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Examination of Human Remains by Forensic Pathologists in the Disaster Victim Identification Context



DRAFT DOCUMENT

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1 Foreword

The forensic pathologist documents personal effects, recognizes unique identifiers, reviews radiologic studies and recovers medical devices. When applicable and appropriate, forensic pathologists also collect evidence, document injuries and contribute to determination of cause and manner of death.

These best practices are put forth by the Disaster Victim Identification subcommittee within OSAC. This document originated from the Scientific Working Group on Disaster Victim Identification (SWGDIV).

2 Acknowledgements

This document was developed by the Scientific Working Group for Disaster Victim Identification prior to the creation of the OSAC DVI. This document has subsequently been fully reviewed and adopted by the OSAC DVI.

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4 Scope

The purpose of this document is to provide best practices and guidelines regarding postmortem data collection by forensic pathologists to aid in the identification of human remains following a mass fatality incident. This document does not speak to the role forensic pathologists may have in death certification or in management of the overall operation, but rather is limited to the morgue operations role. In the absence of a specific guideline, the principle, spirit and intent of this document should be met.

The priorities established in a mass fatality incident will be dictated by the specifics of the incident and the directives established by the medicolegal authority of that jurisdiction. The forensic pathologist should recognize that the objectives addressed by the examination of human remains in a mass fatality incident may differ from routine caseload management in their daily practice. The examination objectives in cases where mortal injuries are externally obvious may prioritize data collection for identification purposes over internal demonstration of injuries with a complete autopsy. It is important that the forensic pathologist shift their perspective and recognize that what they consider essential in their daily caseload management practice may not be the objective in a specific mass fatality incident. In the DVI operation, the forensic pathologist belongs to a multi-disciplinary team and often serves as the main examiner or scientific team leader during the post-mortem examination.

DVI practitioners are encouraged to develop, implement, exercise, and review their mass fatality incident response operating procedures in light of these guidelines and best practices, and to update their procedures as needed. It is anticipated that these guidelines will evolve as future technologies emerge.

5 Terms and Definitions

5.1

Forensic Pathologist

A physician who is certified in forensic pathology by the American Board of Pathology (ABP) 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 Recommendations

Remains should be thoroughly examined as soon as possible, before ongoing decomposition limits the value of the examination. A thorough examination at the outset also prevents time spent re-examining remains – an expensive and time-consuming activity (1). It is assumed that the remains have been rendered safe from any hazards and that appropriate personal protective equipment (PPE) has been provided. The following is a chronological description of the activities of the pathologist in the mass fatality investigation context.

6.1 Pre-Examination

Before the examination of remains, the forensic pathologist should review information about the incident and specific remains. This information may consist of:

- ❑ Geographic location (where the remains were recovered)

- ❑ Circumstances surrounding the death (natural versus accidental versus man-made event)
- ❑ Circumstances surrounding the recovery of the remains (e.g. found under rubble, recovered from water, remains removal facilitated by implements or machinery, etc.)
- ❑ Details regarding any identifying documents or personal effects found on the remains if these items have been removed from the remains prior to arrival of the remains at the morgue

6.2 Postmortem Radiographs

At the discretion of the forensic pathologist or DVI team leader and as dictated by the incident characteristics, obtain postmortem radiographs before the forensic pathologist examines the remains. The radiographs should be available for evaluation by the forensic pathologist. The objectives of postmortem radiographs include: documenting identifying/individuating features for comparison with antemortem radiographs; identifying injuries; assisting in age estimation; comparison with antemortem radiographs for identification; identification of foreign objects (such as explosives or potentially dangerous weapons) and recognition of medical artifacts and implanted medical devices (such as surgical clips, pacemakers, or prosthetic joints). In review of the radiographs, the forensic pathologist should:

- ❑ Document evidence of previous surgical procedures (such as implanted devices, surgical clips and wires), foreign bodies, remote (healed) fractures and unique morphoscopic traits
- ❑ Document and retain any medical devices or appliances that could facilitate identification. (Recovery of medical devices or appliances should occur following examination of the remains by anthropology.)
- ❑ Document evidence of acute injuries
- ❑ Recover all foreign bodies relevant to cause and manner of death (such as projectiles)

Postmortem multislice computer tomography (CT) has distinct advantages and disadvantages at a mass fatality. Obtaining the equipment to perform the examination may be difficult; however, CT scanners are increasingly mobile. The images obtained can be rotated on a 3-dimensional basis, facilitating comparison with standard plain-film radiographs. As a best practice, a complete body CT scan can be completed in about 15 minutes and is extremely useful for rapidly decomposing bodies and in areas where autopsies cannot be performed or are discouraged based on cultural concerns (2). Information from the CT is useful for identification as well as injury documentation, location of personal effects and evaluation for commingled remains (3). It is possible that computed tomography will become the sole radiographic modality at DVI operations (4). It should be recognized that constant use can burn out the very expensive CT tube, so it is advised that its use be paced.

6.3 Personal Effects

The forensic pathologist or their representative (or a member from another section), under the direction/supervision of the forensic pathologist, should:

- ❑ Create a clothing and personal items/effects inventory of all items on the remains with a label bearing a unique case number.
- ❑ Document the position of the personal effects on the body, providing information regarding the level of association with the body. For example, "A yellow metal ring is on the left ring finger."
- ❑ Undress the remains.
- ❑ Photograph all personal effects and jewelry in-situ and off of the remains, describe the items and keep the items with the remains in signed and sealed plastic bags. Relocation of these the materials away from the remains should be discouraged since the value of the personal effects to the identification process is diminished once they are separated from the remains. (5)
- ❑ Describe the jewelry: item, color, stone colors, sizes and engraving or personalized details.

- ❑ Record information about the clothing items (color, size and the manufacturer).
- ❑ Record the contents of all clothing pockets, create an itemized description of wallet contents and describe cell phones including the type, numbers, makes/models and the cell phone service providers.

6.4 External Examination of the Remains

The forensic pathologist or representative should:

- ❑ Document and photograph the remains, including all externally visible characteristics, with all photos containing the unique case number and a scale.
- ❑ Measure the height (length) of relatively intact remains (bodies).
- ❑ Weigh all remains, even if fragmented. This allows an approximation/estimation of the percentage of remains recovered.

The forensic pathologist should:

- ❑ Estimate apparent age by visual inspection, using broad ranges (e.g. “approximately 30 to 40 years old”, or “middle aged”). A narrow age range may result in individuals being excluded when the estimated age range is entered into a database.
- ❑ Determine sex. In many cases, even when bodies are badly burned, the sex can be determined by examination of the external genitalia. (6)
- ❑ The forensic pathologist’s description of the external aspects of the remains should (where possible) include details about:
 - Body habitus (such as endomorphic, ectomorphic or mesomorphic)
 - The forensic pathologist should include a description of postmortem changes such as: discolorations, bloating, mummification, corneal cloudiness and postmortem animal and insect activity.
 - Apparent race or ancestry
 - Hair color, length, characteristics (such as straight versus curly), distribution and accessories (such as wigs, extensions)
 - Facial hair (beards, mustaches, sideburns, cleanly shaved, facial hair color)
 - Eye color, contact lenses, prosthetic eyes
 - Piercings, scars, tattoos, antemortem amputations.
 - Inspection and description of the head, neck, thorax, abdomen, extremities, hands and feet and genitals
 - Evidence of medical or surgical intervention

- The presence or absence of dentition (a thorough documentation of the dentition is completed in the dental section of the morgue)

6.5 Determination to Conduct an Autopsy

The local medicolegal authority will determine whether an autopsy should be performed. Indications for when to perform an autopsy are available from the National Association of Medical Examiners at www.thename.org (7).

6.6 Internal Examination of the Remains

When the decision to perform an autopsy has been made, the forensic pathologist should:

- ② Document all internal features that may be of use for identification, for example: evidence of surgical procedures such as appendectomies, cholecystectomies and hysterectomies.
- ② Remove all implanted devices identified by examination and/or radiography, recording the type of device, manufacturer and model number and serial number. Photographs should be obtained by the pathologist or their representative, under the supervision of the pathologist.
- ② In certain cases, such as with charred remains, an internal examination may reveal anatomical structures useful for determining sex (e.g. presence of a uterus, fallopian tubes, ovaries, vagina, a prostate gland, or testes).

6.7 Fragmentation and Commingling

In cases of fragmented remains, the forensic pathologist should assess the possibility of commingling (a task that may have been previously performed at the anthropology and/or at the triage stations). If commingling is detected, pathologists should follow the established morgue protocol. Typical protocols are to route the remains back to triage and the admitting station so that the commingled remains can be assigned a new accession number, or the commingled remains may be segregated at the pathology section with a new number assigned to the sorted remains.

The forensic pathologist or their representative should:

- ② Photograph each fragment with its unique case number and a scale in the photograph

The forensic pathologist should:

- ② Describe each fragment, similar to a gross examination of a surgical pathology specimen, to include the weight, size, color, tissue type, whether it is a right or left (when applicable and possible) and any other significant features
- ② Examples:
 - The remains consist of a 2400-gm total weight right foot with 7-cm segment of distal tibia (fibula absent), 22 cm from heel to tip of great toe, pale skin, small amount of hair on top of foot, toenails with dark red polish.
 - The remains consist of skeletal muscle attached to 5 cm segment of long bone. Total specimen measurements 6 x 4 x 3 cm; total weight 130 grams.

6.8 Injury Documentation

When indicated and authorized by the responsible medicolegal authority, the forensic pathologist should:

- ❑ Document injuries in writing, diagrams and direct to be obtained or obtain photographs of the injuries
- ❑ Record the injury type, location, size, shape and pattern.

6.9 Cause of Death and Manner of Death

When indicated and requested by the local medicolegal authority, the forensic pathologist should document information that allows for a determination of the cause of death, the manner of death and information that would contribute to estimating intervals such as post-injury survival time. Information from the scene, such as how the remains were found, is often critical in these determinations.

6.10 Toxicology

When indicated and requested by the local medicolegal authority, obtain appropriate specimens (when available) for toxicology testing. All specimens should be promptly labeled with the case number, the date and time, the name of the medical examiner or coroner and the initials of the individual who obtained the sample.

6.11 Transportation Incidents

In an aircraft accident and possibly other transportation accidents, submit specimens to the Federal Aviation Administration (FAA) Civil Aerospace Medical Institute (CAMI) by following the instructions included with the TOX-BOX.

- ❑ The procedures for collection and shipping toxicology specimens to the FAA CAMI are available in the following document:
http://faa.gov/data_research/research/med_humanfacs/aeromedical/media/SpecimensHandlingVersion10_14_2010.pdf.
- ❑ For additional information regarding this process, or to obtain TOX-BOX kits contact FAA CAMI:
FAA Civil Aerospace Medical Institute, Room 351
6500 South MacArthur Boulevard
Oklahoma City, OK 73169
Phone: 405-954-4866 (0800-1630 CT; Monday-Friday, excluding Federal holidays)
Phone (outside normal business hours): 405-954-3793
Fax: 405-954-3705

6.12 DNA Collection

Postmortem DNA collection may or may not be obtained at the pathology station. This will be covered by the OSAC DVI *DVI Management* document.

6.13 Quality Assurance Strategy

Implementing a systematic evaluation of the various aspects of the pathology evaluation is a critical component to the procedures occurring in the pathology section of any death investigation system. The methods of examining and documenting findings should be systems based, designed to prevent and find errors. (8)

A mass fatality incident brings with it factors (such as a large workload, fatigue and procedures that are unfamiliar to the physician and staff) that call for a robust quality assurance program. There should be forensic pathologist designated as the Pathology Team Leader of the incident, who is present for the duration of the incident and oversees the work of other forensic pathologists. This individual is responsible for executing the Quality Assurance protocols.

Annex A (informative)

Foundational Principles

Forensic pathologists are responsible for the collection of data derived from the physical examination of human remains recovered from mass fatality incidents, for the purpose of: 1) scientific identification and 2) determination of cause and manner of death. This examination includes—but is not limited to—documentation of personal effects, recognition of unique morphoscopic identifiers, review of radiologic assessments and recovery of medical devices. Forensic pathologists also collect evidence and document injuries.

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