which case the manner is referred to as **accident**; or intentional, in which case the manner is either **homicide** or **suicide**, depending on whether the death was self-inflicted (suicide) or inflicted by another person (homicide). Deaths for which a manner cannot be determined are classified as **undetermined** in manner (sometimes specified as "not determined" or "could not be determined"). Determination of the manner of death can be very difficult in some cases.

In general, deaths that are not solely due to natural causes should be reported to the local coroner or medical examiner, who will certify the cause and manner of death in most if not all such cases. Usually, if death is brought about or hastened by an external condition, a manner of death other than natural will be assigned by the certifier. In general, physicians who are not acting in the capacity of a medical examiner or coroner will mainly be concerned with cause-of-death statements involving a natural manner of death.

A specific place exists on the death certificate to indicate an appropriate manner of death. The way in which the manner of death is indicated on the death certificate varies among states. Many states use a check box to indicate the manner of death, others require that the manner of death be written in text by the certifier, and other states designate a natural manner of death by leaving the item blank. Consult local death certificate instructions to ensure that you know the correct procedure for indicating a natural manner of death. If you suspect that a death has resulted in whole or in part from non-natural causes, report the death to the medical examiner or coroner.



## Ensuring That Natural Causes Are Evident

The wording in some cause-of-death statements, in conjunction with the format for indicating manner of death, may not make it clear whether death resulted from natural causes or from external conditions (injury or poisoning). For example, subarachnoid hemorrhage can be due to disease or injury; the manner of death depends on which of those occurred. If a specific natural underlying cause of death is not known, a well-designed cause-of-death statement can make a natural manner of death obvious by making it clear that external conditions are not involved in the cause of death, thereby avoiding the need for queries by the registrar. The following instructions might be helpful.

The certifier should be aware of local policy for indicating a natural manner of death and should ensure that the local procedure for indicating a natural manner of death has been followed. If death is due to natural causes, but conditions or nonspecific processes cited in the cause-of-death statement can result from external conditions, the cause-of-death statement should include an indication that the condition or nonspecific process is due to natural causes:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Subarachnoid hemorrhage** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Undetermined natural causes** | **Unknown** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Following the above procedures will reduce the need for queries and will assist the registrar, nosologist, and other users of the cause-of-death statement by making the natural manner obvious. Further, it will be clear that a specific underlying cause of death has not been omitted through oversight or failure of the certifier to conduct the search for specificity. In essence, ensuring that natural causes are evident is another form of qualifying a nonspecific process.

## Special Circumstances

See Part IV of this book for information on the following types of death:

- Deaths from external conditions
- Infant deaths
- Periprocedural deaths (complications of medical care)

### Multiple Conditions Adding Together

People do not always die from a single cause of death. For example, a person may have significant hypertensive and atherosclerotic heart disease, which act together to produce death. In such a case, it is intuitive that the underlying cause of death might be stated as "hypertensive and atherosclerotic coronary heart disease." However, when more than one condition is contained on a single line in the cause-of-death statement, nosologists use a somewhat arbitrary set of rules to ascribe death to a single cause, which may not be the one that actually was of primary importance. Thus, official guidelines recommend against putting two conditions on a single line in Part I of the cause-of-death statement.

To make it clear which condition is the most important, and to facilitate nosologic classification, it is best to indicate, in the certifier's opinion, which one of multiple causes is the most significant, and to list it as the underlying cause of death. Other relevant conditions can then be listed as other significant conditions. However, some analysis of the case scenario is required to do this. For example, assume that, for the person who seems to die of the combined effects of hypertensive and atherosclerotic heart disease, he or she had angina prior to death, and that ischemic EKG changes were observed in the emergency room prior to death. The underlying cause-of-death statement might then be best attributed to atherosclerotic coronary artery disease, while hypertension could be listed as an other significant condition.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Atherosclerotic coronary artery disease** | Approximate interval between onset and death<br>**Years** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Essential hypertension** | |

It is acceptable to list more than one condition as other significant conditions. On occasion, when combinations of conditions are involved, an other significant condition may consist of a condition that resulted from the underlying cause of death.

**Neoplasia**

When death is due to a neoplasm, the underlying cause of death, if possible, should reflect the primary site, grade, and cell type. The immediate and intermediate causes of death should reflect the complications that occurred, if known. For example:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Pulmonary hemorrhage** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Aorto-pulmonary fistula** | **Days** |
| | Due to, or as a consequence of:<br>C. **Well differentiated squamous cell carcinoma, left upper lung lobe** | **Months** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

If the neoplasm was metastatic, the metastatic sites should be noted. The cause-of-death statement should also specify when the primary site or cell type is unknown. For example:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Staphylococcus pneumonia** | Approximate interval between onset and death<br>**Days** |
| | Due to, or as a consequence of:<br>B. **Carcinoma metastatic to both lungs** | **Probably months** |
| | Due to, or as a consequence of:<br>C. **Poorly differentiated adenocarcinoma, unknown primary site** | **Months to years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

When a phrase such as “metastatic carcinoma, lung” is used without further clarification, it is not clear whether the primary site is the lung, or the lung is being referred to as the metastatic site. Words should be selected that make these circumstances clear.

It is acceptable to cite a "probable" or "presumed" primary site if reasonable certainty exists, for example, "Adenocarcinoma metastatic to lung, probable colon primary." It is also acceptable, when a specific immediate cause of death is unknown, to attribute death to an unspecified sequela or complication, for example, "Complications of adenocarcinoma of lung" (single line Part I format). This should only be done when a more specific immediate cause of death is unknown, as discussed previously.

**Drug Reactions and Toxicity**

*Note: In general, if a death is thought to result from poisoning, toxic effects of drugs, or adverse drug reactions, the death should be reported to the medical examiner or coroner.*

In general, overdose deaths (deaths that result from poisoning, the toxic effects of drugs or other substances, or idiosyncratic reactions) are designated as accidental in manner if death is unintentional, suicidal or homicidal if the death is intentional (depending on the circumstances), or undetermined if the manner of death is not clear. This is particularly true if the death results from a single episode or dosage, or if the substance was clearly taken or administered in excess in a single episode or during a short interval of time.

Some types of deaths do not clearly fall into a category such as those just described, particularly when death results from medications that are not abused or administered or taken in excess. For example, consider the person who dies of sepsis secondary to bone marrow suppression from therapeutic cell poisons used in cancer treatment, or a person who dies of digoxin toxicity because near-toxic levels are required to prevent congestive heart failure. In general, such deaths are regarded as being due to natural causes because the medication was needed to maintain or strive toward a "normal" lifestyle, and the potential fatal complications of the substance are known and have established risks inherent to therapy. Such deaths therefore are not totally unexpected or unanticipated, and the manner of death is often regarded as natural.

It can be seen that some certification practices, particularly regarding the manner of death, are based on convention rather than scientifically consistent criteria.

If faced with having to certify drug-related deaths, it is wise to contact the medical examiner or coroner, who may certify the death. If they elect not to certify the death, their advice on how to construct the cause-of-death statement and determine the manner of death can be quite helpful, keeping in mind the general principles outlined above.

Here is an example cause-of-death statement for drug toxicity as a natural manner of death:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Digoxin toxicity** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Treatment of intractable heart failure** | **Months** |
| | Due to, or as a consequence of:<br>C. **Chronic ischemic heart disease** | **Years** |
| | Due to, or as a consequence of:<br>D. **Atherosclerotic coronary artery disease** | **Decades** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

## Alcohol-Related Deaths

Alcohol can cause death in many ways: by poisoning; through withdrawal seizures; by producing organ damage, such as cirrhosis; as a risk factor for fatal injuries, such as vehicular crashes; and as a risk factor for certain diseases, such as tuberculosis, to mention a few. Because of the length of time that may be involved, the alcoholic etiology may be lost or forgotten when writing a cause-of-death statement.

It is important to include appropriate mention of alcohol in the cause-of-death statement when alcohol is a factor in causing death or has placed a person at significant risk for death. Some basic principles may be useful:

- If a person dies of alcohol poisoning (severe intoxication that produces coma or respiratory arrest and death) in a single episode of binge drinking that was not done intentionally to produce death, by convention the underlying cause of death can be stated as alcohol (ethanol) poisoning. The manner of death is accidental. Such deaths should be reported to, and will usually be certified by, the medical examiner or coroner.
- Deaths that result from the chronic effects of alcohol, such as cirrhosis, or through withdrawal are conventionally regarded as natural deaths. The underlying cause of death should include mention of chronic alcoholism, alcohol addiction, alcohol dependence, or the alcohol-induced nature of the condition, such as alcoholic cirrhosis.

- The cause-of-death statements for deaths of persons who, with reasonable certainty, were placed at higher risk for death through alcohol intoxication, such as environmental hypothermia deaths and deaths of pedestrians or at-fault vehicle operators, may include alcohol intoxication as a risk factor or as an other significant condition. Some states have specific policies or procedures for indicating the presence of alcohol or intoxication; local procedures and policies should be followed in such cases.

Numerous studies have shown that alcohol-related deaths are under-reported on death certificates. Adherence to the principles above can improve the monitoring of alcohol-caused and other alcohol-related deaths. Because many persons who die of alcohol are found dead in places other than the hospital, such deaths are often investigated by the medical examiner or coroner. However, a substantial number of alcohol-caused deaths occur in hospitalized patients; cause-of-death statements for such persons should include appropriate mention of alcohol as an underlying cause, other significant condition, or risk factor.

Here is an example cause-of-death statement for an alcohol-caused death:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Alcohol withdrawal seizure** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Chronic alcoholism** | **Decades** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

## Arrhythmias

When a cardiac dysrhythmia (or arrhythmia) occurs as a final common pathway or mechanism of death from a specific underlying cause of death, the dysrhythmia need not be included in the cause-of-death statement, although it is sometimes helpful to include it for clarity. For example, if the decedent is known to have had a specific cardiac conduction defect that resulted in death (such as prolonged QT syndrome), then inclusion of the derangement in the cause-of-death statement is appropriate.

On rare occasions, as might occur after a person is “scared to death” or after a blunt impact to the chest without visible chest wall or cardiac contusion (commotio cordis), inclusion of probable cardiac dysrhythmia as an immediate cause of death is sometimes

helpful to clarify the circumstances of death, with fright or blunt impact to chest being listed as the underlying cause of death. Of course, because the underlying cause of death in such cases is due to an external condition (an assault producing fright or a blow to the chest producing commotio cordis), such cases will usually be investigated and certified by the medical examiner or coroner, assuming the death is reported to one of them.

On other rare occasions, a person may have clinically suffered a sudden cardiac death, but autopsy shows an apparently normal heart, even when the conduction system is examined. In such cases, citation of "probable spontaneous cardiac dysrhythmia, natural cause" as the underlying cause of death might be appropriate. Again, because such deaths are sudden, unexpected, and unexplained, most should be reported to, and will probably be investigated and certified by, the medical examiner or coroner.

Here is an example cause-of-death statement with appropriate citation of a dysrhythmia:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Acute cardiac rhythm disturbance** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Prolonged QT syndrome** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Deaths Associated with Aging**

The opinions of gerontologists differ as to whether death should be attributed to old age alone. Autopsy studies of the elderly document the fact that disease is often present at the time of death, but to a degree that does not seem to explain death (ie, many elderly persons seem to die *with* their disease rather than *from* it). It has been advocated that death be attributed to senescence when a person appears to die of old age. Recognizing that there is no uniformly accepted protocol to determine the cause of death in elderly persons, some suggestions are offered:

- Use of such terms as senescence, old age, infirmity, and advanced age in the cause-of-death statement is acceptable, but should not be overused for convenience. (Note: The decedent's age appears on the death certificate and can be analyzed in conjunction with the cause-of-death statement.)

- If there is a specific condition or nonspecific process that, with a reasonable degree of certainty, has a high likelihood of having caused the death, that condition or nonspecific process (qualified, of course) should be cited as the underlying cause of death.
- If an underlying cause of death is elusive, and the citing of the underlying cause of death amounts to no more than arbitrarily selecting an underlying cause of death, a single line Part I format should be used, and the underlying cause of death may be attributed to unspecified natural causes.
- Potentially fatal conditions that existed, but that cannot be confidently cited as an underlying cause of death, may be listed as other significant conditions.

**Case scenario.** A 90-year-old man is found dead in bed, apparently dying in his sleep. He has been treated for mild hypertension for 20 years and has no other significant medical history. An autopsy is not performed. There is no evidence of foul play or injury.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Unspecified natural causes** | Approximate interval between onset and death<br>**Unknown** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**History of hypertension** | |

In such a case, it would also be acceptable to use a single line Part I format and attribute to death to "Hypertension associated with advanced age." Either way, the cause of death would be coded as hypertension because hypertension is the most specific condition in the cause-of-death statement. If it is likely that a certain condition did not cause or contribute to death, do not include it on the death certificate.

**Pneumonia**

Pneumonia is often a nonspecific process that occurs as the terminal event in someone who dies of a more specific underlying cause of death, such as congestive heart failure resulting from ischemic heart disease. In such cases, the specific underlying cause of death should be included in the cause-of-death statement.

Pneumonia is often designated as either community acquired or hospital or institution acquired (nosocomial). If the community- or institution-acquired nature of the pneumonia is known, the cause-of-death statement should include an indication of which one applies.

The specific bacterial, viral, or other infectious agent, if known, should be cited in the cause-of-death statement.

Relevant risk factors should also be cited in the cause-of-death statement, as might occur in an alcoholic who develops tuberculous pneumonia. Only in those instances where pneumonia has caused death and there is no known underlying cause or risk factor should the underlying cause of death be stated as "Pneumonia," being sure to specify the infectious agent, if known, or specifying that a specific etiology is unknown, if such is the case.

One example of a cause-of-death statement involving pneumonia:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Community acquired Klebsiella pneumonia** | Approximate interval between onset and death<br>**Days** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Chronic alcohol abuse** | |

## Cerebrovascular Deaths

For persons who die of stroke or other cerebrovascular problems, it has been commonplace to use the term "cerebrovascular accident"; however, the word "accident" technically applies to the manner of death when death results from unintentional external conditions, such as injury or poisoning. Thus, the term "cerebrovascular accident" should be abandoned.

Deaths due to catastrophic cerebral events are usually due to infarction, hemorrhage, or ischemia caused by thrombosis, embolism, or vascular obstruction from atherosclerosis or other vascular wall conditions. If possible, the cause-of-death statement should specify which of these has occurred, avoiding the generic terms "cerebrovascular accident" and "stroke." If necessary, "cerebrovascular stroke" is preferred to "cerebrovascular accident."

If possible, the portion of the brain affected by the process or condition should also be specified in the cause-of-death statement. For example:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Infarction of right parietal cerebral cortex** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Embolus of right middle cerebral artery** | **Hours** |
| | Due to, or as a consequence of:<br>C. **Staphylococcal endocarditis, tricuspid valve** | **Weeks** |
| | Due to, or as a consequence of:<br>D. **Chronic intravenous substance abuse** | **Months** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Atrial septal defect** | |

## Syndromes

The names of some *syndromes* can be used in cause-of-death statements. To be included in a cause-of-death statement, a syndrome should be known to be capable of causing death, there should be diagnostic criteria or findings that define the syndrome, and the diagnostic criteria should be substantially met. Some syndromes have a single specific etiology and are therefore appropriately listed as an underlying cause of death. Other syndromes have multiple causes and are essentially nonspecific processes that may be more appropriately listed as an immediate or intermediate cause of death, with a more specific condition listed as the underlying cause of death, or as an underlying cause of death if qualified in the same fashion as another nonspecific process would be qualified.

The key to selection is specificity. If the syndrome has a single cause, it can serve as an underlying cause of death. If the syndrome has more than one possible cause, then it is more appropriate to use it as an intermediate or immediate cause, unless the syndrome name is qualified, as is done for other nonspecific processes when cited as an underlying cause of death.

| Example Syndromes for Cause of Death | Type of Cause |
|---|---|
| Budd-Chiari syndrome | Variable* |
| Waterhouse-Friderichsen syndrome | Immediate / Intermediate** |
| Prolonged QT syndrome | Underlying |
| Wiskott-Aldrich syndrome | Underlying |
| Sturge-Weber syndrome | Underlying |
| Schonlein-Henoch purpura syndrome | Variable |
| Ehler's-Danlos syndrome | Underlying |

** May be secondary to such conditions as metastatic carcinoma, in which case Budd-Chiari syndrome could be listed as an immediate cause of death. However, some cases have no apparent cause, in which case it might be appropriate to indicate "Budd-Chiari syndrome, Unknown cause" as the underlying cause of death.*

*** Waterhouse-Friderichsen syndrome occurs as a complication of infection or various etiologies. Therefore, it might be best listed as an immediate cause, with the specific infectious agent and disease listed as the underlying cause.*

## Medical Complications of External Conditions: "Buzzwords" and "Red Flags"

Some patients may appear to have died from disease conditions, but when their clinical course is closely scrutinized through the search for specificity, the medical conditions were complications of an external condition (injury or poisoning). Such deaths may occur long after the injury, causing the certifier to lose sight of the fact that an injury started the downhill train of events that led to death. It is important to recognize delayed deaths due to injury so that they are reported to the medical examiner or coroner, and to ensure that investigation occurs and the proper underlying cause of death is indicated in the cause-of-death statement.

There are certain conditions and types of death that are notorious for causing the type of problem alluded to above. When registrars see such conditions within a cause-of-death statement, and the manner of death is indicated as natural or the circumstances of death are not completely clear, the registrar may be required to conduct a *query* to further clarify the cause, manner, or circumstances of death. Some common buzzwords and red flags that prompt such queries are contained in the list that follows.

*Conditions that may prompt a registrar's query for clarification or require reporting to the medical examiner or coroner:*

- Subdural hematoma (usually due to injury)
- Epidural hematoma (usually due to injury)
- Subarachnoid hemorrhage (often due to injury)
- Fracture (usually due to injury)
- Pulmonary emboli (often a delayed sequela of injury)
- Thermal burns/chemical burns (these are injuries)
- Sepsis (a frequent sequela of an injury)
- Hyperthermia (may be endogenous or exogenous and due to injury)
- Hypothermia (may be endogenous or exogenous and due to injury)
- Hip fracture (often due to injury)
- Seizure disorder (often post-traumatic)
- Drug or alcohol overdose/drug or alcohol abuse (often involves an external cause or injury)

The certifier should always question if the underlying cause of death was an external condition (injury or poisoning) and report the death to the medical examiner or coroner if such is the case. If the wording used in the cause-of-death statement for a natural death suggests an external cause (injury), wording should be carefully chosen to clarify that death is due to natural causes.

**Miscellaneous**

Other mistakes in cause-of-death statements can be avoided by adhering to the following procedures:

- Specifying the primary site and benign or malignant nature of a neoplasm (or specifying that the primary site is unknown)
- Specifying the cell type and grade of a neoplasm (or specifying that the cell type is unknown)
- Specifying the underlying cause and etiology of "sepsis" or "septic shock" (or specifying that the underlying cause and etiology are unknown)
- Specifying the part or lobe of an organ involved by a neoplasm or other process

- Specifying the underlying cause of nonspecific processes, such as:
    - congestive heart failure
    - convulsions
    - coma
    - syncope
    - renal failure
    - quadriplegia/paraplegia
    - other nonspecific processes, which are myriad
- Realizing that deaths from complications of hip fractures sustained in falls involve external conditions (injury), and the manner of death may be other than natural. (Also remember that some hip fractures are pathologic and do not involve external conditions!)

## Sample Case Histories and Cause-of-Death Statements

A number of case histories are presented, with suggested examples for constructing the cause-of-death statement. Note that for many scenarios, more than one example is given, as rarely is there only one way to state a cause of death. Each scenario will be designed to emphasize a point discussed in the preceding sections of this manual. The example cause-of-death statements are not the only acceptable alternatives.

**Case 1**
*The search for specificity (SFS)*
*Immediate, intermediate, and underlying causes of death*

**Case 1 history.** A 45-year-old female, after a long history of ethanol abuse and ethanol-induced cirrhosis, developed portal hypertension. She was admitted to the hospital for upper gastrointestinal hemorrhage, which endoscopy proved to be due to esophageal varices. Hemorrhage could not be controlled; she developed shock, cardiac arrest, and died.

During his search for specificity in the cause-of-death statement, the clinician realized that the upper gastrointestinal hemorrhage was caused by varices. The varices were produced by portal hypertension resulting from cirrhosis, which has several possible causes. The clinician then realized that the cirrhosis was due to chronic ethanolism. There is no tangible antecedent cause for the chronic ethanolism. Thus, the clinician's search for specificity ceases at chronic ethanolism, a specific condition that started the train of events that led to death.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Upper gastrointestinal tract hemorrhage** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Esophageal varices** | **Months** |
| | Due to, or as a consequence of:<br>C. **Cirrhosis of liver** | **About 10 years** |
| | Due to, or as a consequence of:<br>D. **Chronic ethanol use** | **Approx 15 years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In the sequence of events described in the above scenario, chronic ethanol use is the only condition that pinpoints the specific underlying cause of the patient's death. Upper gastrointestinal hemorrhage, esophageal varices, portal hypertension, and cirrhosis connote, but do not specify, an alcoholic etiology. Portal hypertension was not included in the cause-of-death statement because there are only four lines in Part I and, of the conditions and processes, it was least important to note because its existence is implicit. However, the certifier can add extra lines in Part I, if necessary. This example also shows an immediate cause of death (hemorrhage), intermediate causes of death (varices and cirrhosis), and the underlying cause of death (chronic ethanol use).

**Case 2**
*Simplicity of cause-of-death statement*
*Underlying cause also serving as immediate cause*
*Single line Part I format*

**Case 2 history.** A 69-year-old female died after several years of progressive dementia, which resulted in a bedridden existence. Clinically, her dementia was consistent with Alzheimer's dementia. During life, she had numerous complications, including decubiti, aspiration, and pneumonia, but at the time of her death, a specific immediate cause of death was not apparent and an autopsy was not performed. One option:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Alzheimer's dementia** | Approximate interval between onset and death<br>**Several years** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Another option:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Complications of Alzheimer's dementia** | Approximate interval between onset and death<br>**Several years** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Either of these options is acceptable, as are some others. The second option is preferable because it indicates that complications (or sequelae) existed, but at the time of death, they were not documented to an extent significant enough to cite them in the cause-of-death statement. A single line Part I format should only be used when there is insufficient information to cite an immediate cause of death in addition to the underlying cause of death. When a single line Part I format is used, the condition cited on line A is the underlying cause of death, and it also serves as the immediate cause of death.

**Case 3**
*Ensuring that natural causes are evident*
*Qualifying a nonspecific process*

**Case 3 history.** Shortly after intercourse with his wife, a 55-year-old male complained of severe headache and then lost consciousness. The paramedics were called, and the patient died within minutes of arriving at the emergency room. The family refused autopsy, and although the medical examiner was notified of the death, the ME elected not to investigate or certify the death. There was no evidence of injury or foul play. In the state where the death was registered, a natural manner of death is indicated by leaving the manner of death data item blank. On the basis of the presentation and clinical history, the certifier strongly suspected a subarachnoid hemorrhage as the cause of death, as shown below.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Probable subarachnoid hemorrhage, natural cause** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Because intracranial hemorrhage can be due to injury, it is helpful to construct wording in such cases that makes it clear that only natural causes are involved. The wording in the example makes it clear that death, with reasonable certainty, was due to natural causes. Other options for the underlying cause of death in this case might include “probable spontaneous intracranial hemorrhage” or similar variations.

The history in this case is fairly classic, and most certifiers would probably feel comfortable with a cause-of-death statement such as that in the above example, as it provides information that is likely correct and somewhat specific. Judgment is required when selecting among various options.

Although the word “probable” may not be carried through to the state or federal levels in nosologic classification, it does allow users of the cause-of-death statement to appreciate a degree of uncertainty in the cause-of-death statement.

**Case 4**
*Qualifying a nonspecific process*
*Ensuring that natural causes are evident*

**Case 4 history.** A patient presents with jaundice, and cholangiography shows obstruction of the common duct. Before the specific nature of the obstruction can be determined, the patient develops Gram negative sepsis and dies. The cholangiogram suggests an intraluminal obstruction by a stone. There is no history to suggest that the obstruction is due to some delayed effect of injury or other external condition (such as postoperative adhesions after surgery for a gunshot wound). Unfortunately, an autopsy is not performed. In the state where the death was recorded, a natural manner of death is indicated by leaving the manner of death data item blank.

One option for Part I of the cause-of-death statement:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Gram negative sepsis** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Biliary obstruction, undetermined natural causes** | **Probably days** |
| | Due to, or as a consequence of:<br>C. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

A second option for Part I of the cause-of-death statement:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Gram negative sepsis** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Common bile duct obstruction** | **Days to weeks** |
| | Due to, or as a consequence of:<br>C. **Probable choledocholithiasis** | **Days to weeks** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Each option is acceptable, and other options exist as well. Each, however, makes it clear that natural disease is involved, that the major problem involves the biliary system, and that there is not absolute certainty about the underlying cause of death. The degree of specificity to be expressed by the certifier requires judgment. The certifier should attempt to be as accurate and specific as possible, without overstating or understating the

underlying cause of death. If the underlying cause were merely stated as "biliary obstruction," a user of the cause-of-death statement would not know if further information was simply lacking or whether the certifier was simply incomplete in making the cause-of-death statement.

**Case 5**
*Other significant conditions*

**Case 5 history.** A 68-year-old man had continual episodes of congestive heart failure due to ischemic heart disease. Diagnostic studies showed that the heart disease was due to coronary artery atherosclerosis. He also had metastatic prostate carcinoma. He suffered a pathologic fracture of his hip, which was not surgically repaired because of his poor cardiac status. Two days following the fracture, he developed intractable congestive heart failure and died.

Example:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Congestive heart failure** | Approximate interval between onset and death<br>**Weeks** |
| | Due to, or as a consequence of:<br>B. **Ischemic heart disease** | **Years** |
| | Due to, or as a consequence of:<br>C. **Coronary artery atherosclerosis** | **Years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Metastatic prostate adenocarcinoma with pathologic hip fracture** | |

Although the prostate carcinoma and related additional stress from the hip fracture may have precipitated the congestive heart failure, they did not cause the coronary artery disease (the underlying cause of death). Hence, the prostate-related problem is best mentioned as an other significant condition. It coexisted with the heart disease and contributed to death but was unrelated to the underlying cause of death in terms of causing atherosclerosis.

**Case 6**
*Risk factors*

**Case 6 history.** A 32-year-old female had a long history of intravenous drug abuse. She developed HIV infection, AIDS, and died of cryptococcal pneumonia. The only risk factor for HIV infection that she was known to exhibit was habitual intravenous drug abuse, which was well documented in her medical record.

Example:

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Cryptococcal pneumonia** | Approximate interval between onset and death<br>**Weeks** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **Approx 9 years** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **Approx 15 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Chronic intravenous substance abuse** | |

By definition, AIDS is due to HIV infection, so it is not absolutely necessary to specify HIV infection as the underlying cause of death, although it is preferable to do so. There is little question that intravenous drug abuse was a crucial factor in producing this woman's death; therefore, indication of drug abuse on the death certificate is appropriate. In this particular case, one might be tempted to cite chronic intravenous drug abuse as the underlying cause of death. For consistency, however, it is probably best to report risk factors, as shown in the example.

As a matter of convention, deaths due to chronic effects of drug or alcohol abuse (such as fungal endocarditis, AIDS, cirrhosis, etc) are usually designated as being natural in manner because of the chronic nature of the problem and incorporation of the risk factor or behavior into the decedent's lifestyle. In general, if death results from a single episode of drug or alcohol ingestion that results in poisoning or fatal toxicity, a manner of death other than natural is usually ascribed. When in doubt as to manner of death, notify the coroner or medical examiner.

Other risk factors for different underlying causes of death can be reported in a fashion similar to the example. More than one risk factor can be reported.

## Other Responsibilities

### Interval Between Onset and Death

In addition to the lines for indicating underlying, intermediate, and immediate causes of death in the cause-of-death statement, Part I of the cause of death section on the death certificate also includes a space to indicate the time interval between the onset of each condition and death. This information greatly assists nosologists when there is a question about the sequence of conditions in Part I of the cause-of-death statement. Throughout this manual, such intervals have been shown in the examples, but further discussion is now provided.

| | | |
|---|---|---|
| Part I | Immediate cause:<br>A. **Bacterial peritonitis** | Approximate interval between onset and death<br>**Approx 2 days** |
| | Due to, or as a consequence of:<br>B. **Diverticulitis with rupture** | **Several days** |
| | Due to, or as a consequence of:<br>C. **Diverticulosis of descending colon** | **About 10 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

The task of specifying the approximate interval between onset and death should not be taken lightly. This information may be used by insurance companies to establish pre-existing conditions, which may influence insurance benefit payments. The intervals should be stated as accurately as possible, without guessing. It is acceptable, if necessary and true, to indicate the interval as unknown. More generic intervals may also be used, such as minutes, hours, days, months, years, and several years.

The interval stated should make sense and not simply represent how long the condition has been known to the certifier. For example, a physician who has been treating a patient with AIDS who was first seen by the physician four months earlier, but who was diagnosed several years earlier, should not list the interval of having AIDS as four months. Several years would be a better choice. Likewise, it makes little sense to attribute the immediate cause of death to end-stage alcoholic liver disease and assign an interval of two days because the patient died two days after admission to the hospital, when preterminal cirrhosis had been present for some time.

Finally, the intervals can be helpful to the certifier by serving as a double-check that conditions have been listed in the right order. The intervals should be progressively longer (or at least stay the same) from top to bottom.

### Other Death Certificate Items Requiring Completion by the Certifier

In addition to the cause-of-death statement, there are several other items of information that usually require completion by the certifier, as follows:

- **Decedent name.** It is acceptable for the certifier to write the decedent's name in the margin of the certificate, so the funeral home can place the correct name in the designated space if an incorrect or incomplete name was supplied by the certifier.
- **Date of death.** This may include the actual date of death and, in some states, the date pronounced dead.
- **Approximate intervals** between the onset of conditions listed in the cause-of-death statement and death (see previous page).
- **Whether or not an autopsy was performed.**
- **Whether or not the autopsy findings were used in making the cause-of-death statement.** Remember: it may be best to defer certification until autopsy results are available, and it may be necessary to amend the certificate if autopsy findings show that a stated cause of death is incorrect or incomplete.
- **The certifier's name, title, signature, and license number.**
- **The date of certification.**
- **The certifier's printed name and address.**
- **The manner of death.** Note: if other than natural, be sure the case has been reported to the medical examiner or coroner.

These items are self-explanatory, are detailed in available manuals and other parts of this book, and require no further discussion except to note that some states may have death certificates with additional items that the certifier must complete. Local policies and procedures should be followed.

If an external condition (injury or poisoning) is indicated in Part I or Part II of the cause-of-death statement, additional items must also be completed to detail the circumstances of the injury. In general, these will be coroner or medical examiner cases.

The U.S. Standard Certificate of Death now includes specific boxes to indicate, for females, pregnancy status at the time of death, and for all cases, whether tobacco use caused or contributed to death. Only some states have included these items on the death certificate. Be familiar with the certificate used in your state and the specific instructions for the pregnancy and tobacco items.

## Ancillary Concepts

### Mode of Dying

An underlying cause of death can sometimes have the potential to result in a diverse array of fatal complications. For example, a person who dies from using cocaine may have a sudden cardiac death, a seizure disorder, or an excited delirium ("cocaine psychosis"). A person who dies of liver disease may exit in a hemorrhagic fashion or an encephalopathic fashion. Such clinical and circumstantial features are referred to as the *mode of dying.* In general, the mode indicates how the cause of death expressed itself, rather than why it occurred.

In general, modes of death should not appear in the cause-of-death statement on death certificates or other documents. Their use might be warranted under certain circumstances (usually in a medicolegal setting); however, a more specific underlying cause of death should be included in the cause-of-death statement.

Some sources have used mode interchangeably with mechanism of death. Technically, such usage is not correct. The error is not a critical one, so long as it is realized that neither mechanisms nor modes constitute specific underlying causes of death.

Mode has also been used to describe a vector or mode of transmission for some diseases. Blood transfusion, for example, might be regarded as the mode of transmission for HIV infection in a person with hemophilia. Suffice it to say that the word mode has been used in many contexts, mode of dying among them.

Although drawn from older literature, a general classification of modes of death is shown below and is included mainly for its conceptual value and historical interest, as virtually all people die via one of these very general modes of exitus:

- **Exitus momentatus.** Sudden rapid death.
- **Exitus interruptus.** Short period of survival or apparent recovery, then death.
- **Exitus retardus.** Prolonged agonal period, with gradual downhill course progressing to death.
- **Exitus dilatatus.** Long period of apparent recovery or survival, then death.

## Fatal Agents

For the sake of completeness, it is worthwhile to briefly discuss the concept of a fatal agent. A *fatal agent* is the etiologic agent (such as bacteria or viruses) or external instrument, tool, toxin, poison, or force that produces the specific condition(s) that lead to death. For example, if a person exsanguinates because he has been stabbed with a knife, the fatal agent is the knife. For a person who dies from alcohol-related cirrhosis, the fatal agent is alcohol. For a person who dies of bacterial pneumonia, the fatal agent is a microorganism (bacteria). It is not always possible to identify a specific fatal agent. For example, a specific fatal agent in a person dying of coronary artery atherosclerosis is somewhat elusive; the fatal agent may simply have to be regarded as disease.

In general, for natural deaths, with the exception of specific infectious agents, fatal agents are not usually indicated in the cause-of-death statement. Fatal agents may be very important from the medicolegal standpoint and are often explicit in the cause-of-death statement when external conditions are involved in causing accidental deaths, homicides, or suicides, but coroners or medical examiners are usually involved in writing such cause-of-death statements.

# Part IV
# Issues Involved in Specific Types of Death

*The material contained in Part IV is derived from* Cause-of-Death Statements and Certification of Natural and Unnatural Deaths: Protocol and Options, *originally published by the College of American Pathologists in 1997. Certain parts of that publication have been extracted or inserted into other parts of this book, while the remaining parts have been updated.*

*Part IV includes information about cause-of-death statements and deaths involving:*

- *The elderly*
- *Dementia and psychiatric illness*
- *External causes such as injury or poisoning*
- *Periprocedural complications (complications of medical care)*
- *Neonates and infants*
- *Mechanisms of death*
- *HIV infection*
- *Combinations of injury and disease*

## Cause-of-Death Statements and the Elderly

### Introduction

Writing cause-of-death statements for elderly people can be difficult for several reasons:

- Elderly people sometimes seem to die "with their disease" rather than "of their disease."
- Several diseases may coexist, none of which alone or together clearly caused death.
- Death may occur many years after "normal life expectancy," and the relationship of aging, "senescence," disease, and death are unclear.
- Conditions that may not occur or be fatal in a young person may cause the death of an elderly person.
- Dementia or injury may be overlooked as the underlying cause of death.
- A specific underlying cause of death (such as the cause of a "stroke") may be overlooked.
- Fractures are common, and nontraumatic pathologic fractures must be distinguished from fractures due to external conditions (injury).
- Elderly people may be more susceptible to death because of a pre-existing condition or "frailty."

Example scenarios will now be presented, along with appropriate explanations, for various options that may be used for writing cause-of-death statements for the elderly.

### Scenario 1

**Complication of dementia.** A 62-year-old woman with Alzheimer's disease had recurrent bouts of aspiration pneumonia and finally died in the hospital with fulminant pneumonia.

| | | |
|---|---|---|
| Part I | A. **Aspiration pneumonia** | Approximate interval between onset and death<br>**Weeks** |
| | Due to, or as a consequence of:<br>B. **Alzheimer's disease** | **Approx 15 years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Comment.** As in this case, when death results from complications of dementia, the specific type of dementia should be reported as the underlying cause of death, if possible. Of course, complications of the dementia that serve as an intermediate or the immediate cause of death (such as aspiration pneumonia in this case) should also be reported in the cause-of-death statement.

**Scenario 2**

**Reasonably certain underlying cause of death.** An 84-year-old woman had a well-documented history of atherosclerotic coronary artery disease with angina, which required occasional nitroglycerin. She had angina on the morning of her death shortly before she lay on the sofa, then dying about an hour later. The medical examiner was notified, but because of the decedent's age, known condition, and lack of suspicious circumstances, declined to investigate and certify the death. The family did not wish to have an autopsy performed. Her physician went to her home and pronounced death and noted mild bilateral lower extremity edema.

| | | |
|---|---|---|
| Part I | A. **Atherosclerotic coronary artery disease** | Approximate interval between onset and death **Years** |
| | Due to, or as a consequence of: B. | |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Comment.** In this case, because of the history, circumstances, and death, there was compelling evidence that, more likely than not, death resulted from atherosclerotic coronary artery disease. Sufficient evidence was lacking, however, to report a more specific immediate cause of death, for it was not determined whether myocardial infarction, dysrhythmia, or some other entity such as congestive heart failure occurred. Thus, a single line Part I format was used. When a specific cause of death is apparent based on all available information, it should be reported in the cause-of-death statement.

## Scenario 3

**Death involving a fracture.** A 69-year-old female had joint pain related to osteoporosis and its complications. One day while walking, she had acute pain in her hip and was admitted with a pathologic fracture. Five days postoperatively, she died of pulmonary embolism, which originated in a lower-extremity deep-vein thrombosis.

| | | |
|---|---|---|
| Part I | A. **Pulmonary embolism** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Deep leg vein thrombosis** | **Several days** |
| | Due to, or as a consequence of:<br>C. **Pathologic fracture of left femoral neck** | **5 days** |
| | Due to, or as a consequence of:<br>D. **Osteoporosis** | **Years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Comment.** It is important not to overlook the underlying condition, osteoporosis, as the underlying cause of death. It is also important to realize that such pathologic fractures are natural manifestations of a disease because no external condition (injury event) is involved, as might be the case when a person falls and fractures the hip from the impact of falling. Deaths involving fractures from external conditions (injury) should be reported to the medical examiner or coroner.

## Scenario 4

**Death of a "compromised" elderly person.** A 69-year-old man had several previous myocardial infarctions due to coronary artery atherosclerosis. He also had an inguinal hernia which began to hurt severely one day, culminating in a visit to the emergency department the next day, where emergency surgery was deemed necessary for a strangulated hernia. While being transported to surgery, he developed chest pain and died before surgery could be performed. Autopsy confirmed an early myocardial infarction and necrotic bowel in the strangulated segment.

| | | |
|---|---|---|
| Part I | A. **Acute myocardial infarction** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Atherosclerotic coronary artery disease** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Strangulated inguinal hernia** | |

**Comment.** The acute myocardial infarction was the pathologic consequence of coronary artery atherosclerosis and was probably brought about acutely by stresses related to the strangulated hernia. Thus, it is appropriate to report all of these conditions in the cause-of-death statement. Because coronary artery atherosclerosis is pathogenetically linked to the acute myocardial infarction, it is appropriate to report that cause-of-death sequence in Part I. Strangulated inguinal hernia is appropriately reported in Part II because it contributed to death but did not result in the underlying cause of death (coronary atherosclerosis). The hernia did, however, contribute to the immediate cause of death listed in Part I (acute myocardial infarction), but that relationship does not preclude reporting of the hernia in Part II.

## Scenario 5

**Death in which a specific underlying cause may be overlooked.** An 82-year-old male died of cerebral infarction with subsequent pneumonia and systemic sepsis. Autopsy confirmed these findings and also showed a thrombosed atherosclerotic plaque of the left middle cerebral artery.

| | | |
|---|---|---|
| Part I | A. **Pneumonia with sepsis** | Approximate interval between onset and death<br>**4 days** |
| | Due to, or as a consequence of:<br>B. **Left cerebral infarction** | **1 week** |
| | Due to, or as a consequence of:<br>C. **Thrombosis of left middle cerebral artery** | **1 week** |
| | Due to, or as a consequence of:<br>D. **Cerebral artery atherosclerosis** | **Years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Comment.** It is important to remember that entities such as “stroke” or “cerebrovascular accident” often have an identifiable underlying cause that should be reported in the cause-of-death statement, when possible. Pathologic terminology, such as “cerebral infarction” or “left internal capsule brain hemorrhage,” is preferred to words such as “stroke” or “cerebrovascular accident.” Furthermore, an “accident” involves external conditions (injury or poisoning) and applies to manner-of-death classification, not cause-of-death wording. This cause-of-death statement is much more informative than one that reads “cerebrovascular accident.” The possibility of overlooking and failing to report a specific underlying cause of death also exists in many other death scenarios among the elderly.

## Scenario 6

**Cause of death questionable.** A 92-year-old man was found dead in bed by his son. He had a 20-year history of mild hypertension and a 5-year history of diet-controlled diabetes mellitus. Chemical studies on autopsy specimens showed no evidence of hypoglycemia or diabetic ketoacidosis, but moderate cardiac hypertrophy was present, consistent with the history of hypertension. No specific cause of death could be identified.

| | | |
|---|---|---|
| Part I | A. **Undetermined natural causes** | Approximate interval between onset and death<br>**Unknown** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Essential hypertension with cardiac hypertrophy** | |

**Comment.** This format lets a reader of the cause-of-death statement know that a specific cause of death was not apparent, but that hypertension and its cardiac sequelae may have had some role in causing death. When this method is used, if more than one condition is listed in Part II, the most important one should be listed first, with the others listed in descending order of importance.

One might argue that the format shown for Scenario 6 is not an appropriate use for Part II because the condition listed in Part II may actually have been the underlying cause of death. Regardless, the approach shown here is a functional one because it accommodates the occasional need for the certifier to indicate that a specific cause of death is not straightforward. Furthermore, this approach does not interfere with statistical classification and coding procedures.

## Scenario 7

**Cause of death not apparent.** A 92-year-old man was found dead in bed. He had a 10-year history of gradual decline, but no specific medical problems had been diagnosed or treated. There was no suspicion or evidence of foul play. The medical examiner was notified but declined to investigate the death. The family consented to an autopsy, which did not disclose a reasonably certain cause of death. Mild generalized atherosclerosis was observed, as was mild "senile" cerebral atrophy.

| | | |
|---|---|---|
| Part I | A. **Undetermined natural causes** | Approximate interval between onset and death<br>**Unknown** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Comment.** This format appropriately lets a reader of the cause-of-death statement know that a specific natural cause of death was not known. The conditions found at autopsy would be expected in a person of the decedent's age. Although some people advocate that the cause of death be written as "old age" or "senescence" in such cases, using such wording is unnecessary because the stated cause of death may be interpreted in light of the decedent's age, as also reported on the death certificate. Furthermore, there is no standardized age-related definition of senescence or old age. "Unspecified natural causes" is an acceptable alternative. However, such wording should only be used when citing a specific cause of death cannot be done with reasonable certainty, and selecting a specific cause would amount to little more than "flipping a coin."

## Distractors of Which to Beware

There are a number of situations in which the complications of an underlying cause of death may clinically overshadow the underlying condition itself, resulting in the certifier forgetting to include the underlying cause in the cause-of-death statement.

Some of the more common complications that cause such problems, along with commonly associated underlying disease categories, are listed below. Any time one of these complications exists in an elderly person who died, a conscientious attempt should be made to identify and report as the underlying cause of death the condition that caused the complication. The complications should be reported as an intermediate or immediate cause of death, as appropriate for the case.

| | |
|---|---|
| **Pneumonia** | Often a complication of dementia, cerebrovascular disease, cardiac disease, lung disease |
| **Gangrene** | Often a complication of peripheral vascular disease, diabetes mellitus, and embolic conditions |
| **Sepsis** | A nonspecific complication of many disorders in the elderly, commonly urinary tract infection, which, in turn, may be secondary to chronic catheterization for underlying neurologic or other disease |
| **Decubitus ulcers** | Almost always due to some underlying debilitating, neurologic, or systemic disease process |
| **Pulmonary embolism** | A nonspecific complication of many diseases that immobilize the decedent or involve hyperviscosity |
| **Urinary tract infection / urosepsis** | Often a complication of neurologic disease, other debilitating disease, or other more specific urinary tract problems such as prostatism |
| **Aspiration pneumonia** | Often a complication of specific neurologic or neuromuscular disorders |
| **Malnutrition** | Often a complication of underlying systemic disease or neoplasia |
| **Chronic bedridden state** | Usually due to some identifiable underlying condition |

## Think of the Medical Examiner/Coroner

Among the elderly, several situations are common that may necessitate notification of the medical examiner or coroner.

**Abuse or neglect.** Elderly people may be victims of abuse or neglect. If a cause-of-death statement is being written that indicates the possibility or abuse or neglect, the medical examiner or coroner should be notified as required by state law, if notification has not already taken place.

**Inconspicuous injury.** Falls, traumatic fractures, and other types of injuries are common among the elderly but may present as natural disease processes. For example, *subarachnoid hemorrhage* may result from head trauma but present as "spontaneous" intracranial hemorrhage. *Seizure disorders* may be post-traumatic. *Pulmonary embolism* may be the final complication of myriad injuries. *Bleeding diathesis* could indicate a poisoning. *Cardiac rhythm disturbance* may indicate tricyclic antidepressant or other type of drug toxicity. An *infected soft tissue* may be the result of an inflicted injury.

**Suicide.** Suicide rates are high among the elderly. When a reasonably certain, non-suicidal cause-of-death cannot be determined, the possibility of suicide should always be considered, and the medical examiner or coroner should be notified, as required by state law and if circumstances dictate. *Antidepressants* are often prescribed and are not infrequently used in suicide attempts. A history of depression should alert the certifier to the possibility of suicide. Some methods of *suicide can be masked* by family members, making suicide difficult to detect—a fact that should always be borne in mind. If a person has committed suicide at least in part because of a potentially fatal disease (such as metastatic gastric carcinoma), it is acceptable to report that disease in Part II as an other significant condition. Similarly, a history of depression may be reported in Part II.

**Hypothermia and hyperthermia.** Elderly people may be at increased risk for death involving environmental hypothermia (cold exposure) or hyperthermia (heat stroke). Hypothermia and hyperthermia may also be endogenous, however, usually due to infectious processes or neurologic disorders. If a cause-of-death statement includes reference to hypothermia or hyperthermia, the certifier must attempt to ascertain whether the condition is endogenous or exogenous. If exogenous causes are a real possibility, state law may require that the death be reported to the medical examiner or coroner because external conditions (injury or poisoning) may be involved. If endogenous, every attempt should be made to identify the underlying cause of the hypothermia or hyperthermia and to report the underlying cause as the underlying cause of death—reporting the hypothermia or hyperthermia as an intermediate or immediate cause of death, as appropriate for the case.

## Neoplasia

Neoplasia is common among the elderly. When death results from the complications of neoplasia, the neoplastic condition should be reported in the cause-of-death statement, usually as the underlying cause of death. The primary site and cell type (eg, “squamous cell carcinoma of left mainstem bronchus”), and nature of the fatal complication (eg, “hemorrhage due to aorto-pulmonary fistula” or “multiple metastases to brain”) should also be reported, if possible.

## Summary

Cause-of-death statements for elderly individuals may be approached as follows:

- If the death involves conditions that with reasonable medical probability constitute the cause-of-death sequence, then the cause-of-death statement may be written using the same basic principles that would be used for certifying the death of a younger individual.
- If a cause of death cannot be determined with reasonable medical probability but seems to be due solely to natural causes, the certifier may attribute death to Undetermined Natural Causes.
- If a condition existed that may have caused death, but reasonable medical probability is tenuous, Part I may be reported as Undetermined Natural Causes, and the condition may be reported in Part II.
- Certifiers should be aware of common complications that may cause one to overlook and fail to report the underlying cause of death, making sure to report such underlying causes of death.
- Special consideration should always be given to the possibility of abuse or neglect, inconspicuous injury, suicide, complications of psychiatric disorders, and exogenous hyperthermia or hypothermia.
- For deaths involving neoplasia, the cell type, primary site, and nature of fatal complication(s) should each be reported in the cause-of-death statement.
- It is important to differentiate pathologic fractures from traumatic fractures.
- Do not overlook some form of dementia as an underlying cause of death.

## Options for Reporting Dementias and Psychiatric Illness When Writing Cause-of-Death Statements

### Introduction

For deaths involving dementia, studies have shown that important information is sometimes omitted from the death certificate, including omission of the underlying cause of death. For example, for a person who dies of aspiration pneumonia (immediate cause of death) because of Alzheimer's disease (underlying cause of death), some may incorrectly cite "aspiration pneumonia" as the only cause of death on the death certificate, with no mention of Alzheimer's disease. Such an approach provides incomplete information for mortality studies and statistics, which may result in suboptimal assessment of mortality patterns, in turn resulting in suboptimal or misdirected research funding and public health programs.

An option is provided here that may be useful when writing the cause-of-death statement for a patient who has died as a result of progressive dementia, to ensure that a specific type of dementia is cited, if possible, and that the more acute complications that culminate in death are also cited in correct format. Advice for reporting psychiatric illness is also included. Deaths resulting from the various encephalopathies that may be reversible and secondary to a host of underlying systemic disease conditions are not addressed here.

### Basic Principles

When writing a cause-of-death statement for a death resulting from dementia, the cause-of-death statement should include the specific type or classification of dementia as the *underlying cause of death,* and the important complications of the dementia should be included as the *immediate* or an *intermediate cause of death,* as shown in the following example:

| | | |
|---|---|---|
| Part I | A. **Aspiration pneumonia** (Complications, ie, Immediate cause) | Approximate interval between onset and death **Days** |
| | Due to, or as a consequence of: B. **Alzheimer's disease** (Underlying cause) | **10 years** |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In some cases, the sequence of events may involve a longer chain of complications, requiring the inclusion of one or more intermediate causes of death, as shown in this example:

| | | |
|---|---|---|
| Part I | A. **Systemic sepsis** (Complication, ie, Immediate cause) | Approximate interval between onset and death **3 days** |
| | Due to, or as a consequence of: B. **Infected decubiti** (Complication, ie, Intermediate cause) | **2 weeks** |
| | Due to, or as a consequence of: C. **Alzheimer's disease** (Underlying cause) | **10 years** |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

It is not always possible to use the *sequential Part I format,* as shown in the previous examples. For example, consider the patient with Huntington's disease, whose death was expected but occurred at home, and an autopsy was not performed. There may be insufficient information to cite a specific immediate cause of death, and a *single line Part I format* may be required, as shown in this example:

| | | |
|---|---|---|
| Part I | A. **Huntington's disease** | Approximate interval between onset and death **12 years** |
| | Due to, or as a consequence of: B. | |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

It would also be acceptable to state the cause of death in this case as "Complications of Huntington's disease." When a single line Part I format is used, the condition listed is the underlying cause of death but also serves as the immediate cause of death.

### Exclusion of Terminal Events

Mechanisms of death that are terminal events, such as cardiac arrest, respiratory arrest, cardiopulmonary arrest, ventricular fibrillation, asystole, and electromechanical dissociation), are extremely nonspecific and should not be included in the cause-of-death statement.

### Nonspecific Processes and Derangements

People who die of dementia often develop one or more nonspecific complications of the underlying dementia. Such nonspecific complications may serve as the immediate or an intermediate cause of death. Some common examples include:

- Aspiration pneumonia
- Pneumonia
- Seizure disorder
- Decubitus ulcers (with or without osteomyelitis)
- Systemic sepsis
- Pulmonary embolism

It is appropriate to include such nonspecific complications in the cause-of-death statement as the immediate or intermediate cause of death, but a specific type of dementia should be specified as the underlying cause of death, if possible. A nonspecific complication should not be cited as the underlying cause of death when death results from a dementia.

### Dementias That May Be Cited as the Underlying Cause of Death

The following table lists some specific types of dementia that, based on current medical knowledge, are primary conditions with a specific or unknown etiology. In every case in which death appears to have resulted from dementia, an attempt should be made to specify one of the conditions in the table as the underlying cause of death when writing a cause-of-death statement.

| Dementias With Specific or Unknown Etiology | |
|---|---|
| Alzheimer's disease (includes the "presenile" and "senile" types) | Idiopathic Parkinson's disease with dementia |
| Dementia with Lewy bodies* | Progressive supranuclear palsy |
| Vascular dementia, multi-infarct type | Corticobasal degeneration |
| Vascular dementia, lacunar type | Creutzfeldt-Jakob disease |
| Vascular dementia, Binswanger's type | Huntington's disease |
| Vascular dementia, otherwise unspecified | Multisystem atrophy |
| Pick's disease | Motor neuron disease with dementia |
| Frontal lobe dementia | Senile dementia, unclassified |
| | Dementia, otherwise unclassified |

** Neuropathologists have not reached a consensus regarding the classification of dementias in this category. "Lewy body variant of Alzheimer's disease," "Senile dementia of the Lewy body type," "Mixed Alzheimer's disease and Lewy body disease," and "Diffuse Lewy body disease" have each been used and may apply in specific cases. At present, each is acceptable as a cause of death.*

Comment: In some cases, a vascular dementia may be listed as the underlying cause of death. In other cases, vascular dementia may be secondary to an identifiable underlying cause, such as cerebral artery arteriosclerosis. When a vascular dementia is known to be due to an underlying cause, the vascular dementia may be listed as an immediate or intermediate cause of death, with the underlying condition being listed as the underlying cause of death.

| | | |
|---|---|---|
| Part I | A. **Klebsiella pneumonia** | Approximate interval between onset and death<br>**1 week** |
| | Due to, or as a consequence of:<br>B. **Multi-infarct vascular dementia** | **10 years** |
| | Due to, or as a consequence of:<br>C. **Cerebral arteriosclerosis** | **Unknown** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Autopsy, histologic examination, or other postmortem studies may be required to diagnose some of the dementias listed in the above table. When possible, the death certificate should reflect such information. The death certificate may be amended if relevant information surfaces after the death certificate is filed.

## Getting Specific

When writing the cause-of-death statement, an attempt should be made to state each condition as specifically as possible, including condition subtype, anatomic sites, and etiologic agents, if known. The following cause-of-death statement serves as an example:

| | | |
|---|---|---|
| Part I | A. **Systemic staphylococcal sepsis** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Infected decubitus ulcer of left buttocks** | **2 weeks** |
| | Due to, or as a consequence of:<br>C. **Multi-infarct vascular dementia** | **10 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

The preceding example includes a specific etiologic agent (staphylococcus), a specific anatomic location (left buttocks), and a specific disease categorization (vascular dementia, multi-infarct type).

## Other Significant Conditions

In some cases, a dementia may contribute to death, but another condition is more important pathophysiologically and constitutes the underlying cause of death. For example, a person may die from ischemic heart disease, but the presence of Alzheimer's disease may also have played a role, perhaps by exacerbating heart failure by producing aspiration pneumonia. In such a case, it is appropriate to list the dementia in Part II of the cause-of-death statement as an "other significant condition."

| | | |
|---|---|---|
| Part I | A. **Congestive heart failure** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Chronic ischemic heart disease** | **10 years** |
| | Due to, or as a consequence of:<br>C. **Atherosclerotic coronary artery disease** | **15 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Alzheimer's disease with aspiration pneumonia** | |

If a dementia is present at the time of death, but the dementia does not cause or contribute to death, the dementia should not be cited in the cause-of-death statement unless otherwise required by local death registration laws, regulations, policies, or procedures.

For further information regarding "other significant conditions," nonspecific processes, and the underlying, intermediate, and immediate causes of death, refer to other parts or sections of this book.

**Psychiatric Illness and Disorders**

It is entirely appropriate to report psychiatric illnesses on the death certificate if such a condition caused or contributed to death. For example, if a person with depression commits suicide, "History of depression" could be reported in Part II.

If a person died of tricyclic antidepressant overdose accidentally while being treated for depression, an acceptable cause-of-death statement could be prepared as follows:

| | |
|---|---|
| Part I | A. **Amitriptylene poisoning** |
| | Due to, or as a consequence of:<br>B. **Complication of treatment for depression** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

| |
|---|
| Manner of Death<br>**Accident** |

Sudden unexplained death may occur in the setting of some psychiatric conditions, such as schizophrenia, and may remain unexplained even after autopsy. In such cases, assuming that no external causes or other competent natural causes were involved, the underlying cause of death could be stated using a single line format, such as "Sudden death associated with schizophrenia."

Some types of psychiatric disorders, such as *excited delirium, catatonia, and acute manic episode,* may cause death, as can adverse reactions to the treatment of psychiatric disorders, such as the *neuroleptic malignant syndrome,* which is occasionally associated with major tranquilizer therapy, and *accidental overdoses* or toxicity of psychiatric medications such as antidepressants. Such possibilities should always be considered, and

if drug overdose or toxicity is suspected, the death should be reported to the medical examiner or coroner, as detailed in state law.

If conditions such as neuroleptic malignant syndrome existed and caused death, the cause-of-death statement can include the underlying psychiatric condition and drug involved in causing the syndrome, such as:

| | |
|---|---|
| Part I | A. **Neuroleptic malignant syndrome** |
| | Due to, or as a consequence of:<br>B. **Complication of phenothiazine treatment of psychosis** |
| | Due to, or as a consequence of:<br>C. |
| | Due to, or as a consequence of:<br>D. |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I |

| |
|---|
| Manner of Death<br>**Accident** |

Refer to the "Manner of Death" and "Periprocedural Death" sections of this book for further discussion of manner-of-death classifications in such cases.

**Reporting Selected Cases to the Medical Examiner/Coroner**

Persons with dementia may sustain injuries that may be unintentional (such as injury resulting from a fall) or intentional (such as injury from physical abuse). Some persons with dementia may be institutionalized. The laws in many states require that deaths of institutionalized patients or deaths involving known or suspected injury be reported to the medical examiner or coroner. Be familiar with local and state laws regarding the types of deaths that must be reported to the medical examiner or coroner, and ensure that such deaths are reported when they occur or are suspected.

In general, if a person with dementia or psychiatric illness has died from a known or suspected injury, the medical examiner/coroner will probably investigate the death and complete the death certificate, assuming the death has been reported to the medical examiner/coroner in the first place. Some states now have laws requiring nursing home or personal-care home deaths to be reported to the medical examiner or coroner, although the medical examiner or coroner may not be required to conduct full investigations or certify the deaths.

## Options for Writing Cause-of-Death Statements for Deaths Due to External Causes (Injury or Poisoning)

### Introduction

The option here is designed for persons who must certify deaths that result from external causes such as injury or poisoning. It is recognized that the approach to certifying such deaths varies among certifiers—even among medical examiners and coroners who certify most deaths resulting from injury and poisoning. Some certifiers prefer to write cause-of-death statements that include only the underlying cause of death (eg, gunshot wound of thorax), while others prefer to write more comprehensive cause-of-death statements that also include one or more intermediate cause of death (eg, hemopericardium) and an immediate cause of death (eg, cardiac tamponade). While certifiers of death must have the liberty to write cause-of-death statements that best meet their needs in a particular case, some guidelines may be useful. The option presented here is one approach based on differentiating an *injury event* from the resulting *trauma* and *fatal derangement.*

### Injury Event, Trauma, and Fatal Derangements

Although the words injury and trauma are often used synonymously, the National Center for Health Statistics (NCHS), which provides guidelines for completion of the death certificate, recommends that the certifier "report each injury or poisoning that caused a bodily trauma," and that the "fatal injury" (eg, gunshot wound to thorax) and the "trauma" (eg, perforation of heart) be reported along with the fatal "impairment of function" (eg, cardiac tamponade). Further discussion of these concepts may be helpful to foster consistency when writing cause-of-death statements.

By virtually all definitions, an injury is caused by an external agent or force (external condition) that is usually physical or chemical in nature. Thus, for the purpose of writing cause-of-death statements, an *injury event* may be viewed as an event involving one or more external conditions that damage bodily tissue or its function. *Trauma* may be viewed as the damage sustained by bodily tissue when an injury event occurs. The trauma may result in some specific or nonspecific anatomic or functional derangement that causes death, which may be viewed as a *fatal derangement*. For example, if a person who has been stabbed near the base of the neck sustains a transection of the subclavian vein with fatal left hemothorax, the "stabbing" (or sharp force injury) may be viewed as the *injury event*, "stab wound of neck" and "transection of the subclavian vein" may each be viewed as *trauma*, and "intra-thoracic hemorrhage" (or hemothorax) may be viewed as the *fatal derangement*. Thinking in these terms may be helpful when writing a cause-of-death statement, as each may be included in the cause-of-death statement in order to fully document the nature of the injury and its fatal consequences.

## General Approach

In general, a useful approach to writing Part I of cause-of-death statements involving an injury event (or poisoning) is shown in the following example:

| | | |
|---|---|---|
| Part I | A. **Fatal derangement** (eg, Cardiac tamponade) | Approximate interval between onset and death |
| | Due to, or as a consequence of:<br>B. **Bodily trauma** (eg, Perforation of heart) | |
| | Due to, or as a consequence of:<br>C. **Injury event** (eg, Gunshot injury to chest) | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

## Sample Cause-of-Death Statements

For a scenario involving a fatal stab wound, the cause-of-death statement may be written as follows, where the injury event constitutes the *underlying cause of death*, each sequential trauma is cited as an *intermediate cause of death*, and the fatal derangement is cited as the *immediate cause of death*.

| | | |
|---|---|---|
| Part I | A. **Left intrathoracic hemorrhage** | Approximate interval between onset and death<br>**20 minutes** |
| | Due to, or as a consequence of:<br>B. **Transection of left subclavian vein** | **20 minutes** |
| | Due to, or as a consequence of:<br>C. **Stab injury of left shoulder** | **20 minutes** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

A more conventional approach may be used by using the word "wound" instead of "injury," as long as the nature of the injury event is apparent, as shown in the following example:

| | | |
|---|---|---|
| Part I | A. **Left intrathoracic hemorrhage** | Approximate interval between onset and death<br>**20 minutes** |
| | Due to, or as a consequence of:<br>B. **Transection of left subclavian vein** | **20 minutes** |
| | Due to, or as a consequence of:<br>C. **Stab wound of left shoulder** | **20 minutes** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In the example immediately above, it is implicit that a sharp force injury event is involved, without a direct statement of that fact. Such an approach may be used for many death scenarios involving an injury event, trauma, and a fatal derangement. Although some certifiers may wish to write the cause-of-death statement simply as "stab wound of shoulder," it should be obvious that such information will not be of much use for studying the nature of the complications produced by the injury event.

One must keep in mind that mortality data may be used to evaluate public health and emergency response needs, and including complete information in the cause-of-death statement is helpful. For example, if it were shown from mortality data that many or most stab wounds of the subclavian region involved air embolism, such information may be useful to emergency response planning.

### Other Items Requiring Completion

When death is caused by external conditions (ie, results from injury or poisoning), several other items of information must be completed on the death certificate:

- The manner of death
- How the injury occurred
- The date, time, type of place, and address where injury occurred
- Whether the injury occurred at work (Yes/No)
- The interval between onset and death for each condition in Part I

For a death resulting from injury or poisoning, the manner of death is usually indicated as homicide, suicide, accident, or undetermined. Manner of death is determined by the type(s) of cause(s) resulting in death and the circumstances under which the cause(s) occur(s). A full discussion of manner of death is beyond the scope of this section, and further information may be found in Part V of this book.

To "describe how injury occurred," enough information must be supplied to address questions that would be anticipated in the type of injury involved. For example, in motor vehicle collisions, it is desirable to indicate whether the decedent was a driver, passenger, or pedestrian, and whether the incident was a vehicle-vehicle collision or an impact with another object, such as a tree (eg, driver of car that struck tree). The space allowed for such entries on many death certificates is limited, and telegraphic statements are sometimes required. The 2003 U.S. Standard Certificate of Death has a dedicated box in which the status (driver, passenger, pedestrian, etc) of a motor vehicle fatality victim is to be reported, but not all states have yet incorporated that item on their death certificates.

For the date and time of injury, "unknown" is acceptable if such is the case, or the date and time may be specified as "approximate" or "found." The "type of place" should be stated generically (eg, "fast-food restaurant"), avoiding specific names of places or businesses. It is also helpful to be unambiguous, specifying, for example, if a death in a home occurred in "decedent's home" or "another's apartment." The address of the location should include the street and street number, city, state, and zip code.

Criteria have been established by the National Association of Public Health Statistics and Information Systems (NAPHSIS) and other groups to assist in determining if an injury occurred at work; these criteria are included at the end of this section. Persons who complete this entry on the death certificate should be familiar with the criteria because some injury deaths that occur while working or going to work are not considered to involve "injury at work." (See end of this section for details.)

Discussion of the "interval between onset and death" is contained elsewhere in this book (see Part II). In brief, these intervals may be stated precisely if adequate information is available, or in broad terms (eg, minutes), or as "unknown," or they may be indicated as approximations (eg, approx 3 years). When possible, the intervals should be stated as accurately as possible without guessing.

Using the principles discussed, an injury-related cause-of-death statement that also includes the other necessary items of information is shown below:

| | | |
|---|---|---|
| Part I | A. **Splenic rupture with intra-abdominal hemorrhage** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Contusion of spleen** | **7 days** |
| | Due to, or as a consequence of:<br>C. **Blunt force trauma of abdomen** | **7 days** |
| | Due to, or as a consequence of:<br>D. **Motor vehicle crash** | **7 days** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

| | | |
|---|---|---|
| 37. MANNER OF DEATH<br>**Accident** | 38. DATE OF INJURY<br>**Jan. 19, 1995** | 39. TIME OF INJURY<br>**Approx. 2:30 a.m.** |
| 40. PLACE OF INJURY<br>**City street** | | 41. INJURY AT WORK?<br>**No** |
| 42. LOCATION OF INJURY<br>**619 Slippery Trail,<br>Catapolis, Georgia 33996** | | 43. DESCRIBE HOW INJURY OCCURRED<br>**Driving car. Struck curb.<br>Vehicle struck a tree.** |

In the example above, some may argue that "motor vehicle crash" should not be included in Part I because item 43 describes what happened. It does no harm to include general injury event information in Part I, however, and it can be helpful in some cases, as described in further detail below.

If an external condition (injury or poisoning) is listed in Part I or Part II of the cause-of-death statement, all of the injury-related items (items 37-43 in the example) must be completed. If an injury is listed as the underlying cause of death, the manner must be designated as other than natural (ie, homicide, suicide, accident, or undetermined).

When disease and injury combine to result in death (eg, a person who falls from a roof during an acute myocardial infarction and sustains a fatal neck injury), writing the cause-of-death statement and assigning a manner of death can be difficult. Further discussion of such dilemmas is beyond the scope of this section (see "When Disease and Injury Seem Inseparable").

## Other Examples and Variations

*In some cases, the trauma resulting from an injury event may not connote a specific type of injury event.* For example, blunt force trauma may result from a fall from a height, from being struck by a vehicle, from a blow with a fist, or from other causes. Although the "describe how an injury occurred" section is used to clarify the circumstances (eg, pedestrian struck by car), it may be helpful in some cases to also cite the injury event in the cause-of-death statement to clarify the type of injury event that occurred. For example:

| | | |
|---|---|---|
| Part I | A. **Intra-abdominal hemorrhage** | Approximate interval between onset and death<br>**1 hour** |
| | Due to, or as a consequence of:<br>B. **Lacerations of liver** | **1 hour** |
| | Due to, or as a consequence of:<br>C. **Blunt force trauma of abdomen** | **1 hour** |
| | Due to, or as a consequence of:<br>D. **Fall from height** | **1 hour** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In the example shown above, the "describe how injury occurred" item on the death certificate would contain further specific information such as "fell from radio broadcast tower." Selecting the best way to state the cause of death requires judgment and must include considerations of clarity, the scope of available information, the space available on the certificate, and other needs—such as a need for circumspection in some medical-legal cases, where complete disclosure of the cause or circumstances of death could interfere with an ongoing investigation.

***

For the remainder of this section, in order to conserve space, only the cause-of-death statement (Part I and Part II) will be indicated in the examples. The other items requiring completion will not be included in the examples.

***

*Some cases require additional thought and use of Part II* (other significant conditions). For example, assume that in the stab-wound case scenario presented earlier, air embolism was also present. Although one may be tempted to write "left intrathoracic hemorrhage and air embolism" as the immediate cause of death, NCHS guidelines advise against the reporting of more than one condition per line in Part I of the cause-of-death statement in order to facilitate nosologic coding, classification, and prioritization of conditions. It is incumbent upon the person writing the cause-of-death statement to select one of the two conditions as the most important and cite it in Part I, and to cite the less important condition in Part II as an *other significant condition*. Thus, if the air embolism was felt to be of lesser importance, the cause-of-death statement could be written as:

| | | |
|---|---|---|
| Part I | A. **Left intrathoracic hemorrhage** | Approximate interval between onset and death<br>**20 minutes** |
| | Due to, or as a consequence of:<br>B. **Transection of left subclavian vein** | **20 minutes** |
| | Due to, or as a consequence of:<br>C. **Stab wound of left shoulder** | **20 minutes** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Air embolism** | |

*In some instances, more than one type of trauma may result from an injury event.* Consider the case of a person who is struck in the head with a baseball bat (injury event) and sustains a right parietal skull fracture (trauma), a lacerated middle-meningeal artery (trauma), and an epidural hematoma (fatal derangement) and death. The cause-of-death statement may be written as shown in the next example, including each trauma sequentially, as appropriate, as an intermediate cause of death, if such facts are known.

| | | |
|---|---|---|
| Part I | A. **Right parietal epidural hematoma** | Approximate interval between onset and death<br>**1 hour** |
| | Due to, or as a consequence of:<br>B. **Laceration of right middle-meningeal artery** | **1 hour** |
| | Due to, or as a consequence of:<br>C. **Right parietal skull fracture** | **1 hour** |
| | Due to, or as a consequence of:<br>D. **Blunt impact to head** | **1 hour** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

As discussed above, whether to include "struck with baseball bat" in the cause-of-death statement or "describe how injury occurred" section, or both, is a matter of personal preference and specific needs of the case. If it is important to not disclose the baseball bat as the weapon, as might occur in some medical-legal cases, one may have to write "struck with blunt object." Regardless of the wording, the "describe how injury occurred" item must be completed for all deaths due to injury, as must the other injury-related items on the death certificate.

*It is not always possible to follow the guidelines as shown in the previous examples.* The amount and type of trauma may be so extensive that more generic statements must be used. Consider the driver of a car who crashes and sustains lacerations of liver, spleen, and heart, with significant internal hemorrhage, but also sustains multiple skeletal fractures and traumatic subarachnoid hemorrhage. In such cases, space limitations may require a more generic approach, as shown in the following example:

| | | |
|---|---|---|
| Part I | A. **Internal hemorrhage of thorax and abdomen** | Approximate interval between onset and death<br>**15 minutes** |
| | Due to, or as a consequence of:<br>B. **Multiple visceral lacerations** | **15 minutes** |
| | Due to, or as a consequence of:<br>C. **Generalized blunt force trauma** | **15 minutes** |
| | Due to, or as a consequence of:<br>D. **Motor vehicle collision** | **15 minutes** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Traumatic subarachnoid hemorrhage** | |

*In other cases, the nature of the fatal derangement may be so complex that its nature is elusive or it cannot be adequately stated in the space provided.* Consider the case of a suicidal gunshot wound to the head in which the bullet perforates both cerebral hemispheres. Just what is the fatal derangement? Hemorrhage, traumatic brain necrosis, vasospasm, neuronal shock, and other derangements are all possibilities that may be difficult or impossible to sort out. Again, a more generic statement may be required, as shown in the next example of a through-and-through gunshot wound of the head.

| | | |
|---|---|---|
| Part I | A. **Perforating wound of brain and head** | Approximate interval between onset and death<br>**10 minutes** |
| | Due to, or as a consequence of:<br>B. **Contact gunshot injury of head** | **10 minutes** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

One may argue that inclusion of "perforating wound of brain and head" is not needed, and that "contact gunshot injury of head" by itself would suffice. That may be true in some cases, but citation of "perforating brain trauma" does differentiate the trauma in this case from that in a case where the bullet, for example, simply impacts with and cracks the skull, causing an epidural hemorrhage and death. Note also in this example that "firearms injury" need not be stated specifically since the nature of the injury event is implicit as stated.

*In some cases where death results from medical complications of an injury, it may be necessary to combine the principles used to write cause-of-death statements for deaths due to disease with those used to cite injury and trauma.* Consider the case of a person who is burned when a tar vat explodes, then, over the ensuing two weeks, develops wound infection, pneumonia, sepsis, and then dies.

| | | |
|---|---|---|
| Part I | A. **Pseudomonas sepsis** | Approximate interval between onset and death<br>**2 days** |
| | Due to, or as a consequence of:<br>B. **Pseudomonas pneumonia** | **5 days** |
| | Due to, or as a consequence of:<br>C. **Cutaneous burn wound infection** | **10 days** |
| | Due to, or as a consequence of:<br>D. **3rd degree thermal burns** | **14 days** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In the above example, the "describe how injury occurred" section could be used to indicate that the decedent was "burned when tar vat exploded."

## Poisoning

Poisoning is an injury event caused by a chemical or other noxious substance, and the same principles may be used to write cause-of-death statements for poisoning as are used for other injury events. In some cases involving alcohol, other drugs, or other substances that result in death by poisoning, a specific fatal derangement may be known, while in other cases, the fatal derangement is presumed or is a matter of little more than speculation.

For example, a person who ingests anticoagulant-containing rat poison may die of a perceivable fatal derangement such as gastrointestinal hemorrhage. In such a case, the cause-of-death statement might be written as follows:

| | | |
|---|---|---|
| Part I | A. **Gastrointestinal hemorrhage** | Approximate interval between onset and death<br>**Unknown** |
| | Due to, or as a consequence of:<br>B. **Coagulopathy** | **Unknown** |
| | Due to, or as a consequence of:<br>C. **Dicumarol rodenticide poisoning** | **Unknown** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Of course, dicumarol poisoning is the "injury event" (or poisoning event), and gastrointestinal hemorrhage is the fatal derangement. Technically, the "trauma" might be most accurately stated as "hepatocellular dysfunction," but the wording in the above example (coagulopathy) also makes the pathogenetic sequence clear. One may describe how injury occurred in this case by writing "ingested rat poison."

*Sometimes the immediate cause of death is not known and cannot be accurately stated with reasonable certainty.* Consider the person who is found dead and is shown to have died from a cocaine overdose (poisoning), and who may have died of a dysrhythmia, a seizure, or perhaps even an excited delirium with hyperthermia—but the circumstances and available information do not allow differentiation of which one occurred. In such a case, a generic, *single line Part I format* may be used, as shown in the following example.

| | | |
|---|---|---|
| Part I | A. **Acute cocaine poisoning** | Approximate interval between onset and death **Minutes to hours** |
| | Due to, or as a consequence of: B. | |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In the preceding example, if investigation showed that the cocaine had been taken by nasal insufflation, it would be acceptable to write "snorting cocaine" in the "describe how injury occurred" section. As an alternative, the cause-of-death statement may be written as follows:

| | | |
|---|---|---|
| Part I | A. **Acute cocaine poisoning** | Approximate interval between onset and death **Minutes to hours** |
| | Due to, or as a consequence of: B. **Cocaine snorting** | **Minutes to hours** |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

If the method shown in the example last cited were used, it would still be necessary in the "describe how injury occurred" section to state "snorting cocaine" or some similar terminology, such as "illicit use of cocaine." Also, if it were known, for example, that the cocaine poisoning caused a fatal seizure, "cocaine-induced seizure" would constitute the fatal derangement and could be written as the immediate cause of death.

As another example, assume that a person died from delirium as a result of crack cocaine smoking. The cause-of-death statement may be written as follows:

| | | |
|---|---|---|
| Part I | A. **Excited delirium** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Cocaine poisoning** | **Minutes** |
| | Due to, or as a consequence of:<br>C. **Crack cocaine smoking** | **Hours** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

When a fatal derangement can be determined in a poisoning death, it is appropriate to report the fatal derangement (excited delirium in the example shown above) as the immediate cause of death.

The method of choice for writing cause-of-death statements in such cases depends on a thorough analysis of all findings, including analysis of the sequence of events, circumstances preceding death, and autopsy and toxicologic findings. In general, if a specific fatal derangement has been identified, it may be included in the cause-of-death statement. Otherwise, a more generic statement may be required.

**More on Part II: "Other Significant Conditions"**

Conditions or risk factors that, with reasonable medical probability, pre-existed or coexisted in the decedent and contributed to death may be indicated in Part II of the cause-of-death statement as an other significant condition. Some common examples include alcohol intoxication (ie, a risk factor for motor vehicle collisions) or a malignancy that may have been the reason a person cited for committing suicide. It is difficult to be consistent in citing such conditions because the necessary information may not be available when the cause-of-death statement is completed. Consistent reporting of such conditions is recommended, however, and there should be documentation or reasonable probability that the condition or risk factor existed in the decedent.

Part II is also used to report conditions that may have contributed to death but did not result in the underlying cause of death in Part I. An example involves a hemophiliac who is shot in the abdomen, with perforating hepatic trauma. The gunshot injury would be listed in Part I, and the hemophilia in Part II, because it did not result in the gunshot wound, but it contributed to death. The reader may consult the references in Part VIII for further information.

## Medical-Legal Considerations

Most deaths that involve an injury event (or poisoning) will be investigated and certified by or under the authority of the medical examiner or coroner, whichever serves your area. Although state laws vary somewhat, most states have death investigation laws that require the medical examiner or coroner to be notified when a death occurs that is suspected or known as having resulted from injury (or poisoning) *regardless of the interval between onset and death*. Be familiar with local laws and abide by the provisions, being sure to report cases to the medical examiner or coroner, as required.

In general, specific brand names should be avoided in cause-of-death statements and the related death certificate items, unless there is a high degree of confidence that a specific brand-name product was involved. There may be a requirement or opportunity to report deaths involving injuries to specific agencies, such as the Occupational Safety and Health Administration, Consumer Product Safety Commission, the Food and Drug Administration, or other agencies. Be familiar with requirements and reporting systems that may apply to individual case reporting in your area.

## Summary

Rigid adherence to the option described here is not always possible. It is not always necessary to specifically cite the injury event if the nature of the injury event is otherwise implicit in the cause-of-death statement or described in the “describe how injury occurred” section of the death certificate. Certifiers should recognize that complete information is valuable for statistical, research, and public health-planning purposes, but in individual cases, judgment is required to select the most appropriate wording for the cause-of-death statement. Judgment should be based on the needs of the case, space availability, an awareness of the value of completeness, and the scope of available information.

Finally, it is recommended that certifiers of death use methods for writing cause-of-death statements that include information stated as specifically and completely as possible, in a fashion that is as consistent as possible from case to case.

## Operational Guidelines for Determination of Injury at Work

1. Complete the injury-at-work item if any other than natural cause of death is mentioned in Part I or Part II of the medical certification, including homicides, suicides, and accidents, including motor vehicle deaths.
2. The injury-at-work item must be completed for decedents ages 14 or older and may be completed for those younger than 14 years of age if warranted. Consider possibility of work injury regardless of whether injury occurred in the course of work in "usual" or other occupation and/or industry. If decendent's "usual" occupation is housewife, student, or retired, consider possible injury during other employment. If occupation is transportation-related, suspect injury at work and evaluate per criteria.
3. Consider available information with regard to location and activity at time of injury. If location is farm, suspect work-related and evaluate per criteria.

| Injury at Work | | |
|---|---|---|
| **Yes** | **No** | **CRITERIA** |
| | | **On Employer Premises** |
| √ | | • Engaged in work activity, apprentice, vocational training |
| √ | | • On break; in hallways, rest room, cafeteria, storage area |
| √ | | • In employer parking lots while working, arriving, or leaving |
| | √ | • Engaged in recreational activities on employer-controlled facilities (games, etc.) for personal enjoyment |
| | √ | • As visitor for non-work purposes, not on official business |
| | | **Off Employer Premises** |
| √ | | • Working for pay or compensation, including at home |
| √ | | • Working as a volunteer EMS, firefighter, or law-enforcement officer |
| √ | | • Working in family business, including family farm. Activity should be clearly related to a profit-oriented business |
| √ | | • Traveling on business, including to and from customer/business contacts |
| √ | | • Engaged in work activity where vehicle is considered the work environment (eg, taxi driver, truck driver, etc.) |
| | √ | • Homemaker working at homemaking activities |
| | √ | • Working for self – non-profit, ie, mowing lawn, repairing own roof, hobby, or recreation activities |
| | √ | • Student engaged in school activities |
| | √ | • Operating vehicle (personal or commercial) for non-work purposes |
| | √ | • Commuting to or from work site |

These guidelines were developed jointly by The Association for Vital Records and Health Statistics (AVRHS), the National Institute of Occupational Safety and Health (NIOSH), the National Center for Health Statistics (NCHS), and the National Center for Environmental Health (NCEH).

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## Options for Writing Cause-of-Death Statements for Periprocedural Deaths (Complications of Medical Care)

### Introduction

The Autopsy Committee of the College of American Pathologists defines a *periprocedural death* as a death that is known or suspected as having resulted in whole or in part from diagnostic, therapeutic, or anesthetic procedures. The "procedure" may be as simple as the administration or ingestion of a drug. In essence, periprocedural deaths involve complications of medical care. Some periprocedural deaths have been referred to as "misadventures," "iatrogenic," or "errors and accidents in medical care." However, the words "misadventure" and "iatrogenic" may connote negligence, but many periprocedural deaths, even though the outcome is undesirable, do not involve negligence, mistakes, or culpability. Thus, the CAP Autopsy Committee suggests that the generic and objective term "periprocedural death" be used to also include deaths that are temporally but not necessarily causally related to medical procedures, therapies, or devices.

It is recognized that the agencies or individuals responsible for investigating periprocedural deaths vary among locations and that the approach to certifying such deaths varies among certifiers—even among medical examiners and coroners who investigate and certify many periprocedural deaths. While certifiers of death must have the liberty to write cause-of-death statements that best meet their needs in a particular case, some suggestions may be useful. The option presented here represents one approach for writing cause-of-death statements for periprocedural deaths.

### Manner of Death

A brief summary of the manner of death concept is warranted because periprocedural deaths may involve various manners of death that must be stated on the death certificate. The *manner of death* is a classification of death based on the type of conditions that cause death and the circumstances under which the conditions occur. A death that is *natural* in manner is due solely to disease (and/or the aging process). If an external condition (injury or poisoning) causes or contributes to death, a manner other than natural usually applies. The manner of death for a death due to unintentional injury (or poisoning) is *accident.* Death resulting from intentional injury is either a *homicide* or a *suicide,* depending on whether the intentional injury was inflicted by another person or the decedent, respectively. Occasionally, the manner of death cannot be ascertained, and the manner of death is regarded as being *undetermined* (or "could not be determined").

Although some certifiers suggest (or actually practice) that the manner of death for periprocedural deaths be indicated as "therapeutic complication," such a designation is not acceptable to many vital records offices. Further, the designation does not provide distinction between the various types of periprocedural death. In difficult cases, a viable

alternative is to classify the manner of death as undetermined, and indicate in the cause-of-death statement or "describe how injury occurred" section that the death involved a complication of medical care (see examples below).

It is recognized that some periprocedural deaths may be regarded legally as homicide (murder or manslaughter): as an act of commission, omission, or negligence. This section does not address such cases, and it is assumed that periprocedural deaths result either from natural causes (manner = natural), unintentional injuries (manner = accident), or a combination of the two (manner may be variable).

### Categories of Periprocedural Death

Several subcategories of periprocedural death may be defined:

- **Perianesthetic.** Related to an anesthetic agent, procedure, or device.
- **Peritherapeutic.** Related to a therapeutic agent, procedure, or device.
- **Peridiagnostic.** Related to a diagnostic agent, procedure, or device.
- **Perioperative.** Related to a surgical procedure or device; may be further subcategorized as *intraoperative* or *postoperative.*

The term "periprocedural" is a generic term that may be used to include any of the subcategories defined above.

### Ensuring that a Periprocedural Death Is Evident

To ensure that periprocedural deaths are evident for coding and other purposes, the periprocedural nature of death may be indicated in the cause-of-death statement. The appropriate category of periprocedural death as previously described (ie, peritherapeutic, peridiagnostic, perianesthetic, perioperative [or intraoperative or postoperative], or periprocedural) is included in the wording in the cause-of-death statement, as shown in this example:

| | | |
|---|---|---|
| Part I | A. **Intraoperative myocardial infarct** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Atherosclerotic coronary artery disease** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Resection of adenocarcinoma of colon** | |

Note that the intraoperative occurrence of the infarct is included in the cause-of-death statement, and that the surgery that was involved in the intraoperative event is also reported (in Part II in this case).

**Circumstantial Classification of Periprocedural Death**

Periprocedural deaths may be classified by the circumstances surrounding the death in question, as determined after adequate investigation:

1. **Malfunction of (or a defective) medical device, tool, or diagnostic/therapeutic agent**
   (eg, internal short circuit in cautery device, causing electrocution)
   (eg, malfunctioning thermostat on whirlpool, causing scalding)
   (eg, contaminated injectable drug preparation)

2. **Incorrect use of a medical device, tool, or diagnostic/therapeutic agent**
   (eg, setting the voltage too high on cautery device, causing electrical burn)
   (eg, gas embolism from pressing wrong button on endoscope)
   (eg, esophageal intubation during an elective procedure)
   (eg, administering the wrong drug or agent)
   (eg, administering the wrong dosage of a drug or agent)

3. **Rarely occurring complication with recognized untoward potential**
   (eg, hepatic necrosis following isoniazid therapy)
   (eg, anaphylaxis following iodine-based dye)
   (eg, anesthetic death from halothane hepatotoxicity)
   (eg, malignant hyperthermia from anesthesia)
   (eg, fatal dysrhythmia during colonoscopy)
   (eg, thrombosis of artery following uneventful catherization)

4. **Unanticipated complication**
   (eg, leaving a surgical towel in the abdomen)
   (eg, inadvertently cutting an artery)
   (eg, inadvertently ligating the wrong artery)

5. **Reasonably anticipated outcome of an indicated medical therapy or procedure**
   (eg, bone marrow suppression following chemotherapy)
   (eg, digoxin toxicity in patient with CHF)
   (eg, theophylline toxicity in patient with asthma)
   (eg, pneumothorax from PEEP required to ventilate patient with severe pneumonia)

6. **Inherent and accepted risk of an invasive procedure or surgery**
   (eg, inability to wean from cardiopulmonary bypass pump)
   (eg, rejection of a transplanted organ)

7. **Nonspecific stress(es) of a procedure or therapy not falling in other classification**
   (eg, death during hip surgery in elderly compromised patient, not in another category)

8. **Periprocedural death otherwise not classifiable**
   (eg, death during surgery, but cause cannot be determined)

Classification of a death into one of these categories may be helpful when classifying the manner of death.

**The Dilemma of Format**

In principle: (1) if an injury or poisoning is the underlying cause of death, the trauma must be indicated as having been initiated by an accident, a suicidal venture, a homicidal event, or in an undetermined manner (or could not be determined); (2) the underlying cause of death should be antecedent to the intermediate or immediate cause of death in a *cause-and-effect* relationship; (3) if death was due primarily to an injury or poisoning, the injury or poisoning should be listed as the underlying cause of death in Part I of the cause-of-death statement; and (4) if an injury or poisoning is listed in either Part I or Part II of the cause-of-death statement, further information about the date, time, place, and nature of injury should also be reported. Periprocedural deaths often involve circumstances that suggest or include an "injury" or "poisoning." Thus, in regard to periprocedural deaths, dilemmas may occur regarding (1) which periprocedural events constitute an "injury," (2) where and how to report the injury in the cause-of-death statement, (3) how to relate and report an injury in relation to existing disease processes, (4) how to designate the manner of death, and (5) how to completely and accurately certify death without inciting litigation or unduly raising issues of culpability when a periprocedural incident presents itself as an injury.

A helpful approach to selecting the format for the cause-of-death statement is to answer a (usually) simple question: *Would death have been imminent in the procedure's absence?* The structure of the cause-of-death statement may be based on whether the answer is yes or no.

## Example

**Death imminent in procedure's absence.** Consider an elderly individual with refractory congestive heart failure on the basis of atherosclerotic coronary heart disease, who dies of digoxin toxicity because of the high dosages required. The following format may be used:

| | | |
|---|---|---|
| Part I | A. **Digoxin toxicity** | Approximate interval between onset and death<br>**Hours** |
| | Due to, or as a consequence of:<br>B. **Complication of digoxin therapy** | **Hours** |
| | Due to, or as a consequence of:<br>C. **Treatment of refractory congestive heart failure** | **5 months** |
| | Due to, or as a consequence of:<br>D. **Atherosclerotic coronary heart disease** | **Years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

This approach, the c*ombined format* (ie, everything is stated in Part I), may be used for other similar deaths, such as theophylline toxicity in a patient with refractory asthma, a death in a patient with a neoplasm whose death results from a chemotherapeutic agent through some toxic effect, or a ventilator-induced pneumothorax in an AIDS patient with respiratory insufficiency from pneumonia. The format is consistent with WHO guidelines, and even though a "toxicity" is mentioned in Part I, does not require designation of a non-natural manner of death because the underlying cause of death as stated is a natural disease. One could argue, however, that the conditions in Part I are not truly linked pathogenetically, and that congestive heart failure and atherosclerosis should be listed in Part II. Such an argument is an argument more about form than substance, however.

**Example**

**Death not imminent in procedure's absence.** Consider an elderly man with a previous stroke (cerebral infarction) from carotid artery atherosclerosis, who died of scald burns sustained in an overheated whirlpool being used as part of the physical therapy regimen to treat lower-extremity contractures that occurred following the stroke. Prior to the scald burns he had been stable.

| | | |
|---|---|---|
| Part I | A. **Pseudomonas burn wound sepsis** | Approximate interval between onset and death<br>**2 days** |
| | Due to, or as a consequence of:<br>B. **Cutaneous scald burns, 85% body surface area** | **4 days** |
| | Due to, or as a consequence of:<br>C. **Whirlpool therapy for leg contractures** | **4 days** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Carotid artery atherosclerosis with remote cerebral infarction** | |

This approach, the *split format* (ie, both Part I and Part II are used), may be used for many other types of periprocedural deaths in which death would likely not have been imminent in the procedure's absence. The ICD-coded multiple-cause mortality data will also include the fact that the patient had carotid atherosclerosis and cerebral infarction, an important consideration because those conditions explain why the patient was in the whirlpool. Listing the atherosclerosis and cerebral infarction in Part II is consistent with WHO guidelines.

The cause-of-death statement for periprocedural deaths may be reported using either the combined or split format. Classification of manner of death as accident or natural will be subsequently discussed but may be facilitated by selecting the most applicable format. The formats provide the necessary flexibility to assign whatever manner of death is appropriate. In general, however, especially if the assigned manner is other than natural, the split format is recommended.

The split format shown above is also consistent with the principles outlined earlier in this manual, regarding cause-of-death statements for deaths involving injury. The injury event (whirlpool treatment) is listed as the underlying cause of death, the bodily trauma (burns) is listed as the intermediate cause of death, and the final fatal derangement (burn wound sepsis) is listed as the immediate cause of death.

### General Guidelines for Classifying the Manner of Death

Although exceptions will be encountered, and some periprocedural deaths are of debatable manner, some general guidelines are offered below. The suggestions are based on the classification of periprocedural deaths and include a suggested manner of death and reporting format of the combined (C) or split (S) method.

| Class of Periprocedural Death | Suggested Manner | Format |
|---|---|---|
| 1. Malfunction of a medical device, tool, or diagnostic/therapeutic agent | Accident | S |
| 2. Incorrect use of a medical device, tool, or diagnostic/therapeutic agent | Accident | S |
| 3. Rarely occurring complication with recognized untoward potential | Variable* | S/C |
| 4. Unanticipated complication | Variable* | S/C |
| 5. Reasonably anticipated outcome of necessary medical therapy/procedure | Natural | C |
| 6. Inherent and accepted risk of invasive procedure or surgery | Natural | C |
| 7. Nonspecific stresses of a procedure or therapy not in another class | Natural | C |
| 8. Periprocedural death not otherwise classifiable | Undetermined | C |

** General consensus about manner of death is lacking in such cases. Medical judgment is required in each case. Usual alternatives are accidental, natural, or undetermined.*

Most cases will clearly fall into one of the classifications above. Judgment is required in all cases when selecting a format and classifying the manner of death—especially those cases that do not fall clearly into one of the classes or those falling into classes 3 and 4. See Part V of this book for further discussion.

In classifying the manner of death, the underlying condition of the patient and the type and circumstances of the treatment must always be considered. For example, a death resulting from an emergent or heroic treatment of a patient with significant, life-threatening conditions may be classified differently than the death of a person who died of a similar complication while being treated as an outpatient, electively, for a condition not considered to be immediately life threatening. It is such analyses and differences that require room for professional discretion and judgment when certifying the death and classifying the manner of death.

## Clarifying the Nature of Injury

If it is assumed that the death of the man who was scalded in the whirlpool was certified as an accidental death because of the scald injury involved, the descriptive injury information might appear in "describe how injury occurred," as follows:

| | | |
|---|---|---|
| Part I | A. **Pseudomonas burn wound sepsis** | Approximate interval between onset and death<br>**2 days** |
| | Due to, or as a consequence of:<br>B. **Cutaneous scald burns, 85% body surface area** | **4 days** |
| | Due to, or as a consequence of:<br>C. **Whirlpool therapy for leg contractures** | **4 days** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Carotid artery atherosclerosis with remote cerebral infarction** | |

| MANNER OF DEATH | DESCRIBE HOW INJURY OCCURRED |
|---|---|
| **Accident** | **Scalded in overheated water in whirlpool.** |

Note that the item, "describe how injury occurred," indicates that the patient was scalded in overheated water in a whirlpool. The certifier need not state whether the whirlpool malfunctioned, was defective, or was improperly used. Such judgments may be beyond the abilities of the certifier, may carry legal ramifications, and are more appropriately addressed elsewhere—perhaps by persons other than the certifier of death. It is appropriate to state that the whirlpool was overheated, however, to explain how the burns occurred.

Injury descriptions should be objective, yet clearly describe what happened. Use generic terms, and avoid ascribing blame to a specific individual. Of course, additional information must also be reported, such as the date, time, place, and address of injury.

## Relationship of Format to Manner of Death

In general, deaths that are to be assigned a natural manner of death are best accommodated by the combined format because a natural disease is stated as the underlying cause of death. In general, deaths that are to be assigned a manner of death other than natural are best accommodated by the split format because an injury event is stated as the underlying cause of death.

## Sample Cause-of-Death Statements

Sample scenarios and cause-of-death statements are provided below, based on the eight classifications presented previously. The examples can serve as templates which may be used for other types of periprocedural death that fall into the same class as a given example. Each is reported in either a combined or split format.

**Class 1. Malfunction of a medical device, tool, or diagnostic/therapeutic agent.** This scenario involves a patient who had metastatic adenocarcinoma of the prostate and was on a morphine drip with an infusion pump. The roller on the pump was defective and tore the tubing, pumping air into the patient and producing fatal air embolism.

| | | |
|---|---|---|
| Part I | A. **Intravenous air embolism** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Malfunction of analgesia infusion pump** | **Minutes** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Metastatic adenocarcinoma of the prostate** | |

Another acceptable format, using the combined Part I format, is shown in the example below:

| | | |
|---|---|---|
| Part I | A. **Intravenous air embolism** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Malfunction of analgesia infusion pump** | **Minutes** |
| | Due to, or as a consequence of:<br>C. **Pain treatment for metastatic prostate adenocarcinoma** | **Weeks/Years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

*Note: Most certifiers would probably designate the manner of death as accident in this Class 1 case.*

In either case, the "describe how injury occurred" section would include a description that the analgesic pump malfunctioned and tore the tubing, pumping air into the vascular system. These two examples show that there is usually more than one acceptable way to prepare the cause-of-death statement, and that substance and content are more important than form. In each case, the periprocedural nature of the death is evident.

**Class 2. Incorrect use of a medical device.** This scenario involves a person who is undergoing retrograde pancreatic endoscopy for biliary tree problems. The physician inadvertently pushed the wrong button and instilled gas instead of water, causing dissection of gas into tissues and a fatal gas embolism. Autopsy confirmed gas embolism and a common duct stone.

| | | |
|---|---|---|
| Part I | A. **Gas embolism** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Periprocedural injury during diagnostic endoscopy** | **Minutes** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Choledocholithiasis with biliary obstruction** | |

Again, the combined Part I format could be used, as follows:

| | | |
|---|---|---|
| Part I | A. **Gas embolism** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Periprocedural injury during diagnostic endoscopy** | **Minutes** |
| | Due to, or as a consequence of:<br>C. **Choledocholithiasis with biliary obstruction** | **Weeks** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

*Note: Most certifiers would probably designate the manner of death as accident in this Class 2 case.*

The lower example is one of "bending the rules" a bit, which is acceptable. The manner of death may still be classified as other than natural, even though the bottom line in Part I

contains only natural conditions, because an injury event is reported in Part I. Each example indicates the periprocedural nature of the death. On line B of each example above, it would be acceptable to report "Complication of diagnostic endoscopy."

**Class 3. Rarely occurring complication with recognized untoward potential.** Shortly following surgery for an inguinal hernia, the patient developed malignant hyperthermia and died. Halothane was the primary anesthetic. The history and autopsy findings were consistent with a halothane-induced malignant hyperthermia.

| | | |
|---|---|---|
| Part I | A. **Malignant hyperthermia** | Approximate interval between onset and death **Hours** |
| | Due to, or as a consequence of:<br>B. **Perianesthetic complication of halothane anesthesia** | **Hours** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Inguinal hernia and herniorraphy** | |

*Note: General agreement is lacking about the manner of death in cases such as this Class 3 case. In the split format shown, the manner could be assigned as accident. If a natural manner were assigned, a combined format could be used, as shown below. Many certifiers would probably lean toward an accidental manner of death in such cases because an exogenous agent was involved.*

| | | |
|---|---|---|
| Part I | A. **Malignant hyperthermia** | Approximate interval between onset and death **Hours** |
| | Due to, or as a consequence of:<br>B. **Perianesthetic complication of halothane anesthesia** | **Hours** |
| | Due to, or as a consequence of:<br>C. **Herniorraphy for right inguinal hernia** | **Hours** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Line B could be stated simply as "Complication of halothane anesthesia." Remember, substance and content are more important than format.

**Class 4. Unanticipated complication.** A man underwent an "uneventful" cholecystectomy for gallstones and was discharged from the hospital. He developed peritonitis, however, and died shortly after returning to the hospital, complaining of fever and abdominal pain, 5 days postoperatively. Autopsy showed a retained surgical towel in the abdomen with diffuse peritonitis.

| | | |
|---|---|---|
| Part I | A. **Peritonitis** | Approximate interval between onset and death **Days** |
| | Due to, or as a consequence of: B. **Retained surgical towel in abdomen** | **5 days** |
| | Due to, or as a consequence of: C. **Perioperative complication of cholecystectomy** | **5 days** |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I **Cholelithiasis** | |

*Note: General agreement is lacking about the manner of death in cases such as this Class 4 case. Many certifiers would probably lean toward an accidental manner of death because the complication is unanticipated and involved a reaction to an exogenous agent that was not part of the intended treatment. The combined Part I format could also be used, as shown below.*

| | | |
|---|---|---|
| Part I | A. **Peritonitis** | Approximate interval between onset and death **Days** |
| | Due to, or as a consequence of: B. **Retained surgical towel in abdomen** | **5 days** |
| | Due to, or as a consequence of: C. **Perioperative complication of cholecystectomy** | **5 days** |
| | Due to, or as a consequence of: D. **Cholelithiasis** | **Months** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Considering this and previous examples, it should be apparent that the most important goals are to report the relevant information in the cause-of-death statement and to classify the manner of death appropriately for the case, based on professional judgment in conjunction with general principles.

**Class 5. Reasonably anticipated outcome of an indicated or necessary medical procedure.** A patient with a history of IV drug abuse and acquired immunodeficiency syndrome developed pneumocystis pneumonia. She became progressively difficult to ventilate, ultimately requiring extreme positive-pressure ventilatory assistance. Bilateral pneumothoraces were produced by the necessarily high ventilator pressures, and the patient died.

| | | |
|---|---|---|
| Part I | A. **Bilateral pneumothoraces** | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Peritherapeutic complication of ventilatory support** | **Minutes** |
| | Due to, or as a consequence of:<br>C. **Pneumocystis pneumonia** | **5 weeks** |
| | Due to, or as a consequence of:<br>D. **Acquired immunodeficiency syndrome** | **3 years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Intravenous drug abuse** | |

*Note: Most certifiers would probably designate the manner of death as natural in this Class 5 case.*

**Class 6. Inherent and accepted risk of a procedure.** A female underwent laparotomy and removal of the gallbladder with placement of drains. The specimen showed that the patient had cholelithiasis and acute cholecystitis. No problems were encountered during surgery. Postoperatively, the bile drainage did not diminish in the usual time, and the patient developed bile peritonitis, shock, and death. Autopsy did not disclose any surgical failures.

| | | |
|---|---|---|
| Part I | A. **Bile peritonitis** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Postoperative complication of cholecystectomy** | **5 days** |
| | Due to, or as a consequence of:<br>C. **Cholelithiasis** | **Months** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Cholecystitis** | |

Cholecystitis is listed in Part II in the example above not because a split format was desired, but because recommendations advise against the reporting of more than one condition per line in Part I. The basic format here remains a combined one. This format was chosen to emphasize the cholelithiasis as the major problem.

As another example of "bending the rules" a bit (by including more than one condition per line in Part I), the cause-of-death statement could have been written as:

| | | |
|---|---|---|
| Part I | A. **Bile peritonitis** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Postoperative complication of cholecystectomy** | **5 days** |
| | Due to, or as a consequence of:<br>C. **Cholelithiasis with cholecystitis** | **Months** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

One could argue that "Cholelithiasis with cholecystitis" is actually a disease complex or syndrome, and is therefore a single condition for the purpose of writing a cause-of-death statement. In such cases, it is important to report the most important underlying cause (cholelithiasis in this case) first.

*Note: Most certifiers would probably designate the manner of death as natural in this Class 6 case.*

**Class 7. Nonspecific stress during surgery or procedure.** A 63-year-old man died on the operating table while undergoing triple bypass coronary artery surgery for atherosclerosis. He had a history of unstable angina and was rated as a high-risk patient preoperatively. The patient elected to have the procedure because angina severely restricted his lifestyle and quality of life. Autopsy did not show any surgical failures.

| | | |
|---|---|---|
| Part I | A. **Intraoperative death during coronary bypass surgery** | Approximate interval between onset and death **Hours** |
| | Due to, or as a consequence of: B. **Atherosclerotic coronary artery disease** | **Years** |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

*Note: Most certifiers would probably designate the manner of death as natural in this Class 7 case.*

**Class 8. Periprocedural death but otherwise not classifiable.** A 45-year-old man died on the operating table while undergoing inguinal herniorrhaphy. A thorough autopsy, medical record review, and death investigation failed to identify an immediate cause of death. Basically, this seemingly healthy person died during a relatively minor procedure for no determined reason.

| | | |
|---|---|---|
| Part I | A. **Intraoperative death during inguinal herniorrhaphy** | Approximate interval between onset and death **Hours** |
| | Due to, or as a consequence of: B. **Undetermined cause(s)** | **Unknown** |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

*Note: An undetermined manner may be appropriate in such cases as this Class 8 case.*

## Poisoning and Medication Errors

When a periprocedural death involves unintentional poisoning, the cause-of-death statement should indicate the periprocedural nature of the poisoning and the generic name (not trade or brand name) of the drug or substance. In general, unintentional periprocedural poisonings and medication errors fall into one of several categories, each of which can be clarified by using carefully selected wording in the "describe how injury occurred" section.

- **Drug preparation or drug dilution mishap.** The drug preparation was formulated, mixed, or diluted incorrectly.
- **Temporal drug dosage mishap.** The drug or substance was not given at the proper intervals.
- **Drug dosage mishap.** A properly constituted formula was given in incorrect dosage.
- **Drug administration route mishap.** A drug or substance was given via the wrong route (eg, IV versus intramuscular).
- **Administration of wrong drug (drug substitution mishap).** The incorrect drug was administered.

These statements should only appear in the "describe how injury occurred" section if the specifics are known with reasonable probability in the death in question. Otherwise, more generic statements may be used, such as "medication error," "received excessive drug," etc. The following example shows how such terminology may be used:

| | | |
|---|---|---|
| Part I | A. **Peritherapeutic intravenous potassium chloride poisoning** | Approximate interval between onset and death **Minutes** |
| | Due to, or as a consequence of: B. | |
| | Due to, or as a consequence of: C. | |
| | Due to, or as a consequence of: D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I **Atherosclerotic heart disease** | |

| MANNER OF DEATH | DESCRIBE HOW INJURY OCCURRED |
|---|---|
| **Accident** | **Drug dilution mishap: failure to dilute drug injected by another.** |

*Note: Note that specific individuals such as a nurse or physician are not specified. Also, the example does not specify if the dilution error occurred in the pharmacy or at bedside. It does clarify, however, that the injection was done by someone other than the decedent, and that a dilution error was involved.*

## Other Death Certificate Items Requiring Completion

If an injury or poisoning is cited in Part I or Part II of the cause-of-death statement, the date, time, address, and type of place where the injury occurred must be indicated in addition to describing how the injury or poisoning occurred. In some states, a specific place exists on the death certificate to indicate the date and reasons for surgery or invasive procedures, even if such procedures did not cause or contribute to death. Be familiar with, and abide by, the regulations in your state.

## Medical-Legal Considerations

Most deaths that involve an injury event (or poisoning) will be investigated and certified by or under the authority of the medical examiner or coroner, whichever serves your area. Some state laws specifically address periprocedural deaths, while others do not. Although state laws vary somewhat, most states have death investigation laws that require the medical examiner or coroner to be notified when a death occurs that is sudden and unexpected, unusual, accidental, or suspected or known as having resulted from, or contributed to by, injury (or poisoning) *regardless of the interval between onset and death*. Be familiar with local laws and abide by the provisions, being sure that appropriate cases are reported to the medical examiner or coroner, as required.

If you report a death to the medical examiner or coroner, who then declines to investigate or certify the death, obtain a case waiver number for documentation in your files, and proceed as instructed. If you are responsible for completion of the death certificate or a cause-of-death statement, the information herein may be useful.

## Concerns About Litigation, Implication, Alienation

Although the death certificate is primarily a statistical document, it may constitute an important source of information for family members and other people or agencies. Such people or agencies may impart too much or inappropriate significance to the death certificate, especially if they are not aware of its general purpose, limitations, and opinion-based nature. Thus, a major issue to those who certify periprocedural deaths is concern about whether cause-of-death wording and manner-of-death classification will foster litigation, unnecessarily implicate a treating physician or other person or agency, alienate professional colleagues, or unnecessarily alarm family members and survivors.

Problems may also result if the cause-of-death statement is oversimplified or if the certifier omits known complications, because some people may perceive an attempt to conceal facts or cover up a problem. Although such concerns are real and need to be considered by certifiers of death, an objective approach that is based on documented or reasonably probable facts should minimize such problems through stating the truth to the best of one’s knowledge.

## Philosophical Issues and Schools of Thought

A common school of thought is that "predictable," "anticipated," or "expected" periprocedural complications are extensions of the underlying disease process, and that the underlying cause of death may therefore be attributed to the disease or to "complications of the disease," while ascribing a natural manner of death. The options above allow that school of thought to be followed in practice but also allow other schools of thought to be practiced as deemed appropriate by the certifier of death.

Some issues of death certification are a matter of *style,* while others are a matter of *substance*. For the most part, the split format and combined format presented above address matters of style in reporting the cause-of-death statement. The major issue of substance involves how the manner of death is classified and ensuring that relevant information is included in the cause-of-death statement. The various options for style allow the certifier to indicate the manner of death as deemed appropriate. It is hoped that the options presented here bring additional information that promote greater consistency in both style and substance.

"Therapeutic complication" has been used as a manner of death when predictable complications arise from indicated (appropriate) diagnostic or therapeutic procedures, because such deaths are not caused exclusively by disease, yet classification as accidental may seem unduly inflammatory when death is caused by predictable complications of appropriate therapy. However, acceptance of "therapeutic complication" as a manner of death by vital records registrars and certifiers of death is not widespread, nor does such a manner of death appear on the U.S. Standard Certificate of Death. Further, one may argue that ascribing "therapeutic complication" as a manner of death may be inflammatory compared to the option of "natural" that applies to some periprocedural deaths. Of course, if death results from an unpredictable complication or an inappropriate therapy or procedure, the manner of death may be classified as accident.

The options presented in this section make it evident that death resulted from a periprocedural or peritherapeutic complication. The difference between the options in this section and alternative approaches is largely a matter of style, as each gets the necessary information across.

## Options for Writing Cause-of-Death Statements for Neonatal and Infant Deaths

### Introduction

Studies have shown that death certificates for perinatal deaths often contain nonspecific or even implausible causes of death.[1,2] For example, it is not uncommon for "prematurity" to be stated as the cause of death, or for an immediate cause of death (eg, pneumothorax) or an intermediate cause of death (eg, hyaline membrane disease) to be cited as the cause of death, while a specific underlying cause of death (eg, chorioamnionitis) is not mentioned in the cause-of-death statement. Options are presented here for writing cause-of-death statements in a consistent and complete fashion for neonatal and infant deaths.

### General Approach

In general, a useful approach to writing Part I of cause-of-death statements for neonatal and infant deaths is shown in the following example:

| | | |
|---|---|---|
| Part I | A. **Peritherapeutic ventilator-induced pneumothorax** (Immediate cause) | Approximate interval between onset and death<br>**Minutes** |
| | Due to, or as a consequence of:<br>B. **Hyaline membrane disease** (Intermediate cause) | **1 week** |
| | Due to, or as a consequence of:<br>C. **Premature labor with prematurity (26 weeks gestation)** (Intermediate cause) | **10 days** |
| | Due to, or as a consequence of:<br>D. **Chorioamnionitis** (Underlying cause) | **Unknown** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

Note that the underlying, intermediate, and immediate causes of death have a sequential cause-and-effect relationship when read from bottom to top. The underlying cause of death is a specific condition, as compared with prematurity, hyaline membrane disease, and pneumothorax, which are nonspecific conditions or processes that may result from a

[1] Kirby RS. The coding of underlying cause of death from fetal death certificates: issues and policy considerations. *Am J Public Health.* 1993;83:1088-1091.
[2] Cole SK. Accuracy of death certificates in neonatal deaths. *Community Med.* 1989;11(1):1-8.

number of causes. The specific underlying cause of death explains the existence of the intermediate and immediate causes of death. Intermediate and immediate causes of death should also be stated as specifically as possible.

Of course, when writing the cause-of-death statement, only the medical conditions are actually written; it is not necessary to write the words "immediate cause," "intermediate cause," and "underlying cause" as shown in the example. To foster clarity and to facilitate statistical ICD coding by nosologists, *only one condition should be indicated on a given line in Part I of the cause-of-death statement* (lines A-D above).

**Background Thinking**

The underlying cause of neonatal and infant deaths will usually fall into one of the following major categories:

- **Congenital and genetic disorders**
  - Inherited disorders (eg, hemophilia)
  - Genetic aberrations (eg, trisomy 18)
  - Congenital anomalies (eg, anencephaly)
- **Placental/amniotic disorders**
  (eg, chorioamnionitis, funisitis, placental abruption)
- **Fetal-fetal disorders**
  (eg, twin-transfusion syndrome)
- **Maternal-fetal disorders**
  (eg, hemolytic disease of the newborn)
- **Maternal disorders**
  (eg, genital herpes infection, malnutrition, drug dependency, diabetes, lupus, hypertension, pre-eclampsia, drug intoxication)
- **External conditions**
  (eg, maternal trauma)
- **Complications of labor and delivery**
  (eg, dystocia)
- **Conditions that affect neonates and infants**
  (eg, hyaline membrane disease)

The cause-of-death statement should be written clearly enough that a reader of the cause-of-death statement could classify the death into one of the categories above. For example:

| | | |
|---|---|---|
| Part I | A. **Herpes simplex pneumonia** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Congenitally acquired herpes infection** | **1 week** |
| | Due to, or as a consequence of:<br>C. **Maternal genital herpes simplex type 1 infection** | **Unknown** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

When discussing causes of death among neonates and infants, one should not ignore conditions that existed in the mother, which may have set in motion the sequence of events that led to neonatal or infant death. For example, on the U.S. Standard Report of Fetal Death, used only in cases where live birth did not occur, maternal and fetal conditions are each itemized. An analogous situation exists when a death certificate is completed for a live-born neonate, because maternal factors may contribute to neonatal or infant death, and it is appropriate to include contributing maternal conditions in the cause-of-death statement, explicitly or implicitly.

### Typical Immediate, Intermediate, and Underlying Causes

Moore and co-authors have reviewed the literature and more than 1500 fetal and neonatal deaths at Johns Hopkins Hospital in order to determine which causes of death would usually be listed as an immediate, intermediate, or underlying cause of death.[1] The following tables contain the most common conditions that would typically be cited as immediate, intermediate, or underlying causes of death. For rare conditions that are not included in the tables, a comparison to these tables might facilitate the decision whether to cite a given condition as an immediate, intermediate, or underlying cause of death.

The tables have been modified slightly from those prepared by Moore and co-authors, and, in general, show the conditions in decreasing order of frequency.

[1] Moore GW, Berman JJ, Hanzlick RL, Buchino JJ, Hutchins GM. A prototype internet autopsy database: 1625 consecutive fetal and neonatal autopsy face sheets spanning 20 years. *Arch Pathol Lab Med*. 1996;120:782-785.

| **Selected Nonspecific Conditions Used to State the *Immediate* or an *Intermediate* Cause of Death but not the Underlying Cause of Death** | |
|---|---|
| Fetal pneumonia | Hydrops |
| Pneumothorax | Perinatal asphyxia* |
| Hydrocephalus | High-grade intraventricular brain hemorrhage (grade 3 or 4) |
| Bronchopneumonia | Hypoplasia of lung (pulmonary hypoplasia) |
| Sepsis | Meconium aspiration |
| Bronchopulmonary dysplasia | Peritonitis |
| Disseminated intravascular coagulation | |
| Hyaline membrane disease | |

** In some cases, "Perinatal asphyxia" may be listed as the underlying cause of death if no underlying reason for it can be determined. Often, however, an underlying cause can be determined.*

| **Selected Specific Conditions Used to Indicate the *Underlying* Cause of Death** | |
|---|---|
| Chorioamnionitis | Atresia of aortic valve |
| Abruptio placentae | Spina bifida |
| Trisomy (including #) | Encephalocele |
| Atrial septal defect | Transposition of the great arteries |
| Necrotizing enterocolitis* | Interrupted aortic arch |
| Coarctation of the aorta | Polysplenia syndrome |
| Renal dysplasia | Prune belly syndrome |
| Cord "accident" (compression or around neck; not truly an "accident") | Anomalous pulmonary venous return |
| Renal agenesis | Holoprosencephaly |
| Omphalocele | Twin transfusion syndrome |
| Diaphragmatic hernia | Tracheoesophageal fistula |
| Myelomeningocele | Polycystic kidney disease |
| Anencephaly | Dandy Walker syndrome |
| Bicuspid aortic valve with stenosis/atresia | Meningocele |
| Potter's syndrome* | Turner syndrome |

** In some instances, this may be secondary to some other underlying cause of death and may be more appropriately used as an intermediate or immediate cause of death.*

### When an Underlying Cause of Death Is Unknown

Deaths in which a specific underlying cause of death cannot be determined with reasonable probability (more likely than not) may be reported as shown in this example:

| | | |
|---|---|---|
| Part I | A. **Pneumonia, organism unidentified** | Approximate interval between onset and death<br>**Days** |
| | Due to, or as a consequence of:<br>B. **Meconium aspiration** | **1 week** |
| | Due to, or as a consequence of:<br>C. **Premature labor with prematurity (22 weeks gestation)** | **1 week** |
| | Due to, or as a consequence of:<br>D. **Undetermined natural cause** | **Unknown** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

### Other Significant Conditions

Conditions that pre-existed or coexisted in the decedent and contributed to death may be indicated in Part II of the cause-of-death statement as an other significant condition. More than one condition may be listed in Part II. To be listed, however, the condition should have contributed to death but should not have resulted in the condition listed as the underlying cause of death. For example, consider an infant who develops pneumonia from a tracheoesophageal fistula, but who also has a significant left ventricular septal defect. Clinically, there was evidence of heart failure, but the cause of death appears to have been primarily due to pneumonia:

| | | |
|---|---|---|
| Part I | A. **Bilateral bronchopneumonia** | Approximate interval between onset and death<br>**5 days** |
| | Due to, or as a consequence of:<br>B. **Congenital tracheoesophageal fistula** | **10 days** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Congenital ventricular septal defect** | |

The ventricular septal defect probably contributed to death by contributing to heart failure, but the septal defect did not result in the tracheoesophageal fistula. The ventricular septal defect therefore is appropriately cited as an other significant condition.

### When Multiple Conditions Seem to Be Inseparable

Sometimes, two or more conditions seem to "add together" or are conceptually and temporally inseparable as an underlying, intermediate, or immediate cause of death. Consider the infant who dies with streptococcal pneumonia and meningitis. In some cases, one condition may clearly have preceded the other, and writing the cause-of-death statement in a Part I sequential format is appropriate and straightforward. In other cases, however, the two conditions may seem to have coexisted without a definite sequence. In such cases, it is incumbent upon the certifier to select the condition that appears to have been the most important and to cite it in Part I, and to cite the other condition in Part II as an other significant condition, because recommendations advise against listing more than one condition per line in Part I. Following this procedure assists in ICD coding and allows the certifier, rather than the nosologist doing the coding, to indicate the most important condition.

| | | |
|---|---|---|
| Part I | A. **Streptococcal meningitis** | Approximate interval between onset and death<br>**2 days** |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Streptococcal pneumonia** | |

This example also serves to illustrate a *single line Part I format,* in which only a single line in Part I is needed to state the cause of death. In such cases, Part I contains the underlying cause of death, which also serves as the immediate cause of death. Obviously, it is not always necessary to use all of the lines provided in Part I of the cause-of-death statement.

### Risk Factors

In some cases, conditions exist that may have caused or contributed to death, but a cause-and-effect relationship is difficult or impossible to prove. For example, in a premature infant born to a mother with pre-eclampsia, did the pre-eclampsia cause the premature

birth? If a pregnant woman uses cocaine during pregnancy and delivers a stillbirth, was intrauterine demise caused by the cocaine?

Some examples of conditions that may constitute a risk factor for fetal or neonatal death are:

- Maternal toxemia
- Maternal diabetes
- Maternal lupus
- Breech delivery
- Premature rupture of membranes
- Twin pregnancy
- Oligohydramnios
- Polyhydramnios
- Maternal drug abuse
- Bicornate uterus
- Placenta previa
- Maternal fever
- Forceps delivery
- Emergency cesarean section

If it is reasonably probable that such a condition contributed to death, the condition(s) may be cited in Part II, as shown in this example:

| | | |
|---|---|---|
| Part I | | Approximate interval between onset and death |
| | A. **Peritherapeutic ventilator-induced pneumothorax** | **Minutes** |
| | Due to, or as a consequence of:<br>B. **Hyaline membrane disease** | **1 week** |
| | Due to, or as a consequence of:<br>C. **Premature labor with prematurity (26 weeks gestation)** | **10 days** |
| | Due to, or as a consequence of:<br>D. **Undetermined natural causes** | **Unknown** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Maternal bicornate uterus** | |

To be cited, there should be documentation or reasonable probability that the condition existed in the case in question. If a cause-and-effect relationship between a risk factor and death can be established in a given case, then the condition may be indicated as the underlying cause of death, although, in general, such cases will be uncommon.

### Interval Between Onset and Death

The interval between onset and death should be stated as accurately as possible without guessing. Generic terms such as “hours,” “weeks,” and “unknown” are acceptable. When prematurity is involved in the cause-of-death statement, the estimated gestational age should be indicated, as shown in the previous example, and the interval should consist of the time period between birth and death.

### Different Forms for Documenting Death and Stillbirths

If a live birth has occurred and is followed by death, a standard death certificate is completed. States have a special form for documenting stillbirths based on the U.S. Standard Report of Fetal Death, used in cases where live birth has not occurred. The forms in some states have specific boxes to indicate with check marks or otherwise the existence of selected risk factors, obstetric procedures, complications of labor and delivery, method of delivery, and congenital anomalies. Familiarity with forms and definitions used locally is essential. Further discussion of stillbirths is beyond the scope of this section and is available from the National Center for Health Statistics (NCHS).

### Medical-Legal Considerations

Although state laws vary, in general, if there is any indication that an injury to or poisoning of the mother, fetus, neonate, or infant caused or contributed to death, the medical examiner or coroner should be notified. It is also prudent (if not required by law) to report deaths in which there is evidence of an attempt to conceal pregnancy, conceal birth, or terminate pregnancy illegally. Whether or not such deaths are investigated by the medical examiner or coroner depends on local laws and practices. If you report a death to the medical examiner or coroner who declines to investigate the death, obtain a waiver number for documentation in your records.

### Use of Generic Statements

In some cases not investigated by the medical examiner or coroner, and in which permission for autopsy cannot be obtained, it may be necessary to state the cause of death in somewhat generic terms. For example, there may be clinical evidence of congenital heart disease, but death may occur before definitive diagnoses can be made. In such cases, the cause of death may have to be stated simply as “congenital heart disease.” The cause of death is the best opinion of the certifier, is based on available information and reasonable medical probability (ie, more likely than not), and can be changed at a later date if further information becomes available. Consult the local or state vital record office for details on how to change (amend) a cause of death that has been stated on a death certificate.

## Sudden Infant Death Syndrome and Related Scenarios

### Introduction

This section, which is based largely on "A Functional Approach to Sudden Unexplained Infant Deaths" prepared by the National Association of Medical Examiners in October 2005, is intended to provide a functional approach to the investigation and certification sudden unexplained infant deaths. Topics include:

- Basis for recommendations
- Methods
- Definitions
- Expected scope of investigation
- Critical general questions
- Critical specific questions
- Cause-of-death reporting
- Reporting of possible stressors, external causes, or gray zone findings
- Data and other issues

### Basis for Recommendations

The recommendations in this section are based on multiple sources, which include:

- The 1989 definition of SIDS[1]
- The examination of the sudden infant death syndrome: investigative and autopsy protocols[2]
- Histopathology Atlas of the Sudden Infant Death Syndrome[3]
- Guidelines for death scene investigation of sudden, unexplained infant deaths: recommendations of the Interagency Panel on Sudden Infant Death Syndrome[4]
- International Standardized Autopsy Protocol for Sudden Unexpected Infant Death[5]

[1] Willinger M, James LS, Catz C. Defining the sudden infant death syndrome (SIDS): deliberations of an expert panel convened by the National Institute of Child Health and Human Development. *Pediatr Pathol.* 1991:11:677-684.
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- Distinguishing Sudden Infant Death Syndrome from Child Abuse Fatalities[2]
- CAP guidelines regarding Autopsy Performance, Autopsy Reporting, Examination of Brain and Cord, Forensic Pathology, and Perinatal and Pediatric Pathology[3]
- Proposed NAME Standards for Forensic Pathology Practice[4]
- Draft revision of the Sudden Unexplained Infant Death Investigative Report Form (SUIDIRF) (2005)[5]
- Medical Examiners' and Coroners' Handbook on Death Registration and Fetal Death Reporting[6]
- Re-evaluation and the 2004 suggested revision of the SIDS Definition[7]
- What is Essential in SIDSOID* Investigation? Manner of Death, and What's in a NAME? [*SIDSOID = Sudden Infant Death and Other Infant Deaths][8]
- Data regarding cosleeping and similar potential stressors (2005)[9]

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## Methods

The above materials were reviewed with the goal of identifying:

- A functional approach to the investigation of sudden unexplained infant deaths
- A "bare minimum" set of recommendations to define the scope of investigation required
- Recommendations for methods to be used when certifying infant deaths
- A list of potential stressors or possible external causes of death that should be identified and reported on the death certificate and/or within a medical examiner/coroner office database

## Definitions

*Sudden unexplained infant death (SUID)* applies to the death of an infant less than 1 year of age, in which investigation, autopsy, medical history review, and appropriate laboratory testing fails to identify a specific cause of death. SUID includes cases that meet the definition of sudden infant death syndrome (SIDS).

## Expected Scope of Investigation

The following represents the scope of investigation that may be considered as the "bare minimum" to consider an infant death investigation as "complete."

- Investigation of the scene where the incidents leading to death are thought to have occurred. The scene investigation should be conducted by a medical examiner or coroner, or a person known to and acting officially on behalf of the medical examiner or coroner. The scene investigation should be documented in narrative form and augmented with photographs and/or diagrams. Witnesses at the scene should be interviewed. The original position of the infant when first found unresponsive should be determined as precisely as possible by questioning and described in detailed written form. Various kinds of demonstrations (such as doll re-enactment) may be used as a supplemental means of describing the as-found position of the infant, but these methods should not replace proper interviewing.
- A medical history of the infant should be conducted to identify any birth-related problems and to assess the infant's growth, development, immunization history, and medical history. (Preferably, medical records should be used, when available.)
- It should be established whether there are any previous unexplained deaths of infant or childhood siblings. If so, relevant details should be obtained. (Preferably, official records should be reviewed.)
- It should be established whether there have been previous social service or police contacts or interventions in the home. If so, the details should be obtained. (Preferably, official records should be reviewed.)

- An x-ray, even if a single babygram, should be performed. It is clearly recognized that a complete skeletal series is the gold standard. However, in jurisdictions in which this is not an option for financial or technical reasons, a single film will at least provide a radiographic record of gross findings.
- An autopsy should be performed. The autopsy examination should involve in-situ examination of the brain, neck structures, and thoraco-abdominal organs, with subsequent removal and dissection. At a minimum, if there is no gross or toxicological cause of death, microscopic examination should be conducted on the brain and meninges, heart, lungs, airways (epiglottis, trachea, bronchi), and liver. If not examined microscopically, stock tissue or paraffin blocks should include kidney, spleen, thymus, rib and costochondral junction, endocrine organs, and representative sections of the gastrointestinal tract (suggested sections include gastro-esophageal junction, and small and large intestine). At a minimum, the weights of the brain, heart, lungs, liver, kidneys, thymus, and spleen are recorded. Blood and urine should be collected. If scene investigation, history, or autopsy suggests exposure to drugs (illicit, prescription, over-the-counter, or of a home-remedy nature), toxicology should be performed to evaluate suspected drugs. As a routine, a screen should be conducted to rule out ethanol and major classes of sedatives and stimulants (including cold medications, if being used) that may have caused or contributed to the death. Salicylates, acetaminophen, and carboxyhemoglobin may be tested, as indicated by case-specific information.
- Vitreous should be collected for possible use as an adjunct to toxicology testing, or if metabolic or hydration status is an issue. Care must be taken not to compromise internal eye examination for retinal hemorrhages, if required.
- A DNA sample should be archived for genetic testing, if indicated.
- Metabolic screening results should be determined from the medical birth record. A blood spot card should be prepared and retained in case autopsy findings suggest a metabolic disorder such as fatty acid oxidation disorder. If the liver is fatty and birth screening results are not available, the blood should be tested for common fatty acid oxidation disorders such as medium chain Acyl-CoA dehydrogenase deficiency.

**Critical General Investigative Questions**

The initial investigation should be geared toward answering the questions or addressing the issues as shown on the following page. The goal of this process is to provide the pathologist with meaningful information relevant to the cause and manner of death, and to guide the pathologist in case management and decision making.

As time and information sources permit, specially trained investigators should collect the information needed to complete the SUIDIRF (CDC infant death investigation form titled, “Sudden Unexplained Infant Death Investigation Report Form”), and the SUIDIRF should be completed.

## Key Issues in SIDS-like Cases

Indicate whether preliminary investigation suggests any of the following:

| *Yes* | *No* | *Issue* |
|---|---|---|
| | | Cause of death due to natural causes—Not SIDS |
| | | Death due to trauma (injury), poisoning, or intoxication |
| | | Asphyxia due to such causes as overlaying, wedging, choking, obstruction of nose or mouth, re-breathing, neck compression, immersion in water |
| | | Environmental hazards such as carbon monoxide, noxious gases, chemicals, sprays, electricity, devices operating in area, licit or illicit drug exposures, habitual exposure to cigarette smoking |
| | | Co-sleeping with other people or animals on any surface, including bed sharing |
| | | Unsafe sleeping surface or sleeping conditions |
| | | Acute change in sleep position (placed in different position or place than usual) or diet (introduction of new food type) |
| | | Religious, cultural, or ethnic home remedies or treatments |
| | | Hyper- or hypothermia from hot or cold environment |
| | | Hyperthermia from excessive blanketing, clothing, or wrapping |
| | | Previous acute life threatening events (ALTEs) |
| | | Recurrent visits to medical care facilities without a diagnosis being made |
| | | Recent falls or injury |
| | | Prior deaths of siblings |
| | | Previous encounters with police or social service agencies |
| | | Suspicious circumstances or questionable witness accounts |
| | | |
| | | Resuscitation or agonal (pre-terminal) medical treatment |
| | | Request for organ or tissue donation |
| | | Objection to autopsy |
| | | Other alerts for pathologist's attention |

Any "Yes" answers should be explained and detailed. All of the above information, including the written narrative of reported circumstances, should be available to the pathologist prior to autopsy.

**Critical Specific Investigative Questions**

In addition to addressing the critical general investigative questions stated above, there are specific questions that also should be answered early in the investigation and prior to autopsy. In general, these questions would be asked of the "First Responder," which typically would be the person who discovered the infant dead or unresponsive, and usually will be the primary caregiver. However, the answers to these questions may need to be obtained from more than one person.

These critical questions are:

- When was the baby put down to sleep?
    - Approximate time
- In what position was the baby put down?
- Who found the baby?
- Did you hear or check on the baby during the interim?
- In what position was the baby found?
- Where was the baby when found?
- Was this the baby's usual sleeping place?
- What was the surface like where the baby was found?
- Was anything covering the baby's nose and mouth?
- Was anyone else sleeping with the baby?
    - Names of the persons and ages
    - Size of bed
    - Specific relative position of baby to others when put down and found
- Was the room extremely hot or cold?
- Did you notice any fluids on the bedding?
- Were there any fluid stains on the caregiver's clothing?
- Was there evidence of wedging?
- What was the baby wearing?
- How many blankets were over the baby?
- What was the general appearance of the residence?
- Did the mother smoke during pregnancy?
- Did any other baby die in the family?
- When was the baby last fed?
- Was the baby ill or on any medication?

## Cause of Death Reporting

If investigation and autopsy disclose findings (actually, lack of findings) that are consistent with the definition of Sudden Infant Death Syndrome, there are several acceptable ways to report the cause of death in Part I of the cause-of-death statement on the death certificate. These are:

- Sudden Unexplained Infant Death
- Sudden death during infancy: no identifiable cause
- Consistent with the definition of Sudden Infant Death Syndrome
- Consistent with Sudden Infant Death Syndrome
- Sudden Infant Death Syndrome

The *manner of death* may be classified as Natural or Undetermined. Any combination of the above wording and manner of death will result in the death being officially coded to R95, Sudden Infant Death Syndrome.

If the "Undetermined" manner is preferred, the following format is suggested:

| | | |
|---|---|---|
| Part I | A. **Sudden Unexplained Infant Death** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved** |

In the example above, the words "Consistent with Sudden Infant Death Syndrome" or "Sudden Infant Death Syndrome" are also acceptable, if preferred.

If the death certificate requires that the date, time, place, and address of injury be completed when the manner of death is classified as Undetermined, the dates and times may be qualified as "found"; the place may be stated in terms such as "Found at Home." The location of injury would include the address where the infant was when it was discovered dead or unresponsive.

If a condition such as bedsharing (which could be a stressor or possible external cause of death) needs to be reported on the death certificate, the following format is preferred and recommended:

| | | |
|---|---|---|
| Part I | A. **Sudden Unexplained Infant Death** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved.**<br>**Bedsharing with 2 adults.** |

This format is also acceptable:

| | | |
|---|---|---|
| Part I | A. **Sudden Unexplained Infant Death** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Bedsharing with 2 adults** | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved.** |

Placement of the "stressor" in Part II may be construed by some as meaning that it is the certifier's opinion that bedsharing (or any other condition in Part II) specifically *caused or contributed to* the death, because that is the way the heading in the Part II box is worded. An option would be to report Part II stressors such as "Risk factor: bedsharing with 2 adults."

| | | |
|---|---|---|
| Part I | A. **Sudden Unexplained Infant Death** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Risk factor: Bedsharing with 2 adults.** | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved.** |

A third method is:

| | | |
|---|---|---|
| Part I | A. **Sudden Unexplained Infant Death associated with bedsharing with 2 adults** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved.** |

However, to allow sufficient room for details and explanations, the first option is preferred:

| | | |
|---|---|---|
| Part I | A. **Sudden Unexplained Infant Death** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved. Bedsharing with 2 adults.** |

*Note: In any of the above examples, it is certainly acceptable to use the words "Sudden Infant Death Syndrome" or "Consistent with Sudden Infant Death Syndrome," and to classify the manner as natural, if that is the certifier's preference. Employing those methods will have no impact on how the death is coded for statistical purposes.*

If, for some reason, it is necessary to certify an infant death, but a critical element of the investigation is lacking (such as no autopsy—a circumstance that should not occur in SIDSOID cases), the following cause-of-death statement format is recommended:

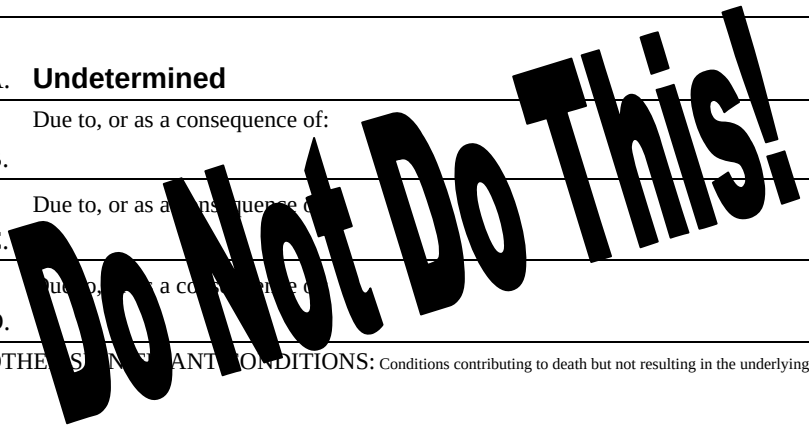
| | | |
|---|---|---|
| Part I | A. **Unclassified infant death** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved. Found dead in bassinette. No autopsy performed.** |

If investigation and autopsy discloses that death was not consistent with the concept of Sudden Infant Death Syndrome, yet no cause of death has been definitively established, the following format is recommended for the cause-of-death statement:

| | | |
|---|---|---|
| Part I | A. **Unexpected and undetermined cause** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred<br>**Undetermined if external causes were involved.**<br>**No cause determined after complete investigation.** |

**The following certification should *not* be used for SIDSOID deaths, because insufficient information is available for the nosologist to code the death into an appropriate classification:**

| | | |
|---|---|---|
| Part I | A. **Undetermined** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Undetermined** | | Describe How Injury Occurred |



Of course, if a specific cause of death is determined, then the cause-of-death statement should be completed using the same principles that would apply to non-infant deaths, as shown in the following examples:

| | | |
|---|---|---|
| Part I | A. **Viral myocarditis** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Natural** | | Describe How Injury Occurred |

| | | |
|---|---|---|
| Part I | A. **Positional asphyxia** | |
| | Due to, or as a consequence of:<br>B. **Chest compression** | |
| | Due to, or as a consequence of:<br>C. **Wedging between adult bed mattress and wall** | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Accident** | | Describe How Injury Occurred<br>**Bedsharing with 2 adults. Became wedged between edge of adult mattress and adjacent wall.** |

## Reporting of Possible Stressors, External Causes, or Gray Zone Findings

A "gray zone" finding is a disease condition, possible stressor, or possible external condition that may have contributed to death, but for which cause and effect relationship are difficult to establish or rule out.

If a gray zone disease condition is encountered, it is recommended that the condition be reported in Part II of the cause-of-death statement as shown below:

<table>
<tr><td rowspan="4">Part I</td><td colspan="2">A. Sudden Unexplained Infant Death</td></tr>
<tr><td colspan="2">Due to, or as a consequence of:<br>B.</td></tr>
<tr><td colspan="2">Due to, or as a consequence of:<br>C.</td></tr>
<tr><td colspan="2">Due to, or as a consequence of:<br>D.</td></tr>
<tr><td>Part II</td><td colspan="2">OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>Focal bronchiolitis</td></tr>
<tr><td colspan="2">Manner of Death<br>Undetermined</td><td>Describe How Injury Occurred<br>Undetermined if external causes were involved.</td></tr>
</table>

If the gray zone finding consists of an external condition or other finding, such as a previous unexplained death of an infant sibling, it is recommend that these conditions be reported in the "Describe How Injury Occurred" box, as outlined in the examples above.

It is recommended that the following conditions, if present in a specific case, be reported on the death certificate:

- Co-sleeping, including bedsharing or sharing the same sleep surface
- Unsafe or soft sleep surface (if found face down)
- Previous unexplained infant death of sibling
- Excessive blanketing or wrapping (may be a factor even in absence of hyperthermia)
- Face down position when found
- Intoxication (defined as detection of a substance in infant's system)
- Injuries of unknown significance (specifying the type)

Consideration should also be given to reporting these:

- Abrupt change in sleep position (such as being placed on side instead of on back)
- Abrupt change in sleep location (such as new room)
- Abrupt change in sleep surface (such as new mattress)

In brief, an unexplained infant death will fall into one of the following categories:

- A specific cause of death is determined
- Death is consistent with the concept of Sudden Infant Death Syndrome, and no stressors are identified
- Death is consistent with the concept of Sudden Infant Death Syndrome, but one or more gray zone conditions or stressors (either natural or non-natural) exist
- Circumstances are not consistent with the concept of Sudden Infant Death Syndrome after full investigation is conducted
- Investigation is lacking to the point that specifying a cause of death would not be appropriate. These should be rare or nonexistent and would include SIDSOID cases in which, for example, an autopsy is not performed.

The cause-of-death statements shown above provide examples of each of these scenarios.

**Data and Other Issues**

In the future, it may well be that information about possible stressors or external causes may be collected via reporting systems that are independent from, but parallel to, the death certificate. At present, however, there is no official system in place to collect such information. Thus, until such a system is developed, it is reasonable to report possible stressors or external causes on the death certificate, as described.

As of 2003, the National Center for Health Statistics (NCHS), which processes death certificate information provided by the states, has been collecting the literal text of all entries in the cause-of-death section of the death certificate. NCHS is also considering the development of specific codes for the various stressors and risk factors, such as those listed above. If that were to be done, the codes for the various stressors could be attached to the primary ICD code for the cause of death (usually, R95 Sudden Infant Death Syndrome). Using such a system, unexplained infant deaths could then be lumped or split based on the type of conditions reported. Further, using the methods described here will allow separation of infant deaths with inadequate investigation and those infant deaths that, after complete investigation, have no defined cause but are not consistent with Sudden Infant Death Syndrome.

The extent of investigation described is intended to provide guidelines for a desirable minimum level of investigation. Exceeding the procedures outlined may be needed in some cases and may, in fact, be advantageous on a routine basis. For example, the collection of nasal swabs for respiratory tract viral pathogens may be done routinely in some settings, or on as as-needed basis as suggested by the clinical history and circumstances.

## Options for Writing Cause-of-Death Statements for Deaths Due to Human Immunodeficiency Virus (HIV) Infection

### Introduction

When a risk factor for a fatal condition has, with reasonable probability, played a role in causing the death of an individual, the risk factor may be regarded as a condition when writing the cause-of-death statement. Previous publications address risk factors but are not entirely clear regarding when and how to report such conditions in cause-of-death statements. This section provides options for reporting significant conditions that are related to acquiring human immunodeficiency virus (HIV) infection, a significant cause of mortality in some areas of the United States, and a source of frequently asked questions regarding acceptable methods for writing cause-of-death statements.

### HIV Risk Factors

Risk factors for acquiring HIV infection include:

- Sexual contact
- Parenteral substance abuse
- Maternal infection (transmission to fetus or infant)
- Blood product transfusion/administration
- Occupational exposure—as where a laboratory worker sustains an inadvertent needle-stick or is exposed to infected blood products or body fluids. Such cases may involve an injury (such as a puncture wound), and some such deaths might be considered as accidental (unintentional injury) in manner.

Not all persons who have such risk factors acquire HIV infection. If a death occurs from HIV infection that is, with reasonable probability, related to one or more of these risk factors, then it is appropriate to regard them as significant conditions and to report them when completing the cause-of-death statement. The situation is analogous to circumstances that may arise in other types of death, such as reporting intravenous substance abuse when a person dies from fungal endocarditis arising from drug abuse; reporting alcohol intoxication when a person dies of drowning; reporting cancer of the stomach because it was a basis for a person having committed suicide; or reporting cigarette smoking when a person dies of chronic lung disease.

As a general practice, a risk factor for the acquiring of HIV infection is reported if reasonably well documented and HIV is other than sexually acquired.

## Assessing and Reporting Significant Conditions

In general, the certifier should use all medical and historical information that is available to determine which significant conditions were present and associated with HIV infection. If a significant condition is cited in the cause-of-death statement, it is advisable that there be documentation or reasonable probability that it contributed to the death of the patient in question.

## Examples

**Case Scenario A.** A 46-year-old male told his doctor he had repeatedly abused heroin intravenously over a 7-year period. His forearms showed chronic needle tracks. He was admitted to the county hospital with shortness of breath. He was found to have pneumocystis pneumonia, which was refractory to treatment, and he died of respiratory failure about 3 weeks after admission. Other than parenteral substance abuse (heroin), no other HIV risk factors were documented or known. Two years prior to death, the patient had been admitted with community-acquired pneumonia and was found to have HIV antibody in his serum.

| | | |
|---|---|---|
| Part I | A. **Pneumocystis pneumonia** | Approximate interval between onset and death<br>**3 weeks** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **Months** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **2+ years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Parenteral substance abuse – heroin** | |

**Comment.** In the above example, it could be argued that parenteral substance abuse was the underlying cause of death and should be cited in Part I of the cause-of-death statement instead of Part II. However, parenteral substance abuse does not, in and of itself, cause HIV infection. To promote consistency in writing cause-of-death statements, it is suggested that the format shown above be used, reporting the relevant significant condition(s) in Part II, unless a cause-and-effect relationship is proven (see Case Scenario D, which follows).

**Case Scenario B.** A 5-month-old infant died of cerebral toxoplasmosis secondary to HIV infection, which was acquired in utero. Other opportunistic infections had preceded the toxoplasmosis. The mother had apparently acquired HIV from intravenous substance abuse.

| | | |
|---|---|---|
| Part I | A. **Cerebral toxoplasmosis** | Approximate interval between onset and death<br>**1 month** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **2 months** |
| | Due to, or as a consequence of:<br>C. **Intrauterine human immunodeficiency virus infection** | **5 months** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

In this example, maternal-fetal transmission of HIV is implicit. The significant condition that affected the infant (ie, maternal infection) need not be restated in Part II. If the mother were to die of her HIV infection, significant conditions relevant to her death (eg, intravenous substance abuse) would be reported on her death certificate, so there is no need to report the condition(s) on the infant's death certificate.

**Case Scenario C.** A 28-year-old male had hemophilia (Factor VIII) deficiency and contracted HIV infection from an infected blood product, which was used to treat his hemophilia. The specific blood product that was infected with HIV was determined retrospectively. He died of disseminated mycobacterium avium infection.

| | | |
|---|---|---|
| Part I | A. **Disseminated mycobacterium avium infection** | Approximate interval between onset and death<br>**2 months** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **2 years** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **8 years** |
| | Due to, or as a consequence of:<br>D. **Blood product infusion for hemophilia** | **28 years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

For the case scenario above, the format shown is suggested for several reasons. First, the cause-and-effect relationship between hemophilia, blood transfusions, and HIV infection

was proven. Second, hemophilia is a specific disease condition without which, in this patient, HIV infection would not have occurred. Third, the format shown makes it clear that hemophilia is the underlying cause of death.

**Case Scenario D.** A 26-year-old female died of pneumocystis pneumonia, following HIV infection and AIDS. No medical history information could be developed regarding the presence of other significant conditions.

| | | |
|---|---|---|
| Part I | A. **Pneumocystis pneumonia** | Approximate interval between onset and death<br>**3 weeks** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **2 years** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **4 years** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

**Case Scenario E.** A 24-year-old female clinical laboratory worker died of cryptococcal myocarditis, following HIV infection and AIDS. She had sustained an unintentional needle puncture while processing blood that was shown subsequently to be HIV positive. Thorough evaluation failed to disclose other HIV risk factors.

| | | |
|---|---|---|
| Part I | A. **Cryptococcal myocarditis** | Approximate interval between onset and death<br>**1 month** |
| | Due to, or as a consequence of:<br>B. **Acquired immune deficiency syndrome** | **3 years** |
| | Due to, or as a consequence of:<br>C. **Human immunodeficiency virus infection** | **5 years** |
| | Due to, or as a consequence of:<br>D. **Occupational puncture wound of hand** | **5 years** |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

As in Case Scenario C, the cause of the HIV infection (puncture wound) in this case was essentially proven. Because the underlying cause of death involved an external condition that was an unintentional injury (ie, puncture wound), the manner of death may be certified as “accident” rather than “natural.” Information would also be required for the death certificate indicating the date, time, place, and address of injury, a description of

how the injury occurred (eg, “skin puncture with syringe needle”), and an indication that the injury occurred at work. In general, such injury-related deaths should be reported to the medical examiner or coroner.

**Sexual contact.** The nature and role of sexual contact as a significant condition is difficult to establish and report—much more so than the other HIV risk factors, which are composed of medically distinct entities or events. Also, data systems exist for sexual behavior risk factor surveillance. For these reasons, the reporting of sexual contact is not necessary.

### Multiple Risk Factors

When the need exists to report multiple conditions in Part II, each should be reported, separating them with a comma, and listing them in descending order of importance.

### Other Considerations

It may seem redundant to specify human immunodeficiency virus infection as the underlying cause of death when death results from acquired immune deficiency syndrome because, by definition, AIDS is due to HIV infection. However, between HIV infection and the development of AIDS, there is latent period that varies considerably among patients. Specifying the interval between HIV infection and AIDS may be useful for statistical, classification, and coding purposes. Thus, it is appropriate that human immunodeficiency virus infection be cited as the underlying cause of death, and that the interval between onset and death be reported.

### Local and Confidentiality Issues

The approach to AIDS confidentiality issues varies among states. Familiarity and compliance with applicable laws and procedures is essential.

## When Disease and Injury Seem Inseparable

### General Principles

Cases will occur in which combinations of disease and injury cause death, or in which one seems to lead to the other. Such cases may cause dilemmas in selecting an appropriate format for writing the cause-of-death statement. In general, there are several variations:

**Type 1.** Significant underlying disease is exacerbated by an injury that in many people would be survivable (eg, coronary artery disease exacerbated by the stress of a fractured hip sustained in a fall, or fatal wound infection of a relatively “minor” wound in someone with diabetes).

**Type 2.** A serious disease causes a fatal injury to occur (eg, a person has a heart attack while swimming and drowns).

**Type 3.** An injury seems to have caused the disease that proves fatal (eg, lye ingestion with subsequent esophageal scarring and fatal esophageal cancer that develops years later).

For managing such cases, an option is to develop an opinion as to whether the injury or disease was the most important, and to list the most important one in Part I and the less important one in Part II, using a split format as described for periprocedural deaths. If the condition listed in Part I as the underlying cause of death is the injury, then the manner may be reported as other than natural (homicide, suicide, accident, or undetermined, as appropriate). If the disease condition is listed in Part I as the underlying cause of death, then the manner may be reported as natural.

Thus, using the Type I case described above (coronary artery disease exacerbated by hip fracture sustained in a fall) for a case in which a person had an acute myocardial infarction 2 days after falling from a ladder and then died 3 days later, one option is as follows:

| | | |
|---|---|---|
| Part I | A. **Acute myocardial infarct** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Atherosclerotic coronary artery disease** | **Years** |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Left hip fracture from a fall** | |

By stating the natural disease in Part I, the certifier is indicating that the natural disease process played the most important role in causing the death of this person. However, the mention of an injury (the fall) in Part II requires that injury-related items be completed. The injury-related items include manner of death, date, time, place, and address of injury, as well as "describe how injury occurred." The format shown in this example is acceptable because the condition reported in Part II (hip fracture) contributed to death but did not result in the underlying cause of death reported in Part I (coronary atherosclerosis). And, the manner may be certified as accident since death would probably not have occurred when it did had the fall (an injury) not occurred.

Another option in the example case is to report the injury in Part I and the underlying disease in Part II:

| | | |
|---|---|---|
| Part I | A. **Acute myocardial infarct** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Left hip fracture** | **5 days** |
| | Due to, or as a consequence of:<br>C. **Fall from ladder** | **5 days** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Atherosclerotic coronary artery disease** | |

Using this option, the manner of death would also be reported as accident, based on the circumstances presented. Of course, the injury-related items would have to be completed. The format shown in this example is acceptable because the condition reported in Part II (coronary artery disease) contributed to death but did not result in the underlying condition reported in Part I (fall from ladder).

Which of these split formats would be used requires the judgment of the person writing the cause-of-death statement, but a major factor to be considered in selecting the format is the relative contribution of each condition in causing death. The split format allows for such discretion.

Yet another option that employs some "bending of the rules"—a very handy option at that—is:

| | | |
|---|---|---|
| Part I | A. **Acute myocardial infarct** | Approximate interval between onset and death<br>**3 days** |
| | Due to, or as a consequence of:<br>B. **Coronary artery disease aggravated by hip fracture** | **5 days** |
| | Due to, or as a consequence of:<br>C. **Fall from ladder** | **5 days** |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |

The important point is that all relevant conditions are reported in the cause-of-death statement, and that the sequence of conditions is logical. Of course, all injury information would need to be completed.

A Type 2 case (such as heart attack while swimming, with subsequent drowning) could be certified as follows:

| | | |
|---|---|---|
| Part I | A. **Acute myocardial infarct complicated by drowning** | |
| | Due to, or as a consequence of:<br>B. **Coronary artery atherosclerosis** | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I | |
| Manner of Death<br>**Accident** | | Describe How Injury Occurred<br>**Had myocardial infarct while swimming in fresh water lake. Drowned in lake.** |

Line A could be written as “Drowning during a myocardial infarct” or “Drowning complicating a myocardial infarct.” Remember that the first condition mentioned is often given greater weight for statistical coding purposes. The same principle could apply to a case of “Cocaine intoxication aggravating coronary artery disease.”

Of course, another acceptable format is:

| | | |
|---|---|---|
| Part I | A. **Acute myocardial infarct** | |
| | Due to, or as a consequence of:<br>B. **Coronary artery atherosclerosis** | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Drowning** | |
| Manner of Death<br>**Accident** | | Describe How Injury Occurred<br>**Had myocardial infarct while swimming in fresh water lake. Drowned in lake.** |

A third acceptable option is:

| | | |
|---|---|---|
| Part I | A. **Drowning** | |
| | Due to, or as a consequence of:<br>B. | |
| | Due to, or as a consequence of:<br>C. | |
| | Due to, or as a consequence of:<br>D. | |
| Part II | OTHER SIGNIFICANT CONDITIONS: Conditions contributing to death but not resulting in the underlying cause of death in Part I<br>**Coronary artery atherosclerosis with acute myocardial infarct** | |
| Manner of Death<br>**Accident** | | Describe How Injury Occurred<br>**Had myocardial infarct while swimming in fresh water lake. Drowned in lake.** |

In each of these examples, the important conditions are reported and the manner of death is non-natural because an external condition contributed to death. To argue that the coronary disease caused the drowning and should be reported in Part I is more a matter of form than substance. Each example makes clear the events leading to death.

Type 3 cases may be more difficult because lengthy time intervals may be involved (see below).

**Discussion**

The most common practice concerning the classification of manner of death when death results from disease and injury is one that has been recommended.[1] In general, if death was brought about or hastened by an injury, preference is given to the injury when classifying the manner of death, because death would not have occurred at the time it did had the injury not occurred. The principle usually applies, regardless of the interval between the injury and death. Thus, for a person who dies of a post-traumatic seizure disorder, which resulted from an unintentional motor vehicle crash 10 years earlier, the manner of death would often be classified as accidental. Not all certifiers subscribe to such principles, however, and room for discretion is required to accommodate the needs and circumstances of individual cases.

Some cases can be quite difficult. For the purpose of discussion, consider the Type 3 case described earlier (lye ingestion with subsequent delayed death from esophageal carcinoma). Assume that the lye was ingested as a suicidal venture, the attempt was

[1] Adams V, Hirsch C. Trauma and disease. In: Spitz WU, ed. *Spitz and Fisher's Medicolegal Investigation of Death*. 3rd ed. Springfield, Ill: Charles C Thomas Publishers; 1993:175-198.

unsuccessful (in the short term, at least), the individual lived for many years before developing the carcinoma, and suicidal tendencies were never again manifest before dying from the carcinoma. One might argue that the cause-and-effect relationship between lye ingestion and carcinoma was tenuous, the decedent lacked any knowledge of the potential delayed complications of lye ingestion, and that suicidal ideation was not only lacking at the time of death but had not been present for many years. Should the general principle of ignoring the interval between onset and death be applied in this case, and the manner of death be classified as suicide? How strong is the cause-and-effect association between the lye ingestion and carcinoma? Did the former really cause the latter? Perhaps accident, natural, or undetermined would be more suitable alternatives in view of these questions. There is no good rule to cover every case, except that case-specific certifier judgment is required.

**Summary**

When death results from the effects of both injury and disease, the cause-of-death statement often may be written using a split format, although a combined format also works in many cases. The most important condition may be cited as the underlying cause of death in Part I, and the less-important condition may be cited in Part II, if the split format is used. The most important thing is to include all relevant conditions in the cause-of-death statement, and to classify the manner of death appropriately. In general, if a non-natural condition (external condition such as injury or poisoning) is reported in Part I or Part II, the manner of death will be other than natural.

## Mechanisms of Death and Cause-of-Death Statements: Principles for Including or Excluding "Mechanisms" of Death

### Introduction

*Mechanism of death* is a term that often arises when discussing causes of death and the death certificate. In general, most instructions, guidelines, and other publications advise certifiers of death not to include mechanisms of death in cause-of-death statements. A problem arises, however, because mechanisms of death have been variably defined. Further, recent improvements in electronic mortality data collection practices among states have set the stage for improving the content and usefulness of cause-of-death information. Therefore, it may be helpful to more specifically define and categorize mechanisms of death with the goal of fostering more complete and consistent reporting of causes of death, which, in turn, will facilitate improvement in the NCHS national mortality database. Definitions and principles are provided herein for evaluating whether so-called mechanisms of death would be helpful to include when completing the death certificate or writing cause-of-death statements for autopsy reports and other purposes.

### Background Information on Mechanisms of Death

Adelson defined the mechanism of death as "the physiologic derangement or biochemical disturbance *incompatible* with life, which is initiated by the cause of death."[1] Representative conditions that Adelson regarded as mechanisms of death include "hemorrhage, hypovolemic shock, acidosis, alkalosis, cardiac asystole, ventricular fibrillation, respiratory depression and paralysis, cardiac tamponade, sepsis with profound bacterial toxemia, and the like." Kircher similarly defined the mechanism of death to be "the physiologic derangement or biochemical disturbance produced by a cause of death and is the means by which the cause exerts its lethal effect."[2]

The CAP's first *Handbook of Forensic Pathology* defined mechanism of death as "the process that causes one or more vital organs or organ systems to fail when a fatal disease, injury, abnormality, or chemical insult occurs. It is the functional or structural change that makes independent life no longer possible after a lethal event has occurred."[3] Cardiac standstill, hemorrhagic shock, and secondary wound infection and sepsis were cited as examples of mechanisms of death. In their chapter on certification of death in the same handbook, Graham and Gantner defined mechanism of death similarly to Adelson and Kircher, and offered tamponade, dysrhythmia, and heart failure as examples. More recently, Hirsch and Flomenbaum paraphrased the definition offered by Adelson and

[1] Adelson L. *The Pathology of Homicide*. Springfield, Ill: Charles C Thomas; 1974.
[2] Kircher LT. Autopsy and mortality statistics: making a difference (essay). *JAMA*. 1992;267:1264,1268.
[3] College of American Pathologists' Forensic Pathology Committee. *Handbook of Forensic Pathology*. Northfield, Ill: College of American Pathologists; 1990.

included disseminated intravascular coagulation, sepsis, cardiac arrhythmias, congestive heart failure, asphyxiation, and exsanguination as examples.[1]

Some of the conditions cited above are not necessarily incompatible with life and, consequently, do not meet Adelson's definition. Further, some of the conditions listed are often forerunners of others that are listed. For example, hypovolemic shock may lead to ventricular fibrillation or asystole. In such instances (of which there are many), it may be difficult to determine exactly which complications should be viewed as mechanisms and which should not, and therefore which should be reported or omitted when completing the death certificate. Graham and Gantner addressed this issue by stating that "most individuals would not squabble if the death certificate includes the mechanism of death, so long as the cause of death is also identified."

Attempting to clarify matters, the CAP Autopsy Committee has identified a subset of mechanisms that, except in extremely rare instances, need never be cited on the death certificate. This subset includes:

- Asystole
- Cardiac arrest
- Ventricular fibrillation
- Cardiopulmonary arrest (or cardiorespiratory arrest)
- Electromechanical dissociation
- Respiratory arrest

Unfortunately, a much larger, ill-defined, and largely unitemized group of so-called mechanisms exist for which specific guidelines are lacking concerning their reporting in cause-of-death statements.

**Rationale for the Principles**

There are many instances in which the inclusion of so-called "mechanisms" of death on the death certificate may be useful. Consider, for example, the use of mortality data for predicting the needs for institution-based health care for treatment of coronary artery disease. If all deaths due to coronary artery disease were simply reported as being due to "coronary artery atherosclerosis," useful information obtained from the death certificate for specific planning would be limited. However, the ability to separately enumerate from death certificates those complications of coronary disease that may require long-term, intensive, or repetitive use of health care facilities and resources, such as those involving congestive heart failure, might be helpful for health care resource planning.

[1] American Society of Clinical Pathologists. Forensic Pathology Check Sample FP 95-1: Problem Solving in Death Certification. Chicago, Ill: American Society of Clinical Pathologists; 1995.

Likewise, it might be helpful to know the proportion of hospitalized patients who ultimately die of systemic sepsis. Many other examples could be cited. Such research and planning needs go beyond routine mortality surveillance and enumeration of underlying causes of death. The issues often relate more to the complications of the underlying cause of death than to the underlying cause of death itself. Therefore, principles might be helpful to facilitate more complete cause-of-death reporting.

## The Principles

It is assumed for the purpose of these principles that readers can identify the underlying cause of death in a given case. For example, chronic alcohol abuse would constitute the underlying cause of death in a chronic alcoholic who develops hepatic cirrhosis, portal hypertension, and fatal hepatic encephalopathy.

### *Definitions*

A *nonspecific anatomic process* is a complication of the underlying cause of death and a macroscopic or microscopic morphological alteration that may have functional consequences and more than one possible cause. A small list of examples includes hepatic cirrhosis, diffuse alveolar damage, hemopericardium, peritonitis, and hydrocephalus. Each of these is nonspecific and anatomically demonstrable. In general, it is acceptable, if not appropriate, to include a nonspecific anatomic process in the cause-of-death statement as an immediate or intermediate cause of death, but not as an underlying cause of death (because etiologic specificity is lacking).

A *mechanism of death* is a complication of the underlying cause of death that (1) is a physiologic derangement or biochemical disturbance; (2) is a disturbance through which the underlying cause ultimately exerts its lethal effect; (3) has more than one possible cause; and (4) is not an etiologically specific or criteria-defined disease, injury, or poisoning event.

Mechanisms of death may be divided into two subsets: *terminal events* and *nonspecific physiologic derangements*. A *terminal event* may be defined as a final complication of the underlying cause of death that is one of a defined set of common final pathways that is uniformly fatal if not immediately reversed (see below). A *nonspecific physiologic derangement* is a complication of the underlying cause of death that is not defined as a terminal event or a nonspecific anatomic process.

With these definitions in mind, three principles may be employed to determine which complications might be included in the cause-of-death statement as an immediate or intermediate cause of death.

**Principle 1. *Terminal events* should not be listed on the death certificate and include:**

- Asystole (or cardiac standstill)
- Cardiac arrest
- Ventricular fibrillation
- Cardiopulmonary arrest (or cardiorespiratory arrest)
- Electromechanical dissociation
- Respiratory arrest

**Principle 2. A *nonspecific anatomic process* or a *nonspecific physiologic derangement* is included in the cause-of-death statement if it meets the following criteria:**

1. It is a recognized, potentially fatal complication of the underlying cause of death.
2. It comprises part of the sequence of conditions that led to death in the patient in question as judged by clinical presentation, the historical sequence of events, or anatomic or laboratory findings.
3. It is not a symptom or sign.
4. Its existence in the patient would not be apparent unless explicitly stated in the cause-of-death statement.
5. Its inclusion does not represent an oversimplification of the facts.
6. An etiologically specific underlying cause of death is also reported, when possible.

**Principle 3. If the existence in the patient of a nonspecific process or derangement (ie, complication) is obvious on the basis of the underlying cause of death or another reported condition or complication, it need not be reported.** For example, if the underlying cause of death were "intravenous potassium chloride poisoning," it would be unnecessary to cite "hyperkalemia" as a complication (immediate cause of death).

*Example*

For a chronic alcoholic who developed cirrhosis, portal hypertension, asterixis, hyperammonemia, and then died from hepatic encephalopathy with respiratory arrest and asystole, the cause-of-death statement may be written as follows:

**Hepatic encephalopathy**
due to: **Portal hypertension**
due to: **Hepatic cirrhosis**
due to: **Chronic alcohol abuse**

Respiratory arrest and asystole were excluded with Principle 1, because they are, by definition, terminal events. Asterixis was excluded with Principle 2, criterion 3, because it is a sign. Hyperammonemia was excluded with Principle 2, criteria 4 and 5, because its existence is apparent through reporting of other items and because listing it would be an

oversimplification of the facts. Hepatic encephalopathy and portal hypertension are mechanisms of death because they are nonspecific physiologic derangements (perhaps with a nonspecific anatomic counterpart as well), but their existence in this patient would not be apparent unless they are included and are explicitly stated in the cause-of-death statement. Hepatic cirrhosis is a nonspecific anatomic process and is also included because its existence in this patient would not be apparent unless it is included in the cause-of-death statement. Chronic alcohol abuse, of course, is included because it is the underlying cause of death. Thus, using the principles, inclusion of all of the complications shown in the example may be explained.

Another way of justifying the example cause-of-death statement is:

a. Not all persons who die of hepatic encephalopathy have portal hypertension.
b. Not all persons who die of complications of portal hypertension have cirrhosis, nor do all people who die of cirrhosis have hepatic encephalopathy as a fatal complication.
c. Not all persons who die of complications of cirrhosis acquired cirrhosis because of chronic alcohol abuse.
d. Not all persons who die of chronic alcohol abuse do so from cirrhosis and its complications.

Thus, each condition listed as an intermediate or immediate cause of death, regardless of whether it is perceived as a mechanism of death or otherwise, existed in the patient in question, and the reported sequence completely explains why this patient died, compared to possible complications that could have occurred in other patients who die from the same underlying cause of death. In essence, the “unique” story of this patient’s death sequence is reported.

It should be obvious that the information contained in the example is potentially more useful than a cause-of-death statement that simply reads “chronic alcohol abuse.” To reiterate and paraphrase Graham and Gantner’s thoughts in the context of the example, few would squabble over the listing of hepatic encephalopathy and portal hypertension in this cause-of-death statement, because the underlying cause of death is also identified. Actually, few would argue with the claim that the cause-of-death statement is more complete and useful than it would have been had the so-called mechanisms been omitted.

Each of the conditions listed in the example has a specific ICD code. NCHS now also captures the literal text of the cause-of-death statement, so reported conditions that may not have a unique code will also be identifiable in the NCHS mortality database.

The following table lists terminal events and some common nonspecific physiologic derangements and nonspecific anatomic processes.

**Sample Mechanisms of Death (Terminal Events and Nonspecific Physiologic Derangements) and Nonspecific Anatomic Processes and their Relation to Immediate or Intermediate Causes of Death**

| *Mechanisms:* Terminal Events[1] | *Mechanisms:* Nonspecific Physiologic Derangements[2] | Nonspecific Anatomic Processes[3] |
|---|---|---|
| asystole | arrhythmia | acute myocardial infarction |
| cardiac arrest | coagulopathy | anoxic encephalopathy |
| cardiopulmonary arrest | coma | bowel obstruction |
| cardiorespiratory arrest | congestive heart failure | cirrhosis |
| electromechanical dissociation | dehydration | epidural hematoma |
| respiratory arrest | dysrhythmia | gastrointestinal hemorrhage |
| ventricular fibrillation | exsanguinations | hemopericardium |
| | hepatic encephalopathy | hemothorax |
| | hepatic failure | peritonitis |
| | hypercalcemia | pneumonia |
| | hypotension | pulmonary embolism |
| | ketoacidosis | subarachnoid hemorrhage |
| | multi-organ failure | subdural hematoma |
| | pneumothorax | |
| | portal hypertension | |
| | pulmonary insufficiency | |
| | renal failure | |
| | sepsis | |

*1. Seldom, if ever, do these need to be reported on the death certificate.*
*2,3. Placed on the death certificate based on application of the principles.*

## Discussion

Aside from its being a complete and comprehensive statement of the cause of death, much of the value of reporting cause-of-death statements as shown in the example has to do with the potential usefulness of the information. It has been stated by certifiers of death that "how registrars code...is their business," and "systems of classification and coding [are regarded] as our servants, not our masters."[1] True, the writing of cause-of-death statements must allow the certifier enough flexibility to meet the needs of a given case, and death certification methods should not be detrimentally enslaved to classification and coding guidelines and procedures. However, it is within the certifier's duty to recognize the potential uses of the information from death certificates that are coded and classified—uses such as surveillance, research, allocation of funds and

[1] Problem Solving in Death Certification. *op cit.*

resources for public health planning and programs, and prioritization of governmental decisions that affect health care.

*The information from individual death certificates is the very stuff from which our national mortality database is made, and the database, in turn, is the major source of mortality information for making decisions regarding national mortality issues*. These considerations oblige us to re-examine our traditional view of so-called mechanisms of death as they relate to death-certification practices.

It is not always possible to identify specific complications or mechanisms that result from an underlying cause of death, because of their multiple or complex nature, or because sufficient information is lacking as might occur when an autopsy cannot be performed. In some cases, the underlying cause-of-death may be known with certainty, while the immediate cause of death is not known with reasonable probability, as might occur when a patient with terminal prostate cancer dies at home and no autopsy is performed. In such cases, rather than guessing, oversimplifying, or specifying just one of multiple postulated mechanisms, it may be preferable to limit the cause-of-death statement to the underlying cause of death, or to generally describe the complication in such terms as "perforating brain trauma" due to "gunshot wound to the head." There are many cases, however, in which a well-defined sequence of complications may be stated with a high degree of confidence and correctness.

Some may take issue with the distinction made here between nonspecific anatomic processes and nonspecific physiologic derangements, claiming that the distinction is a step backward in pathophysiologic concepts because structure and function are intimately related. The distinction has been made, however, to allow for clearer definitions and to facilitate communication about mechanisms of death.

## Conclusions

Principles are presented to determine which complications of an underlying cause of death may be reported in cause-of-death statements, particularly in regard to conditions that are often viewed as mechanisms of death. *Mechanisms of death* include a defined list of *terminal events* (such as asystole) and a larger group of *nonspecific physiologic derangements* (such as portal hypertension). Mechanisms of death are therefore distinguished from *nonspecific anatomic processes* (such as cirrhosis).

The content of a cause-of-death statement should be based on whether the information is, within reason, potentially useful, and upon the value of reporting the unique sequence of a given person's death. Relying solely upon whether a given condition is defined or construed as a mechanism will result in cause-of-death statements that are less useful than they otherwise might be. Mechanisms of death defined as terminal events, however, need not be reported in cause-of-death statements.

# Part V
# A Guide for Manner of Death Classification

*In 2002, The National Association of Medical Examiners prepared* A Guide for Manner of Death Classification *(Randy Hanzlick, MD, John C. Hunsaker III, MD, JD, and Gregory J. Davis, MD, editors; approved by the NAME Board of Directors in February 2002). The guide was an outgrowth of years of discussion that centered upon various controversies about manner of death classification, also a topic of a 1995 Questionnaire and an Interim Meeting of the National Association of Medical Examiners titled, "Mind Your Manners," held in Nashville, Tennessee, in February 1996. The guide included here is an abridged version of that which appears on the National Association of Medical Examiner's website at www.TheNAME.org in the Library section of the website. The website version contains various comments and alternative viewpoints provided by reviewers, which are not included here, but this version has not otherwise been materially altered.*

*As stated in the "Preface and Caveats" section of the guide, "The recommendations contained herein are not standards and should not be used to evaluate the performance of a given certifier in a given case. Death certification and manner-of-death classification require judgment, and room must be allowed for discretion on a case-by-case basis."*

## Preface and Caveats

If reading this guide results in a given certifier of death deciding to change his/her approach to classifying manner of death in certain types of cases, there is no need to amend or change certifications that have already taken place. Starting the new approach at a given point in time is acceptable, with the caveat that one may occasionally need to explain differences between newer and older certifications involving similar or identical circumstances. If changes in manner-of-death classification procedures are undertaken, it may be prudent to discuss them with appropriate vital records registrars so that they are not surprised, and they understand the reasons for the change.

The recommendations contained herein are not standards and should not be used to evaluate the performance of a given certifier in a given case. Death certification and manner-of-death classification require judgment, and room must be allowed for discretion on a case by case basis.

It must be realized that when differing opinions occur regarding manner-of-death classification, there is often no "right" or "wrong" answer or specific classification that is better than its alternatives. When promulgating guidelines, however, one of the available

options needs to be selected as the one recommended for use. Thus, the recommendations herein are ones selected to foster a consistent approach amongst certifiers, not because the recommended approach is the "right" or the "better" one.

The "arguments," principles, and foundations used to support certain recommendations in this guide cannot be applied uniformly to every conceivable death scenario because issues sometimes vary with the manner of death being discussed. As a result, there will be obvious, apparent "inconsistencies" in the rationale discussed for making some of the recommendations in this guide. This problem is unavoidable because of the nature of the subject at hand. Thus, in some cases, one simply must select an available manner-of-death classification as the preferred one for use in a given scenario, while recognizing that the logic used to select that option may not be applicable or directly transferable to other situations (and, in fact, may seem inconsistent with the logic employed in other scenarios). In short, it is sometimes necessary to simply select an approach and use it for the purpose of consistency, recognizing that other approaches may be "just as good."

## Introduction

All states have a standard death certificate that is based upon a model certificate called the U.S. Standard Certificate of Death. Although the official death certificate in each state varies from the model and the death certificates used in other states, there are numerous similarities in form and content. The *certifier of death* is the physician, medical examiner, or coroner who completes the cause-of-death section of the certificate, which also includes details about the circumstances surrounding death. *Manner of death* is one of the items that must be reported on the death certificate; it is a classification of death based on the circumstances surrounding a particular cause of death and how that cause came into play.

In most states, the acceptable options for manner-of-death classification are:

- Natural
- Accident
- Suicide
- Homicide
- Undetermined (or "Could not be Determined")

Whether manner of death is indicated by checking an appropriate box on the death certificate or by writing or typing the manner in a designated space depends on the state and how its standard death certificate form is designed. Familiarity with state death certification procedures and the death certificate form are required.

Manner of death is an American invention. A place to classify manner of death was added to the U.S. Standard Certificate of Death in 1910. Manner of death is not addressed directly in the International Classification of Diseases as promulgated by the World

Health Organization. It was added to the death certificate by public health officials to assist in clarifying the circumstances of death and how an injury was sustained—not as a legally binding opinion—and with a major goal of assisting nosologists who code and classify cause-of-death information from death certificates for statistical purposes.

Medical examiners and coroners have debated for decades about how the manner of death should be classified in certain situations, and more recently, whether certifiers should be required to classify manner of death at all. The debate continues and is a frequent subject of discussion.

This guide has been written with the assumptions that, for the foreseeable future, manner-of-death classification will continue to be recorded on the death certificate, and that differences in opinions about how to classify manner of death shall persist. The major impetus for preparing this Guide is the premise that, for consistency's sake, there can be a common thought and decision-making process upon which manner-of-death classifications can be based reproducibly in the great majority of cases.

Medical examiners and coroners reached the point that, for personal, interpersonal, and interjurisdictional consistency, we as death certification professionals should be able to recognize the recurrent debates about manner-of-death classification and arrive at a consensus approach for the commonly encountered manner of death dilemmas. We can "agree to disagree—but to not be disagreeable," to quote New York City Medical Examiner Charles Hirsch. All agree, however, on the fundamental premise that manner of death is circumstance dependent, not autopsy dependent. To that end, the suggestions in this guide are made based on experience, the literature, and a goal for greater consistency.

## Other Background Information

The death certificate is used for several major purposes. One purpose is to serve as legal documentation that a specific individual has died. In general, the death certificate serves as legal proof that death has occurred, but not as legal proof of the cause of death. Other major purposes of the death certificate are to (1) provide information for mortality statistics that may be used to assess the nation's health; (2) systematically catalogue causes of morbidity and mortality; and (3) develop priorities for funding and programs that involve public health and safety issues.

In general, the *certifier of death* completes the cause-of-death section and attests that, to the best of the certifier's knowledge, the person stated died of the cause(s) and circumstances reported on the death certificate. It is important to remember that these "facts" only represent the certifier's opinion and are not written in stone or legally binding. Information on the death certificate may be changed, if needed. In general, states require that the certifier of death be a licensed physician, a medical examiner, or a coroner. In some states, lay coroners may serve as certifier, but such certifiers can and should rely upon physician input and guidance when completing the death certificate.

Because the cause and manner of death are opinions, judgment is required to formulate both for reporting on the death certificate. The degree of certainty required to classify the manner of death depends sometimes on the circumstances of the death. Although such issues will be discussed in further detail below, a general scheme of incremental "degrees of certainty" is as follows:

- Undetermined
  (less than 50% certainty)
- Reasonable medical or investigative probability
  (greater than a 50:50 chance; more likely than not)
- Preponderance of medical/investigative evidence
  (for practical purposes, let's say about 70% or greater certainty)
- Clear and convincing medical/investigative evidence
  (for practical purposes, let's say 90% or greater certainty)
- Beyond any reasonable doubt
  (essentially 100% certainty)
- Beyond any doubt
  (100% certainty)

Seldom, for the purpose of manner-of-death classification, is "beyond a reasonable doubt" required as the burden of proof. In many cases, "reasonable probability" will suffice; but in other instances, such as suicide, case law or prudence may require a "preponderance" of evidence, or in homicide "clear and convincing evidence" may be required or recommended. Further references to these principles will follow on the discussion of specific scenarios, as appropriate.

The certifier's responsibilities include professional, administrative, and quasi-judicial elements. The conclusions that lead to manner-of-death classification are drawn at some point during an ongoing investigation. Cases are seldom, if ever, truly "closed," because the conclusions regarding manner of death may be changed (amended) anytime based on new relevant and material information. It is also important to remember that the conclusions reached for the purpose of manner-of-death classification may not be the same as those of other entities and officials. Such differences are expected because of the different roles and viewpoints of those entities and officials. In virtually all instances, explanations for such differences are usually apparent and readily offered. It is also important to remember that new developments in medicine and forensic science may provide the relevant and/or material information that leads to a need for reclassification of manner of death.

Manner-of-death classification has, to a significant degree, an element of history and tradition. When asked why manner of death is classified in a specific way, a not-uncommon response is "that's the way I was trained" or "that's the way its always been done where I have worked." Tradition, history, training, and local idiosyncrasies in the

criminal justice and law enforcement communities can have an impact upon manner-of-death classification strategy. This phenomenon is recognized and is taken into account during the development of principles in this guide.

Finally, one cannot escape the need to consider *intent* when classifying manner of death. However, the definition of or need to consider "intent" may vary depending on the case. One basic consideration is beyond dispute: the concept of intent differs when manner-of-death classification issues are compared with other paradigms, such as legal code and public health strategies. These issues will be addressed in various scenarios below. The take-home point devolving from contemporary practice is that a singular definition and application of "intent" does not work in the context of manner-of-death classification.

## General Principles

There are several General Principles that may guide manner-of-death classification for the purposes of the death certificate. It is important to recognize that the death certificate has unique uses that dictate a special set of guidelines for manner-of-death classification.

**A. There are exceptions to every "rule," but every rule holds true most of the time.** Therefore, rules can be modified or broken in exceptional circumstances but can, and should, be followed most of the time.

**B. There are basic general "rules" for classifying manner of death.**

- Natural deaths are due solely or nearly totally to disease and/or the aging process.
- Accident applies when an injury or poisoning causes death and there is little or no evidence that the injury or poisoning occurred with intent to harm or cause death. In essence, the fatal outcome was unintentional.
- Suicide results from an injury or poisoning as a result of an intentional self-inflicted act committed to do self harm or cause the death of one's self.
- Homicide occurs when death results from a volitional act committed by another person to cause fear, harm, or death. Intent to cause death is a common element but is not required for classification as homicide (more below). It is to be emphasized that the classification of homicide for the purposes of death certification is a "neutral" term and neither indicates nor implies *criminal* intent, which remains a determination within the province of legal processes.
- Undetermined or "could not be determined" is a classification used when the information pointing to one manner of death is no more compelling than one or more other competing manners of death, in thorough consideration of all available information.
- In general, when death involves a combination of natural processes and external factors, such as injury or poisoning, preference is given to the non-natural manner of death.

There are challenging aspects and exceptions related to each of the above classifications and concepts. These will be addressed in the various sections that follow.

**C. Certifiers of death should avoid, to the extent possible, interpretation of specific statutes as they may apply to a specific case in question.** For example, if a state defines a fatal vehicular hit-and-run incident as a type of "vehicular homicide," the certifier may classify manner as accident if the fatal injury seems to have been unintentional, without clear intent to harm or cause death. Prosecution for vehicular homicide is not precluded if the legal requirements are met. This principle minimizes the need for the certifier to rely upon reported, often circumstantial, third-party or hearsay information and evaluate these data in the context of applicable criminal law—a function better suited to others in the criminal justice system.

**D. In general, the time interval between an injury/poisoning event and death is of little relevance in regard to manner of death classification** if death resulted from the effects or complications of the injury/poisoning and there is no clear supervening cause. For example, if a person dies 10 years after being intentionally shot by another person, with death resulting from pneumonia and systemic sepsis as a result of quadriplegia caused by the gunshot wound, the manner of death would still be classified as homicide. By reliance on this approach, legal interpretations are not required of the certifier, and the criminal justice system's duties are not precluded.

**E. Manner of death certifications should be objective and based on simple established criteria.** Manner-of-death classification should not be formulated on the basis of trying to facilitate prosecution, avoiding challenging publicity, building a political base, or promoting a personal philosophy or agenda.

**F. Regardless of how the certifier classifies the manner of death, the certifier may later address whether the findings are consistent with a proposed hypothetical situation.** For example, if the proper legal foundation is laid, the certifier may explain in court why the manner of death was certified as accident when told that the defendant has been charged with vehicular homicide. Whether the certifier is permitted to testify in court about the certified manner of death rests upon the law and practice of the relevant jurisdiction.

**G. The "but-for" principle is commonly applicable.** "But for the injury (or hostile environment), would the person have died when he/she did?" This logic is often cited as a simple way to determine whether a death should be classified as natural or non-natural (homicide, suicide, accident). When an injury or poisoning is involved in the cause of death, an answer of "yes" supports a natural death, and an answer of "no" should prompt due consideration to be given to a non-natural manner of death. The certifier needs to recognize, however, that the intermingling of natural and non-natural factors presents a set of complex considerations in assigning a manner of death. Regardless of whether the non-natural factor (1) unequivocally precipitated death, (2) exacerbated an underlying

natural pathological condition, (3) produced a "natural" condition that constitutes the immediate cause of death, or (4) contributed to the death of a person with natural disease typically survivable in a non-hostile environment, this principle remains: the manner of death is unnatural when injury hastened the death of one already vulnerable to significant or even life-threatening disease.

**H. Most jurisdictions do not provide for manner of death to be classified as "Complication of Therapy."** Although there are advocates for such an approach, acceptance of the approach is not widespread. To be sure, the death certificate should indicate when a death results from complications of medical diagnosis or treatment, whether such indication is given in the cause-of-death statement itself, the "how injury occurred" section, or in some other way. This guide indulges the presumption that "Complication of Therapy" is not an accepted category for manner of death, and that a decision will have to be made for classification as one of the standard manners of death.

**I. Risk-taking behavior poses challenges when classifying manner of death.** More and more, people are engaging in risky sports, recreational activities, and other personal behaviors. Injury or death, when it occurs during such activities, is not entirely unexpected, prompting the argument that such deaths may not truly be "accidents." Further, relevant differences in the nature and extent of risk, when comparing risky activities, are difficult to clearly identify. For example, how does placing an "unloaded" gun to the head and pulling the trigger ("Roulette") differ from jumping from a bridge on an elastic cord, engaging in sexual acts with a noose around the neck, or participating in a sport in which blows to the head are part of the "game"? These are challenging questions. In subsequent sections of this guide, an attempt is made to provide a system of defensible logic to classify the manner of death in such cases.

**J. Volition versus intent.** In evaluating the manner of death in cases involving external causes or factors (such as injury or poisoning), injuries are often categorized as "intentional" (such as inflicted injury in child abuse or shooting a person during a robbery) or "unintentional" (such as falling from a building). Thus, assessment of "intent" does relate to manner-of-death classification: it necessarily underlies the quasi-judicial responsibility derived from the enabling law in the relevant jurisdiction of the death certifier. However, the legal view of intent may differ from the death investigator's viewpoint. It is sometimes agonizingly difficult, and occasionally impossible, for the unbiased investigator to infer a victim's or perpetrator's intent. Intent is also much more apparent in some cases than others. For this reason, the concept of "voluntary acts" or "volition" may be useful. In general, if a person's death results at the "hands of another" who committed a harmful volitional act directed at the victim, the death may be considered a homicide from the death investigation standpoint. For example, consider the case of a variation of firearms "roulette" in which the game is played as usual (one bullet in the revolver's cylinder), except that another person holds the gun to the "player's" head, spins the cylinder, pulls the trigger, and the gun discharges and kills the "player." All acts (loading the gun, spinning the cylinder, placing the gun to the head, and pulling

the trigger) were both volitional and intentional. Although there may not have been intent to kill the victim, the victim died because of the harmful, intentional, volitional act committed by another person. Thus, the manner of death may be classified as homicide because of the intentional or volitional act—not because there was intent to kill.

## Principles and Recommendations for Specific Types of Cases

**1. To classify a death as Suicide,** the burden of proof need not be "beyond any reasonable doubt," but it should exceed "more likely than not" (that is, the burden of proof should be more compelling than 51%, which barely exceeds chance). In general, requiring a "preponderance of evidence" is a reasonable practice when deciding whether to classify a death as suicide. In some states, case or other law requires that a preponderance of evidence exist to classify death as suicide. In short, if classification as suicide is little more than an informed guess or mere speculation, accident or undetermined are deemed to be better options.

**2. When a natural event occurs in a hostile environment,** as when someone has a myocardial infarct while swimming, and there is a likelihood that the person was alive when the face became immersed (ie, the person was still alive while in the hostile environment), preference is usually given to the non-natural manner unless it is clear that death occurred before entry into the hostile environment. In the example cited (drowning because of a myocardial infarct while swimming), the manner of death would be appropriately classified as **Accident**. In this instance, a modified "but-for" test can be applied. "But for" the hostile environment, death would have been considerably less likely to occur when it did and may not have occurred at all.

**3. Consequences of chronic substance abuse,** such as alcoholic cirrhosis, alcohol withdrawal seizures, endocarditis secondary to chronic IV drug abuse, and emphysema associated with smoking, have been traditionally designated as **Natural** manner. The argument is often made that these deaths are chronic poisonings, or that they result from continuous exposure to external agents, and are therefore not natural deaths. Further, some argue that there is a "subintent" to do self harm. However, the classification of such deaths as natural has a long history, widespread acceptance, and recognition that such behaviors result in "diseases" and become part of the person's "normal" lifestyle, which often includes psychiatric elements such as a dependency or addictive disorder. For these latter reasons, classification as natural seems most appropriate.

**4. Deaths directly due to the acute toxic effects of a drug or poison (ie, poisoning),** such as acute alcohol poisoning, excited delirium from acute cocaine intoxication, or cardiac dysrhythmia due to tricyclic antidepressant toxicity, have been traditionally classified as **Accident** (assuming there was no intent to do self harm or cause death). In general, these are adverse acute events involving external factors, and the occurrence of the adverse event is not planned, reasonably expected, or reliably predictable as to time, place, or person. The difficulty often encountered is whether the drug or substance

detected represents an acute exposure. For example, if benzoylecgonine only is detected in blood, does that constitute an "acute exposure"? The issues involved are highly dependent on the substance involved, are beyond the scope of this guide, and are better left to other publications. Suffice it to say that if death results from an acute intoxication and the death was "unintentional," tradition and logic indicate that the manner of death is best classified as "accident." Further discussion (and exceptions) are discussed in #6 below in reference to some deaths involving medications and treatments.

**5. "Natural" disorders precipitated by an acute intoxication**, such as cerebral hemorrhage associated with acute cocaine intoxication, or rupture of a coronary atherosclerotic plaque during acute cocaine intoxication, for the purpose of consistency, may be classified as **Accident** if toxicology tests are supportive of an acute intoxication. The problem is, however, as in #4, deciding upon how "acute" such an intoxication is or must be to classify the manner of death as accident—and how acute effects of the drug relate to more chronic effects, if present. A convincing argument could be offered that preference should be given to the natural event, while citing the intoxication in Part II and classifying the death as natural. It is recommended, however, to remain consistent with General Principle B (last bullet) that such deaths be classified as accidents. It is also recommended that "acute" be interpreted liberally, perhaps even as "recent," that is, if the circumstances appear to link the death and a very recent intoxication, that the intoxication be considered when classifying manner of death.

**6. Deaths due to predictable, essentially unavoidable toxicity related to accepted treatment of a medical disorder**, such as digoxin toxicity in severe congestive heart failure, or bone marrow suppression with fatal infection secondary to chemotherapy (a poison), may be classified as **Natural.** In such cases, the treatment may have prolonged the life of the individual. Because such deaths are "poisonings," some advocate classification as accident. However, tolerance, the need for high doses, and other factors can make interpretations difficult. For these reasons, natural is the preferred classification.

**7. Hunting "accidents"** in which a hunter intentionally fires a weapon (but may not intend to shoot at a human) may, for consistency's sake, be classified as **Homicide,** because the decedent died at the hands of another who volitionally fired the weapon. Each step but one involved intent and volition: loading the weapon, aiming it at a target, and pulling the trigger. The only intent absent was that of striking a human. The intent to hit a target was fulfilled.

**8. Firearms deaths in which a gun is shown to be capable of discharge without pulling the trigger and, based on investigation, did so** (as when a gun fires when dropped on the ground or discharges when it is picked up), may be classified as **Accident** if circumstances and investigation indicate that the gun was not fired by intentionally pulling the trigger (lack of a volitional act).

**9. Death of one who is struck by a ricochet from a firearm fired legally and without disregard for safety or human life** may be classified as **Accident**. To classify this as homicide, critical elements are missing: an intent to harm or kill and an intentional or volitional pointing of the weapon in a way that the victim was the intended target. Often, if bullets ricochet, wound morphology allows analysis of possible ricochet before bullet entry, allowing the forensic pathologist to assess the possibility or likelihood of ricochet.

**10. Russian Roulette or similar variants** may be classified as **Suicide** because the act of placing a loaded gun to the head and pulling the trigger is inherently dangerous, carries a high risk of death, and implies a "subintent" to do self harm or accept the risk of serious injury or death. Guns are generally regarded as lethal weapons and are inherently lethal if misused. Knowledge of this fact is part of the reason the game is played. Thus, playing the game connotes an acceptance of a possibly fatal outcome. Attempting to determine the victim's state of mind and intent are extremely difficult. Classification of such deaths as suicide provides for a consistent approach and reflects the most common practice.

**11. Motor vehicle fatalities** in general, may be classified as **Accident** (assuming no suicidal or homicidal intent), even if by law the death may be regarded as vehicular homicide, and there is no evidence from reasonable investigative inference that the at-fault person was using the vehicle as a weapon with an intent to kill the victim (in which case homicide would apply).

**12. Deaths due to vector-borne disease,** even though the result of a bite or puncture, such as rabies, Rocky Mountain spotted fever, and malaria, may be classified as **Natural.** These vectors transmit disease, and humans become ill or die from the disease processes. Typically, the deaths are less sudden than those due to envenomization, and idiosyncratic responses to the agents are less variable than the individual response to envenomization.

**13. Deaths due to toxic envenomization,** such as spider bites, snake bites, and anaphylactic reactions to bee stings, may be classified as **Accident**. These episodes are typically acute, and the fatal human pathophysiologic response involves reaction to a toxin. Granted, the distinction between this type of death and those described in #12 is somewhat arbitrary, but the line of distinction, thus drawn, is also fairly clear and easy to establish.

**14. Deaths due to drug- or food-induced anaphylaxis or anaphylactoid reaction** may be classified as **Accident,** even if there is a previous history of allergic reaction to the putative agent. Some argue that anaphylaxis represents an idiosyncratic pathophysiologic response and should therefore be considered natural. However, such deaths are often sudden, unpredicted, "premature," and involve an external factor. Thus, classifying the manner as accident is preferred. It matters not whether the agent is food, drug, contrast dye, or other.

**15. Unintentional deaths from drug toxicity/poisoning in which the drug is administered by someone with the consent of the decedent** may be classified as **Accident,** as long as there is no evidence by reasonable investigative inference that the drug was given with the intent to kill the victim. Prosecution may still occur, if appropriate. This approach may seem inconsistent with some other scenarios, but it is reasonable on the basis that severe injury or death is not near as likely as, for example, when a loaded gun is placed to the head and the trigger is pulled.

**16. Deaths due to positional restraint induced by law enforcement personnel or to choke holds or other measures to subdue** may be classified as **Homicide**. In such cases, there may not be intent to kill, but the death results from one or more intentional, volitional, potentially harmful acts directed at the decedent (without consent, of course). Further, there is some value to the homicide classification toward reducing the public perception that a "cover up" is being perpetrated by the death investigation agency.

**17. Deaths of athletes due to injuries sustained in organized sports** may be classified as **Accident** because the participants accept inherent risks of the sport, unless the nature of the injury clearly falls outside that which normally occurs during the activity. Another way to regard this issue is that the "volitional or intentional act" that causes harm is inherent in participating in the game, and the game or sport requires the participant to commit potentially harmful acts. Thus, an untoward event is not solely attributable to the participant, and the potential risks have been sanctioned and accepted. Examples might include death from a "legal" head blow during boxing or a broken neck from a tackle during a football game. However, death resulting from an altercation might be considered homicide if there was clear unwarranted aggression outside the bounds of normal activities related to the rules of the sport—chasing down a baseball pitcher and striking him with the bat, for example. Judgment and informed discretion are required.

**18. Death of a law enforcement officer from cardiovascular or other natural disease while in pursuit of a criminal, felon, or suspect** may be classified as **Natural,** assuming there is no aggression or battery on the part of the person fleeing. Physical exertion may be listed as a contributory factor. Sample wording for use in Part II might be "Physical exertion while apprehending a fleeing suspect." Such wording is appropriate for Part II because no injury occurred, thus the "how injury occurred" item is not applicable.

**19. Deaths due to reasonably foreseeable complications of an accepted therapy for natural disease** may be classified as **Natural.** Examples include bone marrow suppression from chemotherapy (a "poisoning," actually) and digoxin toxicity in someone who had intractable heart failure and required digoxin to maintain cardiac function and life. Numerous other analogous examples exist.

**20. Deaths due to improper use of medical equipment (without evidence of intentional misuse) or defective or malfunctioning medical equipment** may be classified as **Accident.** Some examples are: instilling of air instead of water during an

endoscopic procedure, causing air embolism; connecting an oxygen cannula to an IV line; malfunction of a morphine drip pump; cutting an artery during surgery and failing to recognize and adequately repairing the "injury."

**21. Deaths resulting from grossly negligent medical care** (such as inducing anesthesia without resuscitative equipment/supplies available) may be classified as **Accident** unless there is clear indication of intent to do harm, in which homicide might apply. The criminalization of medical malpractice is of great concern to both the legal and medical professions, and whether or not medical acts of commission or omission meet a legal definition of negligent or other homicide is better left to others more familiar with the legal issues involved.

**22. Deaths due to undesirable outcomes of diagnostic or therapeutic procedures and which involve circumstances outside the realm of reasonably acceptable risk and expected outcome** may be classified as **Accident** if a traumatic or toxic cause is shown (such as inadvertently cutting a major artery or overdosing with anesthetic), and **Undetermined** if a cause cannot be established (such as a young healthy man who dies during surgery for a inguinal hernia and a cause cannot be determined).

**23. High-risk surgical patients who die while undergoing (or after) high-risk procedures** may be classified as **Natural** if it appears that the normal and unavoidable stress of the surgery and underlying disease resulted in death. Using the ASA surgical risk classification to evaluate manner of death, as described by Reay, is a useful approach.[1]

**24. When a person commits suicide by forcing the police to shoot,** the death may be classified as **Homicide.** In "How injury occurred," language such as "decedent forced police to shoot him" may be used. The accuracy of reported details in such cases is not always known, and classification as homicide seems to be the best approach. Public perceptions of a "cover up" are also minimized using this approach.

**25. Judicial executions** may be certified as **Homicide.** In "how injury occurred," language such as "judicial electrocution" or "judicial lethal injection" may be used.

**26. When a young child shoots another child by pointing a gun and pulling a trigger**, the death may be classified as **Homicide,** even though the child may not be subject to prosecution. **Undetermined** may be appropriate if the circumstances are not well clarified, or **Accident** may apply if investigation shows a faulty/malfunctioning weapon.

[1] Reay DT, Eisele JW, Ward R, Horton W, Bonnell HJ. A procedure for the investigation of anesthetic/surgical deaths. *J Forensic Sci.* 1985;30(3):822-827.

**27. Traffic fatalities in which a pedestrian is killed and the driver has shown negligent behavior, probable intoxication, or fleeing of the scene** may be certified as **Accident,** even though these features may meet a legal definition of vehicular homicide, and assuming that there was no intent to kill the individual. Whether or not the case meets a legal definition of vehicular (or some other form) of homicide/manslaughter is better left to the criminal justice system.

**28. Deaths resulting from fear/fright induced by verbal assault, threats of physical harm, or through acts aggression intended to instill fear or fright** may be classified as **Homicide** if there is a close temporal relationship between the incident and death. Examples include someone who has an acute cardiac death while being verbally assaulted; someone who dies in an auto crash while being chased by another to instill fear or panic; someone who dies suddenly immediately after being bitten; and someone who dies suddenly when someone scares them by popping up in a window and yelling "BOO!" with an apparent intent to scare or instill fear. In general, the time interval to establish the causal relationship between "minor injury" and collapse followed by death or those involving acute cardiac deaths following fright must be very short—during the stress-inducing episode or immediate emotional response period—a few minutes or less.

**29. Post-traumatic seizure disorders** may be classified in accordance with the nature of the injury that resulted in the seizure disorder, regardless of the time interval between the injury and death. Thus, post-traumatic seizure disorder that caused death 10 years after the auto accident that caused the disorder may still be classified as **Accident.**

**30. Failure to prescribe needed medication for natural disease, if there is no indication of willful failure to prescribe with intent to do harm**, may be classified as **Natural**.

**31. When a person has clearly committed a suicidal act, then apparently changes his/her mind, but dies as a result of the act,** the manner of death may be classified as **Suicide.**

**32. Café coronary** in its classic form of upper airway obstruction by food (that hasn't made it to or through the esophagus) in an otherwise healthy person may be classified as **Accident**. Typically, there is historical, anatomic, or toxicologic evidence accounting for compromised deglutition. Agonal aspiration of gastric contents or GE reflux do not fall into this category and, in general, should not be classified as an accidental manner of death.

**33. Deaths due to aspiration of oral secretions or gastric contents in those with dementia or other chronic debilitating central nervous system disease** may be classified as **Natural.**

**34. Death involving obstruction of a tracheostomy site or tube by mucous plugs** or other secretions may be classified in accordance with the nature of the condition that required the tracheostomy to be performed. For example, if performed for throat cancer, the manner would be **Natural**; if performed because of an old accidental head injury, the manner would be **Accident.**

**35. Deaths due to work-related infections resulting from job-related injury**, such as HIV infection acquired through an accidental needle stick, may be classified as **Accident** if investigation shows no other compelling competing causes, and the details of the incident are reasonably well documented.

**36. Deaths involving active euthanasia or actively assisted suicide** may be classified as **Homicide** unless state law dictates otherwise.

**37. Assisted suicide involving passive assistance** may be classified as **Suicide** unless otherwise required by state law, and assuming that the assistance goes no further than supplying one or more items (or information needed) to complete the act.

**38. Deaths in which infants/young children die because of placement in a potentially hostile environment** (such as in a bath tub with water, or being left in a locked car) may be classified as **Accident** if there is no evidence of intent to harm the child.

**39. Deaths due to environmental hypothermia or hyperthermia** may be classified as **Accident** if there is no intent to kill or harm the victim via the act of placing or leaving a person in such environment, with apparent intent to do harm.

**40. Deaths in which hot weather or cold weather seem to precipitate death primarily caused by underlying disease** such as cardiovascular or respiratory illness may be classified as **Natural.** In Part II of the cause-of-death statement, “Hot weather” or “Cold weather” may be listed as contributory factors. Life consists of having to live within the realm of natural conditions imposed by the weather and climate, and if the individual’s underlying ill health is a major factor in causing death, the adverse impact of natural changes in weather, even if regarded as extreme, does not warrant classification as Accident. For example, if a person’s emphysema/bronchitis are aggravated by a high pollen count and death results, are we to classify the death as an accident? What about high and low humidity that may contribute to death by aggravating severe respiratory disease? The potential cause-and-effect relationships are too vague and difficult to establish to allow for non-natural classification in such cases. Similarly, deaths related to exertion brought about by adverse weather may also be classified as natural, such as a myocardial infarction brought about by shoveling snow.

**41. Deaths of those with major disease and minor accidental trauma** may be classified as **Natural** if it is thought that death was about as likely to have occurred when it did had the trauma not existed. For example, a person in sickle cell crisis might sustain a minor injury that could exacerbate the crisis, yet the crisis is severe enough that it may well have been fatal on its own.

**42. Pregnancy-related deaths, such as those due to eclampsia, air embolism, amniotic fluid embolism,** and other well-recognized complications of pregnancy, may be classified as **Natural** if there is no indication that that the complication resulted from inappropriate use of a medical device or an inappropriate or unlawful procedure.

**43**. **Death resulting from an act of aggression with a chemical or biological agent** released or activated to cause fear or harm may be classified as **Homicide.** Bioterrorism events are included in this category, which would also include smaller-scale events, such as intentionally poisoning the food at a salad bar or tainting a commercial drug with a poison.

**44. Fatalities resulting from autoerotic behavior or consensual atypical sexual behavior** may be classified as **Accident** in manner. Examples include autoerotic asphyxia with hanging, or deaths involving bondage with asphyxia in which the person being bound did so voluntarily, as far as investigation can show. As dangerous behaviors, one could argue that these are not dissimilar from Russian Roulette. The perceived risk of death, however, may not be as great, and the "weapon" or agents involved are, in general, not as inherently dangerous.

**45. Natural deaths occurring during the exertion of intercourse** or other sexual activity such as masturbation may be classified as **Natural** in manner. An example would be rupture of a berry aneurysm shortly after coitus.

**46. Self-inflicted deaths committed while under the influence of a mind-altering drug** may be classified as **Suicide**. Assuming that the mind-altering drug was taken voluntarily, the victim assumes the risk of the adverse effects of the drugs on behavior. A pathologist can rarely, if ever, determine that a suicidal act would not have occurred if a given drug were not in the victim's "system," or that an intoxication caused an "accident" rather than suicide.

## Sudden Infant Death Syndrome (SIDS) and Related Infant Deaths

**S1. Simultaneous apparent SIDS deaths** may be classified as **Undetermined.** The odds of simultaneous deaths due to natural causes is extremely low, making non-natural causes (accidental or homicidal) likely enough to use the undetermined classification. The cause of death may also be listed as undetermined or employ wording other than sudden infant death syndrome.

**S2. Second and subsequent apparent SIDS deaths** among siblings or common caregiver(s) may be classified as **Undetermined** (assuming there is insufficient information to classify them otherwise). The odds of a second SIDS is low, justifying the undetermined classification. The cause of death may also be listed as undetermined or employ wording other than sudden infant death syndrome.

**S3**. **Illegal termination of pregnancy may be classified as Homicide if live birth occurred or as Feticide if stillborn**, regardless of length of gestation, and assuming that fetal demise was caused by the attempt to terminate pregnancy. The criminal justice system can make decisions about which cases meet the criteria for prosecution.

**S4. Death of fetuses and infants possibly due to maternal drug intoxication** may be certified as **Accident** unless there is a preponderance of investigative information indicating that the mother intended to terminate the pregnancy or life. In essence, the same manner would apply to the fetus/infant as if the mother died under the same circumstances.

# Part VI
# Current Issues

*Part VI contains a summary of some recent events or changes related to death certification and the death certificate.*

## The U.S. Standard Certificate of Death

Approximately every 10 years, the National Center for Health Statistics reviews the U.S. Standard Certificate of Death and makes modifications, as needed. The U.S. Standard is then published so that each state may revise its own death certificate to be consistent with the U.S. Standard. The most recent U.S. Standard Certificate of Death was released in 2003. Since that time, some states have modified their death certificate, while others have not. It is important to know the current death certificate form being used in your state.

The 2003 U.S. Standard Certificate if Death includes several changes and additions:

- There is more room to describe how fatal injuries injury occurred.
- A specific data item has been added to indicate whether tobacco use contributed to death.
- A specific data item has been added to indicate, for females, their pregnancy status at the time of death.
- For deaths due to transportation injuries, a specific data item has been added to indicate whether the deceased was a driver, passenger, pedestrian, or other type of rider of a vehicle.

Some states have revised their certificates accordingly, and some include additional items that are not on the U.S. Standard. For example, the Nebraska certificate has questions about whether organ and tissue donation was considered and whether consent was obtained.

Another change in the 2003 revision is that an administrative section exists as the lower third of the death certificate. This information contains data about the decedent's education level, race and ethnicity, and occupation and industry. The form was designed so that copies of death certificate information that includes the factual death information, but does not necessarily include what might be considered more personal or private information, may be prepared. The information in this section is to be used primarily for public health purposes and research.

A copy of the 2003 U.S. Standard Certificate of Death is included as the last page of Part VI.

## Electronic Death Registration (EDR)

A handful of states have initiated efforts to eliminate hardcopy death certificates and to enable on-line death certification and registration. The basic principle is that physicians, medical examiners, coroners, and funeral directors would have controlled access to a web-based system, each would be responsible for and "own" certain items of information in the death record, and that the death record would grow in information as it becomes available. A key element is to be able to officially record the fact of death within 24 hours of death, with other information, such as the cause of death, being added when it becomes available. Copies of the death certificate would then be prepared from the electronic database in a format fitted to need. Standard paper death certificates would eventually become obsolete.

A major driving force in this effort is from the federal government, so that death could be rapidly determined and no-longer needed benefit payments cease promptly to save federal dollars. An advantage of EDR is that automatic edits and control checks can be built in to computer screen entry programs so that unacceptable causes of death could not be used by the certifier, and on-line tutorials would be readily available.

A comprehensive set of standards has been developed for use by states that are pursuing electronic death registration. For more information, see www.naphsis.org.

### Processing and Management of Death Information

The National Center for Health Statistics (NCHS), through receipt of individual death certificate data collected from each state, has information for every death occurring in the United States. The cause-of-death information is coded using ICD-10, the International Classification of Diseases, 10$^{th}$ Revision, prepared by the World Health Organization. Almost every conceivable condition, whether a disease, injury, poisoning, or syndrome, has an alphanumeric code specific to that entity. For example, the ICD code for Sudden Infant Death Syndrome is R95.

When death certificate information is received, people trained to code and classify causes of death, so-called *nosologists*, identify the codes for the various conditions listed on the death certificate. Two major forms of aggregate national death data are prepared, consisting of single-cause mortality data and multiple-cause mortality data.

- **Single-cause mortality data** is the form used by most researchers and for most statistical reports prepared for the public. In essence, an attempt is made to boil down all information in the cause of death section to a single underlying cause of death. For example, a person who had multiple medical complications of a suicidal gunshot wound would ultimately be classified as a self-inflicted intentional injury with a firearm.

- **Multiple-cause mortality data** includes all conditions listed in the cause-of-death section of the death certificate. The computer programs used allow reconstruction of not only every condition listed, but also the line on which it was listed and the sequence if more than one condition was listed on a line. These data are usually used for more complicated research and statistical reports.

Also, NCHS now captures all text on the death certificate, allowing the data to be searched for specific words, phrases, or character strings. This capability will increase the usefulness of death certificate data.

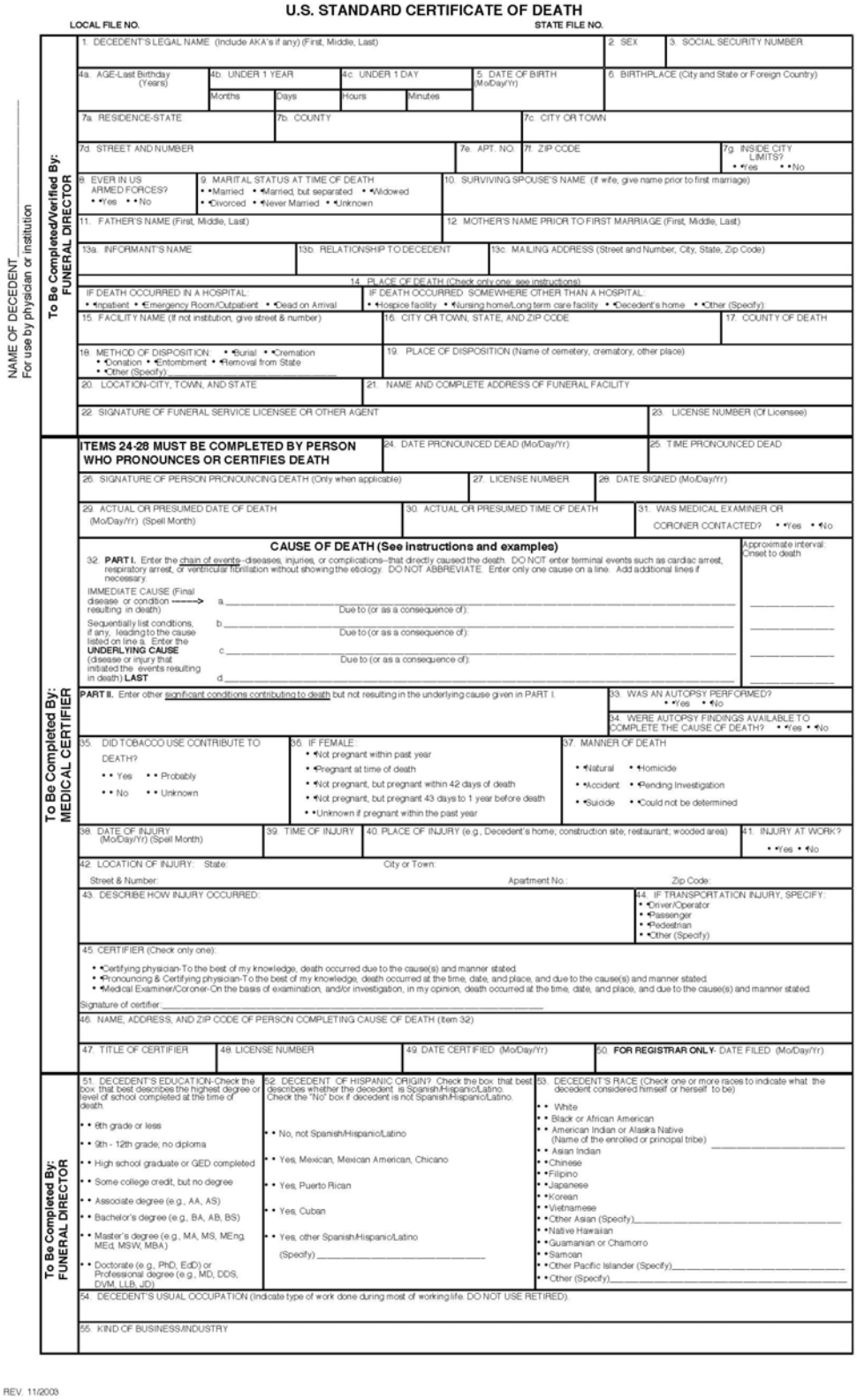
The **National Death Index** is a separate database that contains some identifying information and can only be used with NCHS permission for research purposes. The identifying information allows linkage to other types of databases, such as birth certificate data, so longitudinal studies and other linkage studies may be performed. In general, routine mortality data do not contain information specific enough to identify a specific individual or incident location.

## New Ideas

Although cause-of-death codes are usually limited to those in ICD, which have been approved by the World Health Organization, there is an occasional need to develop codes on a short-term or regional basis. For example, when AIDS deaths began to occur in the 1980s, there were not adequate codes for such deaths, and special codes had to be developed quickly for practical use, outside of the usually scheduled WHO procedures.

With emerging information and observations about sudden unexplained infant deaths, a need has arisen to consider the development of special codes for certain types of conditions, such as bedsharing or sleeping on an unsafe sleep surface. At the time of this writing, the NCHS was considering the development of such codes to allow for better classification of sudden unexplained infant deaths. In the future, the need for specialized codes may emerge for other types of death as well.

Currently, Item 43 on the U.S. Standard Death Certificate, “Describe How Injury Occurred,” was intended to be completed only for deaths which resulted from external conditions, such as injury or poisoning. However, there has been some appreciation that Item 43 might also be useful for providing explanatory or clarifying comments in other types of deaths. For example, in a natural death, it might be useful to indicate in Item 43 that the decedent “apparently died during sleep” or “collapsed while playing basketball.” Using Item 43 in this way might enable other death certificate information to be more clearly understood or interpreted.



## U.S. STANDARD CERTIFICATE OF DEATH

LOCAL FILE NO. STATE FILE NO.

NAME OF DECEDENT
For use by physician or institution

**To Be Completed/Verified By: FUNERAL DIRECTOR**

1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last)
2. SEX
3. SOCIAL SECURITY NUMBER
4a. AGE-Last Birthday (Years)
4b. UNDER 1 YEAR: Months, Days
4c. UNDER 1 DAY: Hours, Minutes
5. DATE OF BIRTH (Mo/Day/Yr)
6. BIRTHPLACE (City and State or Foreign Country)
7a. RESIDENCE-STATE
7b. COUNTY
7c. CITY OR TOWN
7d. STREET AND NUMBER
7e. APT. NO.
7f. ZIP CODE
7g. INSIDE CITY LIMITS? • Yes • No
8. EVER IN US ARMED FORCES? • Yes • No
9. MARITAL STATUS AT TIME OF DEATH • Married • Married, but separated • Widowed • Divorced • Never Married • Unknown
10. SURVIVING SPOUSE'S NAME (If wife, give name prior to first marriage)
11. FATHER'S NAME (First, Middle, Last)
12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)
13a. INFORMANT'S NAME
13b. RELATIONSHIP TO DECEDENT
13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)
14. PLACE OF DEATH (Check only one; see instructions)
IF DEATH OCCURRED IN A HOSPITAL: • Inpatient • Emergency Room/Outpatient • Dead on Arrival
IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: • Hospice facility • Nursing home/Long term care facility • Decedent's home • Other (Specify)
15. FACILITY NAME (If not institution, give street & number)
16. CITY OR TOWN, STATE, AND ZIP CODE
17. COUNTY OF DEATH
18. METHOD OF DISPOSITION: • Burial • Cremation • Donation • Entombment • Removal from State • Other (Specify)
19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)
20. LOCATION-CITY, TOWN, AND STATE
21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY
22. SIGNATURE OF FUNERAL SERVICE LICENSEE OR OTHER AGENT
23. LICENSE NUMBER (Of Licensee)

**To Be Completed By: MEDICAL CERTIFIER**

**ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH**

24. DATE PRONOUNCED DEAD (Mo/Day/Yr)
25. TIME PRONOUNCED DEAD
26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable)
27. LICENSE NUMBER
28. DATE SIGNED (Mo/Day/Yr)
29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Spell Month)
30. ACTUAL OR PRESUMED TIME OF DEATH
31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? • Yes • No

**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.

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. _____

**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? • Yes • No
34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? • Yes • No
35. DID TOBACCO USE CONTRIBUTE TO DEATH? • Yes • Probably • No • Unknown
36. IF FEMALE: • Not pregnant within past year • Pregnant at time of death • Not pregnant, but pregnant within 42 days of death • Not pregnant, but pregnant 43 days to 1 year before death • Unknown if pregnant within the past year
37. MANNER OF DEATH • Natural • Homicide • Accident • Pending Investigation • Suicide • 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)
41. INJURY AT WORK? • Yes • No
42. LOCATION OF INJURY: State: City or Town: Street & Number: Apartment No.: Zip Code:
43. DESCRIBE HOW INJURY OCCURRED:
44. IF TRANSPORTATION INJURY, SPECIFY: • Driver/Operator • Passenger • Pedestrian • Other (Specify)
45. CERTIFIER (Check only one):
• Certifying physician-To the best of my knowledge, death occurred due to the cause(s) and manner stated.
• Pronouncing & Certifying physician-To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner stated.
• Medical Examiner/Coroner-On the basis of examination, and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner stated.
Signature of certifier: _____
46. NAME, ADDRESS, AND ZIP CODE OF PERSON COMPLETING CAUSE OF DEATH (Item 32)
47. TITLE OF CERTIFIER
48. LICENSE NUMBER
49. DATE CERTIFIED (Mo/Day/Yr)
50. **FOR REGISTRAR ONLY**- DATE FILED (Mo/Day/Yr)

**To Be Completed By: FUNERAL DIRECTOR**

51. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death. • 8th grade or less • 9th - 12th grade, no diploma • High school graduate or GED completed • Some college credit, but no degree • Associate degree (e.g., AA, AS) • Bachelor's degree (e.g., BA, AB, BS) • Master's degree (e.g., MA, MS, MEng, MEd, MSW, MBA) • Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)
52. DECEDENT OF HISPANIC ORIGIN? Check the box that best describes whether the decedent is Spanish/Hispanic/Latino. Check the "No" box if decedent is not Spanish/Hispanic/Latino. • No, not Spanish/Hispanic/Latino • Yes, Mexican, Mexican American, Chicano • Yes, Puerto Rican • Yes, Cuban • Yes, other Spanish/Hispanic/Latino (Specify) _____
53. DECEDENT'S RACE (Check one or more races to indicate what the decedent considered himself or herself to be) • White • Black or African American • American Indian or Alaska Native (Name of the enrolled or principal tribe) _____ • Asian Indian • Chinese • Filipino • Japanese • Korean • Vietnamese • Other Asian (Specify) _____ • Native Hawaiian • Guamanian or Chamorro • Samoan • Other Pacific Islander (Specify) _____ • Other (Specify) _____
54. DECEDENT'S USUAL OCCUPATION (Indicate type of work done during most of working life. DO NOT USE RETIRED).
55. KIND OF BUSINESS/INDUSTRY

REV. 11/2003

# Part VII
# Glossary

*Using terms and concepts based on National Center for Health Statistics guidelines, in combination with new terms and concepts introduced in this manual and its forerunners, a language now exists to facilitate communication about cause-of-death statements. For example, if you are asked if you think the cause-of-death statement for a particular patient's death should be stated using a combined or split format, you should know what the question means and be able to use the concepts to answer the question and explain your reasoning. The glossary contains the terminology that forms the language of cause-of-death statements.*

**Amendment:** The process of changing or updating the information on a death certificate after it has been filed with the registrar. Usually, amendment must be done in writing and by the original certifier.

**Cause-of-death statement:** A cause of death written or otherwise stated in a format similar to that used on a death certificate. It must include an underlying cause of death and may include an immediate cause of death, one or more intermediate causes of death, and one or more other significant conditions.

**Cause-of-death's rule of thumb:** A cause-of-death statement must contain an underlying cause of death; a nonspecific process should not be listed as the underlying cause of death unless it is qualified.

**Certifier:** The physician, coroner, or medical examiner who indicates the cause of death on a death certificate and signs the certificate attesting, in his or her opinion, that death resulted from the causes stated, to the best of his or her knowledge.

**Combined format:** A method of writing cause-of-death statements in which the complications and the underlying condition are both reported in Part I.

**Ensuring that natural causes are evident:** Ensuring that conditions in the cause-of-death statement, if they can be caused by external conditions, are specified as being due to natural causes, if such is the case.

**External conditions:** Injury (chemical, physical, or other) or poisoning that causes or contributes to death. Deaths resulting from external conditions are usually designated as homicidal, suicidal, or accidental in manner and are, in general, certified by or under the authority of the medical examiner or coroner.

**Fatal agent:** The etiologic agent, instrument, tool, force, toxin, poison, or other implement that produces the condition(s) that lead to death. Except for infectious agents, fatal agents are not usually specified in cause-of-death statements for natural deaths.

**Fatal derangement:** Any pathophysiologic process or event that is involved in dying or producing the death of a person, including mechanisms of death, nonspecific processes,

and specific conditions. For deaths due to injury or poisoning, the term is used to describe the final fatal impairment of bodily function that follows an injury event and its associated trauma.

**Immediate cause of death:** The final disease (condition) or complication resulting from the underlying cause of death, occurring closest to the time of death, and directly causing death. The immediate cause of death is always placed on line A in Part I of the cause-of-death statement.

**Injury event:** An event involving one or more external conditions (injury or poisoning) that damages bodily tissue or its function. Two examples include "gunshot injury of chest" and "fall from height."

**Intermediate cause of death:** A disease (condition) or complication occurring somewhere in time between the underlying cause of death and the immediate cause of death.

**Interval between onset and death:** An item of information that is to be completed for each condition listed in Part I of the cause-of-death statement. The interval should be stated as accurately as possible.

**Manner of death:** A classification of death based on the type of conditions that cause death and the circumstances under which they occurred. The manner of death may be natural, homicidal, suicidal, accidental, or undetermined.

**Mechanism of death:** A complication of the underlying cause of death that (1) is a physiologic or biochemical disturbance; (2) is a disturbance through which the underlying cause of death exerts its lethal effect; (3) has more than one possible cause; and (4) is not an etiologically specific or criteria-defined disease, injury, or poisoning event. Mechanisms of death include mechanistic terminal events (such as asystole) and nonspecific physiologic derangements (such as congestive heart failure).

**Mode of dying:** Describes how a death occurred, rather than why it occurred, such as a hemorrhagic mode from a hereditary coagulation disorder or a cardiac mode from cocaine intoxication. In general, modes of dying are not included in cause-of-death statements for natural deaths.

**National Center for Health Statistics (NCHS):** A center administratively and organizationally within the Centers for Disease Control and Prevention (CDC), based in Atlanta, Georgia, NCHS is responsible for compiling and publishing national vital statistics (births, deaths, fetal deaths, marriages, and divorces) obtained from state records filed under state law.

**Natural causes (natural manner) of death:** A cause of death due solely to disease.

**Nonspecific anatomic process:** A complication of the underlying cause of death and a macroscopic or microscopic morphological alteration that may have functional consequences and more than one possible cause (such as hepatic cirrhosis).

**Nonspecific physiologic derangement:** A mechanism of death and a complication of the underlying cause of death that is not defined as a terminal event or nonspecific anatomic process. Pulmonary insufficiency is one example.

**Nonspecific process:** An anatomic (structural) or functional (physiologic) derangement that has more than one possible cause. A nonspecific process may be cited as an immediate or intermediate cause of death but should not be cited as an underlying cause of death unless it is qualified.

**Nosologist:** A person who classifies and codes causes of death for statistical and epidemiologic purposes.

**Other significant condition:** Listed in Part II of the cause-of-death statement, an other significant condition is a coexisting (or pre-existing) condition that contributed to death but did not have a causal relationship to (ie, did not lead to) the underlying cause of death. For surveillance purposes, certain states require that some conditions (such as pregnancy) be reported as an other significant condition, even if the condition did not contribute to death.

**Part I of the cause-of-death statement:** Contains lines for writing the immediate, intermediate, and underlying causes of death. When a death is certified, an entry must be made in Part I of the cause-of-death statement. If possible, only one condition should be listed on each line in Part I.

**Part II of the cause-of-death statement:** Contains the space to indicate other significant conditions. More than one condition may be listed. For some deaths, where there are no other significant conditions, Part II of the cause-of-death statement may be left blank.

**Periprocedural death:** A death occurring while in surgery or under anesthesia, or known or suspected as having been brought about or hastened by a medical therapy, treatment, procedure, or device.

**Qualified cause-of-death statement:** A cause-of-death statement that contains a specific condition that has been qualified as being probable or presumed and/or a nonspecific process that has been qualified as being of probable, presumed, unknown natural, undetermined natural, or unspecified natural etiology.

**Qualifying:** Including words such as probable, presumed, unknown, unspecified, or undetermined in the cause-of-death statement. Qualifying is used to express a degree of uncertainty about the accuracy of the cause-of-death statement, or to assure a user of the cause-of-death statement that a specific underlying cause of death has not been omitted through the certifier's oversight or failure to search to specificity.

**Query:** An inquiry made by the registrar to clarify or complete missing information on the death certificate or in the cause-of-death statement. Queries can be avoided by properly completing the death certificate on the first attempt.

**Registrar:** An agent within the government or health department who is responsible for the official filing of death certificates and other vital records such as birth certificates. There is a registrar on the state level and often a registrar at the county or local level who acts as an agent of the registrar and is responsible for the initial filing of vital records.

**Risk factors:** Medical, behavioral, environmental, or demographic conditions or circumstances that place a person at risk for the development of a specific condition. Risk factors may be reported as other significant conditions if they were operative in the decedent.

**Search for specificity:** A thought process used by the certifier to identify an underlying cause of death that is as etiologically specific as possible.

**Sequential Part I format:** Completion of Part I of the cause-of-death statement by using more than one line in Part I. This creates a cause-of-death statement where one condition has resulted from another, going backward in time on progressively lower lines in Part I. All conditions listed in the sequential Part I format must have a cause-and-effect relationship when read from bottom to top.

**Single line Part I format:** Completion of Part I of the cause-of-death statement by using only line A, which must include an underlying cause of death that also serves as the immediate cause of death. A single line Part I format should only be used when there is insufficient information available to state an immediate cause of death with reasonable certainty in addition to the underlying cause of death.

**Specific condition:** A disease (condition) that can lead to death and has only one etiology (either proven or assumed, based on current medical knowledge). The underlying cause of death should consist of a specific condition, if possible.

**Specificity paradox:** When a nonspecific process has qualities that may cause it to be perceived as a specific condition and be incorrectly cited as an underlying cause of death. Writers of cause-of-death statements must avoid being trapped by the specificity paradox.

**Split format:** A method of writing cause-of-death statements in which Part I and Part II are both used to report complications and the underlying condition, in order to emphasize the most important ones in Part I.

**Terminal event (or mechanistic terminal event):** A final complication of the underlying cause of death that is one of a defined set of common final pathways that is uniformly fatal if not reversed. These include asystole, cardiac arrest, ventricular fibrillation, cardiopulmonary arrest, electromechanical dissociation, and respiratory arrest. Terminal events should not be reported in the cause-of-death statement.

**Trauma:** The damage sustained by bodily tissue when an injury event occurs. Two examples include “perforating wound of lung” and “laceration of spleen.”

**Underlying cause of death:** For deaths due to natural causes, the disease (condition) that initiated the train of morbid events leading directly to death. The underlying cause of death is stated on the lowest completed line in Part I of the cause-of-death statement.

**Unqualified cause-of-death statement:** A forthright, specific, cause-of-death statement that connotes that the cause-of-death statement has been made with a high degree of certainty about its accuracy.

**U.S. Standard Certificate of Death:** A model death certificate, developed by the National Center for Health Statistics in cooperation with state vital statistics offices and other interested organizations and individuals, upon which the death certificates in the states are based in design.

# Part VIII
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The National Center for Health Statistics (Department of Health and Human Services, Centers for Disease Control and Prevention) has prepared a number of publications that may be of interest or use to those with more in-depth interest in causes of death and mortality statistics. These include:

*U.S. Vital Statistics System: Major Activities and Developments, 1950-95.* DHHS Publication (PHS) 97-1003.

*Annotated Bibliography of Cause-of-Death Validation Studies, 1958-1980.* DHHS Publication (PHS) 82-1363.

*The Autopsy, Medicine, and Mortality Statistics.* DHHS Publication (PHS) 2001-1416.

*Medical Examiner's and Coroner's Handbook on Death Registration and Fetal Death Reporting.* 2003 Revision. DHHS Publication No. (PHS) 2003-1110.

*Physician's Handbook on Medical Certification of Death.* 2003 Revision. DHHS Publication No. (PHS) 2003-1108.

There are a variety of other NCHS publications that include instructions or other information relevant to death certificates and mortality data processing, such as:

*ICD-10 Cause-of-Death Lists for Tabulating Mortality Statistics, Effective 1999.*

To obtain such publications, or for further information about these and other NCHS publications, see the Publications and Products section of the NCHS web site at www.cdc.gov/nchs/.

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