

Chapter 3

Hospital Versus Medicolegal (Forensic) Autopsies

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I. Overview

- A. One of the most important facts that must be recognized by pathologists is that hospital autopsies and medicolegal autopsies differ in many important respects.
- B. Competency in hospital autopsy performance does not necessarily equate to competency in medicolegal autopsy performance.
- C. Understanding the important differences between hospital and medicolegal autopsies is essential in being able to recognize cases that should be handled as medicolegal cases. In certain instances, hospital pathologists might wish to refer the case to someone with more forensic expertise.
- D. It is also important to recognize that, depending on the jurisdiction and the type of medicolegal death investigation system, a local, hospital-based, nonforensic pathologist might be considered by all persons involved (including police) as the person with the most expertise in forensic pathology. As such, all pathologists should be aware of the basic requirements and expectations when performing medicolegal autopsies.
- E. Following a brief synopsis of some more general differences between hospital and medicolegal autopsies and a discussion of when a hospital autopsy is recognized as a medicolegal autopsy, the remainder of this chapter will deal with specific items of importance.

II. Hospital (Non-Medicolegal) Autopsy: General Statements

- A. A valuable and underutilized medical procedure that can provide important medical information to physicians and families regarding the death of a loved one/patient.
- B. Requires consent of legal next of kin; may be limited to certain body sites.
- C. May be useful in determining the cause of death.
- D. Can provide correlation between clinical diagnoses and symptoms.
- E. May be useful in evaluating the effectiveness of therapy.
- F. Can provide documentation of disease extent.
- G. Useful in medical education.

- H. May uncover unknown disease process or complication of disease/therapy.
- I. Can provide useful information to surviving family members concerning potentially familial conditions.

III. Medicolegal Autopsy: General Statements

- A. Another valuable medical procedure, similar to the hospital autopsy, performed at the request of an official death investigator (coroner or medical examiner) regarding a death that fulfills criteria established for death investigation in that particular jurisdiction.
- B. Does not require consent from legal next of kin.
- C. Depending on the jurisdiction, such cases may be performed by forensic pathologists or hospital-based nonforensic pathologists.
- D. Useful in determining cause and manner of death.
- E. Important in establishing or confirming the decedent's identity; provides permanent record of decedent (photos, DNA sample, fingerprints, etc).
- F. May provide correlation of facts and circumstances related to the death.
- G. Provides documentation of disease and/or injuries for possible use in court.
- H. Allows for proper recovery and preservation of evidence.
- I. May be useful in accident/injury reconstruction.
- J. Can aid in estimating time of death.
- K. Provides factual, objective, medical information for law enforcement and other agencies.
- L. Important component of public health surveillance, allowing for identification of potential health concerns, including contagious infectious processes (eg, tuberculosis, HIV, *Neisseria meningitidis*), bioterrorism attacks, and emerging infectious diseases.

IV. When a Hospital Autopsy Becomes a Medicolegal Autopsy

- A. Occasionally, an autopsy that is being performed as a "hospital" autopsy is recognized by the pathologist (prior to, during, or after the exam) as a case that should really have been referred to the medicolegal death investigation system (coroner or medical examiner). Examples include various "therapeutic misadventures" (subclavian insertion causing massive hemothorax, medication error) as well as injuries sustained in falls in the hospital.

- B. In such instances, it is important to notify the coroner or medical examiner.
- C. Depending on the case type, a variety of options exist. In many instances, the coroner/medical examiner will simply ask the pathologist to send the autopsy findings to them.
- D. It is important to remember that the focus might change in such cases. Careful attention to the guidelines outlined below will help alleviate potential problems.

V. Background Information: Hospital Versus Medicolegal Autopsies

- A. In hospital cases, the complete hospital record is usually available for review by the pathologist prior to autopsy. In addition, clinicians and family members typically are available for consultation prior to autopsy, so any specific questions they might have can be subsequently addressed during the autopsy.
- B. In medicolegal autopsies, the investigation being performed by death investigators and/or police is frequently in progress and not complete. As such, all of the specific questions that might eventually be asked by these agencies may not yet be known. Consequently, the pathologist must perform these autopsies and anticipate important questions that might eventually be asked. Many of the specific recommendations presented here are done so with this issue in mind.

VI. Perform a “Complete Autopsy”

- A. Hospital autopsies are limited by the wishes/consent of the legal next of kin. One of the most common exclusions is examination of the head. Frequently, a complete neck exam is not considered part of a complete hospital autopsy.
- B. With some exceptions, medicolegal autopsies should always be “complete” (head, neck, chest, abdomen). Even if the cause of death is obvious on trunk exam, the head and neck exam should be performed. The neck exam should include hyoid bone; some prefer to always remove the tongue as well. A routine “complete exam” does not typically include the spinal cord, posterior neck, eyes, middle ears, or extremity dissection; however, each of these specialized exams (and others) may be performed, as necessary.

VII. Positive Identification (ID)

- A. The identity of the decedent in hospital cases is virtually never in question. As such, the pathologist need only check the hospital identification bracelet to ensure that the autopsy is being performed on the correct individual.

- B. In contrast, the identity of the decedent in medicolegal autopsies is frequently in question. Many times, a “positive” ID can be established via visual means, although even this method can produce errors. Other acceptable items that may aid in positive identification include visualization by next of kin and the presence of unique body features (eg, tattoos, scars). “Circumstantial” methods of identification include clothing, drivers license, location of decedent, etc. In certain case types (bad burns, decomposition, distorting injuries), visual ID is impossible. Scientifically acceptable means of establishing positive ID include:
1. Fingerprint comparison
 2. Dental comparison (charting and radiography)
 3. Nondental radiograph comparison (see “Postmortem Radiography” section below)
 4. DNA analysis
- C. Each medicolegal death investigation system should have set protocols for establishing positive identification. It is important for the autopsy pathologist to work towards establishing definitive identification in all cases.
- D. If a decedent is not positively identified, the following should be collected/taken and retained:
1. Fingerprints
 2. Photographs
 3. Dental charts and radiographs
 4. Full-body radiographs (especially in burnt or decomposed bodies)
 5. Samples for future DNA comparison (blood or bone)

VIII. External Examination

- A. In hospital cases, the external examination of the body may or may not be very important. In either instance, the external exam in most hospital cases requires only a few minutes, and it rarely has a bearing on the cause of death.
- B. In medicolegal autopsies, the external exam is very important, not only with regard to cause-of-death issues (injuries), but also with regard to identification and other issues (time of death estimation, trace evidence collection, sexual activity kit collection, clothing retention, etc).
- C. Consequently, the time required for external examination may be incredibly lengthy. The external examination (trace evidence collection, photography, documentation of injuries) in a complex homicide case may require several hours.

- D. Injuries should be documented by diagram and photography (see below). In cases with gunshot wounds, stab/incised wounds, or homicidal blunt force injuries, the injuries should be described in detail with regard to size, shape, and body location (using local landmarks, eg, the nipple, as well as the top of the head or the bottom of the foot, and the midline or midaxillary line as reference points). In order to best examine and document injuries, it is essential that the surrounding skin surfaces be washed of any blood, dirt, or debris. This should only be done following the collection of any pertinent trace evidence.
- E. Other important areas to examine prior to internal exam in forensic cases include:
1. Conjunctival (eye and eyelid) surfaces (the presence of petechiae may indicate neck or chest compression)
 2. Intraoral area (bite marks and other injuries of the inner cheeks may occur in homicidal asphyxial deaths)
 3. Scalp (injuries may be masked by hair)
 4. Neck (even small, subtle, cutaneous injuries may indicate possible strangulation)
 5. Hands and other extremities (look for “defensive” or other types of wounds)
 6. Axillary regions (particularly in cases of gunshot wounds)
 7. Back (often ignored during hospital autopsies)
 8. External genitalia/anus (look for evidence of injury and recent sexual activity)
- F. External examination should also document any medical therapy present on the body. In some cases, it is difficult to differentiate therapeutic interventions from true injuries. Sometimes, surgeons cut through true injuries as they attempt to save the victim’s life. Timely consultation with clinicians, prehospital emergency personnel, and medical records is essential in such cases.

IX. Photography

- A. In hospital cases, the use of photography is generally considered optional. In some places, it is always used and is considered a method of documenting the autopsy findings. In other places, photography is rarely used, implying that the written report and histologic sections are sufficient for documenting the findings. Photography in hospital autopsies is usually limited to educational use.

- B. In medicolegal autopsies, photography is considered a required part of the overall documentation of the case, primarily with regard to identification issues, but also with regard to certain injuries (particularly in homicides).
- C. Each case should have an identification photograph (a facial photograph with the autopsy number).
- D. In select cases, other photographs should also be taken.
 - 1. “As is” photos: photos showing how the body appeared as it is first viewed at autopsy (undisturbed). For all homicides and suspected homicides and certain other cases (some suicides, hit-and-run deaths, in-custody deaths).
 - 2. Injury photographs. In all homicides and other cases where trauma is implicated in death. Frequently, when showing specific injuries, an “orientation” photo should be obtained, showing the location of the wound, accompanied by a “close-up,” to document the wound characteristics. Labels with autopsy number and a scale should be included.
 - 3. Photos of “uncleaned” injuries. Important in some cases, but not nearly as important as photos of cleaned injuries.
 - 4. Photos of “cleaned” injuries. Clothing, bandages, other medical therapy, and blood (dry and wet) must be removed in order to properly document injuries.
 - 5. Photos of shaved injuries. When body hair obstructs the margins of an injury, particularly when the injury is considered the cause of death (as in gunshot wounds), it is important to shave the hair in order to better visualize the wound.
 - 6. Pertinent negative photos. Photos that show absence of injuries are sometimes warranted. These are especially important in deaths in custody and in any case where homicidal or abusive injury has been alleged as the cause of death, yet autopsy fails to confirm such.

X. Postmortem Radiography

- A. In most hospital autopsies where x-ray exam is beneficial, the x-rays have already been performed prior to death. Exceptions occur, and various postmortem radiologic procedures are well known and useful.
- B. Postmortem radiography is absolutely essential in many forensic autopsies. All cases with gunshot wounds (even if they appear to be exiting) and stab wounds (looking for retained weapons or portions of weapons) should be x-rayed.

Postmortem x-rays can also be useful for identifying venous air embolism within the heart or the presence of a pneumothorax. Finally, postmortem radiography is important in many cases for establishing positive identification.

Comparing postmortem dental films with antemortem x-rays can establish positive identity. In the same fashion, postmortem x-rays of frontal sinuses, vertebral spinous processes, and orthopedic hardware, among other things, can be compared to antemortem films for identification purposes.

XI. Toxicology Specimens

- A. In hospital cases, the collection of various bodily fluids for toxicology tests is rarely performed. Collection for other tests (chemistry, culture, etc) occurs occasionally.
- B. In medicolegal autopsies, the collection of blood, vitreous, urine, and other tissues for toxicology testing is essential. An exception would be a case where survival of several days (or longer) occurred following the initial event leading to death. Even in these cases, however, it is prudent to at least collect and retain samples, as unexpected issues may arise (DNA testing for paternity).
- C. Different toxicology laboratories utilize different samples or tissues for testing, so each pathologist should be familiar with what samples and tube types are required by the toxicology lab for testing.
- D. Blood and other samples collected in the hospital prior to death should be obtained from the hospital laboratory.
- E. At autopsy, peripheral blood (femoral) is better than heart blood, since postmortem redistribution occurs with certain drugs such that a postmortem elevated level may occur in heart blood. Several tubes of blood should be collected, including some with sodium fluoride (grey top tube) and some with no preservative (red top or other tube). If carbon monoxide levels are to be tested, check with the lab to determine which tube type is required (some can use red tops, others require green or purple tops).
- F. If other specialized chemistry/serology tests are desired, it is best to check with the lab for proper collection instructions. Urine and vitreous (and bile and CSF) can be collected in red top tubes.
- G. Collection and retention of various "solid" tissues is also prudent in certain cases. Liver, brain, and/or skeletal muscle are appropriate for these purposes. Gastric contents may also be collected for further testing, particularly if an ingestion is a

possibility (drug overdose, children). Subdural hematomas may provide useful toxicology data, particularly if there is a significant survival time between injury and death.

- H. All specimens should be packaged separately in appropriate containers and should be labeled with the decedent's name, the date of autopsy, the autopsy number, the pathologist, and specimen type (and site, if blood). Proper retention will depend on the lab involved. Long-term refrigeration or freezing of solid tissues is appropriate for archived samples. Unused specimens should be retained for a minimum of 1 year prior to disposal.

XII. Internal Examination

- A. The extent of the internal examination in hospital cases is limited by the autopsy permit. Even if "complete" consent is granted, neck exam is frequently limited by the pathologist unless, of course, the clinical circumstances require such an exam. Histologic exam is always performed as part of a hospital autopsy.
- B. The internal exam in medicolegal autopsies is dictated, to a certain extent, by the circumstances of the case; however, as mentioned previously, a complete exam will always include the head/brain and the neck, as well as the trunk.
- C. Remove the dura. Internal skull exam (including the basilar skull) is not considered complete until the dura has been stripped from the skull, allowing direct visualization of the bone to rule out fractures.
- D. Examination of the neck. Internal examination of the neck, with removal of the neck contents up to and including the hyoid bone, is the minimum necessary for a complete medicolegal autopsy. Additional examination, including layer-by-layer anterior neck dissection, tongue removal, and posterior neck dissection, should be performed, as indicated. Deaths that are related to neck trauma, and others where the circumstances dictate that foul play must be excluded by the autopsy, should always have a layer-by-layer anterior neck dissection performed, with removal of the tongue. Such a layer-by-layer dissection of the strap muscles of the neck should be performed only after evisceration of the trunk organs and the brain, to allow for blood drainage from the neck prior to dissection. The presence of intramuscular hemorrhage in any of the strap muscles should be documented. Such hemorrhage occurs in cases of neck trauma, most significantly strangulation. Careful examination of the hyoid bone and the thyroid cartilage (especially the horns) and

the cricoid cartilage are essential. Fractures of any of these also indicate neck trauma. In select cases, a posterior neck dissection may be performed, again looking for evidence of muscular hemorrhage.

- E. Additional specialized exams are sometimes warranted in order to fully document or rule out injuries. As such, eye removal and subsequent exam, spinal cord removal, and leg or arm dissections are frequently performed. Dissection of the pelvic veins and the deep veins of the legs is warranted when pulmonary thromboemboli are identified. Postmortem angiography can sometimes be beneficial in demonstrating vertebral artery or other vascular injuries. Incisions elsewhere on the skin and underlying soft tissues may be warranted in certain cases (child abuse, elder abuse, pedestrians' legs).
- F. Depending on the jurisdiction/office, histologic sections are not necessarily taken in every medicolegal autopsy. If possible, histology should be performed in each case where the cause of death is related to a pathologic condition; certain non-natural deaths may also require histology (contact gunshot wounds to document gunshot residue; lungs, liver, or stomach in drug-related deaths; trachea/bronchi to demonstrate soot in fire deaths). In certain injury cases (such as child abuse cases), sections of injuries (contusions, subdural hematomas, retinal hemorrhages) are often helpful. Iron (hemosiderin) stains can show that injuries are not acute. Stock pieces of formalin-fixed tissues should be maintained in forensic autopsy cases for a minimum of 1 year.

XIII. DNA Specimen Retention

- A. In most hospital autopsies, no blood samples (of any type) are collected or retained.
- B. In medicolegal autopsies, it is not only necessary to collect and retain blood samples for toxicology testing, but it is prudent to also collect blood (or bone or tooth) samples specifically for potential DNA testing. Specialized collection cards are commercially available, which allow for safe, convenient collection and storage of blood drops for potential DNA testing. These specimens should be maintained indefinitely.

Checklist for Medicolegal Autopsy Performance

- Obtain all available historical information prior to autopsy.
- Obtain required consent from medicolegal death investigation official (coroner/medical examiner).
- Assure the positive identity of the decedent.
- Collect appropriate evidence, in cooperation with the investigating police agency. Certain types of evidence require collection prior to disturbing the body (sexual activity kit, trace evidence).
- Perform a complete external examination, including the back, the hands, the neck, the conjunctiva, the anogenital area, and the oral cavity.
- Photograph, as dictated by case type. At the very least, an identification photograph is required.
- Perform x-rays, as warranted by the case.
- Perform complete autopsy (head, neck, chest, abdomen), including specialized examinations, as warranted.
- Properly collect and submit (or retain) samples for toxicology testing.
- Perform complete internal exam, including various specialized techniques, as warranted by the case (tongue, anterior neck, posterior neck, eyes, spinal cord, leg dissection).
- Collect and retain samples for potential DNA testing (blood spot card, hair sample).
- Check with investigation agency for latest information before signing case out.

Further Reading

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