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City Health Information

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Improving Cause of Death Reporting: Update 2012

- **Accurate and detailed cause of death reporting is critical for disease surveillance, public health research, and forensic investigations.**
- **Cause of death reporting requires:**
  - **Review of the medical record**
  - **Identification of all conditions and events leading or contributing to the death**
  - **Ordering the conditions and events in a medically probable sequence**

Death certificates are both important legal documents and essential public health tools. Rapid reporting enables families to arrange funerals and settle estates quickly and helps government agencies prevent the fraudulent use of birth certificates, driver's licenses, Social Security benefits, and other entitlements. Timely and detailed documentation of cause of death (and other significant conditions and events related to that cause) is crucial to public health reporting and surveillance. The New York City Health Department and the Centers for Disease Control and Prevention (CDC) rely on cause of death data to identify outbreaks and emergencies, such as pandemic flu and heat waves. For these reasons, the NYC Health Code requires that all deaths be reported within 72 hours.

The NYC Health Department and other government agencies, as well as hospitals, researchers, and community-based organizations, use statistics from death certificates to identify public health priorities and develop appropriate interventions. Detailed cause of death reporting yields accurate information about neighborhood differences in the number of deaths due to diabetes, for example, enabling policymakers to target community interventions such as healthy food initiatives or physical activity programs. Incomplete or nonspecific reporting can lead to inaccurate statistics that can affect interventions, policy, and funding. Reporting cardiac arrest as the cause of death without recording the underlying condition (eg, metastatic breast cancer or chronic obstructive pulmonary disease) may cause an underestimation of mortality due to the true underlying illness.[1-3] Chart review studies have identified substantial inaccuracies in cause of death reporting in NYC.[4] Educating providers can improve the quality of death certificate information, making it a more useful tool for assessing population health.[5]

Because the quality of cause of death data is critical for legal and public health purposes, each death undergoes multiple levels of review. Medical providers must understand how to document cause of death in sufficient detail to meet review requirements and avoid the need for resubmission. Electronic reporting in the NYC Electronic Vital Events Registration System (EVERS) has simplified the death certification process, but misconceptions still affect the quality and timeliness of reporting (**Box 1**).

BOX 1. MYTHS ABOUT CAUSE 0F DEATH REPORTING

- The "Burial Desk" at the NYC Health Department will not register the death if the cause provided is too complex.

  Not true. Both the Burial Desk and the Office of the Chief Medical Examiner (OCME) prefer detailed and complete descriptions of the cause of death.

- You must use a cause from the "list" of acceptable causes.

  Not true. There is no list of acceptable causes of death. Use your clinical judgment and the patient's medical history to detail causes of death.

- Funeral directors have the authority to request a specific change to the Cause of Death section.

  Not true. The funeral director is not authorized to tell the provider what to write as the cause of death, but may tell the hospital staff or health care provider to contact OCME or the Health Department about the cause of death.

- Information from the death certificate doesn't really matter anyway; it's just to determine whether the death is a Medical Examiner case or not.

  Not true. Death certificate information has many important public health and legal uses.

- The certificate cannot be submitted if the cause of death fields in the Electronic Vital Events Registration System (EVERS) are yellow.

  Not true. If you see an error message and yellow highlighted field, you must verify or update your entry and hit Validate. If the field remains yellow, but you feel the entry is complete and accurate, check the Override box, save the override, and submit the case. The data entry field will remain yellow after the override.

HOW TO DOCUMENT CAUSE OF DEATH

There are 2 parts to the cause of death section: Part I captures the primary chain of events that led to death, and Part II is used to record other significant conditions that contributed or *may* have contributed to the death, but were not a part of the primary sequence in Part I.

Part I contains 4 fields (lines a through d) for the cause(s) of death:

- *Immediate cause (line a, Part I)*: the condition that directly preceded permanent cessation of cardiac activity, often the condition being managed at the time of death (eg, sepsis, congestive heart failure, pneumonia).
- *Intermediate cause(s)*: the conditions that resulted from the underlying cause of death and led to the immediate cause of death.
- *Underlying cause (the lowest completed line in Part I)*: the disease or condition that set off the chain of events leading to the immediate cause of death. **The underlying cause did NOT result from another event or condition**.

If necessary, you can include more than one cause on a line, linking them with the words "due to."

BOX 2. EXAMPLES OF CORRECT SEQUENCING OF CAUSES OF DEATH

- A patient with a history of poorly controlled hypertension and a prior positive stress test dies of an acute myocardial infarction. The patient also has a history of smoking and elevated cholesterol.

  Part I: Line a: acute myocardial infarction; line b: atherosclerotic coronary artery disease; line c: essential hypertension. Part II: smoking and hypercholesterolemia

- A patient with liver cirrhosis from chronic alcohol abuse dies of an upper gastrointestinal bleed.

  Part I: Line a: upper gastrointestinal bleed; line b: probable ruptured esophageal varices; line c: liver cirrhosis; line d: chronic alcohol abuse

- A debilitated patient with a history of emphysema, hypertension, and multi-infarct dementia is hospitalized for community-acquired Klebsiella pneumonia and dies.

  Part I: Line a: community-acquired Klebsiella pneumonia; line b: emphysema; line c: smoking. Part II: Multi-infarct dementia, atherosclerotic cerebrovascular disease, hypertension

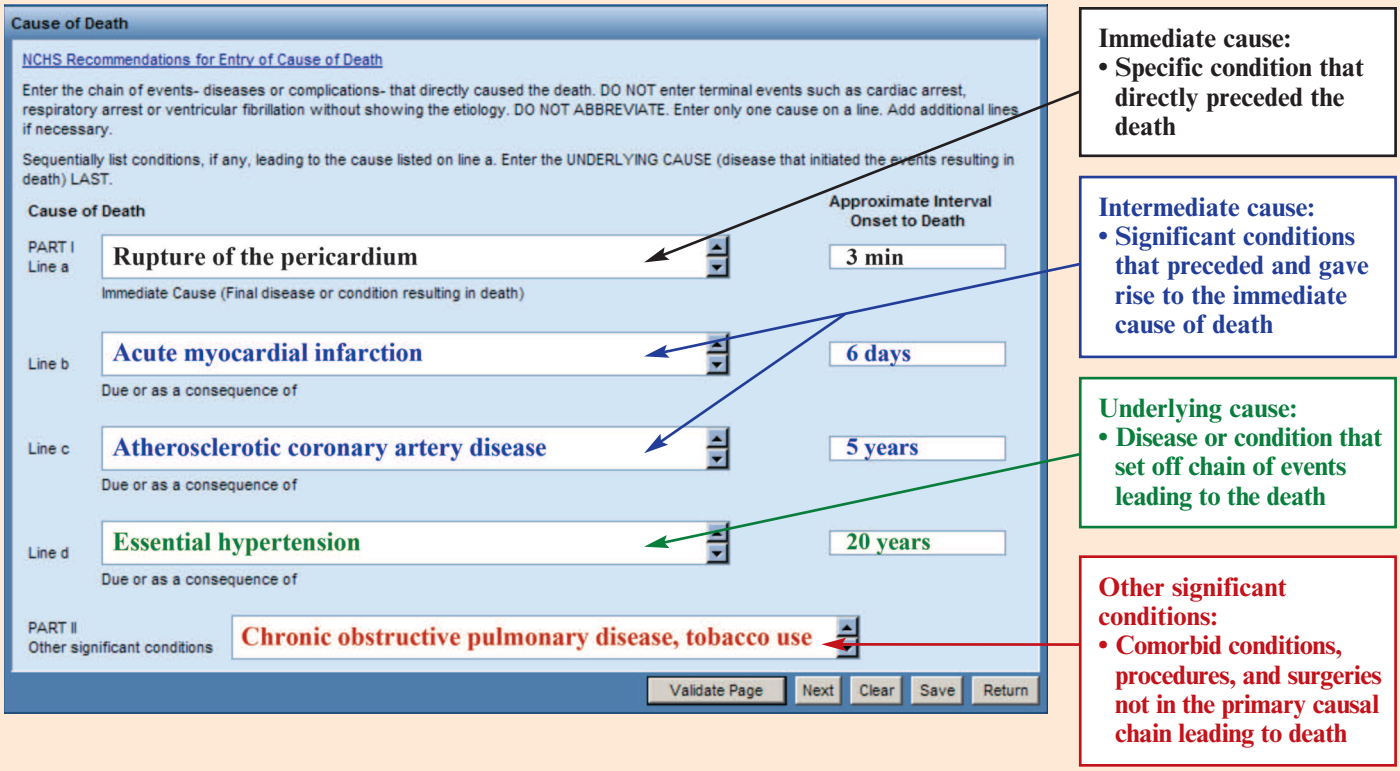
Part II is for documenting other conditions or events that contributed to or hastened the death, but did not cause or result from the conditions or events in Part I. These conditions are entered on a single line in order of importance.

Cause of death reporting requires a review of the medical record, identification of all conditions and events leading to the death, ordering the underlying cause and resulting conditions in Part I, and documenting contributing conditions and procedures. Begin by reviewing the patient's medical history and creating a list of conditions that contributed or possibly contributed to the patient's death. Use your best medical judgment to identify the conditions or events that led to the immediate cause of death, and order them in the sequence that makes the most medical sense in Part I (see **Box 2**). Include the best estimate of the time interval between each entry and the date of death. List any additional contributing conditions outside the main chain of events in Part II. Events in Part II do not need to be listed sequentially but in order of importance.

For example, if the immediate cause of death on **Line a** is organ system failure (eg, hepatic failure), use **Line b** to record the etiology of that condition (eg, hepatitis C). On **Line c** list the condition or event that led to the hepatitis C (eg, intravenous drug use), and so forth. Document the entire sequence. The underlying cause of death should be entered last, since it is the disease or condition that triggered the chain of events leading to the death. In Part II, document any conditions that may have "sped up" the chain of events or made treatment of the underlying cause difficult (eg, obesity, atherosclerotic heart disease, depression). Often the conditions in Part II are also candidates for the underlying cause, but the events in Part I were more responsible for the patient's death. Do not use abbreviations because multiple conditions may have the same abbreviation.

In **Figure 1**, rupture of the pericardium was the immediate cause of death, which occurred within minutes. The rupture was a consequence of an acute myocardial infarction that occurred approximately 6 days earlier. The acute myocardial infarction was a consequence of atherosclerotic coronary artery disease present for 5 years prior to the death, which in turn was a consequence of hypertension, a condition the patient had for 20 years prior to the death. The hypertension was not known to have a medical cause; therefore, essential hypertension is documented as the underlying cause of death. This patient also had a history of chronic obstructive pulmonary disease, which may have affected the heart and made him

FIGURE 1. REPORTING CAUSE OF DEATH



more susceptible to the myocardial infarction or less likely to recover from it. Chronic obstructive pulmonary disease is documented in Part II as a condition that may have contributed to the death, but was outside of the chain of events beginning with hypertension and ending with the rupture of the pericardium. See **Box 2** on page 2 for examples of correct sequencing of causes of death, and the **Table** on page 5 for examples of incorrect and correct cause of death documentation.

MISSING OR LIMITED INFORMATION

In cases of missing or limited information, use other records such as reports from emergency medical services personnel attending the decedent and available medical records. Make every attempt to contact the attending physician and the family if you need information. You may use terms such as "probable," "presumed," "unspecified," "likely," "suspected," or "undetermined" to indicate an unconfirmed diagnosis. Only if the etiology is unknown should you enter "etiology unknown."

If you are uncertain of the time intervals between conditions, use your best estimate. Entries such as "3-5 years," "less than 5 years," and even "years" are acceptable and will inform the underlying cause of death. Only enter "unknown" if no approximation can be made.

UNDERLYING CAUSES OF DEATH

While there is no list of acceptable causes, certain conditions should not be entered as the *underlying* cause of death (ie, the last or only line in Part I).

Nonspecific causes are events or conditions that occurred along the path to death, and can therefore be listed as immediate or intermediate causes, but must be accompanied by the underlying condition(s) that gave rise to them. Mechanisms of death are not considered causes of death and should generally not be included in the cause of death statement (see **Box 3**).

Special Situations

Elderly patients: Identifying the underlying cause of death can be especially challenging with elderly patients. Avoid using uninformative terms such as "senescence," "infirmity," and "advanced age," which do not describe the unique circumstances of the death. Review the medical record, nursing home record, and information provided by family members to identify the underlying cause, for example, "renal failure due to dehydration, due to underlying dementia." If necessary, use qualifying terms such as "probable" or "likely."

Cancer-related deaths: When the cause of death is cancer, provide as much information as possible, including stage, primary site, and site of metastases.

BOX 3. CONDITIONS THAT SHOULD NOT STAND ALONE OR BE THE UNDERLYING CAUSE OF DEATH

Nonspecific conditions can be the intermediate or immediate cause, but not underlying cause

Cirrhosis	Pulmonary embolism
End-stage kidney disease	Cerebral infarct
End-stage liver disease	Spontaneous hemorrhage
Pulmonary fibrosis	Sepsis
Dementia	Pneumonia
Other end-stage organ diseases	Gastrointestinal hemorrhage
Congestive heart failure	Cardiac arrhythmia
Myocardial infarct	Multi-organ failure
Deep vein thrombosis	Paraplegia/quadriplegia

Mechanisms of death are not part of the cause of death statement

Cardiopulmonary arrest	Respiratory arrest
Cardiac arrest	Asystole

BOX 4. MEDICAL EXAMINER CASES

Contact the Office of the Chief Medical Examiner at (212) 447-2030 in cases of:

- Criminal neglect and violence
- Drug and chemical overdose and poisoning
- Exposure to excessive heat or cold
- Physical, chemical, biological, and radiological injuries
- Workplace-related injuries
- Any injury contributing to death, regardless of when it occurred
- Deaths during diagnostic or therapeutic procedures or due to complications from these procedures
- Sudden death when the individual is in apparent good health
- Deaths of unidentified individuals
- Deaths of individuals in legal detention, jails, or police custody
- Deaths of individuals unattended by a physician in the past 31 days
- A fetus delivered dead in the absence of a physician or midwife
- Neonatal deaths when premature delivery was due to maternal trauma or drug abuse

Medical Examiner cases: You must contact the Office of the Chief Medical Examiner (OCME) at 212-447-2030 before registering the death in cases of deaths not entirely due to natural causes and in the circumstances listed in **Box 4**.

ADDITIONAL ITEMS THE MEDICAL PROVIDER MUST COMPLETE

The medical provider must include additional information for infant deaths and for determining if a death was pregnancy-related, as well as information concerning autopsies, tobacco use, and whether OCME was consulted.

- **Infant deaths:** If an infant is born alive and dies, both a birth certificate and a death certificate must be reported, regardless of viability, birth weight, gestational development, or duration of life. The name and address of the birthing facility are also required.

  In NYC, a live birth is defined as the "complete expulsion or extraction from its mother of a product of conception, regardless of the duration of pregnancy, which after expulsion or extraction shows evidence of life, such as breathing, beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached."[6] If there is a spontaneous termination of pregnancy (ie, a stillbirth or miscarriage), you must file a Spontaneous Termination of Pregnancy (call 212-788-4575 for information).

TABLE. IMPROVING CAUSE OF DEATH DOCUMENTATION

EXAMPLE 1

INCORRECT		IMPROVED	
Cause of Death	**Approximate Interval to Onset of Death**	**Cause of Death**	**Approximate Interval to Onset of Death**
a. Upper gastrointestinal hemorrhage	1 day	a. Upper gastrointestinal hemorrhage	1 day
b.		b. Presumed peptic ulcer disease	7 years
c.		c.	
PROBLEM: Cause of death is incomplete. Upper gastrointestinal hemorrhage does not usually occur without a precipitating event or condition and therefore cannot be the underlying cause.		**SOLUTION:** Consider the patient's medical history. Based on a previous prescription history, peptic ulcer entered as underlying cause. "Presumed" is acceptable for unconfirmed diagnosis.	

EXAMPLE 2

INCORRECT		IMPROVED	
Cause of Death	**Approximate Interval to Onset of Death**	**Cause of Death**	**Approximate Interval to Onset of Death**
a. Congestive heart failure	7 months	a. Congestive heart failure	7 months
b. Atherosclerotic heart disease	4 years	b. Atherosclerotic heart disease	4 years
c. Metastatic adenocarcinoma of the left breast		**Part II. Other significant conditions:** metastatic adenocarcinoma of the left breast	
PROBLEM: Incorrect sequence: b does not arise from c.		**SOLUTION:** Select the underlying cause that you believe ultimately led to the death. In this example, cancer of the breast is recorded in *Other significant conditions*.	

- **Maternal deaths:** Deaths of women who were pregnant at the time of their death or within 1 year of death are of particular interest to public health agencies. Consequently, you must determine whether a woman of childbearing age was recently pregnant (within 1 year of death) or pregnant when she died, and record pregnancy status, outcome, and date of pregnancy outcome on the death certificate in the section following the cause of death.

CAUSE OF DEATH REVIEW

When the death is electronically reported, the cause of death is reviewed at least twice: first by the automatic quality-control features of EVERS, and then by manual review at the Health Department Burial Desk. If cremation clearance is requested, the certificate will be reviewed by OCME. After the death has been registered, the Health Department reviews all certificates to identify underlying causes of death that would typically not occur without a preceding cause.

Electronic System Review

Before any death can be registered, EVERS automatically performs a validation check on the information entered. This built-in quality-control measure will provide a warning message if you entered an abbreviation or entered a mechanism of death instead of a cause, a cause that suggests the death resulted from an injury, a rare cause of death that is of public health concern, or a nonspecific intermediate cause with no underlying cause (see **Box 3**).

If any of these validations fail, the field will be highlighted in yellow (**Figure 2**) to alert you to the issue. A message explaining the reason for the failure will appear at the bottom of the screen. You must review your entry. After entering additional information or confirming that the existing entry is true and complete, you may validate the cause by clicking the override button, saving the override, and proceeding to certify the death. *Note that the field will remain yellow after you've completed the entry or checked the override box. This will not prevent registration of the death.*

Examples of entries that will fail validation checks if entered as the underlying cause of death (eg, the final condition reported in Part I) include:

- **Congestive heart failure, myocardial infarction, sepsis, gastrointestinal hemorrhage, pulmonary embolism:** These do not occur without a precipitating event or condition and are therefore intermediate, not underlying, causes of death.
- **Sepsis, cerebrovascular accident, seizure:** These conditions may indicate nonnatural causes. On the death certificate, document the etiologically specific natural cause (eg, seizures due to chronic idiopathic epilepsy).
- **Cerebral infarct:** The terms "cerebral infarct," "cerebellar infarct," "brain stem infarct," and "spontaneous hemorrhage" are more specific and thus preferable to "cerebrovascular accident," but in all these situations, you must indicate the underlying etiology of the disease; for example, hypertension, arteriosclerotic cerebrovascular disease, or ruptured aneurysm. For infarcts due to an embolic vegetation or thrombus, include the underlying disease process, such as infective endocarditis due to intravenous drug abuse or degenerative valvular disease.

Manual Review

After the death certificate is submitted for registration, the Health Department Burial Desk reviews the cause of death to ensure that 1) a cause of death is provided rather than just a mechanism of death (see **Box 3**); 2) no abbreviations are used; and 3) cause of death does not suggest an injury and therefore is a potential OCME case. In any of these circumstances, the certificate will be rejected by the Burial Desk or the case will be referred to OCME and the medical provider or hospital staff will be notified or contacted.

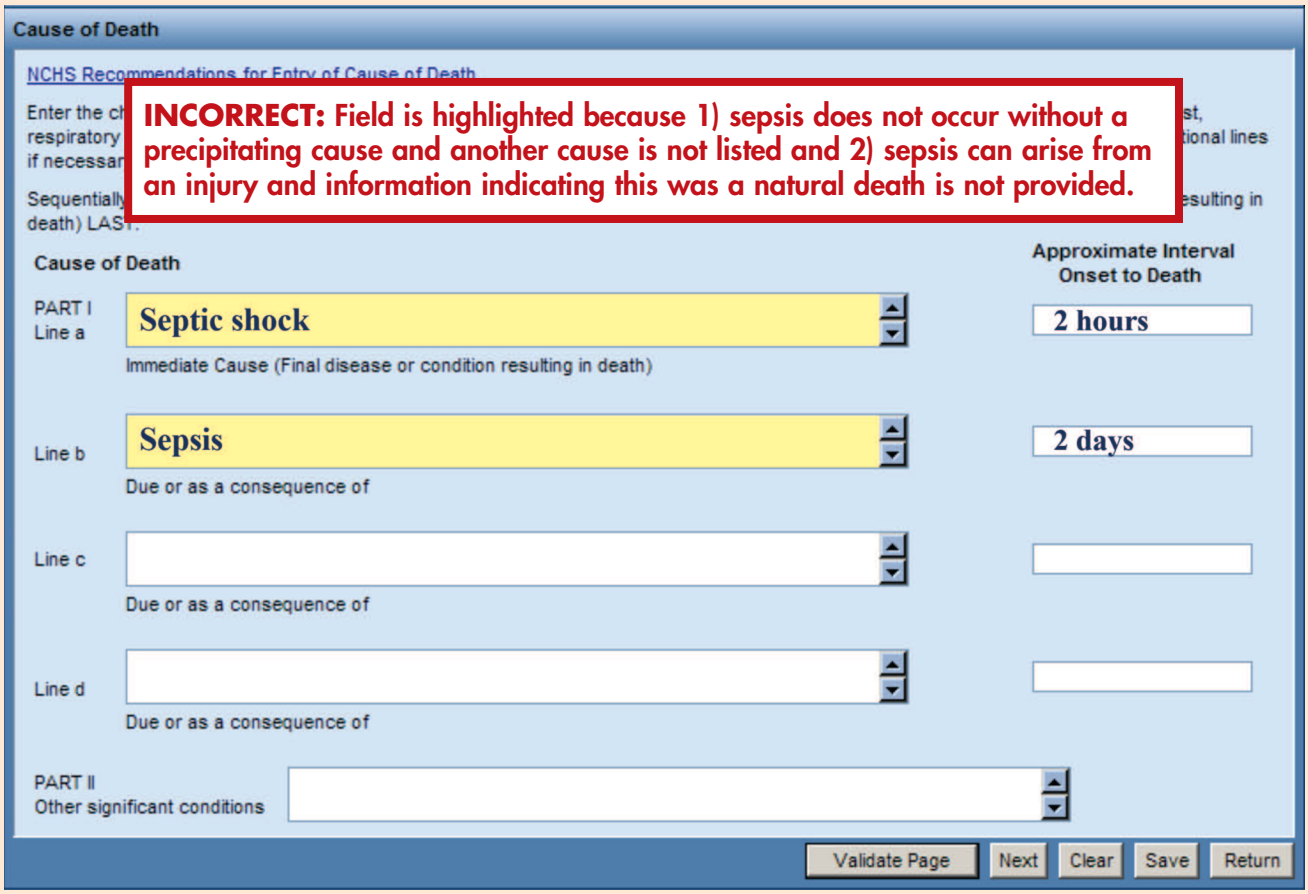
Cremation Clearance

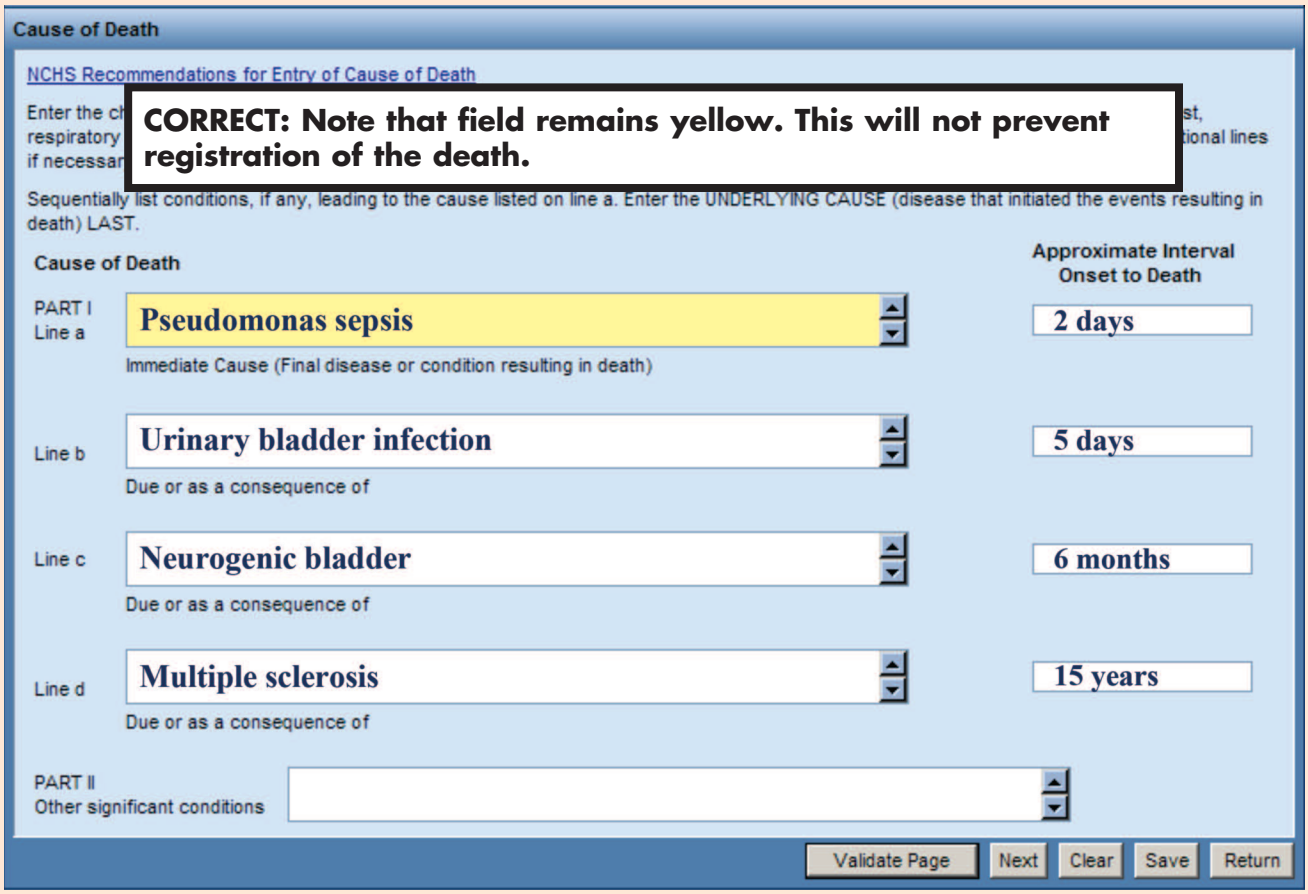
If cremation clearance is requested, OCME must review the cause of death to ensure that the death was natural and that cremation does not pose a risk of destroying forensic evidence. If OCME cannot determine that the death was natural from what is written on the death certificate, the cause of death is deemed "not etiologically specific" and OCME will contact the certifying medical provider to establish the etiology of the cause of death and rule out any nonnatural component. This may delay registration of deaths and disposition of the decedent's remains, affecting families and funeral homes. Completing the death certificate with as much detail as possible allows OCME to evaluate cremation clearance without an additional call to the care provider.

Cause of Death Query

After a death has been registered, the Health Department Bureau of Vital Statistics may contact the certifying medical provider if a cause of death appears to be missing the underlying cause. A certificate that lists pneumonia as the only information in the cause of death section would lead to a query because pneumonia is rarely fatal without other serious conditions, and usually there is another condition present that puts the decedent at risk for

FIGURE 2. EXAMPLE OF EVERS QUALITY-CONTROL ALERT





pneumonia, such as emphysema. The Health Department will ask the provider to review the medical record and add missing, additional, or corrected cause of death data within 5 business days by submitting a Cause of Death Query Amendment electronically via EVERS.

SUMMARY

A death certificate is an important legal document and an essential public health surveillance and research tool, so you must document the cause of death completely and promptly using your best medical judgment. The death certificate undergoes multiple reviews and the Health Department queries records that do not adequately describe the cause of death. Be sure to record the entire chain of events leading to the death as specifically as possible, taking care to identify the underlying cause of death. ◆

ELECTRONIC VITAL EVENTS REGISTRATION SYSTEM (EVERS)

The EVERS Web page (www.nyc.gov/evers) contains

- Instructions for medical facilities
- E-learning training module
- Resources
- Health Department notices
- Instructions for funeral homes

Please check regularly for updates. If you have any questions, please contact the Vital Events Reporting Unit at 212-788-4575 or e-mail evers@health.nyc.gov.

RESOURCES

NYC Department of Health and Mental Hygiene

- Electronic Vital Events Registration System: www.nyc.gov/html/doh/html/vr/vr-evers.shtml; 212-788-4575; e-mail: evers@health.nyc.gov
- Office of Vital Statistics (OVS): www.nyc.gov/html/doh/html/vs/vs.shtml; e-mail: VitalQI@health.nyc.gov
  - OVS Quality page: www.nyc.gov/html/doh/html/vs/vs-cod-quality.shtml
- Office of the Chief the Medical Examiner: www.nyc.gov/html/ocme/html/dirmedex.html; 212-447-2030

Centers for Disease Control and Prevention

- National Center for Health Statistics (NCHS): www.cdc.gov/nchs
- NCHS Mortality Data from the National Vital Statistics System: www.cdc.gov/nchs/deaths.htm
- Handbook for Cause of Death Reporting: www.cdc.gov/nchs/data/misc/hb_me.pdf

Other Resources

- The National Association of Medical Examiners Tutorial: www.thename.org

REFERENCES

1. Coady SA, Sorlie PD, Cooper LS, et al. Validation of death certificate diagnosis for coronary heart disease: the Atherosclerosis Risk in Communities (ARIC) Study. *J Clin Epidemiol.* 2001;54(1):40-50.
2. Jemal A, Ward E, Hao Y, Thun M. Trends in the leading causes of death in the United States, 1970-2002. *JAMA.* 2005;294(10):1255-1259.
3. Lloyd-Jones DM, Martin DO, Larson MG, Levy D. Accuracy of death certificates for coding coronary heart disease as the cause of death. *Ann Intern Med.* 1998;129(12):1020-1026.
4. Agarwal R, Norton JM, Konty K, et al. Overreporting of deaths from coronary heart disease in New York City hospitals, 2003. *Prev Chronic Dis.* 2010;7(3):A47. www.cdc.gov/pcd/issues/2010/may/09_0086.htm. Accessed March 29, 2012.
5. New York City Department of Health and Mental Hygiene. *Summary of Vital Statistics 2010: Population and Mortality:* 2011: 41-44. www.nyc.gov/html/doh/downloads/pdf/vs/vs-population-and-mortality-report.pdf. Accessed March 28, 2012.
6. Kowaleski J. *State Definitions and Reporting Requirements for Live Births, Fetal Deaths, and Induced Terminations of Pregnancy (1997 Revision).* Hyattsville, MD: National Center for Health Statistics; 1997. www.cdc.gov/nchs/data/misc/itop97.pdf. Accessed March 29, 2012.

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