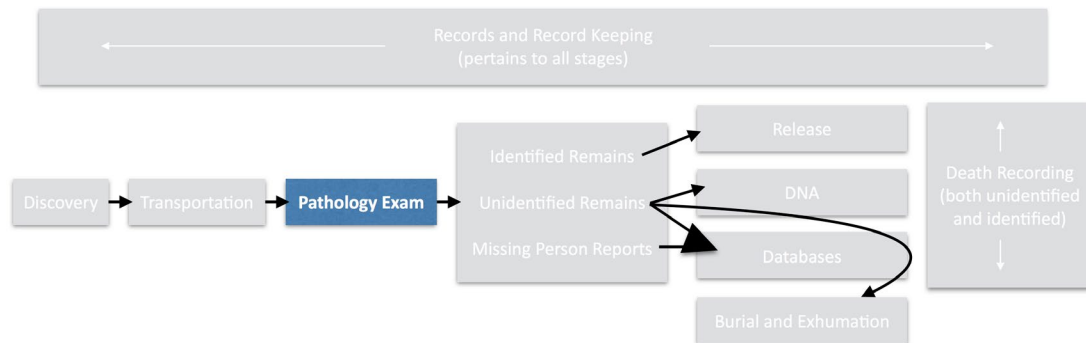


Section 4: Pathology Exams



INTRODUCTION

In states and counties throughout the U.S., there is variation in protocols pertaining to medical examination after a dead body has been discovered. This lack of standardization has been recorded in studies conducted by organizations like the Center for Disease Control and the National Academy of Science, among others [12][21]. This creates a number of problems in circumstances of suspected foul play and when bodies are found outdoors or unattended. And even though this is a national problem [21], the situation is even more complex on the U.S.-Mexico border as medico-legal personnel have faced disaster-scale death numbers as undocumented border crossers have sought clandestine entry into the United States through the remote wilderness areas of border counties. The lack of standardized protocol means a variation in what may be considered a rigorous procedure for identifying both cause of death as well as the name and next of kin of the decedent [12]. In this section, we present an example of what standardization might entail, including the supplemental autopsy form for UBCs used by the PCOME (Figure 8, pages 25 and 26).

ISSUES

Decomposition / Exposure of Remains

Exposure to the elements after dying in an outdoor setting, especially a desert, and not being immediately recovered means that remains will often be sufficiently decomposed as to obscure or erase any superficial identifiers (e.g., facial features, and even clothing and personal effects) [22].

UBC Deaths and Their Impact on Counties

1. According to interviews conducted with border county officials, a repeated theme was the sense that they were left to deal with a dramatic increase of human remains with no federal assistance and county budgets that constrained officials from taking the most basic and indispensable measures to identify bodies.

2. Many county officials reported deliberately triaging what cases can be rigorously processed. What this means in practice is that bodies with no superficial evidence of foul play will not always be autopsied and bodies found with identification cards will be considered as identified without any additional corroborating forensic evidence of his/her identity.

Absence of forensic experts / equipment

The findings of this study have shown many counties along the border do not have immediate access to the medical professionals or basic equipment, like X-ray machines, critical to postmortem examinations.

BEST PRACTICES

This section is not intended to take the place of medical training and credentialing. The intention is to outline the necessary steps within and importance of pathology exams.

Forensic experts on the scene

Forensic specialists should be involved in all work related to the recovery and examination of human remains. When this is not possible, protocols to facilitate future evaluation by forensic personnel should be designed and followed. What this means is that at a future date, these personnel should be able to access the body, all information available on the circumstances of death and the ensuing condition of the decedent in order to properly investigate the cause of death, and in the cases of unidentified individuals, to find the decedents' identities and reunite them with family [17].

When it is known that a forensic specialist will not be immediately available to examine the remains, relevant offices should develop an organizational standard operating procedure (SOP) to handle remains systematically, in ways that will facilitate future forensic attention [17]. Personnel who lack training in these procedures should be thoroughly briefed in advance of their managing decedent cases. Non-medical personnel should never conduct internal examinations.

However, external exam methods by non-medical personnel may include those procedures that:

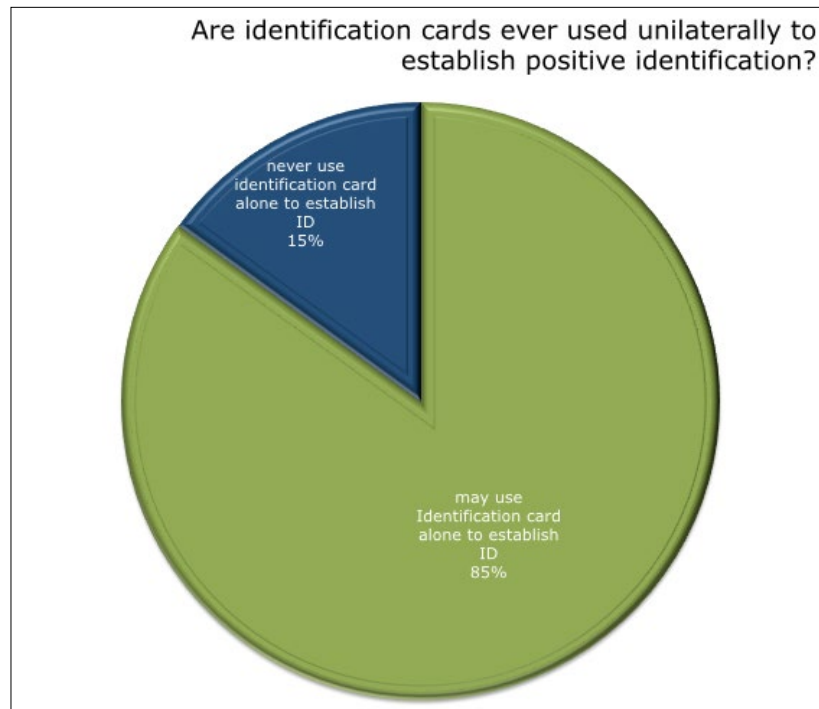


Figure 6: Based on recorded responses to survey questions, 85 percent of officials who answered this question indicated that identification cards along were sometimes used to establish the identity of UBCs.

1. will facilitate the remains' future evaluation by forensic personnel;
2. involve documentation of external conditions and personal effects associated with recovery of the body; and
3. will prevent the future disorganization and loss of information, crucial to the future identification of the body [17].

Information – such as DNA samples – collected by non-specialists will have no value unless it is evaluated by specialists [17].

Examination Facility

1. The facility should include a separate area with a water source and drainage, as well as a place for cleaning and drying, especially when consistently dealing with badly decomposed remains [17][15].
2. Ideally, separate stations should be available for all processes: receiving, forensic exams, radiography, evidence processing, storage and release of the bodies [15].
3. Radiography (X-ray) equipment should be available.

External Exams

Material Needed [17]

1. Material needed includes an ink pad (for fingerprinting);
2. Plastic or metal markers;
3. Plastic bags with labels (for belongings and samples);
4. Surgical gloves with masks and shoe covers,
 - These should be used for any direct contact with bodies [17]; and
5. A camera and/or video equipment.

Reference Number

All bodies should be assigned a reference number. If this does not occur at recovery, a number should be assigned when the body reaches the medical examination facility [17].

1. A reference number should be associated with a date and place of body recovery [17].
2. This number should be attached to all records related to the individual to whom it is assigned [17].

*Data to collect (see Figure 7)**DNA*

Protocol for **DNA collection** from decedents will be detailed in the section entitled DNA.

Fingerprints

1. Before prints are taken, hands and feet should be cleaned and dried [15].
2. Prints from all of the fingers on both hands, starting with the left little finger should be taken [17]. Two sets must be recorded [18].
3. If the fingers on the body are too desiccated for fingerprinting, there are numerous procedures for their rehydration [23]. Hands may have to be removed as a last resort.
4. Fingerprinting is a possible form of positive identification. Records of prints should be kept for unidentified individuals and uploaded to an appropriate database. Refer to the section on Databases for more detail.

X-rays and CT scans should be taken of the entire body and teeth

The following should be used for forensic radiological specialists and also forensic anthropologists to look for/record [15][18]:

1. Internal implants, previous injuries or surgical procedures that may allow for the identification of the decedent [15][18];
2. Foreign objects found lodged inside the body [15][18];
3. Age of the decedent [15];
4. Dental radiology [15], including
 - Molars on both sides with jaws together,
 - Upper and lower molars with premolars and incisors, and
 - Teeth with special features (e.g., crowns).

Samples

Hair samples: A sample of the hair should be taken, including roots to the extent possible and placed in a plastic bag with a body's unique reference number [17][13]. This can be used for DNA analysis [17].

Dental samples: Preferably, sampling should be done by a dentist, forensic odontologist, or an appropriately trained individual [15].

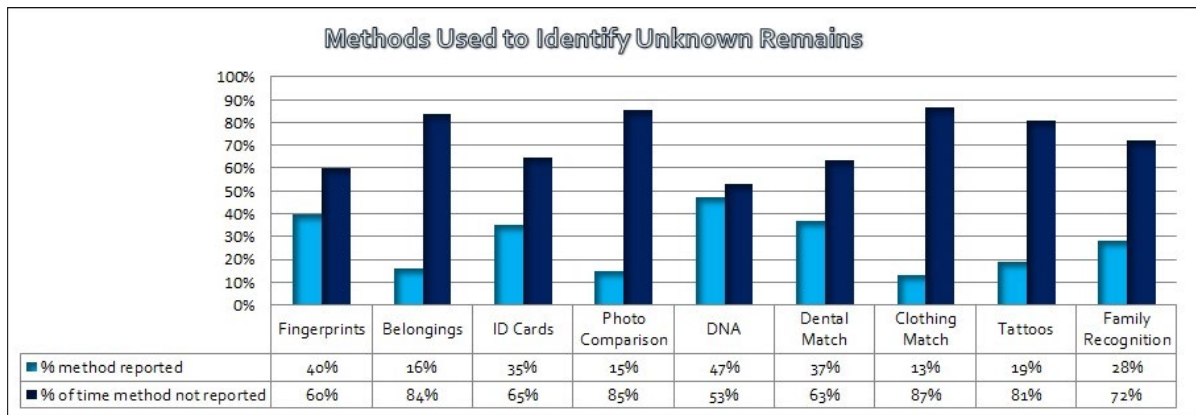


Figure 7: Based on the results of survey, officials involved in the pathology exam reported a range of possible samples collected for the future identification of body. Officials reported all practices known, which also allowed statistics to be generated on samples not collected by some county offices.

- Forensic anthropologists have identified certain dental characteristics that may point to a region of origin for many undocumented migrants, such as the presence of “shoveled” anterior teeth [22][23].
1. Assessment of teeth may include [15]:
 - incising soft tissues,
 - cleaning of teeth and jaw, and
 - evaluation of dental quality.
 2. The jaws of the decedent should only be removed when necessary, as the process is destructive and can be viewed as an act of mutilation by family members. Only in extreme circumstances should such a measure be considered, usually at the discretion of the examiner. If removal does take place, measures should be taken to minimize the damage and after the fact, to replace any tissues [15]. If this is not possible, the removed jaw should be kept with the body, usually placed at the head of the laid-out corpse to facilitate for future examination [15].
 3. Dental records are particularly important as they represent a means for positive identification. Dental X-Rays and other identifying materials should be kept for unidentified individuals and uploaded to an appropriate database, such as NamUs (see Appendix F and Databases section for a discussion of this database).

Personal effects

1. Personal effects should be stored in a *separate container* marked with the associated body’s unique reference number [17][15][18]. The plastic evidence bags must be sealed to prevent contamination [15]. Note that certain objects may have trace DNA of the victim on them, to allow for DNA sampling and identification [15].
2. All personal effects should also be photographed with the unique reference number visible in the photo [17][18][13].

3. Ensure that personal items are stored in a place where they will be kept dry and not wear or degrade. These items should be stored until a body is identified and/or the effects can be returned to the family . Alternatively, they should be photographed, and photographic records should be kept on file with decedent records [17].

Records

Records for each individual decedent should be kept in an electronic file attached to the body's unique reference number (see Figure 8 for an example). If not an electronic file, then hard copies should be kept in a secured place in the examination facility [17]. Records should include:

1. Approximate age;
2. Weight;
3. Height;
4. Sex;
5. Possible ethnic affiliations [15][13];
6. The likely cause of death, if possible [17];
7. Lists of the personal effects, including specific descriptions of items found on or around the body, including jewelry, wallets, contents of wallets, etc. [17][15];
8. Descriptions of clothing, as well as tags and marks on said clothing [17];
9. Descriptions of obvious marks on the body, e.g. tattoos, moles [17][15];
10. Descriptions of obvious injuries on the body, e.g., scars or more recent wounds [17][15]; and
11. Descriptions of any prostheses. If these include serial numbers, these should be recorded and tracked as a means of identifying their owner, the decedent [15].

For identified bodies

1. Full name;
2. Date of birth; and
3. Any other particulars related to the person's identity [17].

For Mass Fatality Incidents (e.g., motor vehicle accidents) record

1. The time elapsed since the incidents;
2. The number of bodies involved;
3. A description of the general state of remains at the incident; and
4. The names of the people who have died in the same incident [17].

Photography

Photography should take place once the body reaches autopsy facility. Details for photos taken at the scene of discovery will be found in the section on Recovery.

A body's unique reference number should appear in all photographs, whether it is written on a piece of paper included in the photograph, on a whiteboard, or other similar material [17] [13]. The preferred medium of photos is a digital camera, such that images can be stored in unique files associated with each decedent [15].

Facial Photos

1. Facial photos must be taken, with the face taking up the full frame of the image [15] [18][19]. The face must be cleaned before the photo is taken, to the extent possible[18][13].
2. Additionally, photos of the teeth must also be recorded, including:
 - A view of the closed mouth with lips retracted to show the front teeth [15], and
 - Dentists should be consulted as to the specific other angles needed for correlation with their records [15].
3. Close up photos of parts of the mouth showing specific dental procedures or abnormalities should be taken [15]. Again, forensic anthropologists working on the border have conducted studies correlating specific dental characteristics to regions of origin for undocumented migrants [22][24]. As such characteristics could prove essential for narrowing down the identity of a decedent, these characteristics should be photographed.

SUPPLEMENTAL AUTOPSY PROTOCOL FOR UNKNOWN PERSONS

ML # _____ Dr. _____ Date _____

Name association: _____

Source of name association: _____

UBC: Y N Likely

Viewable face: Y N Partially

Fingerprints obtained: Y N Pending

Hands removed: Y N

Body Condition Stage: 1 2 3 4 5 6 7 8

Estimated PMI: _____

FEATURES OF IDENTIFICATION

Sex: M F ? **Estimated Age:** _____ **Complexion:** _____

Height: _____ inches **Weight:** _____ pounds **Teeth:** _____

Head Hair: Color _____ Length _____ **Facial Hair:** Mustache Goatee Beard

Scars/Marks/Piercings (size, shape, location): _____

Tattoos (description, location): _____

Other unique features: _____

Figure 8: Supplementary autopsy forms from the Pima County Office of the Medical Examiner. These ensure that PCOME gathers necessary data to facilitate future identification of unknown persons, especially useful given the high number of UBC remains examined by this office. As will be further explained in the next section on Identification, many UBC remains enter the medical examiner's office as John or Jane Does.

Body Photos

1. Full length photos of bodies should be taken [15][13].
 - The subject of the photo should take up the full frame of the image [15][13].
2. Overlapping photos of the upper and lower portions of the body should also be recorded [15][13].
3. If the body is skeletonized, ensure full body photos are taken, as well as individual photos of unique skeletal features [18].

Tattoos and Markings

1. Note any obvious injuries, and photograph them [15][13].
2. When dealing with individual marks, a scale should be visible in the picture to provide reference as to the size of the marking [15].
3. Consult with forensic pathologists as to whether specific/more detailed photos of certain abnormalities or pathologies should be taken [15].

Personal Effects

1. In addition to personal effects being photographed in situ during recovery, they must also be cleaned and photographed during the external exam [15][13].
2. These must be photographed with a macroscopic lens in front of a non-reflective background to ensure full display of item details [15].
3. All distinguishing features of personal items must also be individually photographed, including clothing labels and credit card numbers, among other things [15].
4. Photos of all markings and labels on body bags should be recorded [15].

Autopsy

Autopsy Objectives

1. These include, identifying cause and manner of death;
2. Establishing a postmortem interval between death and recovery;
3. Finding the identity of the decedent / obtain samples for identification; and
4. Documenting injuries and evidence that could be of benefit to legal investigators and others attempting to identify the victim [15].

Internal examination should only be conducted by individuals with medical training and credentialing. This manual is not meant as a technical guidebook for conducting an autopsy. Rather, this section simply outlines the important role of the procedure in a body's postmortem itinerary.

Autopsies are mandatory for cases of suspected foul play, unknown or unattended deaths, and unidentified remains [15][13]. As UBCs are commonly recovered from the wilderness, their cause of death should never be assumed and each individual should be autopsied to investigate both cause of death, and to take forensic samples which could lead to the individual's identification.

As an autopsy is conducted, a forensic pathologist and autopsy assistant should be present, and all instruments should be cleaned to prevent contamination of the physical evidence [15].

A supplemental autopsy protocol for unknown persons as elaborated by the PCOME (see Figure 8) should be adopted as a high number of UBCs are unknown. The following checklist enumerates the best practices that should be followed for unidentified remains.

Autopsy Records

1. Note any internal scarring, or other evidence of past surgical procedures as well as medical devices implanted through intrusive procedures [15].
 - Devices inside of the body such as intrauterine devices and pacemakers should have serial numbers that can be used as a direct means of correlating the decedent with his or her identity [15].
2. Note aspect and position of external injuries and broken bones [15].
3. Describe position and visible patterns of traumas to the body, internal and external, including: bleeding, fractures [15].
4. Note previous surgical procedures and internal implants [15].
5. Note unique/distinguishing anatomical features of decedent [15].

Samples

Samples should be taken from all unidentified bodies for toxicology and DNA [15] (see sections on Databases and DNA).

Forensic Anthropology

Anthropological examinations should only be conducted by individuals with advanced training and usually, a Ph.D. in forensic anthropology.

Due to highly decayed remains of body found on the border, forensic anthropologists should be utilized much more often than in other contexts.

1. Forensic anthropologists should work in close cooperation with the forensic pathologists assigned to the decedent [18].
2. As pertains to highly decayed, mummified or skeletonized remains, the profile of individuals created by forensic anthropologists can reveal basic identifying characteristics that are unattainable through the pathology exam alone. These otherwise unattainable characteristics used to establish deceased UBCs include:

- facial approximation [25],
- sex [26],
- stature [27],
- age [28],
- ancestry [29],
- a history of trauma [30],
- pathologies [31],
- and taphonomic processes that a body might have undergone before recovery [32].

Body Storage

1. Storage should be in a facility with secure entry [17]. Bodies should not be stored in a location readily accessible to the general public [17].
2. The location should facilitate the loading and unloading of bodies by transport vehicles [17].
3. The facility should include a separate area with a water source and drainage, as well as a place for cleaning and drying, especially when consistently dealing with older and/or desiccated remains [17][15].
4. Bodies should be stored at a temperature of approximately 40 degrees Fahrenheit [17] [15][13].
5. The location should be dry [17].
6. If dry ice is used for cooling, it should not be placed in direct contact with the body as it can cause burns [15][13].