

Forensic Autopsy Performance Standards



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The National Association of Medical Examiners 2023

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Preface

Efforts by the National Association of Medical Examiners (NAME) to promulgate practice standards began in the 1970s. These early efforts subsequently became focused on the operational aspects of medical examiner offices, resulting in the well-known NAME Office *Accreditation Checklist*. More recently, some members suggested that the time was ripe for standards that address the professional aspects of individual death investigations. Then-president Michael Bell appointed this committee to draft such standards.

The principal objective of these standards is to provide a constructive framework that defines the fundamental services rendered by a professional forensic pathologist practicing his or her art. Many forensic pathologists will exceed these minimal performance levels and are encouraged to do so.

NAME recognized that certain standards may not be applicable where they conflict with federal, state, and local laws. Deviation from these performance standards is expected only in unusual cases when justified by considered professional judgment.

National Association of Medical Examiners
Standards Committee
August 12, 2005

Committee and Panel Membership

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* Completed initial survey instruments - unable to attend meetings.

** Nominated to the committee - unable to attend meetings.

Steven C. Clark, Ph.D. served as project director and Denise McNally, NAME Executive Director, provided administrative support.

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Section A: Medicolegal Death Investigation

The purpose of this section is to define responsibility for medicolegal death investigation and to outline the types of cases that are to be investigated by such systems. Investigations can be conducted by inquiry with or without examination. Inquiries are typically conducted via telephone interview, personal interview, or review of records. Examination may include scene investigation, external inspection, and forensic autopsy.

Standard A1 Responsibilities

Medicolegal death investigation officers, be they appointed or elected, are charged by statute to investigate deaths deemed to be in the public interest--serving both the criminal justice, civil justice and public health systems. These officials must investigate cooperatively with, but independent from, law enforcement and prosecutors. The parallel investigation promotes neutral and objective medical assessment of the cause and manner of death.

To promote competent and objective death investigations:

- A1.1 Medicolegal death investigation officers should operate independently and objectively without undue influence from society, other government entities (e.g., law enforcement or legal professionals) and private entities (e.g., funeral homes or personal relationships).
- A1.2 A forensic pathologist or representative shall evaluate the circumstances surrounding all reported deaths.

Standard A2 Initial Inquiry

Medicolegal death investigators assess each death reported to the office to determine whether it falls under their jurisdiction as outlined by statutes, rules, and regulations. The categories below are those which should receive further investigations to protect the public safety and health, and determine the cause and manner of death.

The forensic pathologist or representative shall investigate all:

- A2.1 deaths due to violence.
- A2.2 known or suspected non-natural deaths.
- A2.3 unexpected or unexplained deaths when in apparent good health.
- A2.4 unexpected or unexplained deaths of infants and children.
- A2.5 deaths occurring under unusual or suspicious circumstances.

- A2.6 deaths of persons in custody.
- A2.7 deaths known or suspected to be caused by diseases constituting a threat to public health.
- A2.8 deaths of persons not under the care of a physician.

Section B: Forensic Autopsies

The purpose of this section is to establish minimum standards for the selection of cases requiring forensic autopsy, who should perform the autopsies, need for special dissection or testing, and who is responsible for interpretations and formation of opinions.

Standard B3 Selecting Deaths Requiring Forensic Autopsies

Medicolegal death investigation officers are appointed or elected to safeguard the public interest. Deaths by criminal violence, deaths of infants and children, and deaths in the custody of law enforcement agencies or governmental institutions-- can arouse public interest, raise questions, or engender mistrust of authority. Further, there are specific types of circumstances in which a forensic autopsy provides the best opportunity for competent investigation, including those needing identification of the deceased and cases involving bodies in water, charred or skeletonized bodies, intoxicants or poisonings, electrocutions, and fatal workplace injuries. Performing autopsies protects the public interest and provides the information necessary to address legal, public health, and public safety issues in each case. For categories other than those listed below, the decision to perform an autopsy involves professional discretion or is dictated by local guidelines. For the categories listed below, the public interest is so compelling that one must always assume that questions will arise that require information obtainable only by forensic autopsy.

The forensic pathologist shall perform a forensic autopsy when:

- B3.1 the death is known or suspected to have been caused by apparent criminal violence.
- B3.2 the death is unexpected and unexplained in an infant or child.
- B3.3 the death is associated with police action.
- B3.4 the death is apparently non-natural and in custody of a local, state, or federal institution.
- B3.5 the death is due to acute workplace injury.*
- B3.6 the death is caused by apparent electrocution.*
- B3.7 the death is by apparent intoxication by alcohol, drugs, or poison, unless a significant interval has passed, and the medical findings and absence of trauma are well documented.
- B3.8 the death is caused by unwitnessed or suspected drowning.*
- B3.9 the body is unidentified and the autopsy may aid in identification.
- B3.10 the body is skeletonized.
- B3.11 the body is charred.
- B3.12 the forensic pathologist deems a forensic autopsy is necessary to determine cause or manner of death, or document injuries/disease, or collect evidence.
- B3.13 the deceased is involved in a motor vehicle incident and an autopsy is necessary to document injuries and/or determine the cause of death.

* unless sufficient antemortem medical evaluation has adequately documented findings and issues of concern that would otherwise have required autopsy performance.

Standard B4 Forensic Autopsy Performance

Performance of a forensic autopsy is the practice of medicine. Forensic autopsy performance includes the discretion to determine the need for additional dissection and laboratory tests. A forensic autopsy must be conducted by a licensed physician who is a forensic pathologist or by a physician who is a forensic pathologist-in-training (resident/fellow).^{*} Responsibility for forensic autopsy quality must rest with the forensic pathologist, who must directly supervise support staff. Allowing non-forensic pathologists to conduct forensic autopsy procedures without direct supervision and guidance is fraught with the potential for serious errors and omissions.

Autopsies shall be performed as follows:

- B4.1 the forensic pathologist or residents in pathology perform all autopsies.
- B4.2 the forensic pathologist directly supervises all assistance rendered during postmortem examinations.
- B4.3 the forensic pathologist or residents in pathology performs all dissections of removed organs.
- B4.4 the forensic pathologist determines need for special dissections or additional testing.
- B4.5 the forensic pathologist shall not perform more than 325 autopsies in a year. Recommended maximum number of autopsies is 250 per year.

Standard B5 Interpretation and Opinions

Interpretations and opinions must be formulated only after consideration of available information and only after all necessary information has been obtained.

Autopsies shall be performed as follows:

- B5.1 the forensic pathologist reviews and interprets all laboratory results the forensic pathologist requested.
- B5.2 the forensic pathologist reviews all ancillary and consultative reports the forensic pathologist requested.
- B5.3 the forensic pathologist reviews the investigative reports, medical records, medications (where applicable), and scene imagery that the forensic pathologist deems relevant in his/her professional opinion.
- B5.4 the forensic pathologist determines cause of death.

^{*} Elsewhere in these standards, where the word “pathologist” appears, it means a physician who is a pathologist or a pathologist-in-training (resident/fellow), as defined by the ACGME.

Section C: Identification

The purpose of this section is to establish procedures for sufficient identification of the deceased, to document information needed to answer questions that may later arise, and to archive information needed for putative identification before burial of unidentified remains.

Standard C7 Standard Identification Procedures

Methods of identification are determined on an individual case basis, but can include viewing of the remains, either directly or by photograph, and comparison of dentition, fingerprints, or radiographs. A photograph of the face, labeled with the case number, documents and preserves the appearance at the time of identification. The same photograph can also be used to minimize and prevent potential errors when multiple fatality incidents occur. When more traditional methods fail in the determination of identification, a routinely-obtained DNA sample may be used to link the remains either to a known antemortem or kindred sample. In addition, a DNA specimen is particularly important for later questions of identity as well as for potential familial genetic analysis and criminalistic comparisons. Preservation of all data used to determine identification is necessary to address future questions and can provide the opportunity for a second objective determination of identification.

In support of identification of the body:

- C7.1 the forensic pathologist assesses the sufficiency of presumptive identification.
- C7.2 the forensic pathologist or representative takes identification photographs with case number in photograph.
- C7.3 the forensic pathologist or representative obtains and archives specimen for DNA on all autopsied cases.

Standard C8 Procedures Prior to Disposition of Unidentified Bodies

Prior to disposition of the unidentified remains, inventory and archiving of potentially useful objective data are required. A forensic autopsy can disclose medical conditions useful for identification. Full-body radiographs document skeletal characteristics and radio-opaque foreign bodies such as bullets, pacemakers, and artificial joints. Dental charting and radiography preserve unique dental characteristics. The documentation of a decedent's clothing and personal effects archives details that are familiar to the next-of-kin. Careful preservation and archiving provide an objective basis for future identification and thereby avoid the need for exhumation.

Prior to disposition of an unidentified body the forensic pathologist shall:

- C8.1 perform a forensic autopsy.
- C8.2 take or cause to be taken radiographs of head, neck, chest, extremities, and torso in their entirety.
- C8.3 cause the dentition to be charted and x-rayed.
- C8.4 document or cause to be documented decedent's clothing and personal effects.

Section D: External Examinations: General Procedures

The purpose of this section is to establish minimum standards for the external examination of all bodies.

Standard D9 Preliminary Procedures

These standards underscore the need for assessment of all available information prior to the forensic autopsy to (1) direct the performance of the forensic autopsy, (2) answer specific questions unique to the circumstances of the case, (3) document evidence, the initial external appearance of the body, and its clothing and property items, and (4) correlate alterations in these items with injury patterns on the body. Just as a surgeon does not operate without first preparing a history and physical examination, so must the forensic pathologist ascertain enough history and circumstances and may need to inspect the body to decide whether a forensic autopsy is indicated and to direct the forensic autopsy toward relevant case questions.

Preliminary procedures are as follows:

- D9.1 forensic pathologist reviews the circumstances of death prior to forensic autopsy.
- D9.2 forensic pathologist or representative measures and records body length.
- D9.3 forensic pathologist or representative measures and records body weight.
- D9.4 forensic pathologist examines the external aspects of the body before internal examination.
- D9.5 forensic pathologist or representative photographs, or forensic pathologist describes decedent as presented.
- D9.6 forensic pathologist documents and correlates clothing findings with injuries of the body in criminal cases.
- D9.7 forensic pathologist or representative identifies and collects trace evidence on clothing in criminal cases.
- D9.8 forensic pathologist or representative removes clothing.
- D9.9 forensic pathologist or representative photographs or lists clothing and personal effects.

Standard D10 Physical Characteristics

The external examination documents identifying features, signs of or absence of disease and trauma, and signs of death. Recording identifying features provides evidence for or against a putative identification. Recording signs of disease and trauma is a primary purpose of the forensic autopsy.

The forensic pathologist shall:

- D10.1 document apparent age.
- D10.2 establish sex.
- D10.3 document or describe apparent race or racial characteristics.
- D10.4 describe hair.
- D10.5 describe eyes.
- D10.6 describe abnormal body habitus.
- D10.7 document prominent scars, tattoos, skin lesions, and amputations.
- D10.8 document presence or absence of dentition.
- D10.9 inspect and describe head, neck, thorax, abdomen, extremities, and hands.
- D10.10 inspect and describe posterior body surface and genitals.
- D10.11 document evidence of medical or surgical intervention.

Standard D11 Postmortem Changes

Recording *livor mortis* helps to answer later questions about bruises and body position. Notation of postmortem artifacts is useful for interpretation of subsequent forensic autopsy findings. Each of these may be useful in estimation of the postmortem interval.

The forensic pathologist shall:

- D11.1 describe *livor mortis*.
- D11.2 describe postmortem changes.
- D11.3 describe evidence of embalming.
- D11.4 describe decompositional changes.
- D11.5 describe rigor mortis.

Section E: External Examinations: Specific Procedures

The purpose of this section is to establish minimum standards for external examination of bodies with documentation of injuries or suspected sexual assault.

Standard E12 Suspected Sexual Assault

Collection of swabs, combings, clippings, and trace evidence may be necessary to 1) determine if sexual assault occurred; 2) link multiple, apparently unrelated deaths; or 3) link the death to an assailant. DNA analysis is now the test of choice on swabs, hair, and fingernail clippings. These collections shall be performed in accordance with the requirements of the crime laboratory procedures.

The forensic pathologist or representative shall, prior to cleaning the body:

- E12.1 collect swabs of oral, vaginal, and rectal cavities.
- E12.2 collect pubic hair combings or tape lifts.
- E12.3 collect fingernail scrapings or clippings.
- E12.4 collect pubic and head hair exemplars.
- E12.5 identify and preserve foreign hairs, fibers, and biological stains.

Standard E13 Injuries: General

Documentation of injuries may be necessary to determine the nature of the object used to inflict the wounds, how the injuries were incurred, and whether the injuries were a result of an accident, homicide, or suicide. Written, diagrammatic, and photographic documentation of the injuries may be used in court. Observations and findings are documented to support or refute interpretations, to provide evidence for court, and to serve as a record.

The forensic pathologist shall:

- E13.1 describe injuries.
- E13.2 describe injury by type.
- E13.3 describe injury by location.
- E13.4 describe injury by size.
- E13.5 describe injury by shape.
- E13.6 describe injury by pattern.

Standard E14 Photographic Documentation

Photographic documentation complements written documentation of wounds and creates a permanent record of forensic autopsy details. Photographic documentation of major wounds and injury shall include a reference scale in at least one photograph of the wound or injury to allow for 1:1 reproduction.

The forensic pathologist or representative shall:

- E14.1 photograph injuries unobstructed by blood, foreign matter, or clothing.
- E14.2 photograph major injuries with a scale.

Standard E15 Firearm Injuries

Documentation of firearm wounds as listed below should include detail sufficient to provide meaningful information to users of the forensic autopsy report, and to permit another forensic pathologist to draw independent conclusions based on the documentation.

The forensic pathologist shall:

- E15.1 describe injuries.
- E15.2 measure wound size.
- E15.3 locate cutaneous wounds of the head, neck, torso, or lower extremities by measuring from either the top of head or sole of foot.
- E15.4 locate cutaneous wounds of the head, neck, torso, or lower extremities by measuring from either the anterior or posterior midline.
- E15.5 locate cutaneous wounds of the upper extremities by measuring from anatomic landmarks.
- E15.6 descriptively locate cutaneous wounds in an anatomic region.
- E15.7 describe presence or absence of soot and stippling.
- E15.8 describe presence of abrasion ring, searing, muzzle imprint, lacerations.

Standard E16 Sharp Force Injuries

Documentation of sharp force injuries as listed below should include detail sufficient to provide meaningful information to users of the forensic autopsy report, and to permit another forensic pathologist to draw independent conclusions based on the documentation.

The forensic pathologist shall:

- E16.1 describe wound.
- E16.2 measure wound size.
- E16.3 locate wound in anatomic region.
- E16.4 estimate depth of wound
- E16.5 determine organs and structures involved

E16.6 estimate direction of stab wound tracks

Standard E17 Burn Injuries

Documentation of burn injuries as listed below should include detail sufficient to provide meaningful information to users of the forensic autopsy report, and to permit another forensic pathologist to draw independent conclusions based on the documentation.

The forensic pathologist shall:

E17.1 describe appearance of burn.

E17.2 describe distribution of burn.

Standard E18 Patterned Injuries

Documentation of patterned injuries as listed below should include detail sufficient to provide meaningful information to users of the forensic autopsy report, and to permit another forensic pathologist to draw independent conclusions based on the documentation. Bite marks should be swabbed to collect specimens to use for DNA comparison with putative assailants.

The forensic pathologist shall:

E18.1 measure injury size.

E18.2 describe location of injury.

E18.3 describe injury pattern.

E18.4 swab recent or fresh bite mark.

Section F: Internal Examination

The purpose of this section is to establish minimum standards for internal examinations.*

Standard F19 Thoracic and Abdominal Cavities

Because some findings are only ascertained by *in situ* inspection, the thoracic and abdominal cavities must be examined before and after the removal of organs so as to identify signs of disease, injury, and therapy.

The forensic pathologist shall:

- F19.1 examine internal organs *in situ*.
- F19.2 describe adhesions and abnormal fluids.
- F19.3 document abnormal position of medical devices.
- F19.4 describe evidence of surgery.

Standard F20 Internal Organs and Viscera

The major internal organs and viscera must be examined after their removal from the body so as to identify signs of disease, injury, and therapy.

Procedures are as follows:

- F20.1 the forensic pathologist or representative removes organs from cranial, thoracic, abdominal, and pelvic cavities.
- F20.2 the forensic pathologist or representative records measured weights of brain, heart, lungs, liver, spleen, and kidneys.
- F20.3 the forensic pathologist dissects and describes organs.

*** The Committee recognizes that some circumstances may justify a “limited” internal examination, in which case the rationale for such shall be documented**

Standard F21 Head

Because some findings are only ascertained by *in situ* inspection, the scalp and cranial contents must be examined before and after the removal of the brain so as to identify signs of disease, injury, and therapy.

Procedures are as follows:

- F21.1 the forensic pathologist shall inspect and describe scalp, skull, and meninges.
- F21.2 the forensic pathologist shall document any epidural, subdural, or subarachnoid hemorrhage.
- F21.3 the forensic pathologist shall inspect the brain *in situ* prior to removal and sectioning.
- F21.4 the forensic pathologist shall document purulent material and abnormal fluids.
- F21.5 the forensic pathologist or representative removes the dura mater and the forensic pathologist inspects the skull.

Standard F22 Neck

The muscles, soft tissues, airways, and vascular structures of the anterior neck must be examined to identify signs of disease, injury, and therapy. A layer-by-layer dissection is necessary for proper evaluation of trauma to the anterior neck. Removal and *ex situ* dissection of the upper airway, pharynx, and upper esophagus is a necessary component of this evaluation. A dissection of the posterior neck is necessary when occult neck injury is suspected.

The forensic pathologist shall:

- F22.1 examine *in situ* muscles and soft tissues of the anterior neck.
- F22.2 ensure proper removal of neck organs and airways.
- F22.3 examine neck organs and airways.
- F22.4 dissect the posterior neck in cases of suspected occult neck injury.
- F22.5 perform anterior neck dissection in neck trauma cases.

Standard F23 Penetrating Injuries, Including Gunshot and Sharp Force Injuries

Documentation of penetrating injuries as listed below should include detail sufficient to provide meaningful information to users of the forensic autopsy report, and to permit another forensic pathologist to draw independent conclusions based on the documentation. The recovery and documentation of foreign bodies is important for evidentiary purposes. Internal wound pathway(s) shall be described according to organs and tissues and size of defects of these organs and tissues.

The forensic pathologist shall:

- F23.1 correlate internal injury to external injury
- F23.2 describe and document the track of wound
- F23.3 describe and document the direction of wound
- F23.4 recover foreign bodies of evidentiary value
- F23.5 describe and document recovered foreign body

Standard F24 Blunt Impact Injuries

Documentation of blunt impact injuries as listed below should include detail sufficient to provide meaningful information to users of the forensic autopsy report, and to permit another forensic pathologist to draw independent conclusions based on the documentation.

The forensic pathologist shall:

- F24.1 describe internal and external injuries with appropriate correlations.
- F24.2 describe and document injuries to skeletal system.
- F24.3 describe and document injuries to internal organs, structures, and soft tissue.

Section G: Ancillary Tests and Support Services

The purpose of this section is to establish minimum standards for the use of scientific tests, procedures, and support services. This section also addresses the need for certain equipment and access to consultants. For toxicology reports, it also specifies the report content needed by the forensic pathologist for interpretation and establishes minimum standards for handling and documenting evidence.

Standard G25 Radiography

Radiographs of infants are required to detect occult fractures which may be the only physical evidence of abuse. Radiographs detect and locate foreign bodies and projectiles. Charred remains have lost external evidence of penetrating injury and identifying features.

The forensic pathologist or representative shall:

- G25.1 X-ray all infants.
- G25.2 X-ray explosion victims.
- G25.3 X-ray gunshot victims.
- G25.4 X-ray charred remains.
- G25.5 X-ray remains when decomposition obscures or causes loss of identifying features and/or evidence of trauma.
- G25.6 X-ray sharp force injury victims (exclusive of superficial incised wounds).

Standard G26 Specimens for Laboratory Testing

Specimens must be routinely collected, labeled, and preserved to be available for needed laboratory tests, and so that results of any testing will be valid. The blood specimen source should be documented for proper interpretation of results. Blood or other appropriate samples should be collected, whenever possible, for potential genetic testing in sudden, unexplained deaths that remain unexplained at the completion of the autopsy.

The forensic pathologist or representative shall:

- G26.1 collect blood, urine, and vitreous.
- G26.2 collect, package, label, and preserve biological samples.
- G26.3 document whether blood is central, peripheral, or from cavity.

Standard G27 Histological Examination

Histological examination may reveal pathologic changes related to the cause of death.

The forensic pathologist shall:

G27.1 perform histological examination in cases having no reasonable explanation of the cause of death following gross autopsy performance, scene/circumstance evaluation, and toxicology examination, unless the remains are skeletonized or severely decomposed.

Standard G28 Forensic Pathologists' Access to Scientific Services and Equipment

The forensic pathologist requires access to special scientific services, equipment, and expertise. Radiographs, body weights, and organ weights are needed for evaluation of pathologic processes. These procedures need to be available during the forensic autopsy. Also, it is not reasonable, practical, or safe to carry bodies or organs to other locations for weighing or imaging.

The forensic pathologist shall have access to:

- G28.1 a histology laboratory.
- G28.2 a radiologist.
- G28.3 a forensic anthropologist.
- G28.4 a forensic odontologist.
- G28.5 toxicology testing.
- G28.6 on-site radiographic equipment.
- G28.7 on-site body and organ scales.
- G28.8 a clinical chemistry lab.
- G28.9 a microbiology lab.

Standard G29 Content of Toxicology Lab Report

For correct interpretation, understanding, and follow-up of toxicology reports, the forensic pathologist requires specific knowledge of the items listed below.

The forensic pathologist shall require the toxicologist or the toxicology report to provide the:

- G29.1 source of sample.
- G29.2 type of screen.
- G29.3 test results.
- G29.4 method of analysis.

Standard G30 Evidence Processing

Custodial maintenance and chain of custody are legally required elements for documenting the handling of evidence.

The forensic pathologist or representative shall:

G30.1 collect, package, label, and preserve all evidentiary items.

G30.2 document chain of custody of all evidentiary items.

Section H: Documentation and Reports

The purpose of this section includes standards for the content and format of the postmortem record.

Standard H31 Postmortem Examination Report

Postmortem inspection and forensic autopsy reports must be readable, descriptive of findings, and include interpretations and opinions to make them informative. The report typically includes two separate parts of the forensic pathologist's work product, (1) the objective forensic autopsy with its findings including toxicological tests, special tests, microscopic examination, etc., and (2) the interpretations of the forensic pathologist.

The forensic pathologist shall:

- H31.1 prepare a written narrative report for each postmortem examination.
- H31.2 include the date, place, and time of examination.
- H31.3 include the name of deceased, if known.
- H31.4 include the case number.
- H31.5 include observations of the external examination, and when performed, the internal examination.
- H31.6 include a separate section on injuries.
- H31.7 include a description of internal and external injuries.
- H31.8 include descriptions of findings in sufficient detail to support diagnoses, opinions, and conclusions.
- H31.9 include a list of the diagnoses and may include interpretations in forensic autopsy reports.
- H31.10 include cause of death.
- H31.11 include the name and title of each forensic pathologist.
- H31.12 sign and date each postmortem examination report.

Terms and Definitions

1. Autopsy

An examination and dissection of a dead body by a physician for the purpose of determining the cause, mechanism, or manner of death, or the seat of disease, confirming the clinical diagnosis, obtaining specimens for specialized testing, retrieving physical evidence, identifying the deceased or educating medical professionals and students.

2. Cause of Death

The underlying disease or injury responsible for setting in motion a series of physiologic events culminating in death.

3. Direct Supervision

Supervision of personnel performing actions in the immediate presence of the supervisor.

4. Forensic Autopsy

An autopsy performed pursuant to statute, by or under the order of a medical examiner or coroner.

5. Forensic Pathologist

A physician who is certified in forensic pathology by the American Board of Pathology or who, prior to 2006, has completed a training program in forensic pathology that is accredited by the Accreditation Council on Graduate Medical Education or its international equivalent or has been officially “qualified for examination” in forensic pathology by the ABP.

6. Manner of Death

A simple system for classifying deaths based in large part on the presence or absence of intent to harm, and the presence or absence of violence, the purpose of which is to guide vital statistics nosologists to the correct external causation code in the International Classification of Diseases. The choices are natural, accident, homicide, suicide, undetermined, and in some registration districts for vital statistics, unclassified.

7. Medicolegal Death Investigator

An individual who is employed by a medicolegal death investigation system to conduct investigations into the circumstances of deaths in a jurisdiction.

8. Forensic Pathologist's "Representative"

Any individual who carries out duties under the direction or authority of the forensic pathologist. Individuals performing these various duties may range from technicians to licensed physician medical examiners, and may be law enforcement or crime laboratory technicians.