

New Mexico Mass Fatality Incident Plan

2012 Mass Fatality Plan Working Group

New Mexico Office of the Medical Investigator

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Executive Summary

The New Mexico Office of the Medical Investigator (OMI) developed a mass fatality plan (MFP) to describe how OMI will respond to any event resulting in a number of fatalities that overwhelms OMI's capacity. The MFP assigns roles and responsibilities to OMI staff members, describes how OMI will coordinate response activities with other agencies, and provides specific instructions and contact information for varied mass fatality incidents (MFIs), from aviation disasters to chemical releases to influenza pandemics.

In the event of a MFI, OMI will be tasked with removing remains from the scene of the MFI, certifying cause and manner of death, identifying decedents, and returning remains to next-of-kin when possible. These tasks will be accomplished in a manner that ensures the health and safety of responding personnel and respects the dignity of the victims throughout the process. The goal of the MFP is to coordinate OMI's response to MFIs and outline preparations for the contingencies arising from large numbers of bodies, while maintaining day-to-day operations.

When responding to a MFI, OMI will use the Incident Command System (ICS) to deploy resources and personnel and interact with other agencies responding to the event. This is part of the National Incident Management System (NIMS), which is designed to provide a standardized management approach to emergencies for all responding local, state, tribal, and federal government agencies.

The Chief Medical Investigator or designee (Chief) will be responsible for the activation and management of the MFP and will report to the Incident Commander (IC). The Chief will determine which of the three levels of response (local, regional, state or higher) is needed and request appropriate aid, including Disaster Mortuary Operational Response Teams (DMORT). The Chief will designate a Director of Field Operations (DFO) who is responsible for coordinating the recovery of remains. A designated Communications Director will oversee interactions with other responding agencies. OMI personnel, as well as volunteers qualified to assist with mortuary procedures and family aid, will report to the Chief or their designated supervisor and director.

Specifics of morgue operations will depend on the location and size of the MFI and are detailed in the plan. During the response to a MFI, OMI personnel may be called upon to assume additional roles and responsibilities beyond their routine job descriptions and work closely with first responders, hospital personnel, DMORT members, funeral directors, and non-governmental organizations providing victim assistance. OMI's response is considered a component of New Mexico's All-Hazard Emergency Plan, drawing on OMI's expertise in the safe handling of remains. OMI's MFP provides a framework for a strategic response to a chaotic event with elements that can be scaled for size and tailored for the type of event.

Table of Contents

Executive Summary	2
Table of Contents	4
Abbreviations	6
Introduction	7
Notification and Activation of Plan	9
Mass Fatality Plan Organization Chart	12
Biosafety	13
Mass Fatality Incident Scene Evaluation, Organization, and Operation	18
Morgue Operations	25
Mass Fatality Administrative Support	36
Public Communications	37
Financial Support	39
Information Technology	40
Religious and Cultural Considerations	41
Family Assistance	45
Plan Maintenance and Implementation	53
Summary including Activation of Plan	55
Appendices (see following page)	A-Z

Appendices Table of Contents

Appendices

Hospital Contact Information	A
Funeral Home Contact Information	B
Language Interpretation Contact Information	C
OMI Consultants Contact Information	D
Religious/Spiritual Contact Information	E
Cultural Resources Contact Information	F
Potential Locations for Family Assistance Center	G
Letter of Support for IT	H
Investigation of Remains – Autopsy Protocol	I
BSL 3 – Autopsy Protocol	J
Infectious Diseases	K
Autopsy Floor Plan	L
Exposure/Accident Report Form	M
Pandemic Influenza	N
Bioterrorism	O
Conventional Explosives	P
Nuclear Detonations/Radioactive Contaminations	Q
Chemical Releases	R
Hazardous Materials- EMO – Albuquerque	S
Natural Disasters	T
Fires	U
Aviation Disasters	V
NM OMI MFI Odontology Manual	W
Article on Biologic Terrorism	X
Radiology Manual	Y
Radiography Requirements – ASFR 2007	Z

Abbreviations

BSL: Biosafety Level

CMO: Chief of Morgue Operations

DFO: Director of Field Operations

DMI: Deputy Medical Investigator

DMORT: Disaster Mortuary Response Teams

EMS: Emergency Medical Services

FDMI: Field Deputy Medical Investigator

FDS: Field Deputy Supervisor

FTL: Finger Print Team Leader

HAZMAT: Hazardous Materials

IC: Incident Commander

ICS: Incident Command System

NMSEOC: New Mexico Emergency Operations System

MECs: Medical Examiner/Coroners

MFI: Mass Fatality Incident

MFP: Mass Fatality Plan

NIMS: National Incident Management System

OMI: Office of the Medical Investigator

PPE: Personal Protective Equipment

SEC: Supervisor of Evidence Collection

UNMH: University of New Mexico Hospital

Introduction

Mass fatality planning is an often-overlooked component of emergency preparedness. Attention and resources tend to be focused on triage, surge capacity, evacuation, and medical management of survivors without much regard for the safe handling and removal of human remains. To be truly prepared for disasters of all causes and scope, local, state, and national agencies must create plans for appropriately responding to a MFI, which is defined as an event in which the number of human bodies to recover, examine, and identify overwhelms local resources.

Overall, the US has been relatively lucky, suffering only seven disasters (excluding wars) that resulted in one thousand fatalities or more. Prior to the 20th century, disasters were primarily natural in cause, shifting to more technologically-based events in more recent history. An epidemic of influenza in 1918 killed 650,000 US residents, with over 20 million victims worldwide. In more recent history, the bombing of the Alfred P. Murrah Federal Building in Oklahoma City in 1995 claimed 168 lives, the 2001 terrorist attacks claimed 2,972 victims in one day, and Hurricane Katrina, the deadliest hurricane to strike the Gulf Coast since 1928, claimed over 1,300 lives. In contrast, the 2004 tsunami in South Asia claimed 165,708 lives in Indonesia alone.

MFI planning must include detailed, up-to-date operational procedures for safe, swift, effective responses to diverse events, from pandemic influenza epidemics to terrorist attacks to nuclear detonations. Given the recognized role and unique expertise of medical examiners and coroners (ME/Cs) in responding to fatalities of all types, ME/Cs should be at the forefront of developing MFI response plans, working with multidisciplinary response teams to ensure that previously identified best practices are followed in the wake of catastrophe.

In order for New Mexico to be as highly prepared for an MFI as possible, the OMI, the statewide, centralized medical examiner's agency, has written the following MFP in conjunction with the New Mexico Department of Health (NMDOH). A multidisciplinary team developed the plan, with each member bringing unique experience and perspective. Drawing on the experience of other jurisdictions, published best practices, and knowledge of local challenges, OMI has assembled a

plan that is as far-reaching yet as detailed as possible. While ideally this plan will never be needed, it is better to “hope for the best, but prepare for the worst.”

The plan is presented in a general, “all-hazards” approach first, giving information about the roles of staff members, needed facilities, biosafety procedures, and responses that will be common to OMI’s response to an MFI. More detailed information based on types of MFIs (aviation disasters, bioterrorism, pandemic influenza, natural disasters, nuclear releases, etc.) is included in the appendices. These appendices include contact information for relevant participating agencies, special equipment and personnel needs for specific MFIs, and concerns that may be unique to certain types of MFIs. Copies of OMI’s MFP will be available in both electronic and hard copy formats at OMI’s office, as well as being distributed to other responding agencies and stakeholders. Contact information will be updated annually, and, where possible, a general title or position will be given rather than the person currently occupying that position (Chief Medical Investigator, Director of Information Technology, Office Manager, etc.). Questions regarding the content of this plan can be directed to OMI at its toll-free number, 1-800-432-5239.

Notification and Activation of Plan

The Office of the Medical Investigator (OMI) investigates any death occurring in the state of New Mexico that is sudden, violent, untimely, unexpected or when a person is found dead and the cause of death is unknown. This would include any mass fatality incident in our jurisdiction. The OMI will take responsibility for the removal, storage, examination, identification, and certification of death of the fatalities.

The OMI Central Office is located in Albuquerque, NM and has eight Forensic Pathologists who are designated as Medical Investigators. Deputy Medical Investigators (DMIs) conduct scene investigations and live locally in or near the counties they serve. Deputy Medical Investigators who work at the OMI in Albuquerque are Central Office Deputy Medical Investigators (CODMIs) while those outside the Albuquerque office are Field Deputy Medical Investigators (FDMIs). Every county in New Mexico is served 24 hours a day and 7 days a week by a Deputy Medical Investigator.

In the event of a mass fatality, the county or city Emergency Manager would activate the OMI using the current framework for all reported deaths. This framework would start by contacting the OMI through the local 911 dispatch center. An alternative would be to contact the OMI Central Office (505 272-3053 or 1 800-432-5239).

The Chief will be responsible for the MFP activation and management and may appoint the Mass Fatality Incident Commander (Commander).

The OMI may become aware of a MFI by a variety of sources: from the local first responder at the incident site, from the media, or from the state or other emergency notification system. The OMI contact will notify the Chief or his designated on-call representative as soon as there is a known or suspected MFI.

In many instances of a MFI, the New Mexico State Emergency Operations Center (NMSEOC) will be activated. In that situation, a representative of the OMI appointed by the Chief will report to the New Mexico State Emergency Operations Center. The Chief will report to the Operations Section Chief during the period of the MFP activation. See NMSEOC for executive summary of OMI interaction with the NMSEOC and the National Incident Management System (NIMS).

If the Governor of the State of New Mexico has declared a state of public health emergency, the OMI will follow the New Mexico Statutes (12-10A-5 and 12-10A-6.C) passed by the New Mexico Legislature in 2003 and will first consult with the

Secretary of the Department of Health (NMDOH), the Secretary of the Department of Public Safety (DPS), and the Director and the Chairman of the Board of Thanatopractice in order to implement and enforce measures to provide for the safe disposal of human remains.

When the OMI becomes aware of an incident that may require activation of the MFP, the Chief will evaluate the incident to determine:

- 1) Jurisdiction over the incident
- 2) Potential or real number and location of remains
- 3) Condition of the bodies
- 4) Potential number of remains for autopsy
- 5) Level of difficulty in recovery
- 6) Types and numbers of personnel and equipment needed
- 7) Accessibility of the incident site
- 8) Possible biological, chemical, physical or radiological hazards
- 9) Level of personal protective equipment needed
- 10) Staffing needs

The Chief will then make a determination of the activation level of the plan. The Chief may alter the level of the response based on changing information or resources. The levels of response are:

- 1) Level 3 Response (Local)
 - a. An incident deemed by the local Field Deputy Medical Investigator (FDMI) as significant or high profile enough as to draw an unusual amount of media attention or outside agency response. However, the number and type of incident fatalities are within the capability of the resources (FDMI availability, transportation and storage capability, equipment, etc.) available for the county in which the incident occurred. The NMSEOC may or may not be activated. An example would be a natural disaster with few fatalities.
 - b. Notification should be made to the central office on-call or on-duty supervisor and pathologist via the on-duty central office investigator for determination of additional notification or resource activation. The Chief may activate the MFP if the incident requires additional resources or the response of specialized personnel. This level of activation of the MFP will usually be managed by sending specialized personnel to the scene of the incident to assist the FDMI and by coordination of transportation of the fatalities to the central office.
- 2) Level 2 (Regional)

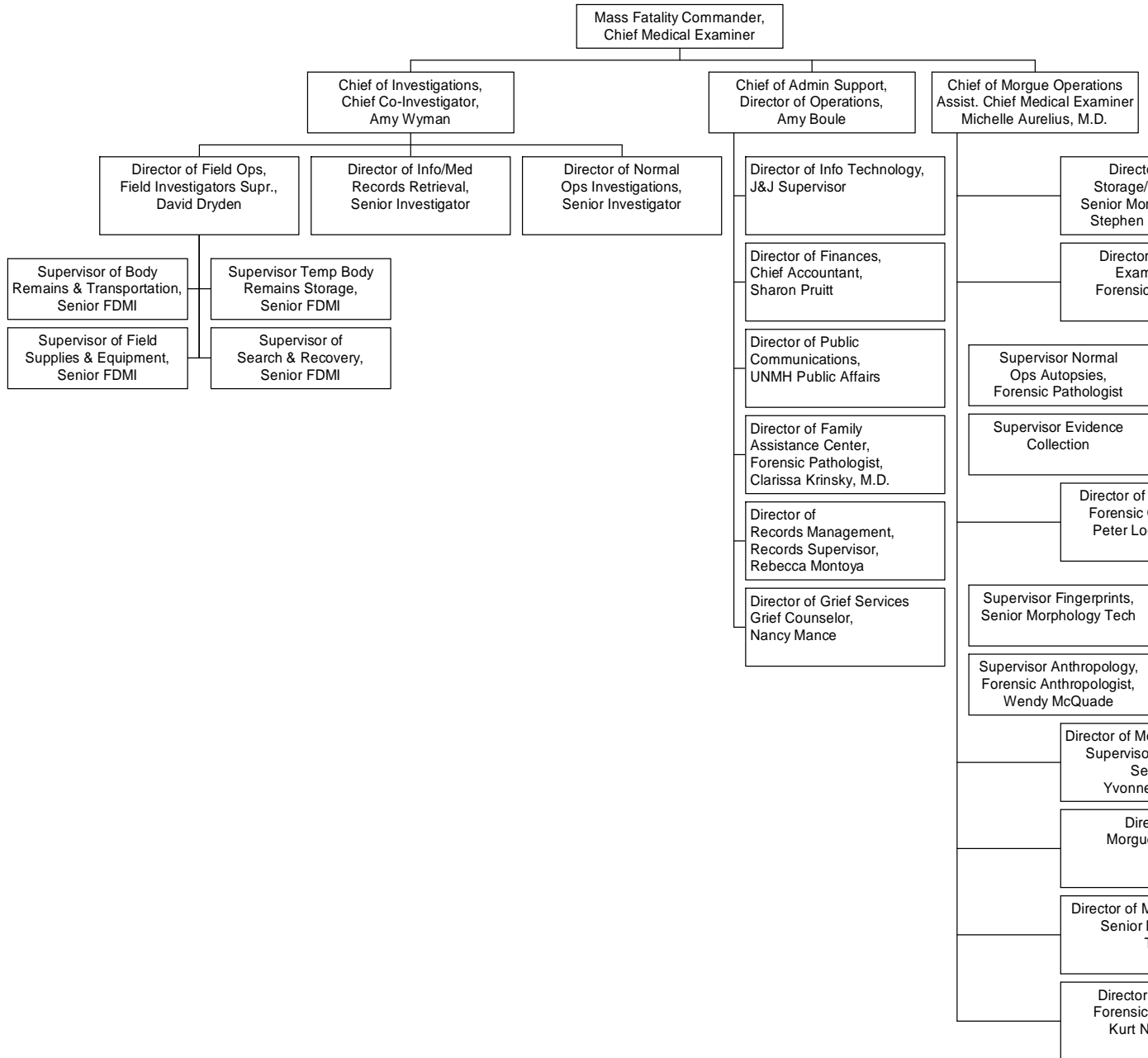
- a. An incident deemed not within the capability of the resources available for the county in which the incident occurred. However, it can be handled appropriately with the assistance of the resources of the surrounding counties.
 - b. The NMSEOC may or may not be activated.
 - c. Notification should be made to the central office on-call or on-duty supervisor and pathologist via the on-duty central office investigator for determination of additional notification or resource activation. The Chief will activate the MFP to provide additional resources and personnel to manage the incident. This level of activation can usually be managed by sending additional resources and personnel to the scene of the incident to assist in recovery and investigation, possible temporary storage of remains, and transportation of fatalities. However, the number of fatalities would not be beyond the capabilities of the resources of the central office.
- 3) Level 1 (State or higher)
- a. An incident deemed not within the capability of the resources available for the county in which the incident occurred and cannot be handled with the assistance resources of the surrounding counties or a declared disaster with large quantities of known, suspected, or anticipated deaths.
 - b. The NMSEOC will probably be activated.
 - c. After notification the Chief will activate the MFP and appoint the Commander.

The MFP is based on Incident Command System (ICS) core concepts and organizational processes. It is designed to work within the NMSEOC and the NIMS. It is also adaptable for any size of MFI and can be expanded or contracted as need arises. The following organizational chart highlights the key organizational structure of the MFP.

The Commander may request assistance from state and federal agencies as necessary. Federal assistance may be sought by the Governor through the Regional FEMA Administrator as per the Stafford Act requesting the Presidential declaration of a disaster.

The Commander will determine when to deactivate the plan.

New Mexico Mass Fatality
Organization Chart



Biosafety

Death scene investigators and autopsy prosecutors (personnel involved in assisting or conducting autopsies) need to be protected from a variety of biohazards. These biohazards are sometimes suspected based on symptoms and other clinical information (e.g., epidemic of a certain disease) or latent (e.g., tuberculosis). Protections include policies and procedures, personal protective equipment (PPE), (please refer to PPE on and off procedures in Appendix I) and facility design. Investigators are exposed principally to blood borne pathogens (e.g., human immunodeficiency viruses and hepatitis viruses). However, when interviewing family members and representatives of a decedent who are sick with the same illness, investigators might also be exposed to airborne pathogens such as influenza viruses. Autopsy prosecutors can be exposed to both bloodborne and airborne pathogens.

Risk Assessment

In a mass fatality event, the OMI biosafety officer and Chief shall conduct a risk assessment and shall inform OMI investigators and autopsy staff, volunteer staff (e.g. DMORT representatives), and the IC of the appropriate biosafety level for investigations and body removal as well as autopsy work. Biosafety Level (BSL) 2 is required to provide protection from bloodborne pathogens. Primary barrier equipment must be used such as face shields, gowns and gloves. BSL 3 is required to provide protection from airborne pathogens. More emphasis on primary and secondary barriers is enforced and access to the work area is strictly controlled. BSL 4 is required to provide protection from exotic viruses that cause highly fatal infections for which there is no cure (e.g., Ebola virus).

Autopsy

Facility Design

The present OMI autopsy suite is designed to function at BSL 3. In the event of a risk assessment that indicates a need for a BSL 4 facility (e.g., potential viral hemorrhagic fever cases), the OMI will consult with the Centers for Disease Control and Prevention (CDC) to develop an appropriate response. Potential appropriate responses could include not performing autopsies and obtaining skin biopsies for immunohistochemical analyses and transporting the bodies to a federal BSL 4 facility such as the United States Army Research Institute of Infectious Diseases).

In a mass fatality event that requires a portable morgue to handle remote autopsy examinations away from the main OMI facility, the Chief and the OMI Biosafety Officer shall discuss the biosafety requirements for such a facility with the IC. DMORT portable morgues can function at BSL 2. If BSL 3 is required, a unique temporary facility might need to be constructed. If BSL 4 is required, these cases should not receive autopsies in a remote portable facility unless the facility has been certified as meeting BSL 4 standards.

Personal Protective Equipment (PPE)

OMI personnel currently wear PPE that provides BSL 3 protection in all cases. Such protections should be maintained in a mass fatality event whether the autopsies are performed in the main facility or remotely. The PPE includes surgical scrubs, surgical gown, impervious apron, shoe covers, impervious sleeves, N-95 or powered air purifying respirator (PAPR), face shield, surgical cap, 2 layers of surgical gloves, and an interposed pair of Kevlar mesh undergloves (See Appendix I).

Policies and Procedures

The current policies and procedures allow OMI prosecutors to function at BSL 3. If the risk assessment is BSL 4, the OMI Biosafety Officer will consult with the UNM Biosafety Officer and the CDC Office of Health and Safety to determine how to safely transport bodies to a BSL 4 facility.

Investigations and Body Removal

OMI Deputy Medical Investigators (DMI)

The following tasks conducted by scene investigators have potential risks of exposure:

- 1) Scene Investigation
- 2) Handling of bodies, blood, fluids, tissue, or contaminated personal property accompanying bodies
- 3) External examination
- 4) Processing toxicology samples, evidence, or items of property from the body
- 5) Interviewing families and friends who were exposed to a decedent's illness prior to death

For purposes of understanding what precautions the investigators should take while conducting an investigation, responses can be divided into four categories – clean, blood contaminated, contaminated by other substances, and working with possibly infectious families.

Clean: A natural home death where there is no blood or body fluids present and the decedent and family members did not have flu-like symptoms or other symptoms that could be caused by an infectious disease. In this situation, the FDMI must wear protective gloves at a minimum.

Blood contaminated: This term is an assumption about the condition of an item, person, or location. The assumption is that a soiling or potential soiling has occurred or can occur that has the potential to injure, infect, or somehow harm a person or property. **UNIVERSAL PRECAUTIONS**: Universal precautions is an approach to infection control to treat all human blood and human body fluids as if they were known to be infectious for HIV, HBV and other bloodborne pathogens.

Required protective equipment: For those participating in an external examination or conducting a scene investigation in which there is a large amount of blood and body fluid present, a full suit is required, including protective gloves, plastic apron, surgical mask, shoe covers, oversleeves, and protective eyewear, which must be worn for the duration of the examination and until the scene investigation is complete. For those participating in the handling of personal property accompanying bodies, items of property from the body or scene, processing toxicology samples, or conducting scene investigations that are clean (no blood or body fluids visible), protective gloves are required.

Contaminated by other substances: This term describes any situation in which body fluids are not present; however, other contaminants are most likely present that could pose a risk for responders. This would include nuclear, radioactive, chemical, or infectious agents. Processing these scenes requires coordination with hazardous materials (HAZMAT) personnel. HAZMAT personnel and potentially Federal DMORT Teams (e.g. weapons of mass destruction) will be required to decontaminate the scene and bodies before they can be processed by OMI personnel.

Working with possibly infectious families: When OMI Investigators need to interview family members who appear to be ill or are sneezing or coughing, they should request that the sick individual wear a surgical mask during the interview. In addition, the investigator should wear an N-95 and eye protection. At the conclusion of the interview and after exiting the dwelling, the investigator should wash their hands or use hand sanitizer.

Preventing Exposures

Investigators will encounter an extremely diverse range of potential scene situations. DMIs should assess each scene prior to entry to determine what contamination exists and the appropriate PPE to wear. Personnel should ensure that any cuts or abrasions are covered with bandages. Cross-contamination should be avoided in the sense that used PPE equipment must be removed and placed in a red biohazard waste container. Personnel should wash their hands with antimicrobial soap or hand sanitizer before touching any clean areas.

When handling sharp items, whether equipment, evidence, or other articles, every care must be made to prevent puncturing the skin. The recapping of needles should be avoided. If there is no alternative to re-capping a needle i.e. no sharps container, the one handed scoop method should be used. Place cap on counter top and “scoop” it up with the needle. After they are used, needles, scalpel blades, and other sharp items should be placed in puncture-resistant containers for disposal; the puncture-resistant containers should be located as close as practical to the use area. The puncture-proof container must be clearly labeled with "DANGER SHARPS".

Investigators should wash hands or use a hand sanitizer after removing gloves and other PPE. All equipment should be disinfected using solutions of 70% ethyl alcohol, 70% isopropyl alcohol, or 10% household bleach. If an employee is exposed to blood or other potentially infectious material, post exposure follow-up and prophylaxis is provided by UNM Employee Occupational Health. If exposure occurs on a weekend, the employee must report to the UNMH emergency room for follow-up. If an employee has been potentially exposed, the following protocols apply:

- STOP WHAT YOU ARE DOING
- Remove any contaminated PPE
- Wash exposed skin with soap and water for a minimum of five minutes.
- Dispose of any contaminated clothes and materials appropriately
- Report incident to supervisor
- Report to EOC or UNMH ER or nearest emergency room for severe injuries

1. Employee Occupational Health
2400 Tucker NE,
Family Practice Center # 232
Albuquerque NM 87131
Phone 272-8043
2. University of New Mexico Hospital
2211 Lomas Blvd
Albuquerque New Mexico 87106
Phone 272-2111

Non-OMI Personnel

Emergency medical services (EMS), funeral homes, and contracted body removal services remove decedents from the location of death to a holding facility and to the central office. These personnel are responsible for their own protective equipment and procedures.

Mass Fatality Incident Scene Evaluation, Organization, and Operation

The purpose of the initial scene evaluation is to identify risks and safety hazards that might still exist on the scene, estimate the number of decedents or remains, determine the difficulties in processing the remains and the personal effects, and to communicate the information to the Chief.

The first concern in any investigation is to ensure that the scene is safe to enter. Law enforcement, federal agencies, and/or HAZMAT teams will make the initial determination when the scene can be entered and processed. Potential safety risks include biological, chemical, and radioactive agents, as well as those imposed by weather and terrain. The second concern is to tend to injured survivors. When these concerns have been addressed, the recovery process can proceed.

When the incident scene is determined to be safe for recovery of bodies/remains, the Director of Field Operations (DFO) will supervise the recovery operation.

Initial body recovery may be done by untrained volunteers or by agents from many agencies, which can lead to difficulty in controlling and properly documenting the scene. It is imperative to have law enforcement secure the scene and the OMI assume control of body retrieval as soon as possible. It is also imperative to remember that the site in many situations will be treated as a crime scene.

- 1) The DFO will be present at the scene and direct the activities of:
 - a. Search and recovery
 - b. Field supplies and equipment
 - c. Field transportation
 - d. Temporary body storage
 - e. The transportation of remains

- 2) The DFO will be responsible for:
 - a. Maintaining a record of all field activity
 - b. Evaluating the staffing and resources needed to investigate deaths of individuals who were removed from the scene and transported to emergency rooms and hospitals
 - c. Determining whether to establish a morgue facility at the site or transport the remains directly to the central office facility
 - d. Identification of a temporary holding facility for remains

- e. Communicating with the Commander and the central office on a regular basis
 - f. Coordinating with appropriate agencies to ensure that security is established around the scene so that access is controlled; and remains, personal effects, and evidence are not moved or disturbed
 - g. Establishing an investigation, search and recovery
 - h. Supervising the storage of remains, personal effects, and evidence at a temporary storage site
 - i. Supervising the transport of remains, personal effects, and evidence to a permanent examination site
 - j. Dividing OMI responders into appropriate teams with specific duties and designating team leaders
- 3) Search and recovery teams may consist of:
- a. OMI investigators
 - b. Forensic pathologists
 - c. Forensic anthropologists
 - d. Forensic odontologists
 - e. OMI photographers
 - f. OMI morphology technicians
 - g. Law enforcement or other representative from another agencies
 - h. Volunteers
 - i. Ideally one representative from each of the above in each team
 - j. A team leader will be assigned by the DFO

Guidelines For the Search and Recovery Teams

Since search and recovery team members may encounter a diverse range of scene situations, they should assess each scene prior to entry to determine potential contamination and hazardous exposure in order to use the appropriate PPE. They should follow these guidelines:

- 1) Make sure any cuts or abrasions are covered with bandages
- 2) Remove dirty equipment before touching clean areas
- 3) Prevent puncturing skin when handling sharp tool, equipment or evidence
- 4) Avoid recapping needles
- 5) Place used sharp instruments in puncture-resistant containers for disposal
- 6) Label used sharp instrument containers “DANGER SHARPS”
- 7) Wash hands or use hand sterilizer after removing gloves and PPE
- 8) Disinfect all equipment after use
- 9) Wear appropriate clothing for the scene conditions

Equipment and supplies for search and recovery include the following:

- 1) Protective clothing
- 2) Body bags or disaster pouches
- 3) Refrigerator trucks
- 4) Commercial trucks to transport remains
- 5) Tents
- 6) Flags for marking locations
- 7) Pre-numbered ID tags for bodies and property
- 8) Biohazard bags
- 9) Permanent ink pens
- 10) Photography equipment
- 11) GPS devices
- 12) Gridding equipment (stakes, compasses, twine, etc.)
- 13) Cell phones, radios, or other communication device
- 14) Computer equipment with software
- 15) OMI forms for individual case records, logs, etc.
- 16) ID badges for volunteers
- 17) Body boards for carrying bodies or remains
- 18) Clipboards
- 19) Flashlights
- 20) Evidence labels
- 21) Hardhats
- 22) Safety vests

Search teams should have the following clothing and should be adjusted to meet the conditions of the scene:

- 1) Heavy jacket
- 2) Work gloves
- 3) Raingear
- 4) Boots

Search teams will report to the staging area where:

- 1) A briefing by the DFO or IC will occur
- 2) Assignments will be given
- 3) Workers will be divided into teams

Initial Search

- 1) Search teams will conduct a thorough search of the disaster site using a line formation
- 2) All remains will be marked with a locator flag

Expanded Search

- 1) Teams will then establish a grid encompassing the site based upon the initial assessment of the scene
- 2) The site grid will then be further divided into grid squares. The sizes of the site grid and the grid squares are dependent upon size, location, terrain, and obstacle that exist at the site. All grid squares will be given specific labels (A1, A2, etc.)
- 3) Teams will be assigned to one grid square at a time and conduct a comprehensive search
- 4) A pre-numbered body identification tag will be attached to each body. The numbering system will not coincide with the numbering system used in the central office. Instead, it will differentiate the mass fatality victims. For instance, DV 0001 (Disaster Victim 1)

Each team will photograph and map with GPS readings remains and personal property that are located in their grid squares.

Personal Property

- 1) All items of property that are on the body should remain on the body (watches, rings, etc.)
- 2) A color-coded tag with the word "PROPERTY" and the grid square number printed on it is attached to all property or effects not attached to a body such as purses, briefcases, etc.
- 3) When it is evident that the property belongs to a body, include the body tag number on the property tag
- 4) When it is not apparent to which body the property belongs, number the property tag with reference to the location of the most proximate bodies. For instance, a tag might read "10 feet S.W. of #23, 13 feet N. of #24, etc."

Body Parts

- 1) When it is obvious that parts of the body belong to a particular torso, the recovery team shall place that part with the body to which it belongs
- 2) If it cannot be ascertained to which body a body part belongs, a color-coded tag shall be used with the words "PARTS" imprinted on it. Note and record the location of the body part in reference to the closest body
- 3) Each body part will receive a pre-numbered body identification tag

When all remains and personal effects are documented, they may be removed by placing them in a disaster bag or body bag. The bags will be sealed with evidence labels that contain the grid number, date of collection, the number from the pre-numbered body identification tag, and the initials of the person verifying the

contents. Additional photographs should be taken once the remains/evidence/property are removed. All efforts will be made to create an OMI case number prior to removal from the scene utilizing portable computer tablets and software.

Each team will completely document all remains and personal effects recovered prior to being relieved of their duties or starting another grid square.

The Filed Deputy Supervisor (FDS) will supervise the work occurring in the overall grid. All documentation should be turned over to the DFO before the end of shift change and before starting a new grid.

Emergency Room Deaths

In a mass fatality incident, first responders will report to a site and tend to sick and injured individuals. Many of those individuals will be transported to emergency rooms (ER) for treatment and may die from their illness or injuries. The DFO will need to establish an ER response team to attend to those decedents in a timely manner.

The team should consist of one or more investigators depending on the number of deaths.

ER response team responsibilities

- 1) ER response team should make all efforts to remove the decedents to a holding facility as soon as possible so as to keep the ER rooms available for live individuals
- 2) Response teams should obtain all medical records and antemortem blood specimens if collected
- 3) Identification photos should be taken of all decedents
- 4) In many ER deaths, family members will come to the hospital. They can make a positive identification and provide demographic information. When working with families who might be sick, in the case of pandemic influenza, bio-safety precautions must be taken. (Refer to appendix on pandemic influenza.)

Equipment Required

Since there is no need for search and recovery and no need to map bodies and their personal belongings, the equipment required is primarily PPE for the investigator, materials for properly packaging decedents, and cameras.

Removal and temporary storage of remains

The OMI currently has agreements with funeral homes, hospitals, and EMS throughout the state for the removal and temporary holding of remains. These can be used in cases of a mass fatality but may quickly become overburdened. The DFO is responsible for identifying and securing a temporary holding facility and transportation to the facility.

- 1) Temporary storage facilities (in order of preference)
 - a. Funeral homes and hospital morgues
 - b. Refrigerator trucks
 - c. Portable morgue trailers (currently NOT obtained)
 - i. Deployment location of the trailers to be determined based upon anticipated case load, space availability, and ease of access for transportation purposes
 - ii. The three portable morgue trailers will be housed in the following locations:
 1. Las Cruces:
 - a. Mountain View Hospital, 4311 E. Lohman Ave., Las Cruces, NM 88011
 2. Farmington:
 - a. San Juan Regional Medical Center, 801 W. Maple Street, Farmington, NM 87401
 3. Albuquerque:
 - a. New Mexico Office of the Medical Investigator, 1101 Camino de Salud NE, Albuquerque, NM 87102
 - d. Temporary morgue
 - e. Temporary burial trenches
 - i. About 5 feet deep
 - ii. At least 700 feet away from drinking water sources
 - iii. Bodies in body bags placed side by side, not stacked
 1. If trenches cannot be dug, group bagged bodies in clusters of 20 (not stacked) with two feet of dry ice in a low wall around each group and cover with tarps. Do not place regular ice on bodies.
- 2) Transportation
 - a. Funeral homes
 - b. Contracted transporters

- c. Contracted long distance transporters that can be pulled into the response area for assistance
 - d. EMS (however, they may be tied up tending to the injured)
- 3) Remains should be properly handled following these guidelines:
- a. In the event of muddy or wet conditions, body bags should be placed on wooden pallets
 - b. All identification tags will be verified by the team leader before being removed from the site
 - c. Body bags containing remains shall be placed shoulder-to-shoulder while awaiting transport and shall not be stacked
 - d. Remains should be screened from public view as best as possible
- 4) Chain of custody of remains
- a. A team member shall be assigned to the temporary storage facility to oversee the receiving of remains
 - b. An accurate log of the remains shall be maintained indicating the case number, the date and time the remains were received, the name of the transporter and the date and time the remains are released
 - c. The team member at the storage facility shall ensure the facility is secure

Morgue Operations

The major purpose of morgue operations is to identify the remains and determine the cause of death.

Chief of Morgue Operations (CMO)

In any mass fatality, the activities in the morgue will be under the control of the CMO who will be appointed by the Commander. Depending on the type and extent of the mass fatality, the CMO may be the Chief or other faculty member. If the extent of the mass fatality requires operation of more than one shift per day, there may be a Deputy CMO.

Responsibilities of the CMO

- 1) Designate a Director for Morgue Body Storage and Gatekeeper (Gatekeeper). The Gatekeeper will manage the movement of remains and bodies into and out of the examination area from the storage facility (permanent or temporary). They will document entry and exit of all bodies or remains using the OMI IT human remains tracking system designed for mass fatalities. The Gatekeeper should preferably be a senior morphology technician knowledgeable in the OMI IT mass fatality tracking system.

- 2) The number and complexity of the different examination stations will depend on the type and extent of the mass fatality. The CMO will determine the location and space for each station. The CMO will designate a Director of Autopsy Examinations and a Director of Identifications. Each station will have a team leader that will be assigned by either the Director of Autopsy Procedures or the Director of Identifications. The CMO will be responsible for determining which station and in which order the bodies or remains will circulate through the stations. In general, the different stations will include one or more of the following functions. (If the morgue operations are conducted at the permanent OMI, the recovery of personal effects/trace evidence, photography, specimen collection, and autopsy evaluation functions will likely take place at the same station.)
 - a. Radiology (CT scan)
 - b. Recovery of personal effects/trace evidence
 - c. Photography
 - d. Specimen collection
 - e. Autopsy evaluation
 - f. Anthropology

- g. Odontology
 - h. Fingerprints
 - i. Specimen processing
 - j. Normal operations
- 3) Determine the need for additional professional/technical personnel to assist at the different stations by activating the established mass fatality forensic specialists resource plan. The plan includes names and contact information for forensic specialists that might be needed beyond the current professional staff. See appendix D for lists of forensic specialists and their contact information.
- a. Pathologists
 - b. Anthropologists
 - c. Odontologists
 - d. X-ray technicians
 - e. Morphology technicians
 - f. Radiologists
- 4) Designate a Director for Morgue Operations Supplies (Supplies Director). The Supplies Director will be responsible for providing each station with adequate supplies and anticipating and communicating those needs to Director of Finances. The Supplies Director may also serve as the Director for Morgue Office Personnel and/or the Director for Morgue Operations Security.
- a. The Supplies Director has the following responsibilities:
 - i. Order and purchase of supplies through the Director of Finances
 - ii. Receive and verify all shipping documents
 - iii. Maintain ordering and shipping records
 - iv. Maintain supplies and rotating stock
 - v. Perform inventory
 - vi. Maintain housekeeping of warehouse

The Supplies Director may be the same person in the OMI who is responsible for maintaining inventory of readiness for a MFI.

- 5) Designate a Director for Morgue Operations Personnel (Personnel Director). The Personnel Director will track and post work schedules and coordinate relief personnel for the different stations.

- 6) Designate a Director for Morgue Operations Security (Security Director).
The Security Director will monitor and enforce security guidelines set up by the CMO for entry to and exit from the examination area and body accessioning area.
- 7) Conduct a briefing session at the beginning of each shift, which will include
 - a. Receive input from each function leader
 - b. Give update of progress of mass fatality examinations
 - c. Orient new staff
 - d. Review safety features

In most mass fatalities, bodies/remains will pass through a succession of workstations each with its own function. The number of workstations for each function will depend on the size and type of the mass disaster. Effective and organized workstations at the morgue facility provide for an orderly and consistent operation and reduce the potential for error.

Function # 1 - Gatekeeper

The Gatekeeper is responsible for monitoring and documenting the entry into and exit from the examination area of all bodies and remains. This function will be under the control of the Gatekeeper. This function is not responsible for entry into or exit from the examination area of personnel; that is the responsibility of the Director for Morgue Operations Security.

In the permanent OMI morgue, the Gatekeeper will operate out of the accessioning office using two stations, one for entry and one for exit. In a temporary morgue, the Gatekeeper will set up a workstation to monitor the physical movement of bodies and remains into and out of the examination area. There will be either one or two workstations for this function depending on the size of the mass fatality. If two workstations are necessary, one workstation will handle entry and one workstation will handle exit. Each workstation will be manned by a data entry person knowledgeable in the OMI mass fatality IT database system and one or two morphology technicians.

Responsibilities of the Gatekeeper

- 1) Assure that all bodies or remains enter or exit the examination area in a sealed body bag or other appropriately sealed container

- 2) Electronically enter the date, time, and identification information of each body or remains as it enters the examination area
- 3) Print labels and armbands as necessary
- 4) Weigh body bag with body or remains
- 5) Photograph body bag seal
- 6) Per instructions by the CMO, make a routing assignment through the different stations
- 7) Electronically enter the date, time, and identification information of each body or remains as it exits the examination area
- 8) If during examination at any of the stations, the body, remains, or personal effects are split or merged, assure that the proper electronic entries are made and the exiting sealed body bag has the correct identification information
- 9) Assign escorts to accompany bodies or remains to and from the storage facility and to the proper workstations

Function # 2 - Radiology

The purpose of the radiology function is to capture radiologic images on each body or set of remains as necessary. The radiology team will have at least four members and will be led by a Radiology Supervisor who will be a radiologist, radiologic technologist (RT), or a senior morphology technician with imaging experience. Other members of the team will include a Radiation Safety Leader and two morphology technicians.

Responsibilities of Radiology Supervisor

- 1) Assign an RT, certified in Computed Tomography (CT), to acquire the initial radiology evaluation by performing full body CT
 - a) Morphology Technicians are not permitted to perform CT examinations.
 - b) Two Morphology Technicians are assigned to the CT area of imaging
 - i) Morphology Technicians aide in moving bodies and positioning
 - c) The RT monitors door ways for activity prior to initiating scan
 - d) Door chain affixed to scan room door as barrier device during radiation exposure
 - e) Automated 'Radiation Warning' dialogue employed prior to every radiation exposure
- 2) The body or remains are left in the intact body bag during full body CT scan.
- 3) Enter date, time, and type of examination into the OMI mass fatality IT database.

- 4) Perform radiographs as directed by CMO and Radiology Supervisor with as little disruption of body parts and personal effects as possible
 - a) RT's and Morphology technicians performing radiographs will place a marker on each radiograph indicating the decedents' assigned identification number
 - b) Specialized radiographs may be requested to aide specifically in identification with regard to incoming antemortem radiographs
 - 5) Enter digital film data into OMI mass fatality IT database using appropriate identification number
 - 6) If additional radiology, such as MRI, is requested by one of the other sections, the Radiology Supervisor will assign a RT trained in MRI to perform the examination and document data as above
 - 7) Any personnel working in the MRI Zone 111 (MRI control room area) or Zone IV (MRI scanner area) will be required to fill out a screening form for possible safety concerns with being in the magnetic field
 - i) Checklist kept on file with the Radiology Supervisor
 - 8) Only Level 2 MR Personnel will be permitted to assess safety checklist
 - i) Level 2 personnel include MRI technologists and Radiologists
 - a. Morphology Technicians are not permitted to perform Magnetic Resonance Imaging (MRI) examinations
 1. Morphology Technicians assigned to MRI duties will have accelerated safety training
 - a. MRI safe equipment available for any activity associated with MRI
 2. Body is screened using CT scan for ferromagnetic objects
- 9) Communicate needs for additional equipment, facilities, or supplies to the Supplies Director
- 10) Works with CMO to integrate post mortem radiologic examinations into the VIP system
 - a. Maintain an electronic log of all images
 1. Images from all radiology modalities are reviewed in the Picture Archiving and Communications System (PACS)

Responsibilities of the Radiation Safety Leader

- 1) Address and monitor radiation safety issues
 - a. Work with CMO to designate dedicated area to perform radiographs
- 2) Monitor radiation dosage of team members
 - b. Temporary Thermoluminescent Dosimeters (TLD's) will be issued to team members working near the radiology area

Function # 3 - Photography/Evidence Collection

This function will be under the management of the Supervisor of Evidence Collection (SEC). The purpose of this function is to photograph the body or remains as received and recover any necessary evidence. This function will also involve recovery and documentation of personal effects, including clothing, and, if appropriate, repeat photographs after cleaning and recovery. Since this may be a time-consuming function in a MFI, there may be many stations performing this function each under the supervision of an evidence collection leader. Each station should have a photographer and two morphology technicians, with at least one of them experienced in recovery and documentation of clothing and personal effects. A forensic pathologist may be assigned to this function if collection of evidence is an important feature of the MFI and would serve as the SEC. The SEC may cover more than one station. If more than one shift is necessary for this function, a Deputy Supervisor of Evidence collection would be named.

Responsibilities of the SEC

- 1) Assign the body or remains to a station
- 2) Oversee opening of the body bag
- 3) Instruct the photographer in type and initial extent of photography of body or remains as is
- 4) Determine the extent and sequence of clothing and personal effect removal and documentation
- 5) Determine the extent and sequence of removal and documentation of evidence
- 6) Determine the extent of cleaning or preparation of body or remains prior to sending to the next function
- 7) Determine which function is appropriate for the next portion of the examination (autopsy/anthropology/odontology)

Function # 4 - Autopsy Evaluation

The management of the Autopsy Evaluation function is under the supervision of the Director for Autopsy Procedures. The purpose of this function is to document injuries and natural disease on the outside of the body or remains and to perform an internal examination, if appropriate, with documentation of injury and disease.

This function may have many stations. Each station will be led by an Autopsy Procedure Supervisor who will be a forensic pathologist.

Each station will have two morphology technicians in addition to the forensic pathologist. One of the technicians will have experience in autopsy photography.

Responsibilities of the Director for Autopsy Procedures and the Autopsy Procedure Supervisors

- 1) Determine the extent of the examination; full autopsy or an external examination if the case is a body. If the case is only partial remains, determine extent of examination required.
- 2) Perform examination
- 3) Collect evidence as indicated by case
- 4) Properly collect cultures as indicated by case type
- 5) Properly collect toxicology samples as indicated by case type
- 6) Collect proper samples for DNA analysis
- 7) If there is a possibility of commingled remains, separate remains
- 8) Re-label separately packaged potentially commingled remains as a subset of the original identification number
- 9) Determine if the body or remains need to be sent to another function or back to the MOS for exit and re-storage

Function # 5 - Anthropology Evaluation

The management of this function is under the Anthropology Supervisor. The purpose of the anthropological examination is to evaluate fragmented, decomposed, mummified, burned, or skeletonized remains for identification, injury, or natural disease. The anthropology section may assist in two functional areas of the morgue: (1) assisting with the initial evaluation, documentation, and sorting of human remains from nonhuman remains and non-biological materials in the morgue triage, and (2) providing comprehensive forensic anthropological documentation of human remains in the morgue. The anthropologist may also be asked to provide additional types of analyses and support within the morgue. The anthropology function may have more than one station. If more than one station is necessary, each station will have an Anthropology Team Leader. Each station will have at least one forensic anthropologist and a morphology technician. The morphology technician will have photographic expertise.

Staffing and equipment needs may vary according to disaster-specific needs and the functional assignment of the section. Standard equipment needed to evaluate and document anthropological findings include the Victim Identification Program (VIP) software for recording anthropological data for each decedent, measurement tools (including calipers, etc.), a ring-light magnifier with clamp base, a digital camera with standard and macro lenses, camera tripod, photo lights, ultraviolet (UV) flashlights, and small digital scale. Examination of small bone fragments to determine origin (human vs. non-human) and trauma analysis may require examination by microscope with dedicated fiber optic light source (trinocular stereoscope with adjustable boom stand and dedicated digital image camera system).

In the triage area, the Anthropology Supervisor will assess the remains using an event-specific probative index to identify remains such as dental fragments or orthopedic appliances that are more likely to lead to identification and assign the body/remains to an anthropology station.

At the anthropology station, the anthropology team leader will:

- 1) Log in and document remains as they are processed at the anthropology station
- 2) Complete standardized forensic anthropology report forms (VIP software)
- 3) Evaluate and document the condition of the remains
- 4) If the remains are fragmented, describe the anatomical structure(s) present, indicate side, and if possible, assess biological parameters such as age, sex, ancestry, etc.

Responsibilities of the Anthropology Team Leader

- 1) Document measurements and morphology for identification (age, sex, stature, ancestry, antemortem trauma, pathological conditions, anomalies/idiosyncratic variation (surgical hardware, etc.)
- 2) Process the body or remains for appropriate anthropological evaluation
- 3) Collect samples for toxicology and DNA as appropriate for case
- 4) Repeat photography or repeat radiology evaluation as necessary
- 5) If evaluation reveals a possibility of commingling of remains, separate remains into containers and label as a subset of the original identification number
- 6) Document, remove, and save non-human and non-biological materials for proper disposal
- 7) Interpret perimortem trauma in consultation with the pathologist
- 8) Obtain and isolate dental evidence in consultation with the odontologist

- 9) Interpret and compare antemortem and postmortem records/radiographs and assist in identification (ID)
- 10) Examine identified remains prior to release to confirm that the biological profile used for ID matches the biological parameters of the remains
- 11) Determine the next function necessary or notify Anthropology Supervisor for decision to send to Gatekeeper exit and re-storage

Function # 6 - Odontology Evaluation

This function is under the management of the Supervisor of Odontology. The purpose of the odontology function is to evaluate each dental element for identification characteristics and evidence of injury or natural disease. The odontology function may have more than one station. Each station will be the responsibility of the Odontology Team Leader. Each odontology station will include at least one dentist and a technician. Dental elements will arrive at the odontology function directly from triage, autopsy, or anthropology. A detailed description of the operations of the odontology function is found in Appendix W.

Responsibilities of the Odontology Team Leader

- 1) Assign dental evidence to a odontology station
- 2) Take dental radiographs with a portable dental radiograph machine
- 3) Take photographs of oral structures and dental evidence as per established protocol
- 4) Process and/or clean specimen for better analysis if appropriate
- 5) Examine and chart dental elements
- 6) Compare dental elements data with dental radiographs or records of putative victims for preliminary identification. All final identifications will be confirmed by the CMO.
- 7) Determine if the body or dental elements are to be sent to another function or to the Gatekeeper for exit and re-storage

Function # 7 - Fingerprints

This function will be under the management of the Supervisor for Fingerprints. Since fingerprint comparison can provide for a positive identification, it is important in any mass fatality incident to obtain fingerprints whenever possible on all bodies or remains. Since fingerprint processing on remains that are fragmented, burned, or decomposed may be long and tedious, it will probably be necessary to have a separate station or stations for this function. Each station will be supervised

by the Fingerprint Team Leader (FTL). Each station will include one or more technicians and may include a fingerprint specialist.

Responsibilities of the FTL or Fingerprint Specialist

- 1) Obtain antemortem prints
- 2) Establish a log of antemortem prints and their source
- 3) Establish files of antemortem and postmortem prints
- 4) Coordinate with CMO before processing prints
- 5) Initiate and maintain an examination log
- 6) Photograph friction ridge surfaces prior to processing
- 7) Collect any trace evidence prior to processing
- 8) Print all available friction ridge skin on fingers and all available friction ridge surfaces on hand and feet if necessary
- 9) Document fingerprint process if special techniques are necessary
- 10) Compare antemortem with postmortem prints
- 11) Initiate automated searches
- 12) Communicate with CMO regarding comparison findings

Function # 8 - Specimen Processing

This function will be under the supervision of the Supervisor of Evidence Collection (SEC). The purpose of the specimen processing function is to assure that all specimens collected for additional testing (trace evidence, toxicology, microbiology, DNA) is properly documented, packaged, stored, and delivered. The SEC will be a senior morphology technician experienced in processing specimen. This function may require more than one team; one for each type of specimen (toxicology, trace evidence, DNA). Each team will have a team leader including at least two technicians.

Responsibilities of the SEC

- 1) Coordinate with each of the function leaders to receive and package specimens from the different stations
- 2) Document each specimen with its source, identification number, type of specimen, time of collection, and requested testing or type of storage
- 3) Properly maintain specimen in temporary storage (refrigeration, drying, etc.) prior to sending to proper long-term storage or to a laboratory
- 4) Maintain inventory of specimens

- 5) Coordinate with Director for Body Examination for needed equipment, supplies, or transportation

Function # 9 - Normal Operations

This function will be under the supervision of the Supervisor for Normal Autopsy Operations. The purpose of the normal operations function is to competently examine the non-mass disaster cases that routinely come to the medical examiner's office. A section/area of autopsy the room will be dedicated to normal autopsy operations.

Responsibilities of the Supervisor for Normal Autopsy Operations

- 1) Maintain communications with investigator assigned to normal operations to triage which cases need to be transported to central facility given the limited resources of the office
- 2) If morgue operations are at the central office, accept body directly from Gatekeeper
- 3) Photograph the body bag seal
- 4) Open the body bag and review information from investigations
- 5) Determine if radiology is necessary and, if so, use portable radiology unit
- 6) Conduct autopsy or external examination as necessary
- 7) Release body to Gatekeeper for exit and indicate readiness for next case
- 8) Assist mass fatality autopsy function if normal operations are completed

Mass Fatality Administration Support

The Commander will designate a Chief of Administrative Support (Admin Chief)

The duties of the Admin Chief are to:

- 1) Collect and analyze information on the current status of the MFI
- 2) Manage the resources to support the MFP
- 3) Obtain, order, maintain, and account for essential personnel, equipment, and supplies
- 4) Maintain incident facilities
- 5) Prepare summaries of incident progress
- 6) Arrange for transportation for support personnel
- 7) Maintain archives
- 8) Arrange for medical services to incident personnel as required
- 9) Manage demobilization of MFP
- 10) Provide daily summaries of incident progress to defined stakeholders electronically or by hard copy, as appropriate

Depending on the size of the MFI, the Admin Chief may designate directors of the following areas:

- 1) Director of Communications
- 2) Director of Information Technology
- 3) Director of Finances
- 4) Director of Family Assistance Center

Public Communications

The Admin Chief will assign a Director of Public Communications to be responsible for all public communications coming from the OMI regarding the mass disaster. In many instances, the Admin Chief will also serve as the Communications Director.

Responsibilities of the Communications Director are to:

- 1) Work closely with the State of New Mexico State Emergency Operations Center (NMSEOC) and, when necessary, the Public Affairs Officer of the University of New Mexico in making public statements concerning the mass fatality. Information should be accurate, consistent, timely, and pertinent
- 2) If the New Mexico All Hazards Emergency Operations Plan has been activated, the Communications Director will coordinate information with the communications department of the All Hazards Emergency Operations Command Center and the Joint Information Center to coordinate public statements concerning the mass fatality
- 3) Maintain communication with the Director of the Family Assistance Center to assure that no personal information or identifications are released to the public prior to notification of families
- 4) Provide daily summaries of public information to authorized stakeholders electronically or by hard copy, as appropriate

The Communications Director will manage the OMI information center for the mass fatality. Depending on the type and size of the mass disaster, the information center may be large or small. Members of the information center under the supervision of the Communications Director will include administrative and clerical employees of the OMI and at least one information technology support person from the OMI staff. Responsibilities of the information staff are to:

- 1) Coordinate flow of information between the functional units such as between site operations and morgue operations
- 2) Keep staff apprised of developments and progress during the mass fatality

- 3) Attend briefings with other agencies involved in the mass disaster such as law enforcement, hospitals, morticians, etc.
- 4) Receive and triage all requests from outside agencies for support or for information
- 5) Deal with all media requests and logistics
- 6) Generate reports regarding recovery operations, number of victims, and identifications
- 7) Generate reports regarding health and safety issues related to the mass fatality

If the incident site is removed from the morgue site and from the information center, the Communications Director may assign an Incident Site Communications Supervisor to accommodate the media at the incident site. The Incident Site Communications Supervisor working with the Communications Director will assure that the media representatives have appropriate access when possible without creating safety hazards.

The Communications Director will appoint Security Supervisors at the morgue operations site and the Family Assistance Center (FAC) whose duties are to:

- 1) Restrict media from entering the operational areas and the FAC
- 2) Establish briefing areas near but not in the incident site, the morgue, or the FAC
- 3) Issue one-time credentials for media personnel

Financial Support

The Admin Chief will, if necessary, designate a Director of Finances (Finance Director) to provide accounting, procurement, time recording, and cost analysis to support the operations associated with a MFI.

The Accountant will follow UNM policies and procedures as purchases are made to support a MFI.

The responsibilities of the Accountant are to:

- 1) Order supplies and equipment as necessary
- 2) Maintain copies of all transactions
- 3) Monitor and Reconcile expenditures per the University of New Mexico Procurement Policies and Procedures.
- 4) Monitor all OMI procurement cards
- 5) Increase limits on OMI procurement cards through the UNM Financial Services Department as necessary
- 6) Create index code to isolate expenses associated with MFI.

Information Technology

In the event of activation of the MFP, the Administrative Chief will designate a Director of Information Technology (IT Director).

The IT Director will be responsible for coordinating all IT systems to track decedents from first discovery to final disposition.

The IT Director will be responsible for maintaining communication systems among all components of the mass fatality plan system and between components of the plan and other involved agencies.

The IT Director will also provide all necessary computer support to all personnel working on the MFI including data entry, data entry security, backup of information, storage of data, and interoperability of information sharing with other agencies.

Religious and Cultural Considerations

A mass disaster will likely involve victims and families of different faith, religious, and cultural backgrounds especially in the setting of the unique tri-ethnic population in New Mexico.

It is recommended that all personnel involved in mass fatality management read this section.

Consideration must be given to the specific needs for the autopsy process, handling of the body and tissues, and support for the grieving families and friends. MFIs will very likely involve victims from communities for whom postmortem investigations are unwelcome and/or require a prompt burial.

Family concerns and religious/cultural considerations must be addressed by all levels of mass fatality management with the understanding that not every family request can be met. Sensitivity to family concerns during this difficult time is paramount.

When family concerns and religious/cultural considerations cannot be met, it is critical to convey why requests cannot be met and assure families of the OMI's commitment to treating their loved ones with dignity and respect.

Data/information collection from families should include:

- 1) Obtain information on religious and cultural beliefs and death practices
- 2) Determine the language the victim's family is most comfortable communicating in
- 3) Provide appropriate interpreters if needed

Religious and cultural considerations should be dealt with in as sensitive of a manner as circumstances allow.

Early in the process, discussion should occur with appropriate religious and community leaders, including tribal representatives.

Communication with families should include:

- 1) Families need to be assured that the spokesperson is releasing accurate information that was officially issued by the OMI
- 2) Warn families that only information from the OMI and FAC is credible and that information from other sources may not be correct
- 3) Inform families where they will be notified of the identification of a family member as a victim, which family members are notified, and how they are contacted. Families should be given the choice to be notified at the FAC or at a location they choose that is convenient for them.

The following are examples of some common questions that families may have that should be addressed:

How are identifications made?

- 1) Provide information on all methods of identification that will be used
 - a. Explain what each method involves and its reliability
- 2) DNA testing, in particular, involves considerations that should be explained to families
 - a. Make copies of *Identifying Victims Using DNA: A Guide for Families*, Appendix G in the National Institute of Justice's *Lessons Learned From 9/11: DNA Identification in Mass Fatality Incidents*, September 2006. This guide is available in English and Spanish at: <http://www.ncjrs.gov/pdffiles1/nij/214781.pdf>
 - b. Give families a realistic timeframe for DNA testing (may take 6-12 months before identifications can be made)
 - c. Tell families that during the DNA identification process no material will be released until DNA testing of all common tissue is completed or at the discretion of the OMI in consultation with families

When and how will victims' personal effects and belongings be returned to families?

- 1) A loved one's personal effects may be very important to the family
- 2) The process for recovering and returning personal effects must be established as soon as possible after the incident and understood by all involved agencies
- 3) The process needs to be communicated to families so that they understand it and know how long it will take until personal effects are returned, or if they cannot be returned, why not
 - a. If the incident is the result of a crime, some or all personal effects may be evidence and cannot be returned until after the trial

Can families go to the incident site?

For many families, being able to go to the incident site is extremely beneficial. It allows them to feel close to their deceased loved ones, imagine their last moments, and honor them and say good-bye.

- 1) Visits to the incident site should always be coordinated with the organization that has jurisdiction at the site (OMI, FBI for crimes, National Transportation Safety Board for commercial airline accidents, etc.)
 - a. Spiritual care and mental health personnel should be present during visits and available to family members.
- 2) If the visit takes place during recovery, work should stop to show respect
- 3) Visiting families should not be exposed to bodies, body parts, or personal effects
- 4) Separate visits should be arranged for families of surviving victims and for families of the deceased
- 5) Prepare families for what they will see. Describe the conditions, the destruction/wreckage, and the odors.

What is the condition of the body/bodies?

A common wish of families is to know details of their loved one's final moments before and after death and a desire to know that their dignity was not affronted. How the condition is explained requires compassion, honesty, and tact.

- 1) Provide context—explain the condition of physical structures and how the location of a victim in relation to the cause of the incident affects the condition of the body
- 2) Assure family members that the body of their loved one is treated with the highest degree of respect and dignity, regardless of its condition
- 3) Avoid these words or phrases: “*damage to the body,*” “*fragmentation,*” “*dismemberment,*” “*pieces,*” “*parts,*” “*destroyed body parts,*” “*damage to the body,*” and “*the body is in bad condition*”
- 4) Do use these words or phrases: “*severe,*” “*significant,*” “*trauma to the body*” or “*condition of the body*”
- 5) Often family members prefer the term loved one to victim
- 6) Take cues from the family and tell them what they want to know. The amount of information families can handle is usually revealed by the questions they ask and their feedback.

Will an autopsy be performed?

- 1) The nature of the incident and the decision of the OMI determine whether or not an autopsy is performed
- 2) Family requests, cultural customs, and religious beliefs that prohibit autopsies should be considered
- 3) If an autopsy is recommended, tell families why it is necessary

How do families know that the information they receive will be accurate?

- 1) Information regarding a mass fatality incident will become public through many sources such as print media, television, radio, and the Internet. Families need to learn about the death of a loved one from a credible source in a compassionate way, not through communications to the public.
- 2) Remind families that information from any source other than officially recognized sources, which should be identified, may be inaccurate
- 3) Provide families with written records to ensure that they have correct information

Can families obtain copies of the OMI's report?

- 1) Many families want to go over the case or see photographs of their loved ones
- 2) Give families the name of the person to contact in the OMI with contact information and encourage them to call if they have questions
- 3) The OMI can explain to families how and when the reports will become available

Family Assistance Center

If the establishment of a Family Assistance Center (FAC) is determined to be necessary, the Admin Chief will designate a Director of Family Assistance.

The establishment of a FAC is necessary to facilitate the exchange of information and to address the families' needs. Families and friends may spend many long hours waiting anxiously for information about their loved ones. The FAC provides the families with accurate information in an appropriate manner and setting.

The FAC addresses the basic physical needs, including food, shelter, transportation, telephones, and emergency services that these families often will have.

The effective operation of a FAC depends on many organizations and individuals working together as a team, the establishment of a chain of command, and the selection of a site that is acceptable to all the individuals and agencies that will be working there.

The purpose of the FAC is:

- 1) To provide a private place for families to grieve
- 2) To protect families from the media and curiosity seekers
- 3) To facilitate information exchange between the OMI and families so that families are kept informed and the OMI can obtain information needed to assist in identifying the victims
- 4) To address family needs (responding quickly and accurately to questions, concerns, and needs - psychological, spiritual, medical, and logistical)
- 5) To provide death notifications and facilitate the processing of death certificates and the release of human remains for final disposition

The operations manager for the OMI FAC will be the OMI Grief Services Manager or a designee. The FAC operations manager oversees and operates the FAC for the OMI and ensures that needed services are provided and available resources are maximized.

The following are the key assumptions underlying family assistance:

- 1) Expect eight to 10 family members or loved ones for each potential victim
- 2) Family members have high expectations regarding:

- a. The identification of the deceased
 - b. The return of loved ones to them
 - c. Ongoing information and updates
- 3) Family members will begin to come to the incident site almost immediately. The FAC, with at least basic services, needs to be open and operating within 24 hours at most
 - 4) FAC operations may be long-term.
 - 5) Responding to a mass fatality incident can be overwhelming, leading to traumatic stress. *Support for responders is essential to monitoring and minimizing the impact.*

Establishment of FAC

Site Selection Factors: Many factors must be considered when selecting a site for a FAC. The type of disaster event and number of fatalities will affect site selection.

A FAC should be located close enough to the site of the disaster to allow the medical examiner personnel and others to travel easily among the site, morgue, and center but far enough from the site that families are not continually exposed to the scene.

If available, a neutral, nonreligious site such as a hotel or school is often an ideal choice for a FAC because some families may be uncomfortable coming to a religious structure. In addition, a hotel or school often can provide flexible, long-term accommodations.

Finally, those involved in site selection should plan for the many agencies that are part of that community's crisis response plan and consider what those agencies will need to do their jobs effectively.

Availability of Facility: The FAC should be established and opened as soon as possible after the incident. The center may be needed for as long as 3–4 weeks depending on the length of time necessary to recover the bodies.

Infrastructure: It is very important to estimate the number of family members and friends who may visit the center to determine whether the center's infrastructure is adequate to handle that number of people. The structure must offer adequate services and utilities including electrical power, telephone service, toilets, controlled heat and air conditioning, water, and sewage.

A determination must be made about whether the site can accommodate people with disabilities and other special or at-risk populations. In addition, a suitable site must allow for implementation of security measures.

Space and Floor Plan: The FAC needs to have a floor plan that will accommodate the simultaneous and effective performance of many functions for and delivery of services to the families and friends of the victims.

Operations Center and administrative offices: An operations center is necessary to allow the different service groups and organizations to meet. If representatives from all organizations are present at meetings, then victim services can be coordinated and efforts will not be duplicated.

Administrative offices should be available for all of the different service groups including mental health professionals, clergy/spiritual advisors/shamans, and medical examiners and organizations including the American Red Cross and Salvation Army. Since these administrative offices will hold files and confidential information generated by the FAC, they must be kept secure.

The FAC should have a separate entrance for its staff so they can check in, be briefed, and receive their assignments before they interact with the families.

General assembly room: A large room with a public address system should be available so that updates on the search and recovery process can be given at least twice daily to large gatherings of family members and friends.

Activities in this room may require translator services.

Reflection room: The FAC should provide a space where the victims' families and friends can quietly reflect, meditate, pray, seek spiritual guidance, or observe religious practices. This space must be designed and furnished to respect diverse cultures and beliefs.

Death notification rooms: To provide privacy and to expedite the notification process, several rooms should be set aside for families to receive the information that their loved ones have been identified. Circumstances may dictate how death notification takes place. In most cases, it is preferable for death notification teams to be sent to the families' homes rather than requiring families to come to the FAC.

Counseling rooms: Several small rooms should be available to provide a private space where information such as antemortem data can be gathered from families and where families can receive counseling from clergy and mental health professionals.

These rooms can be used for family members to spend time together and to use the telephone to contact other relatives and friends.

The number of rooms necessary will vary depending on the number of fatalities.

The following is a general rule: 100 or fewer fatalities will require 3–5 rooms, 101–200 fatalities will require 10–12 rooms, and more than 200 fatalities will require 15–25 rooms.

Counseling that is meant to convey positive identification of the loved one and emotional support for families should not be conducted in hotel rooms with bedroom furniture. If hotel rooms are the only rooms available, replace the bedroom furniture with couches and chairs.

Medical area: Family members and friends of the victims may require medical assistance.

Reception and registration for families: When family members and friends arrive at the FAC, the staff should greet them and gather information about who will be visiting the FAC. Staff will assign them an escort who will take them to a designated area where they may be more comfortable and can be located if necessary.

When families and friends leave the FAC, they should check out and leave their address so that they can be contacted with additional information and support and notification of their loved ones' deaths.

When adequate personnel are available, an escort may be assigned to each family group. Escorts may help the families with any need that arises during their stay at the FAC.

Procedural Considerations

Collect Antemortem Data

Personnel at the FAC will be assigned to collect accurate and detailed antemortem information from the families and friends of the victims.

This information may be gathered by experienced death investigators or funeral directors who have been well briefed on the information they need to collect from the families. If funeral directors are providing this service, it is critical that they act as representatives of the medical examiner's office and not as funeral directors.

Death certificate information can be collected at the initial interview to save the families from going through another interview at the funeral home.

Information includes the decedent's occupation, level of education, and the residency and name of the informant (person providing the information).

A questionnaire can be downloaded from the DMORT Web site at www.dmort.org by clicking "[FAC Questionnaire](#)."

During antemortem data collection, it is important to reassure families that all information will remain confidential.

The American Red Cross can assist the OMI by providing mental health professionals who may be needed during antemortem interviews or memorial services.

Victim advocates can identify community resources and refer the victims' families to them for help throughout the recovery process.

Conduct Death Notifications

The procedures for death notification are an important component of a sensitive family assistance plan. Whenever possible, death notification should be made by a team rather than an individual. The team may consist of a representative of the OMI, a member of the clergy, a mental health professional, and possibly a medical professional. If the family's own pastor or other clergy member is present, the team clergy should play only a supportive role.

The notification team should be well briefed on the information being provided to the families so they can answer as many questions as possible.

The team should be given a fact sheet that contains relevant information that they can leave with the family for later reference because family members may forget to ask questions at the time of the notification.

Death notification teams also should be available to travel to meet with families who do not want to or are not physically able to come to the FAC.

Next-of-kin who are out of town should always be notified in person. When a death notification must be made in a distant location, the office charged with death notification responsibilities can contact the sheriff or chief of police in the distant community to request coordination of notification.

The American Red Cross or the state Victims of Crime Act (VOCA) can assist in providing a mental health professional.

The office charged with death notification responsibilities can provide the notifying law enforcement agency with a letter from the OMI that contains information about the decedent and the office name and contact number in case the family has questions.

Staff conducting a death notification for a victim whose body is not intact must ask the family at the time of notification if they want to be informed about later identification of common tissue. After the family members make their decision, staff should provide them with a written copy of their decision as a reference for what they agreed to at that time.

Coordinate and manage many volunteers: The American Red Cross website offers several ideas about volunteer management and support services for disaster preparedness. This site also helps communities identify their own resources and teaches them how to avoid pitfalls as they develop a crisis response plan.

Determine fiscal responsibility for expenses: The expense of setting up the investigation site and providing family assistance accommodations varies depending on the event and the state in which it occurred. Document expenses under the management of the Director of Finances (see Financial Support Section).

Dispose of common tissue: After incidents such as high-impact aviation crashes, bombings, and tornadoes, some human tissue may not be identifiable. When the OMI determines that all means of identification have been exhausted, the decision about the disposition of common tissue must be made. Typically, common tissue is

interred at a memorial service to which the victims' families are invited. In a major aviation accident, the American Red Cross is the designated planning organization for memorial services and may also assist the OMI.

Establish victims' suffering: The issue of victims' suffering can cause tension. On the one hand, there is a need to preserve evidence that establishes the amount of suffering the victim endured for use at the perpetrator's sentencing hearing when mass fatality incidents are a consequence of a terrorist or other homicidal act. On the other hand, there is great need to comfort families and answer their questions about how much their loved ones suffered before dying. During the recovery of bodies, the OMI must sensitively convey information to families that is consistent with the information provided to the criminal investigation system.

Implement security measures: Access to the FAC must be controlled so families and friends of the victims have privacy and are not overwhelmed by the press, photographers, and the public.

Checkpoints may need to be established at entrances to the FAC and its parking lot.

A badge system can be implemented that gives family members and authorized workers easy access to the FAC.

Work with the media. The Commander will designate a Director of Communications to release information about the mass fatality event.

The press will have questions that only a representative of the OMI can answer properly, including questions about the recovery operation, identifications, and condition of the bodies.

Information must be released to the media only by the designated Communications Director and not by any staff members of the OMI.

A joint information center should be set up to coordinate the release of information, and no information should be released to the media unless it has been discussed with the families first.

Roles and Responsibilities

Team Leader, OMI Family Assistance Center:

- 1) Grief Services Director oversees implementation and maintenance of OMI's portion of FAC
- 2) Meets with representatives from Red Cross, Salvation Army, and other support services to determine location and scope of FAC
- 3) Oversees funeral directors, grief services employees, and volunteers in collecting victim information and kinship information for identification purposes

Assistant Team Leader, OMI Family Assistance Center:

- 1) Grief Services licensed social worker, as designated by the team leader or the Chief
- 2) Assists in logistics of establishing and operating OMI's portion of FAC
- 3) Performs tasks as required by FAC Team Leader

Administrator, OMI FAC:

- 1) Provides clerical and administrative support to Team Leader and Assistant

Team Leader:

- 1) Acquire and help install phones and computers as needed by FAC
- 2) Arrange transportation and lodging as needed for arriving families in conjunction with other victim/family support service organizations

Plan Maintenance and Implementation

The OMI Director of Operations will be responsible for updating and maintaining the Mass Fatality Incident Plan.

Maintenance and Implementation of the Plan will include:

- 1) Assure that a current issue of a hard copy of the Plan is present at key stations in the office and that hard copies have been distributed to appropriate state agencies
- 2) Assure that a current electronic copy of the Plan is available on the OMI web site and that the location on the web site is prominently displayed
- 3) Periodically advertise to appropriate agencies and individuals the existence of and location of the Plan
- 4) Train new employees in their role in a mass disaster and how to use the Plan
- 5) Continue to electronically update the appendices in the Plan including the phone lists, the available additional resources, and the available additional personnel
- 6) Notify key individuals and agencies of electronic updates in the Plan
- 7) Maintain a system or file for storage of information relative to the Plan between updates
- 8) Maintain information relative to the needs of the Plan that can be addressed with additional time or budget
- 9) Keep outdated copies of the Plan
- 10) Coordinate yearly meetings of the committee for review and update of the Plan. The committee will be chaired by the Director of Operations and will include the Chief and appropriate members of the key staff of the office as determined by the Director of Operations.
- 11) On even numbered years, conduct discussion-based exercises of the Plan, which will include both orientation exercises and tabletop exercises
- 12) Orientation exercises will introduce or refresh staff to the Plan and collect feedback
- 13) Tabletop exercises will be held with scenario-based discussions to test various aspects of the Plan
- 14) It is recommended that during implementation of the Plan that local OMI Field Deputy Medical Investigators are invited to Local Emergency Planning Committee Meetings (LEPC) that are chaired by county or city Emergency Managers

- 15) On odd numbered years, conduct operations-based exercises that will include drills to test performance of people and equipment, identify gaps in resources, clarify roles and responsibilities, and improve team performance
- 16) Evaluate discussion- and operation-based exercises
- 17) Based on committee review of the plan and discussion and operation based exercises, revise and appropriately distribute the Plan

Summary

The New Mexico Office of the Medical Investigator (OMI) is a medical examiner system that investigates any death that is sudden, violent, untimely, unexpected or when a person is found dead and the cause of death is unknown. This would include a mass fatality event. Because the system is statewide, the framework for responding to a mass fatality incident in any New Mexico location is already in place. The goal of this plan is to ensure a prompt, organized, safe, and prepared response to a mass fatality incident as a component of New Mexico's All-Hazard Emergency Plan.

Mass Fatality Action Plan Summary

In the event of an incident occurring in New Mexico involving mass fatalities, the county or city Emergency Manager involved would take one of two steps:

- Notify the Department of Homeland Security and Emergency Management (DHSEM) watch officer or the State Emergency Operations Center (SEOC), if it is activated, that there have been fatalities, and the State EOC would then contact the New Mexico Department of Health (NMDOH) Emergency Operations Center Representative (EOCR) and the Secretary of NMDOH. In turn, NMDOH would contact the state Office of the Medical Investigator to begin implementation of the 2012 Fatality Management Plan (MFP) and/or
- Would activate the OMI using the current framework for all reported deaths. This framework would start by contacting the OMI through the local 911 dispatch center. An alternative would be to contact the OMI Central Office (505 272-3053 or 1 800-432-5239).

The OMI may also become aware of a mass fatality incident (MFI) from the local first responder at the incident site, from the media, or other emergency notification system. The OMI contact will notify the Chief Medical Examiner (Chief) or his designated on-call representative as soon as there is a known or suspected MFI. The Chief will be responsible for the MFP activation and management and may appoint a Mass Fatality Incident Commander (Commander).

In some instances of a MFI, the SEOC will be activated. In that situation, a representative of the OMI appointed by the Chief will report to the New Mexico State Emergency Operations Center. The Chief will report to the Operations

Section Chief during the period of the MFP activation, along with the NMDOH EOCR. The NMDOH EOCR will keep in continuous contact with the Secretary of NMDOH, and the Secretary, at her discretion, may activate the NMDOH Department Operations Center (DOC).

If the Governor of the State of New Mexico has declared a state of public health emergency, the OMI will follow the New Mexico Statutes (12-10A-5 and 12-10A-6.C) passed by the New Mexico Legislature in 2003 and will first consult with the Secretary of the Department of Health (NMDOH), the Secretary of the Department of Public Safety (DPS), and the Director and the Chairman of the Board of Thanatopractice in order to implement and enforce measures to provide for the safe disposal of human remains.

When the OMI becomes aware of an incident that may require activation of the MFP, the Chief, in concert with the Secretary of the NMDOH, will evaluate the incident to determine:

- 11) Jurisdiction over the incident
- 12) Potential or real number and location of remains
- 13) Condition of the bodies
- 14) Potential number of remains for autopsy
- 15) Level of difficulty in recovery
- 16) Types and numbers of personnel and equipment needed
- 17) Accessibility of the incident site
- 18) Possible biological, chemical, physical or radiological hazards
- 19) Level of personal protective equipment needed
- 20) Staffing needs

The Chief will then make a determination of the activation level of the plan. The Chief may alter the level of the response based on changing information or resources. The levels of response are:

- 1) Level 3 Response (Local) An incident deemed by the local Field Deputy Medical Investigator (FDMI) as significant or high profile enough as to draw an unusual amount of media attention or outside agency response. However, the number and type of incident fatalities are within the capability of the resources (FDMI availability, transportation and storage capability, equipment, etc.) available for the county in which the incident occurred. The NMSEOC may or may not be activated. An example would be a natural disaster with few fatalities.

- a. Notification should be made to the central office on-call or on-duty supervisor and pathologist via the on-duty central office investigator for determination of additional notification or resource activation. The Chief may activate the MFP if the incident requires additional resources or the response of specialized personnel. This level of activation of the MFP will usually be managed by sending specialized personnel to the scene of the incident to assist the FDMI and by coordination of transportation of the fatalities to the central office.
- 2) Level 2 (Regional)
- a. An incident deemed not within the capability of the resources available for the county in which the incident occurred. However, it can be handled appropriately with the assistance of the resources of the surrounding counties.
 - b. The NMSEOC may or may not be activated.
 - c. Notification should be made to the central office on-call or on-duty supervisor and pathologist via the on-duty central office investigator for determination of additional notification or resource activation. The Chief will activate the MFP to provide additional resources and personnel to manage the incident. This level of activation can usually be managed by sending additional resources and personnel to the scene of the incident to assist in recovery and investigation, possible temporary storage of remains, and transportation of fatalities. However, the number of fatalities would not be beyond the capabilities of the resources of the central office.
- 3) Level 1 (State or higher)
- a. An incident deemed not within the capability of the resources available for the county in which the incident occurred and cannot be handled with the assistance resources of the surrounding counties or a declared disaster with large quantities of known, suspected, or anticipated deaths.
 - d. The NMSEOC will probably be activated.
 - e. After notification the Chief will activate the MFP and appoint the Commander.

The MFP is based on Incident Command System (ICS) core concepts and organizational processes. It is designed to work within the NMSEOC and the NIMS. It is also adaptable for any size of MFI and can be expanded or contracted as need arises. The following organizational chart highlights the key organizational structure of the MFP.

The Commander, in concert with the Secretary of the NMDOH, may request assistance from state and federal agencies as necessary. Federal assistance may be sought by the Governor through the Regional FEMA Administrator as per the Stafford Act requesting the Presidential declaration of a disaster.

The Commander, in concert with the NMDOH Secretary, will determine when to deactivate the plan.

Appendix A
Hospital Contact Information

Appendix B
Funeral Home Contact Information

Appendix C
Language Interpretation Contact Information

Language Interpretation Resources

1. Deaf/Hard of Hearing

University of New Mexico
Department of Linguistics
University of NM
Albuquerque, NM 87131
(505) 277-0928 v/tty

Community Outreach Program for the Deaf (COPD)
10601 Lomas Blvd NE, Suite 112
Albuquerque, NM 87112
(505) 255-7636
(800) 229-4262

Registry of Interpreters for the Deaf (RID)
New Mexico Commission for Deaf and Hard of Hearing
2500 Louisiana Blvd, NE, Suite 400
Albuquerque, NM 87110
(800) 489-8536
(505) 881-8824 v/tty

2. Various

For Referrals:

New Mexico Translators and Interpreters Association (NMTIA)
Internet website listing of translators in NM for the following
languages: Arabic, Armenian, Bosnian, Catalan, Chinese, Croatian, French,
German, Indo-Iranian, Italian, Navajo, Japanese, Polish, Portuguese,
Russian, Serbian, Slovene, Spanish, Thai, Vietnamese.
<http://Internet.cybermesa.com/~nmtia/langs/htm>

For Referrals:

Department of Foreign Languages and Literatures
University of New Mexico
(505) 277-4771

3. Interpreter Language Services Program at UNM Hospitals

- a. Primary location in Albuquerque NM but phone interpretation available
- b. See separate UNMH interpreter list with dual roles

- c. Office Hours M-F 8 AM – 4:30 PM
 - d. Phone: (505) 727-5399 or Fax: (505) 272-1418
 - e. Available 24/7 with AMION pager
 - f. Available 24/7 by phone or video at (505) 272-8255
 - g. American Sign Language
 - i. 24/7 by video at (505) 272-8255
 - ii. After hours (505) 857-3642
4. New Mexico State University, College of Arts and Sciences,
Department of Languages and Linguistics
- a. Primary location Las Cruces, NM
 - b. Department Head, Dr. Mary Wolf
 - i. Email mawolf@nmsu.edu
 - c. Phone (575) 646-3408, fax (575) 646-7876
 - d. Majors in French German, Spanish
 - e. Courses in German, French, Japanese, Portuguese, Spanish
5. San Juan College, Modern Language Program
- a. Primary location Farmington, NM
 - b. Courses in German, Navajo, Russian, Spanish
 - c. Michele Picotte, Assistant Professor of Spanish
 - i. Phone 566-3274
 - ii. Email: picottem@sanjuancollege.edu
 - d. General phone number (505) 326-3311

Dual role Interpreters UNMH

Appendix D
OMI Consultants Contact Information

Appendix E
Religious/Spiritual Contact Information

Religious/Spiritual Resources

1. CATHOLIC
Contact the Archdiocese for appropriate regional referrals:
Archdiocese of Santa Fe
The Catholic Center Offices
4000 Saint Joseph's Place NW
Albuquerque, NM 87120
(505) 831-8100 (Main Switchboard)
2. LATTER DAY SAINTS
Contact: Perry Webb for referrals to regional resources
(505) 325-4445
3. BAPTIST
Baptist Convention of New Mexico
Disaster Relief
Attention: Ira Shelton, State Director
(505) 934-4751
For mobilization of disaster relief team
Also: Attention: Crickett Pairret @ (505) 924-2315
4. EPISCOPAL
The Episcopal Diocese of the Rio Grande
6400 Coors Blvd, NW
Albuquerque, NM 87120
(505) 881-0636
5. JEWISH
Jewish Federation of New Mexico
(505) 821-3214
6. METHODIST
The New Mexico Conference of the United Methodist Church
(800) 678-8786

Appendix F
Cultural Resources Contact Information

Cultural Resources

1. HISPANIC
National Hispanic Cultural Center
Albuquerque, NM
(505) 246-2261

2. NATIVE AMERICAN
GENERAL
New Mexico Indian Affairs Department
Santa Fe, NM
(505) 476-1600/1602-04

3. NATIVE AMERICAN
JICARILLA APACHE
Jicarilla Apache Nation
Dulce, NM
(575) 759-3242

4. NATIVE AMERICAN
NAVAJO
The Navajo Nation
Window Rock, AZ
(928) 871-7660 (Cultural/Education)
(928) 871-6311 (General Svcs/Admin)
(928) 871-6079 (General Svcs)
(928) 871-6915 / (928) 871-6919 (Emergency Fire & Safety)
(928) 871-6810 (Listing of localized leadership statewide via Chapters)

5. NATIVE AMERICAN
NAVAJO
Local Government Chapters (listings for localized leadership statewide)
Window Rock, AZ
(928) 871-6810

5. NATIVE AMERICAN
PUEBLOS
Indian Pueblo Cultural Center
(505) 843-7270

6. NATIVE AMERICAN
PUEBLOS
All Indian Pueblo Council
Albuquerque, NM
(505) 242-2995

7. NATIVE AMERICAN
PUEBLOS
Acoma: (800) 747-0181
Cochiti: (505) 465-2244
Jemez: (575) 834-7235
Isleta : (505) 869-3111
Laguna: (505)-552-6654
Nambe: (505) 455-2036
Ohkay Owingeh: (505) 852-4400
Picuris: (575) 587-2519
Pojoaque: (505) 455-2278
Sandia: (505) 867-3317
San Felipe: (505) 867-3381
San Ildefonso: (505) 455-2273
Santa Ana: (505) 867-3301
Santa Clara: (505) 753-7330
Santo Domingo: (505) 465-2214
Taos: (505) 758-9593 / (505) 758-1028
Tesuque: (505) 983-2667 / (505) 455-2467
Zia: (505) 867-3304
Zuni: (505) 782-7000

Appendix G
Potential Locations for Family Assistance Center

Appendix for Family Assistance Center:

The purpose of this appendix is not to provide locations of family assistance centers (FAC) for every potential mass fatality location in New Mexico but to supply an FAC framework that focuses on community colleges and includes the three most populated cities in New Mexico: Santa Fe, Las Cruces, and Albuquerque.

Santa Fe Community College

Public 2 year community college in Santa Fe, NM
Enrolls more than 14,500 students per year
Employs approx 300 full time
Employs approx 600 part time
59 degree programs including culinary arts, criminal justice, nursing, EMT, dental health programs, child education
Own public TV and radio stations

Contact information:
<http://www.sfccnm.edu/>

Business hours
8 a.m. to 7 p.m., Monday through Thursday
8 a.m. to 5 p.m., Friday
8 a.m. to 2 p.m., Saturday

Main campus number: (505) 428-1000

President	Dr. Sheila Ortego cgerzanich@sfccnm.edu	505-428-1148
Vice President	Dr. Jacqueline D. Virgint jvirgint@sfccnm.edu	(505) 428-1409
Data Report Specialist	Tina La Caze tlacaze@sfccnm.edu	(505) 428-1160
Other Contact	Jacqueline Virgint	(505) 428-1409

Campus Security

- Campus Safety office: (505) 428-1224

- Campus Safety cell phone: (505) 690-1477

Academic and Student Affairs

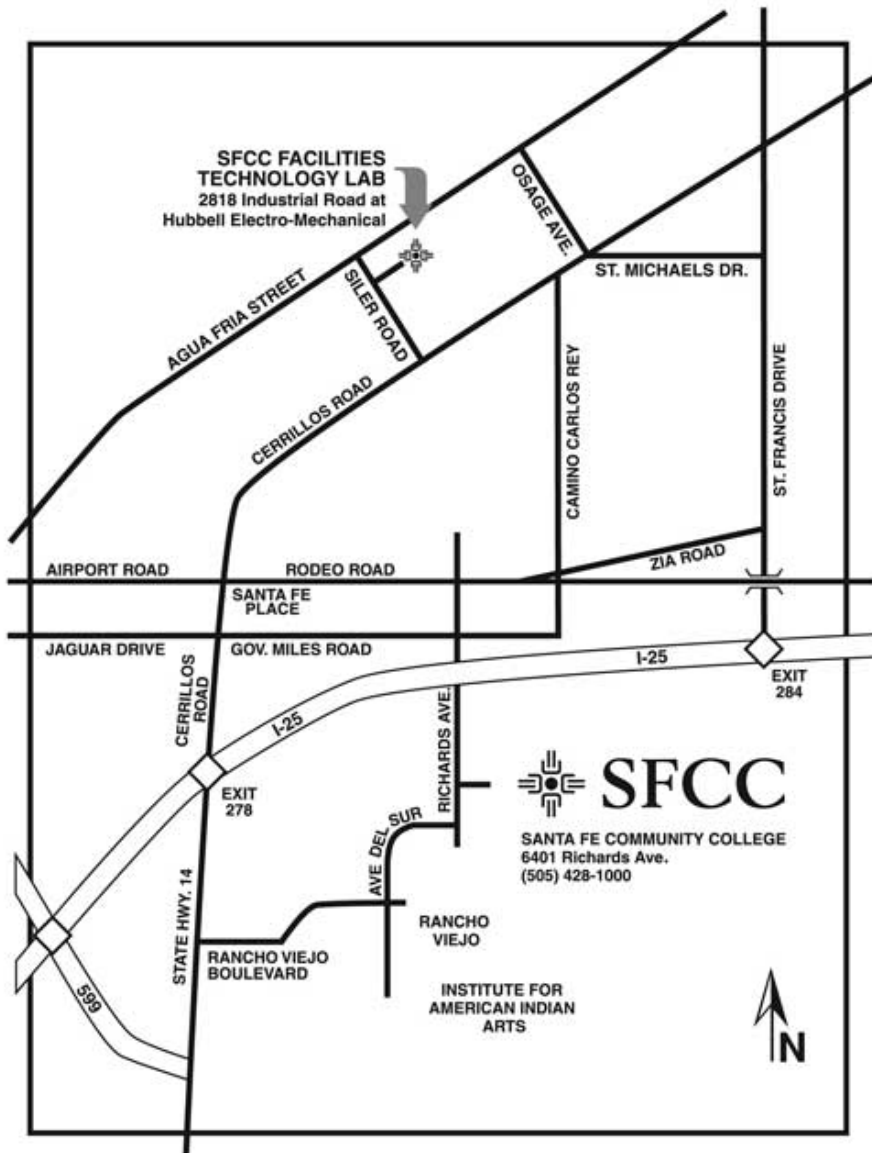
Telephone: (505) 428-1351

Fax: (505) 428-1350

Name	Title	Phone	Email
Liss, Ron	VP of Academic and Student Affairs	(505) 428-1301	rliss@sfccnm.edu
Luper, Karen	Assistant to the VP	(505) 428-1605	kluper@sfccnm.edu
Roybal, Teresa	Academic & Student Affairs Coordinator	(505) 428-1351	troybal@sfccnm.edu
Schweitzer, Teresa	Executive Secretary	(505) 428-1348	tschweitzer@sfccnm.edu
Slentz, Carla	Administrative Associate for VP	(505) 428-1300	cslentz@sfccnm

Location:

366 acres off Richard's Avenue, south of Rodeo Road
 12 miles SW of Santa Fe's downtown
 6401 Richards Avenue, Santa Fe, NM 87508



Pros:

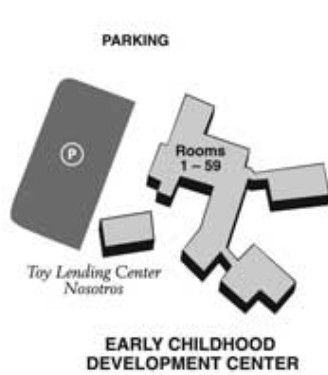
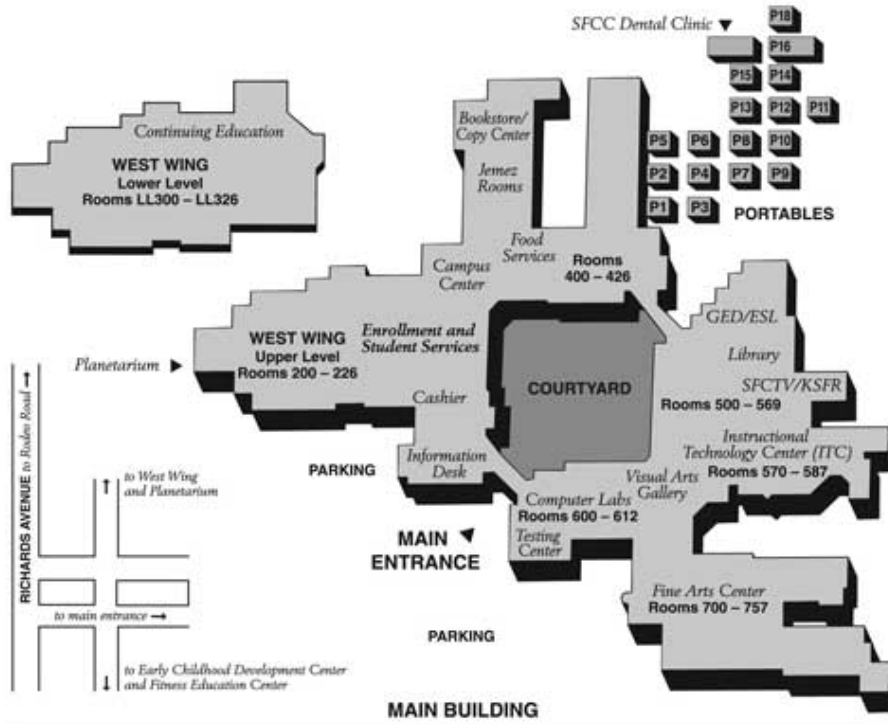
- Location off I-25 easy to find with road signs
- Ample parking
- Many buildings to accommodate small to large mass fatality incident
- Radio/TV access
- Access to campus can be easily restricted
- Restaurants and hotels within a few mile distance
- Students attending in above listed programs would be wonderful volunteers
- Online website
- Center courtyard with outside seating
- Fitness center
- Child care center
- Conference center can accommodate 10 to 200
- Food service and AV equipment rental

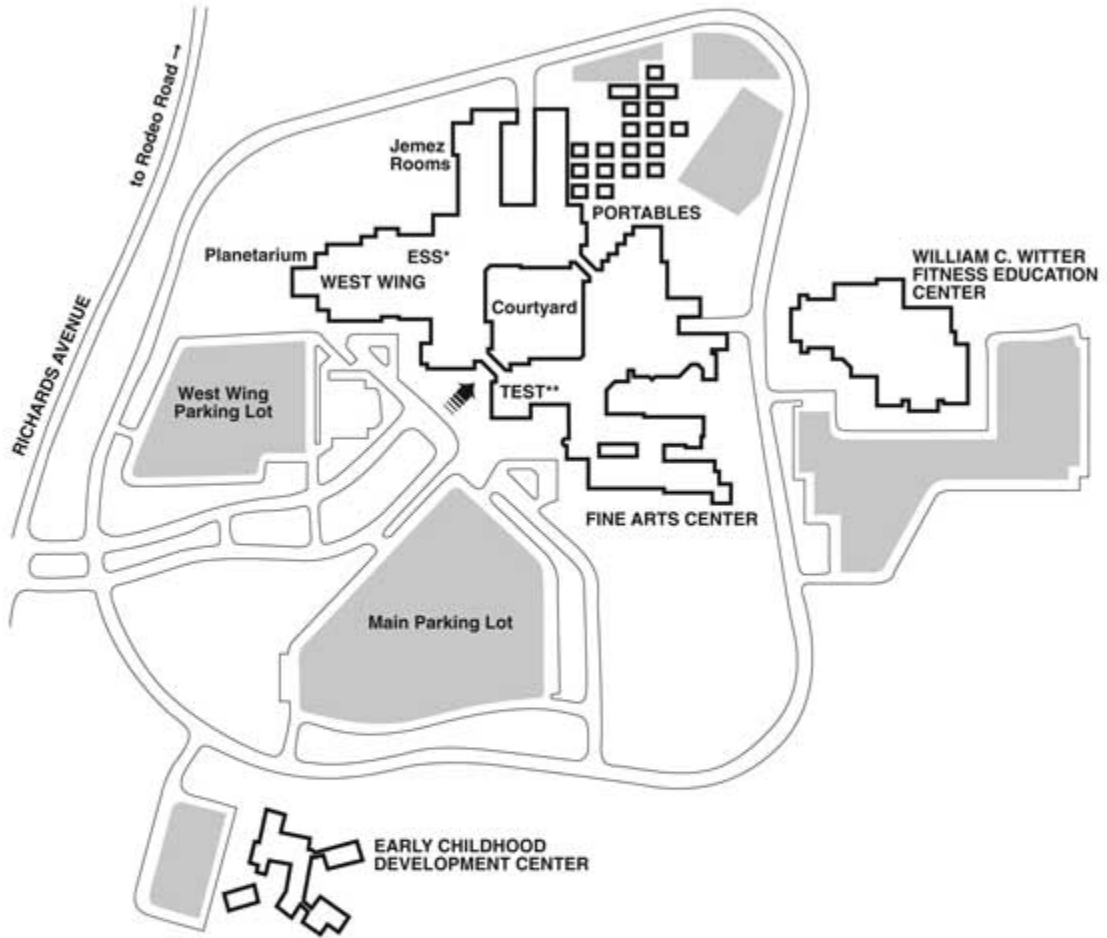
Plenty of electrical outlets, desks, chairs
Courtesy phones in hallways
Toilets, wheelchair accessible

Cons:

? dorms/housing
Would school close if mass disaster struck?
Geared towards classroom environment
? wireless
? enough telephones?

Layout:





-  PARKING
-  BUILDINGS
-  ENTRANCE TO MAIN BUILDING
- ESS* ENROLLMENT AND STUDENT SERVICES
- TEST** TESTING CENTER

Second location: Las Cruces

Dona Ana Community College

Approximately 900 computers for student use – most in classrooms

There are main locations detailed below including the Central Campus, East Mesa Campus, South County Centers (Gadsen Center and Sunland Park Center), Workforce Center, Mesquite Neighborhood Learning Center, and White Sands Center.

Programs from which to recruit volunteers:

- [Associate of Science](#)
- [Certified Nursing Assistant \(Health Care Assistant\)](#)
- [Computer Information Technology](#)
- [Criminal Justice \(Law Enforcement\)](#)
- [Dental Assistant](#)
- [Dental Hygiene](#)
- [Diagnostic Medical Sonography](#)
- [Early Childhood Education](#)
- [Education](#)
- [Educational Paraprofessional](#)
- [Emergency Medical Services](#)
- [Fire Investigations](#)
- [Health Care Assistant](#)
- [Health Information Technology](#)
- [Law Enforcement](#)
- [Nursing](#)
- [Public Health](#)
- [Radiologic Technology](#)
- [Respiratory Therapy](#)

Locations:

Central Campus

3400 S. Espina St, Las Cruces, NM 88003 - Telephone 505-527-7500

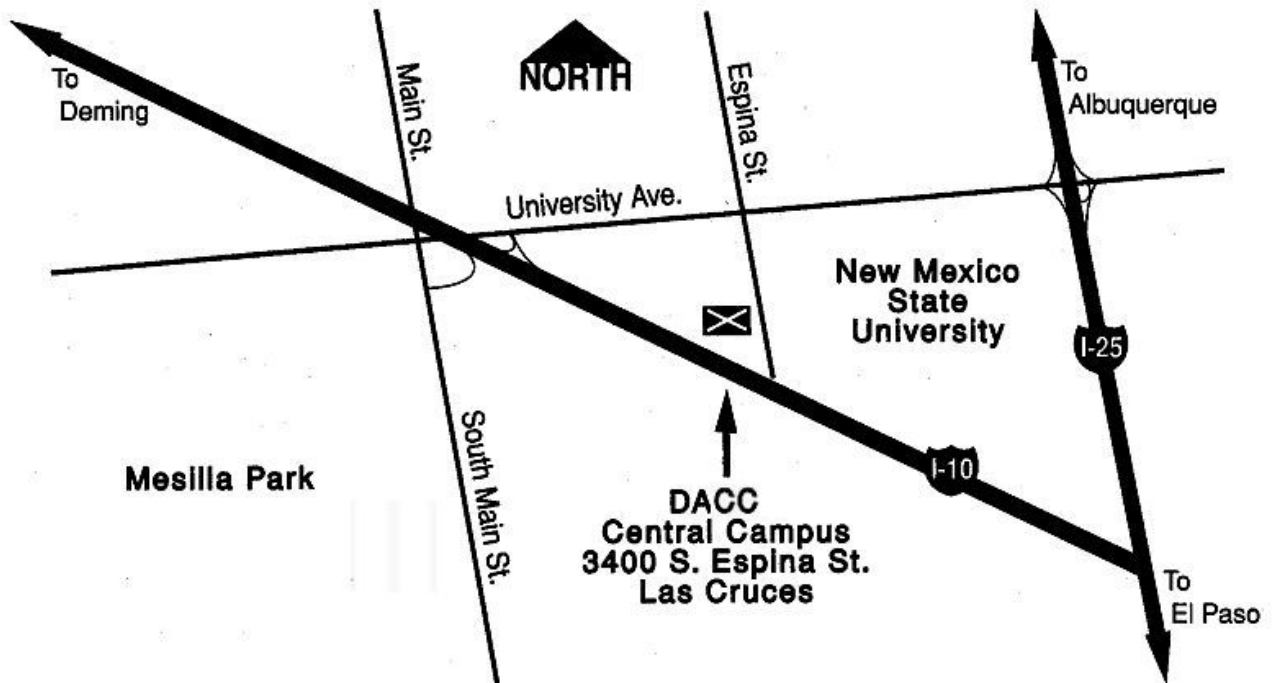
The central campus of Doña Ana Community College is located on 15 acres adjacent to the main campus of NMSU in Las Cruces, New Mexico. DACC also operates a campus on the East Mesa of Las Cruces, as well as centers in Anthony, Sunland Park and White Sands Missile Range. To make a community college education even more accessible, classes are also offered at some of the local high schools.

East Mesa Campus

2800 N. Sonoma Ranch Blvd, Las Cruces, NM 88011 - Telephone 505-528-7250

The East Mesa Campus served more than nine 900 students its first semester and more than 1,200 the second semester. The campus houses a library, a computer lab, and the administrative and faculty offices of the Business and Information Systems Division.

PDF layout of classrooms and building can be found under Class Schedule, last page:
<http://dabcc-www.nmsu.edu/students/>



Las Cruces Central Campus

South County Centers

Gadsden Center - 1700 E. O'Hara Road, Anthony, NM 88201 - Telephone 505-882-3939

Sunland Park Center - 3365 McNutt Road, Sunland Park, NM 88063 - Telephone 505-874-7780

DACC operates two centers in the southern portion of Doña Ana County. The Gadsden Center is located immediately to the east of O'Hara Road overpass at Interstate 10 in Anthony. The Sunland Park Center is located on McNutt Road, approximately three and a half miles south of Country Club Road.

Both centers offer freshman and sophomore-level coursework in vocational, technical, developmental, and general education, as well as the Associate of Arts, Associate of Criminal Justice, and Associate of Pre-Business degrees. The centers also provide concurrent enrollment programming for the Gadsden School District and Customized Training and Community Education courses. ESL, GED, and citizenship classes for the border area are available through the ABE program, also housed at the centers. Refer to the section titled, "Adult Basic Education," in this catalog for a full listing of services.

Attending Gadsden Center or Sunland Park Center is similar to attending the Las Cruces campus of DACC. Tuition is the same, applications are accepted throughout the year, and the COMPASS assessment (for placement in classes) is offered on-site virtually every weekday. While these centers follow the same policies, procedures, and academic calendar as the central campus, class scheduling differs. Classes are offered in the afternoon and the evening to meet the needs of the local community.

White Sands Center

Building 465 - White Sands Missile Range, NM - 505-678-6198

The center offers freshman and sophomore-level coursework in general education, technical and developmental studies, and several associate degree programs. DACC programs are open to service members, civilians, and those living in surrounding communities. Only U.S. citizens and permanent residents aliens possessing a bona fide Emigrant Alien Card allowing permanent residency in the United States can attend the White Sands Center. Students attending classes must obtain a post pass and vehicle pass. Call WSC staff for current procedures.

Academic services for students enrolling in classes are admissions, registration, advising, tuition payment, schedule changes, withdrawals, and purchase of textbooks.

Students attending the White Sands Center may pursue the following associate degrees:

- Associate of Arts
 - Associate in Pre-Business
 - Associate in Criminal Justice
 - Associate of Applied Science
- Option: Computer Technology
- Associate General Studies

The associate degree programs in liberal arts, pre-business, and criminal justice articulate to NMSU and other colleges for students desiring to pursue baccalaureate degrees. These programs include the lower-division general education courses typically found in four-year college degree programs. Students planning to transfer to upper-division programs at NMSU or other universities are advised to consult the catalogs and appropriate representatives of those institutions. Schedules and degree plans for the above programs are available at the White Sands Center and the DACC administrative offices in Las Cruces.

The White Sands Center offers a variety of general education courses in the social sciences, liberal studies, sciences, and general studies.

All courses offered through the center are consistent with Veterans Administration and Social Security Administration regulations.

Mesquite Neighborhood Learning Center

890 N. Tornillo St., Las Cruces, NM. - 575-528-4051

Initially funded by a grant from the U.S. Department of Housing and Urban Development in 2000, and now funded through a second HUD Hispanic Serving Institutions—Assisting Communities grant, the Mesquite Neighborhood Learning Center brings education to those who otherwise might not have access to it.

The center's focus is on providing low-income students with the knowledge necessary to obtain a higher education, while developing work-related skills. Transitional classes and workshops involving work-readiness skills allow students to eventually move on to college and careers. GED and ESL classes are offered on site through DACC's Adult Basic Education Division.

Another goal is to establish relationships between students and the center's partners throughout the community. Numerous community agencies and businesses have partnered with Mesquite Neighborhood Learning Center and the City of Las Cruces to provide health care, legal assistance, computer literacy, child care, and many other services.

Recent developments under the grant include three components:

- Micro-enterprise classes offered by the Small Business Development Center, through which MNLC student learn the many facets of opening their own business
- Work readiness
- Service Learning
- Landscaping classes and classes leading to custodial certification also are offered

Workforce Center

2345 E. Nevada St. Las Cruces, NM, 88001. Telephone 527-7776

- **Contract Training**
- **Business Training Seminars**

Customized contract training for employee development is available in a variety of business-related topics at the Workforce Center. Customized classes focus on employee development and peak team performance. Every aspect of a course may be tailored to meet an organization's specific needs, including class topics and content, location, length and time. The courses may be held on campus or at the work location. Times can be tailored to fit employee work schedules.

Customized training services have been utilized by numerous local banks and businesses, public schools, government contractors, and federal, state, and local governmental agencies. Training areas have included computer skills, management/supervision, welding, customer service, and others.

Business training seminars cover topics in business, computers, and professional development. These seminars are open to the public.

Non central campus maps can be obtained in

http://dabcc-www.nmsu.edu/publications/Our_Students/2009-10%20Catalog.pdf

Contact information:

575-527-7500 • 800-903-7503 • Fax: 575-527-7515

<http://dabcc-www.nmsu.edu/>

Administration

Campus Executive Office	527-7510
Campus Academic Office	527-7520
Campus Institutional Effectiveness & Planning Office	527-7729
Computer Lab - Central Campus	527-7561

Third location: Albuquerque

Central New Mexico Community College

<http://www.cnm.edu/>

largest community college in the state of NM

estimated 20,000 – 23,000 students

330 full time faculty, 670 part time faculty

Four campuses in Albuquerque with main campus at Coal and University SE

Contact Information:

President: Dr. Katharine W. Winograd 224-3000 or 224-3487 or 224-4415.
winograd@cnm.edu

Diana Chavez, Administrative Assistant to the President 224-4415

Samantha Bousliman, Chief Communications Officer/Executive Assist to Pres 224-4414

Beth Pitonzo, VP for Academic Affairs 224-4414

Louise Scherffius, Administrative Coordinator for VP of AA 224-4427

Xeturah Woodley, Associate VP Academic Affairs 224-3294

Akilah Hollingsworth-Pickett, Administrative Coordinator 224-3295

Risk Management and Safety Office: Security Emergency Dispatch 224-3001; Non-emergency 224-3002; Safety Office 224-4657

Location:

525 Buena Vista Dr. SE, Albuquerque, NM 87106

Campus map for main campus and other campuses in PDF file at:

<http://cnm.edu/about/cnmmaps.php>

Programs from which to recruit volunteers:

Child, youth and family development

Clinical Laboratory Assistant

Computer Information Systems

Computing Technology

Criminal Justice

Dental assistant
Diagnostic Medical Sonography
Elementary education
EMT/Paramedic
Environmental Safety and Health
Fire Science
Health Information Technology
Health Unit Coordinator
Judicial Studies
Medical Laboratory Technician
Medical Office Assistant
Nursing
Nursing Assistant/Home Health Attendant
Practical Nursing
Respiratory Therapy
Surgical Technology
Veterinary Technology

Third location:

San Juan College

Three campus locations including San Juan College – Main Campus, San Juan College East (Aztec) and San Juan College West (Kirtland)

More than 5,500 students per semester, staff 81 full time faculty and 203 part-time faculty

Contact Information

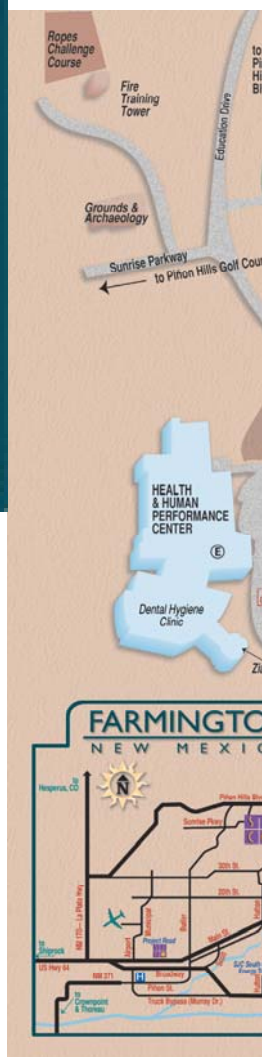
Carol J. Spencer, Ph.D, President, 566-3209, SpencerC@sanjuancollege.edu

Douglas N. Easterling, VP for Institutional Research and Planning, 566-3630, EasterlingD@sanjuancollege.edu

David P. Eppich, VP for Student Services, 566-3318, EppichD@sanjuancollege.edu

Billy Newton, Security and Safety, 566-333, www.sanjuancollege.edu/pages/360.asp

San Juan College – Main Campus



San Juan College East

315 S. Ash Street, Aztec, NM 87410 | (505) 334-3831 x200

Office Hours:

Fall & Spring Semester

Mon - Thur 11:30am - 9pm

Fri 9am - 1pm

Summer

Mon - Thur 9pm - 6pm

Fri 9am - 1pm

San Juan College West

69 County Road 6500, Kirtland, NM 87417
(505) 598-5897

Additional campus maps at: <http://www.sjc.cc.nm.us/pages/3538.asp>

Scheduling Services For Facility Use

<http://www.sjc.cc.nm.us/pages/186.asp>

Main Campus

San Juan College enjoys the opportunity to serve by providing beautiful facilities to accommodate the growing conference, convention, and meeting space requirements of the community. The James C. Henderson Fine Arts Center is an 83,000 square foot complex that includes a performance hall, four large meeting rooms, and an art gallery.

The performance hall features continental seating for 800 on the mezzanine and balcony levels, an orchestra lift, an orchestra shell and a flyloft for quick change of scenery. The four conference rooms may be configured in different sizes and with room arrangements that can fill the requirements for most banquets, breakout sessions, or general meetings.

The college also features a smaller, 350 seat theatre and four smaller community meeting rooms in the main building located by the cafeteria. The classrooms are available for use after class

hours and most weekends. The campus parking lots are available for events that may need that kind of venue space.

Businesses, clubs, organizations, and any public event may use the facilities with a rental rate that is budget sensitive. The facilities are not scheduled for private affairs including wedding receptions, anniversary parties, baby showers, family reunions, graduation receptions, etc.

Mary's Kitchen is San Juan College's food contractor and caters all events on campus. For arrangements, please contact them at 566-3265.

Assistance in the planning of an event is available by calling 566-3296.

You may inquire about reserving facilities in the SJC Henderson Fine Arts Building at:
[SJC Henderson Fine Arts Building Reservations Form](#)

For facilities usage fees click on the following link:
[Facilities Usage Fees](#)

For facilities on the Main Campus contact:
[Alana Vanden Broeck, vandenbroecka@sanjuancollege.edu](mailto:Alana.VandenBroeck@sanjuancollege.edu)

West Campus

The West campus, located in Kirtland, NM (16 miles west of Farmington) has seven classrooms available for meeting rooms on a first come first serve basis. The classrooms accommodate from 15 to 30 people. Upon availability rooms 111 & 113, with the partition open may hold 50 people.

Each of the classrooms has whiteboards, table podium, DVD-VCR, document camera and upon request a flipchart holder (paper is not available).

An organization's first meeting room request is complimentary for each month. For the second and more meeting room requests in the same month there will be a \$25 per day room fee charged.

For facilities at SJC West contact:
[Elaine Benally, benallye@sanjuancollege.edu](mailto:Elaine.Benally@sanjuancollege.edu)

East Campus

For facilities at SJC East contact:
[Marti Kirchmer, kirchmerm@sanjuancollege.edu](mailto:Marti.Kirchmer@sanjuancollege.edu)

Appendix H
Letter of Support for IT



TECHNICAL SERVICES, INC.

March 15, 2012

To: Ross E. Zumwalt, M.D.
Chief Medical Investigator
NM Office of the Medical Investigator

Re: Information Technology for OMI in the event of a mass fatality

Dear Dr. Zumwalt:

I understand you are working on revising your statewide Mass Fatality Plan (MFP), and that one of the elements calls for the appointment of a Director of Information Technology in the event of activation of the MFP. I further understand that the Director of Information Technology will be responsible for the following duties:

The Director of Information Technology will be responsible for maintaining communication systems among all components of the mass fatality plan system and between components of the plan and other involved agencies.

The Director of Information Technology will also provide all necessary computer support to all personnel working on the mass fatality incident (MFI) including data entry, data entry security, backup of information, storage of data and interoperability of information sharing with other agencies.

J and J Technical Services, Inc., accepts the responsibility for the Director of Information Technology role and will name a specific individual to discharge these duties upon request of the designated Chief of Administrative Support in the event of activation of the MFP.

Sincerely,

A handwritten signature in black ink, appearing to read 'John Freienmuth', is written over a light blue horizontal line.

John Freienmuth, President
J and J Technical Services, Inc.

1510 Barbara Loop, Rio Rancho, NM 87124 505-896-2969 FAX 505-891-5351

Appendix J
Investigation of Remains – Autopsy Protocol



III.

Title: Examination Of Remains	Procedure
Target Group:	B. (x) Morphology Technicians

AREAS OF RESPONSIBILITY

Morphology Department

UNIVERSAL PRECAUTIONS

Universal precautions is an approach to infection control to treat all human blood and human body fluids as if they were known to be infectious for HIV, HBV, and other bloodborne pathogens (Bloodborne Pathogens Standard 29 CFR 1910.1030(b) definitions)

- Bloodborne pathogens standard 29 CFR 1910.1030(d)(1) requires:
 1. Employees to observe Universal Precautions to prevent contact with blood or other potentially infectious materials
 2. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.
 3. Treat all blood and other potentially infectious materials with appropriate precautions such as:
 - Use of gloves, masks, gowns, aprons, sleeve covers, head covers, eye protection.
 - Use engineering work practice controls to limit exposure.

SAFETY GUIDELINES

Safety guidelines are in place to protect all employees at the OMI. Complete compliance is required for all individuals entering and exiting the BSL-3 autopsy suite.

- All PPE must remain on while handling bodies and opening body bags
- Contaminated PPE must be removed before exiting contaminated area.
- Employee should not attempt to move large bodies alone. Wait for help!
- The body slide must be used for moving all adult bodies from gurney to other gurney.

BIOSAFETY ALERT!!!!!!

Safety guidelines for entering the BSL-3 autopsy suite include utilizing all required personal protection equipment (PPE). Once inside the BSL-3 autopsy suite all required PPE must remain on in the prescribed manner (including all respirators and face protection) until stand down is in effect. Failure to comply with safety guidelines and procedures may compromise the safety and health of the OMI staff and may result in disciplinary action.

PROCEDURE

I. External Examination

- i. Verify armband of deceased. If discrepancy is discovered notify sr. morphology technician.
- A. Review yellow page on CME for instructions by the pathologist.
 1. Take height and thumbprint of deceased.
 - a. Take print from right thumb. If it is not possible to take print from right thumb, print left thumb and document under case notes.
 - b. Take a length measurement by starting the measuring tape at the decedents heel and up to top of head. Do not go over the abdomen.
 - c. Enter measurement into CME.
- B. Inventory will be taken when both technician and pathologist are ready. All clothing and valuables will be entered into database accordingly on all cases stored at OMI, including "Jurisdiction Terminated" (JT) cases and "no autopsy" cases.
 1. One tech will check all pockets and display clothing and valuables for pathologist. Clean tech will enter information.
 - a. Items held for evidence must be taken to evidence room (see evidence collection procedures).
 - b. Items scheduled for release must be delivered to the valuables room via the pass through port in the evidence processing room.
 - c. Clothing and valuables will be deposited only after pathologist has seen them.
 - d. Two technicians must verify all valuables and clothing before packaging. Both technicians must validate by signing document and validating each item in computer. Each item must be documented on inventory sheet and attached to release form.
- C. Prepare decedent for photos. Body should not be washed until pathologist has given permission.



1. The area needing photographs must be placed on a blue board. Check with the pathologist if pre-washing photos are needed. Photographs of trace evidence, foreign materials or blood patterns may be needed. The blue board must be wiped clean and dry before photographing.
 2. The photo ID number (OMI number) must be placed in **anatomical position below the area being photographed**. The clean tech will handle computer adjustments for photos and the other tech will handle deceased and blue boards.
 3. All blue boards are to be decontaminated after each use.
- D. Obtain femoral blood
1. Use a 20 ml syringe. Use this method for a dictated external exam otherwise femoral blood will be obtained internally under the direction of the pathologist.
 - a. To find placement of insertion, place right thumb on left iliac crest and your pinky on the pubic symphysis. The spot where your fore finger falls is the place where you puncture the skin. You may be able to feel the vessel.
 - b. Stick the needle straight in and pull back the plunger. Slowly pull outwards until blood fills the syringe. It is not necessary to pull back the plunger completely. Little pressure is needed to obtain blood if the vessel is actually punctured.
 - c. Do not vigorously move the needle around to find the blood – this may contaminate your sample with tissue from the body.
 - d. Once obtained the blood must be put into a black top tox tube and label with a 'Femoral Blood' seal. If blood is left over fill tiger top tubes. Also use this blood for a DNA sample.
 - i. If less than five mls of femoral blood is obtained, it is not necessary to preserve sample: the sample must be put into a non preserved- tox tube.
- E. Obtain heart blood - Note: do not collect heart blood at this point if case is a full autopsy.
1. For external exam: place large external autopsy needle onto a 20 ml syringe. Enter the chest just left of the sternum at the nipple line. Puncture straight down until you are past the sternum and then angle the needle to the midline chest.
 2. Pull back the plunger and slowly pull the syringe backwards until blood fills the syringe. You may need to reposition the needle to get blood.
 3. Put the blood in a black top tox tube and label with a 'Heart Blood' label.
- F. Obtain vitreous fluid - This procedure is done only after pathologist has looked at the eyes and the ID photo has been taken.
1. Use a 5 ml syringe, place the syringe at the outside corner and slowly pull back the plunger. If the plunger is pulled too vigorously, the retina can accidentally be pulled up along with the vitreous.
 2. Vitreous fluid should fill the syringe. If the syringe does not fill, twist the syringe in its place and move inwards or outward a little.

3. Fill a preserved bullet with vitreous. Place the bullet in a red top tox tube. The remaining vitreous from the eye and vitreous from the other eye will go into a non-preserved tox tube.
 4. Label both tox tubes with vitreous label.
- G. Obtain urine – Do not obtain urine at this time if case is a full autopsy.
1. Place a large external needle onto a 20 ml syringe.
 2. Puncture the skin right above the pubic symphysis. Once past the bone, angle the needle downwards towards the bladder.
 3. Pull the plunger back and slowly pull the syringe backwards until it fills with urine.
 4. Put the urine in a non-preserved tox tube and label appropriately.
- H. Package and place all tox specimens in a biohazard zip lock bag.
1. Surface decontaminate specimen bag.
 2. Deliver to specimen receiving.
 3. All specimens will be scanned out of autopsy and into specimen receiving via pass through port.
- I. Review yellow page on computer and make sure all required fields are completed.
- J. Two technicians must verify armbands on decedent before sealing bag.
1. Enter body bag seal history into CME.
 - ii. Place body bag label on outside of body bag.
 2. Use black marker to circle label to signify case is done.
 3. Seal body bag - Ensure zipper is completely zipped. Twist tops of zippered end and use silk tape to seal.
 4. Place small ID label on body bag seal and initial. Body bag seals must have two initials. This indicates that two individuals have verified the armbands.
 5. Place ID label over silk tape
- K. Check case for completion in CME before body is put away.
- L. Use clean body tray from gurney wash to transfer body-to-body transfer.
1. Spray outside of body bag with disinfecting solution and wipe clean before placing body on clean tray.
 2. Scan body bag seal and place body into body transfer. Body must be scanned in order to track location of body.

III. Pre-Autopsy Procedures

- i. Check both armbands of the decedent and compare labels. All spelling, case numbers and dates should match.
- B. Inventory will be taken when both technician and pathologist are ready.
1. Clothing and valuables will be entered into database accordingly.
 - a. One tech will check all pockets and display clothing for pathologist. Clean tech will enter information.
 - b. Items held for evidence must be taken to evidence room (see evidence collection procedures).

- c. Items scheduled for release must be delivered to the valuables room via the pass through port in the evidence processing room.
 - d. Clothing and valuables will be deposited only after pathologist has seen them.
 - C. Review yellow page on CME for instructions by the pathologist. Gather any extra tools and supplies needed for the autopsy.
 - D. Take thumbprint of right thumb after pathologist has examined hands.
 - 1. If it is not possible to get print from right thumb, print left thumb and make note under case notes in CME.
 - 2. Do not take thumbprints if fingerprints are to be taken as evidence. It is important the ridges are clear.
 - E. Take length measurement
 - 1. Start the measuring tape at the decedents heel.
 - a. Do not measure over the abdomen.
 - 2. Record measurement into CME.
 - F. If body is still in bag, aid the pathologist in taking any necessary trace evidence as directed.
 - 1. Aid pathologist in taking evidence for sexual assault workup if needed.
 - G. Place body on table with pathologist approval.
 - 1. Clean body after pathologist's approval and set up blue boards for photography.
 - After pathologist has given permission to clean body, prepare blue boards under head for ID photo.
 - Wipe blue board of all blood and water.
 - Place ID OMI number along with measurement scale on chest or neck.
 - ID/scale should always be on lower end and in anatomical position.
 - 2. Obtain all required photos, including ID, per pathologist's instructions.
 - 3. Collect vitreous and fill preserved and non-preserved vitreous tubes.
 - H. Determine if block dissection or organ by organ is necessary.
 - 1. Determine which organs the pathologist would like to remove.
 - i. Begin Y – shaped incision at the pathologist's direction.
- IV. Overall Summary of Autopsy
- A. Allow pathologist to check pleural and peritoneal cavities.
 - 1. Note adhesions or fluids to the case pathologist.
 - 2. Assist in measuring fluids and record on blue page in CME.
 - 3. Make sure to distinguish between right and left pleural cavities.
 - B. Assist pathologist in obtaining external (femoral blood, cerebrospinal fluid) and internal cultures (heart blood, lungs, spleen, other) if needed.
 - 1. **DO NOT TAKE CULTURES WITHOUT THE CASE PATHOLOGIST.**
 - C. Obtain toxicological specimens which include femoral and heart blood, vitreous fluid, urine, solid tissue, bile and gastric if necessary.
 - 1. Needle sticks are a common occurrence when trying to obtain the femoral blood via the femoral vein.

- a. This procedure requires the internal removal of femoral blood after removal of the intestines.
- D. Remove the heart and lungs.
 1. Pathologist will check for possible pulmonary thromboembolus if organ-by-organ evisceration.
- E. Remove small and large intestines.
 1. Cut the mesentery close to the serosal surface.
 2. Place the appendix in a stock jar.
- F. Complete evisceration with or without the assistance of the pathologist.
 1. In the case of any additional oddities or pathologies, tell the case pathologist.
- G. Remove all fluids and residual tissues from the body cavities to aid in optimal inspection of the body cavities.
- H. Open the small and large intestines.
 1. Cut along the antimesenteric border when possible.
- I. Reflect scalp
 1. The pathologist examines the skull before sawing open.
 2. The pathologist should remove the brain unless otherwise directed.
 3. Strip the dura.
- J. Obtain the pituitary gland with the dura stripper tool.
 1. Place it in the stock jar.
- K. Obtain a piece of bone marrow
 1. With the pathologists' permission.
 2. Cut a 3-cm. portion of rib and place it in the stock jar.
- L. Record the toxicology specimens obtained.
 1. Note whether the decedent had an appendix, and amounts of fluids in body cavities on the blue page.
- M. Complete all paperwork, including initials at all fields.
 1. Have pathologist sign evidence labels, if needed.
- N. Inventory the amount of histology
 1. Prior to placing the stock jar of histocassettes onto the laboratory pass through in the specimen receiving lab, inventory the amount of histology cassettes that the case pathologist used.
 - a. Write each block letter and number, noting if all blocks have the same case number.
 - b. Place a small ID label on the histology log sheet in the indicated space, initial, and record the amount of cassettes included in the jar.
 - c. Write the case pathologist's name on the small ID label.
- O. Seal the toxicology specimens with a tamper seal and a specimen label before delivering to the pass through.
 1. Place all cultures in the pass through box in specimen receiving area and notify the supervisor if lab is vacant.
 2. Load blood tubes in centrifuge, spin down and place in pass through. DNA blood cards will be turned in through the pass through as well.



- P. Close up the body.
1. Most cases will require a tack closure.
 2. Depending on cultural or religious affinity or if home burial is the arrangement for body disposition the body may need to be fully sewed.
 3. Check the body for the appropriate green armband. Place the body inside of the body bag.
- Q. A second technician will verify that the body placed inside of the body bag is the named decedent prior to enclosing the body inside of the bag.
1. The body bag and zipper at the head of the bag will be twisted and enclosed with surgical tape (provided at all autopsy stations).
 2. A small ID label will be placed onto a body bag seal in the large white space to the right.
 3. The two verifying persons will initial over the edge of the small ID and the body bag seal to indicate seal is intact without tampering.
 4. Both technicians will initial in the space title "Sealed by", and the day's date will be written under "Date".
- R. Body bag must be surface decontaminated with 10% bleach solution before body is placed in body transfer unit.
- S. Body Bag Seal
1. The case technician will log onto CME in order to record under the "Body Bag Seal History" section the sealing of the body bag.
 2. The technician will choose their name for the section titled "Sealed by".
 3. Under the "Reason Seal Broken", choose the appropriate reason the seal was broken, in this case, "Autopsy".
 4. Under "Verified by", the second technician is chosen for the verification.
 - a. Finally, click onto the "Enter Seal History" to finalize the entry.
 - b. If there is any discrepancy that is missed by the two technicians, they and/or the last person to break the seal will be held responsible.
 5. If for any reason the seal must be broken after the autopsy, or the two-person body bag seal process, then only one person has to check the armbands and reseal the body.
 - a. Be sure to update the Body bag seal history in CME.
- T. Decedent personal belongings.
1. Red biohazard bags containing clothes are to be labeled and tied closed.
 2. All personal belongings are turned into the valuables room via the pass through compartment.
 3. All entries of clothing and valuables must be entered before items are placed in pass through.
 4. Another technician must check and validate the entries prior to submitting.
- U. Enter the 'done' or 'hold' exam/fingerprint status in CME.
1. If body is to be on exam "hold" per doctor's request, notify supervisor or senior technician with reason.

- V. Disinfect entire autopsy station including tables, cabinet tops and sides, floors, exam lights, and walls where blood or other body fluids may have splashed or smeared.
 - 1. Remove the soiled blue pad from the station and check all of the instruments are clean before placing them on the new blue pad.
 - 2. Make sure all stations are stocked for the following day. Do not over stock.
- W. Load all photographs into CME and label X-rays, then store in appropriate drawer in autopsy suite.
- X. Package any dried evidence.

V. Routine Autopsy Evisceration

A. Y- Incision

- 1. Elevate body by placing a white block between the scapulae.
- 2. Make a Y-shaped incision through the skin beginning at the anterior shoulders to the central chest.
 - a. Extend the incision inferiorly along the midline of the abdomen, to the left of the umbilicus to the pubic symphysis.
 - b. Deepen the incision through the muscle to the underlying rib cage over the chest.
 - i. Follow through the muscle and facial layers into the peritoneal cavity over the abdomen, taking care not to puncture the gastrointestinal tract or bladder.
 - c. Record any peritoneal effusion.

B. Reflect the skin and muscle of the sides of the chest over the rib cage.

- 1. Reflect the skin and subcutaneous tissue from the superior chest toward the head to expose the strap muscles and the vessels of the neck.
 - a. Be careful not to cut through the skin of the anterior or lateral aspects of the neck for proper cosmetic appearance.
 - b. With direction from pathologist note any medical intervention that may have to be transected for determination of proper placement.

C. Cutting the Ribs

- 1. Find the space between the clavicle and sternum.
 - a. Using the scalpel blade, mark the line to be followed by the rib cutters.
 - b. Depending on the condition of the ribs, cut through the sternoclavicular junction and then along a line just medial to the costochondral junctions of ribs on both sides of the sternum.
- 2. Use the rib cutters to cut through the ribs using this line as a guide.
 - a. Do not cut through broken ribs unless the pathologist has documented them. If you note broken ribs the pathologist has not viewed, alert the pathologist.

D. Lifting the breast plate

- 1. Lift one lower, lateral corner of the loosened breastplate and hold the scalpel parallel to the under surface of the plate, cut away the

underlying attached diaphragm and mediastinal tissues.

- a. Make the cuts as close to the underside of the plate as possible so as to leave the pericardium and thymus (if present) intact.
 - i. Before the breastplate is removed, check the pleural cavities for effusions.
2. HOMICIDES.
- a. In gunshot or stabbing cases, the pathologist may want to approximate wound tracks with the organs in situ at this time. With the pathologist's approval, proceed with either block or organ-by-organ evisceration).

E. Breast Tissue

1. If the decedent is female, the breasts should be cut in the bread loaf fashion in situ from the inside.
 - a. Bread loaf fashion: criss-cross cuts that form squares in the tissue.
2. Look for any abnormalities and collect tissue for the stock jar. If there are abnormalities, notify the pathologist.

F. Rib for Bone Marrow

1. Strip the muscle away from one of the ribs.
2. Using the rib-cutters remove a piece of rib about 3cm from an undamaged area and place in the stock jar.
 - a. The pathologist may also want some bone marrow extruded onto a piece of filter paper.
 - i. It should be allowed to air dry, forming a "skin".
3. A new piece of paper should be used to store the bone marrow. At this point it should be placed in a tissue cassette for protection before placing in the stock jar.

G. Major Vessel Tie-Off

1. The major vessels are tied off as a courtesy to the funeral homes. The head and arms are embalmed through these vessels.
2. It is easiest to cut between the aorta and the pericardium, following up until the vessels branch off of the aortic arch.
3. The carotid and the subclavian will branch off the aorta to the left. The brachiocephalic will branch off to the right.
 - a. The brachiocephalic artery then branches into the carotid and subclavian so it is important to tie the vessel below this bifurcation.
4. Transect each artery inferiorly to the strings.

H. Tongue - The tongue should ONLY be removed at the request of the pathologist.

1. In cases where the tongue is to be removed, reflect the skin as described previously.
2. Starting at the point of the chin, the scalpel blade should be inserted through the floor of the mouth and a cut made laterally around the attachment of the tongue to the back of the throat. Repeat for the other side.
3. Lateral traction on the throat will help prevent nicking of the carotids. Once the incision is completed in a large arc around the attachment of the tongue, use blunt dissection to pull the tongue from inside the mouth.
4. Free up the throat from the spinal column and while pulling upward gently use the scalpel to carefully cut the remaining attachments.
5. The scalpel should be roughly parallel to the spinal column.
6. Continue freeing the trachea and esophagus from the spine. Note any catheters entering the appropriate vessels and cut them at this point.
7. The carotids can be dissected away from surrounding tissues and then tied securely and cut just above the clavicles. (For some pathologists

this should be done prior to dissecting out the tongue and upper neck organs so that traction can be applied to the carotids to ensure that they aren't nicked during subsequent dissection).

i.

VI. Rokitansky Evisceration Procedure (Block)

- A. Using either scalpel or scissors, cut the diaphragm leaflets away from the lateral and posterior walls of the body around to the vertebral column following the C-shaped curvature of the body wall.
 1. Careful to cut posterior to the kidneys.
- B. Free up the neck and mediastinal structures by making longitudinal incisions with the scalpel just lateral to the larynx cutting through the strap muscles but taking care not to incise the carotids or thyroid gland.
 1. Tie off the vessels.
- C. Cutting medial to the carotids on each side of the larynx and trachea, free up the underside of the larynx, trachea and esophagus from the cervical spine.
- D. In cases where the tongue is not to be removed and where strangulation is not a possibility, reflect the skin and subcutaneous tissue of the neck to the jaw line.
 1. Free the upper larynx at the level of the jaw line by cutting through the musculature and attachments using the inner mandible as a guide and cutting as close to the larynx as possible.
- E. Cut through the base of the tongue above the hyoid bone, cutting toward the cervical spine.
- F. Remove intestines either beginning at the distal duodenum around the ligament of Treitz or at the end with the rectum.
 1. Tie off the small intestine at the distal duodenum. Moving the feces within the rectum proximally, transect the rectum as far down into the pelvic cavity as possible.
 2. Using a combination of blunt dissection and sharp force, remove the intestines cutting as close to the serosal surfaces of the intestines as possible.
 3. Transect the small bowel distally to the string.
- G. Using hands for blunt dissection, free the urinary bladder from the anterior pelvis.
 1. Working in a lateral then a posterior direction, free up the attachments at the sides of the bladder and posterior to the rectum.
 2. Using scissors or scalpel, cut through the bladder outlet (urethra) in front of the prostate gland if male or in front of the cervix if female using the pubic symphysis as a guide.
 3. Retract the pelvic organs as the cut is made to insure that the entire prostate or cervix is eviscerated.
- H. Retract pelvic structures superiorly.
 1. Cut through the testicular or ovarian arteries but keeping the iliac and femoral arteries intact.
- I. Keep retracting structures, exposing the aortic bifurcation. Locate the ureters and, taking care not to incise the ureters, cut across the aorta and its adjacent inferior vena cava superior to their bifurcations.

1. Continue cutting superiorly, as close to the lumbar spine as possible, posteriorly to the aorta and inferior vena cava, cutting through the attachments of the psoas muscles at their attachments to the vertebral column.
 - J. Grasp larynx and esophagus and pull the thoracic organs toward the feet with moderate traction.
 1. It may be necessary to free up pleural adhesions with blunt dissection. If needed, use a scalpel to sever any remaining attachments of the organ block to the vertebral column.
 2. Place the organ block anterior side down on the cutting board.
 - K. Remove the brain and pituitary as described below.
- VII. Virchow Evisceration Procedure (organ by organ)
- A. Any variation of evisceration is possible to show organ or system pathology. The method described here is only general. During the evisceration, the technician and pathologist should note any abnormalities and alter the evisceration accordingly.
 - B. Heart and Lungs
 1. If a blood culture is ordered, obtain this first with the case pathologist.
 - a. Check for a pulmonary thromboembolus by making a cut in the proximal pulmonary artery close to the heart.
 - b. Run finger down the right and left branches to check for an obstruction.
 - c. Obtain the toxicology samples by cutting across the inferior vena cava attachment to the heart.
 - d. Draw blood into a 60cc catheter tip syringe.
 - e. Remove the heart by cutting through the remaining vessel attachments as close to the pericardium as possible.
 2. Grasping one lung, cut through the hilar attachments to the vertebral column as the lung is retracted and cut through the hilum (bronchus, pulmonary artery and pulmonary vein).
 - C. Intestines - The removal of the intestine can be done in two ways: either beginning with the duodenum or with the rectum.
 1. Duodenum - Find where the duodenum is attached to the viscera on the left posterior before it attaches to the stomach.
 - a. Tie off a section with string approximately 3cm distal to the emergence of the duodenum. (This keeps the contents of the stomach from running out.)
 - b. Cut distal to the tie and begin removing the intestines by separating them from the mesentery and fascia.
 - c. Cutting may also begin in the middle working to both ends.
 - d. Cut the mesentery as close to the intestine as possible. Continue removing the intestines down to the ileo-cecal junction.
 - e. Note if the appendix is present on the cecum. If so, remove it and place in the stock jar.

- f. Continue cutting away the ascending colon from the underlying fascia taking care not to cut the underlying right ureter and further up towards the liver, the underlying flexure of duodenum.
 - g. Cut away the transverse colon from the hepatic flexure across to the splenic flexure and down the descending colon.
 - h. Continue the dissection down to the rectum separating it from the more anterior structures, i.e., bladder and prostate in the male, and bladder, uterus, vagina, ovaries in the female.
2. Rectum - Find the end of the rectum as it exits to the exterior of the body.
- a. Reach posteriorly, as far as possible and push any feces up the large intestine.
 - b. Cut distally below the feces and begin removing the intestines by separating them from the fascia and the mesentery.
 - c. Follow the instructions for duodenum above, except in the opposite order.
 - d. Cut the mesentery close to the intestine.
 - e. Tie off the duodenum with the piece of string and cut distal to the tie.
 - f. Appendix- Check to see if the appendix is present. Remove and place in the stock jar.
 - i. Check the bowel for tears, intussusception, tumors, scarred areas, diverticula, or surgery.
 - ii. If any are present, alert the pathologist.
- D. Liver - Cut the liver away from the diaphragm superiorly and posteriorly taking care not to cut the right adrenal gland, which is close to the posterior right lobe of the liver.
- 1. Transect the portal vein, the left lateral attachments to the stomach and the porta hepatic.
 - 2. This includes the common bile duct, hepatic artery, and hepatic vein.
 - i. Spleen
 - 3. Check the spleen for lacerations prior to removing.
 - 4. Remove the spleen by cutting across the distal pancreas, splenic artery and splenic vein as close to the spleen as possible.
 - a. Be careful not to incise the stomach.
 - b. Check for accessory spleens.
 - i. Stomach Block
 - 5. Before removing the stomach, duodenum and pancreas together, check for placement of any tubes (i.e., naso-, orogastric, or feeding tubes).
 - 6. Grasp the posterior aspect of the mesentery and while pulling up, cut the mesentery free anterior to the duodenum.
 - 7. Next, grasp the pancreas and while pulling up cut it free from the head to the tail between its underside and the underlying kidney and adrenal.
 - a. Then free the attached duodenum from the pylorus to the previously placed duodenal tie.

8. Grasp the mesentery, stomach, pancreas and duodenum together and cut underneath freeing the block to the pylorus and the diaphragm.
9. Grasp the esophagus and cut through the diaphragm to the esophageal hiatus and cut the diaphragm away from the esophagus.
10. Grasp the block by the esophagus and cut anterior at the area of the esophagus parallel to the bronchi of the lungs.
 - a. This block will contain the esophagus, stomach, pancreas, duodenum and mesentery.
 - b. Place the block on the dissection table with the esophagus resting on top. Measure and record stomach contents. Save all stomach contents, if needed for toxicology.

E. Aorta and Renal Arteries

1. The aorta and renal arteries must be visually inspected before removing the kidneys.
2. Insert scissors into the hole where the mesenteric artery used to be and cut up and down the aorta.
3. The first branch off of the aorta will be the celiac trunk.
 - a. The next branch will be the superior mesenteric artery.
4. The pair of arteries that branch off next are the renal arteries.
 - a. Cut down the renal arteries to check for patency and condition.

F. Adrenals

1. Remove both right and left adrenals from the superior poles of both kidneys.

G. Kidneys

1. Incise longitudinally through peri-renal fat and renal capsule into the renal parenchyma.
2. Using forceps to strip off the renal capsules, noting whether it strips off with ease or not.
3. Mark which kidney is left or right (the ureter should be long on the left kidney).
 - a. If the urinary tract is of importance, the bladder can be separated from other organs and maintained intact.

H. Pelvic Organs

1. Before preparing to remove the pelvic block, extract the appropriate amount of urine needed for toxicology testing.
2. Lift the bladder with forceps in order to cut a small hole to fit a 60 cc syringe.
3. Withdraw and measure all urine in the bladder.
4. Using your hands for blunt dissection, free the urinary bladder from its anterior attachments to the abdominal wall and then work around laterally to free all the pelvic organs (rectum and bladder in the male; rectum, vagina, uterus and ovaries, and bladder in the female) within the pelvic cavity.
5. Using a scalpel or scissors cut down through the attachments of the pelvic organs as close to their outlets as possible.
6. Use the pubic symphysis as a guide and be sure to retract on the uterus on a female so as to cut through the vagina distal to the cervix, and on the bladder on a male so as to cut inferiorly to the prostate.
7. FEMALE: Check the uterus, cervix and fallopian tubes for continuity.
 - a. Check the ovaries for cysts and corpus luteum.
 - b. Examine the length of the fallopian tubes for ligations (missing segments).
8. MALE: Be sure to include the prostate in the pelvic block.

- a. Testes - The testes may be pulled up and through the inguinal ring before the organ block is removed or after the organs are removed by dissecting through the anterior abdominal wall.

I. Neck Organs

1. Continue reflection of the skin and muscle of the superior thorax from the clavicles.
2. Reflect cautiously up the anterior and lateral neck to expose the strap muscles of the neck and finally the anterior protuberance of the thyroid cartilage (Adam's apple).
 - a. Be extremely careful not to cut through the skin of the anterior or lateral neck for cosmetic appearance for the mortuary.
 - b. Note proper placement of any catheters.
3. Also, note and photograph at the direction of the pathologist any hemorrhage in the neck region, especially if it is a possible strangulation case. If strangulation is suspected:
 - a. The technician should eviscerate the body, leaving all neck organs in place.
 - b. When the blood has stopped draining after brain removal, layer-wise dissection of the neck can begin by the pathologist.
 - i. In cases where the tongue is not removed, reflect the skin and subcutaneous fat of the neck back to the jaw line.
 - c. Incise the neck organs superior to the thyroid cartilage, making sure to remove the hyoid bone.

J. Brain, Dura and Pituitary Gland Removal

1. The incision must be placed behind the ears.
 - a. If the decedent has no hair (bald, fetus or infant) prop the head on a black block below the cervical spine and make a scalp incision starting behind one of the ears, across the vertex of the scalp in the coronal plane and ending behind the opposite ear.
2. The incision over the top of the scalp will need to be placed more posteriorly on the head in order to more easily conceal the incision for open casket viewing.
3. Lift up a portion of the scalp and separate the scalp from the underlying calvarium with a scalpel.
 - a. Considerable traction is often necessary to accomplish this; try not to tear the scalp tissues.
4. Reflect the scalp anterior and posterior to a point about 3 cm. above the level of the orbital ridges and just below the occipital protuberance.
5. Incise and reflect the temporalis muscles from the skull.
 - a. Using a scalpel, draw a line on the periosteal tissue on the skull, marking the line to cut by the Stryker (bone) saw.
 - b. The line should be circumferential on the skull with a stair-step type notch at the sides of the head, level with the mastoid processes.

- i. The notch is made so that the line on the occipital region of the skull is higher than on the frontal bones by about 1-1 ½ inches to aid in replacement of the skullcap and to keep the skullcap from slipping off.
6. Change into a new pair of gloves before retrieving the Stryker saw.
 - a. Begin sawing on the superior forehead area just where the calvarium begins sloping down.
 - i. If the cut is made too far down, the frontal sinuses will be encountered making it more difficult to cut.
7. Following the line, cut through the bone taking care to avoid excessive pushing down on the saw. Let the saw do the work.
 - a. Regulate the depth of the cut by resting a hand on the calvarium and resting the saw shaft on the hand.
8. At the direction of the pathologist, use the skull key to gently pry the calvarium away from the brain.
 - a. Occasionally, the calvarium will easily peel away from the underlying dura.
 - i. Gently incise the dura with a scalpel along the line of the saw cut so that the calvarium and the dura are removed together.
9. The pathologist should see the brain in-situ and be given the opportunity to remove the brain.
 - a. Measure any amounts of epidural and/or subdural hemorrhage including blood clots.
 - b. Save blood if necessary for toxicology.
10. To remove the brain.
 - a. Cut any remaining attachments of the dura such as the anterior falx cerebri.
 - b. Gently manipulate the frontal lobes out, cutting through the optic chiasm, internal carotids, hypophyseal stalk and visible cranial nerves close to the base of the skull.
 - c. Gently lifting the temporal lobes and using the petrous ridges as a guide, incise the tentorium that separates the middle from the posterior cranial fossae. Incise the tentorium as far laterally as possible.
 - d. On the lateral sides of the brain stem, transect the vertebral arteries close to the bone and sever the remaining cranial nerves that originate from the pons and medulla.
 - e. Reaching as far down into the foramen magnum as possible, transect the high cervical spinal cord and gently retract the brain from the skull. If the brain does not come out easily, check and sever any remaining attachments. Do not force the brain out.
 - f. Strip the remaining dura from the skull using the dura strippers.
- K. After the pathologist has examined the skull, remove the pituitary gland from the sella turcica with a scalpel. It may be necessary to gently break part of the bone of the sella turcica to gain access.
- L. The pathologist may want to save the brain for a more in-depth examination.

1. For adult brains, suspend the brain by running a string under the basilar artery in a 20% formalin-filled brain bucket.
 - a. Make sure the brain is completely immersed in the formalin and that it does not touch the sides or bottom of the bucket.
 - b. Close the lid, tie the string, and place a small ID label on the lid.
 - i. Use either a Sharpie marker or grease pencil to write both the decedent's OMI number and name on the side of the brain bucket.
 - c. Put the brain bucket in the organ prep room.
 - i. Place a small ID label on the sheet and write the pathologist's name and your initials.
 - ii. Note whether or not dura and/or spinal cord are included inside of the brain bucket.
 - d. Leave a neuropathology sheet and about 6 small ID labels with the brain bucket.
 - e. To fill out the neuropathology form, put a small ID label over the patient information section; write the date of autopsy, and the pathologist name.
 - f. The pathologist will fill out the rest of the form. There is also a worksheet for the extended examination of organs.
- M. Place the pink copy of this form with the brain bucket.
 1. The pathologist will discuss options with the family and let a senior technician or the morphology supervisor know whether the body can be released with or without the brain.
 2. Until this is decided, put the body on exam hold and tell either the senior technician or supervisor.
 3. They can leave a note in the "Case Notes" section of CME why the decedent is being taken off of hold.
 4. Write brain hold on the body bag before the decedent is put away.

VIII. Middle Ear Removal

- A. After the brain and dura have been removed from the skull, locate the petrous portions of the temporal bones in the base of the skull (petrous ridges).
 1. Locate the auditory nerve (VIII cranial nerve) where it enters the posterior medial portion of the petrous ridge. The petrous ridge is the medial border of the skull where the saw cut will be made.
- B. The lateral margin is defined only by how far laterally the skull limits the cut.
 1. Using an autopsy saw with a small quarter-round blade, make a transverse cut as deeply as the blade allows in the medial border as defined above and another transverse cut as far laterally as the skull allows.
- C. Make a horizontal cut where the anterior portion of the petrous ridge blends into the middle fossa.
 1. Make another horizontal cut at the posterior margin of the ridge where it becomes the posterior fossa.
 2. These cuts should be angled towards each other to affect a V-shaped wedge of bone.

- D. Use the T-handled chisel or a bone chisel to loosen the wedge of bone and remove.
- E. An alternate method is to use the large bone cutters.
 - 1. Grasping the bone with the cutters from the lateral edge, in the petrous ridges, start removing the petrous ridge exposing the middle and inner ear.
- F. A swab culture can be done if indicated.

IX. Anterior Spinal Cord Removal

- A. Place a head block underneath the shoulder blades to extend the neck backwards.
 - 1. This will increase accessibility to the spinal cord.
- B. Cut away the psoas muscles with a scalpel from the lumbar vertebrae and expose the costal vertebral junctions.
 - 1. Using the Stryker saw, make a transverse cut through the anterior and lateral portions of the lower lumbar vertebrae.
 - 2. Make another transverse cut through the anterior and lateral portions of the cervical vertebrae as proximally as possible.
- C. At the level of the costal-vertebral junctions, saw longitudinally along the lateral aspect of the vertebral column on both sides connecting both proximal and distal transverse cuts.
 - 1. Be aware that the spine is curved and that the longitudinal cuts should maintain the same depth relationship along the entire spine by cutting along the level of the costal-vertebral junctions.
- D. Using the T-handled chisel or a longer bone chisel.
 - 1. Pry up the resultant bone flap.
 - 2. If the Dura is still connected to the bone flap it must be gently pried off.
- E. Remove the spinal cord by cutting across the most distal cauda equina with a scalpel, severing the nerve roots on both sides as the spinal cord is gently lifted out of the vertebral column.
 - 1. Circumferentially sever all dural and nerve root attachments at the cervical region and foramen magnum using a long handled scalpel blade.
 - a. Be careful not to compress the cord too tightly as it is being removed.

X. Posterior Spinal Cord Removal

- A. Turn the body over into a prone position. Place a head block underneath the chest region.
- B. Beginning at the low occipital region of the scalp, make an incision through the skin and muscles with the scalpel along the midline of the neck and back using the spinous processes of the vertebrae as a guide.
- C. Reflect the skin and cut through the muscles down to the vertebral arches on each side of the vertebral column.
 - 1. At a 45-degree angle, saw through the vertebral arches on each side of the vertebral column from the most proximal cervical region to the

lower lumbar region.

- D. Make a transverse saw cut through the high cervical vertebra and lower lumbar vertebra.
- E. Pry the bone flap off and gently remove the spinal cord and dura by severing the nerve roots and cervical attachments as described under anterior approach.

XI. Sphenoid Sinus Examination (Drowning)

- A. After the brain and dura have been removed, chip through the medial aspects of the orbital plates adjacent to the cribriform plate using a T-handled chisel or dura stripper.
- B. Insert a syringe into the sphenoid sinus and draw back on the plunger to aspirate any liquid.

XII. Posterior Leg Dissection for Thrombi

- A. With the body in a prone position, make an incision longitudinally along the back of the leg beginning at the distal thigh to the Achilles tendon.
- B. Carefully reflect the skin of the lower leg from the underlying muscle.
- C. Make a transverse cut through the Achilles tendon and, using the scalpel, reflect the gastrocnemius muscle to expose the deep veins and arteries of the lower leg. Continue the reflection superiorly past the popliteal region.
- D. Either cut longitudinally along the popliteal and posterior tibial veins or make serial cross-sections to locate thrombi.

XIII. Posterior Leg Dissection for Avulsion Pockets

- A. Make incisions similar to posterior leg dissection for thrombi except begin the incision above the buttock to the Achilles tendon.
- B. Reflect the skin of the entire leg from the underlying muscle including the anterior aspects to adequately see any avulsion pocket. If an impact to the anterior aspect of the legs is suspected, the body can be placed in a supine position and the longitudinal incisions can be made on the anterior legs beginning at the proximal or mid thigh region.

XIV. Esophagus Tie-Off for GI Bleeds

- A. The esophagus must be tied for all cases where there is the possibility of a GI bleed. Use string to tie the upper portion of the esophagus once it has been isolated. This keeps the pressure constant, which allows varices to remain dilated and easier to detect.

XV. Baby Autopsy Procedure

- A. The autopsy procedure is similar to an adult although a block evisceration is

recommended.

- B. It is routine to take total body X-rays and photographs on all babies and children one year of age and under.
- C. Blood, lungs, and spleen cultures are taken similar to adult autopsies although, since femoral blood is usually difficult to obtain, heart blood will most likely be utilized for a blood culture. In addition, cerebrospinal fluid culture will be obtained (Refer to acquisition of cultures section).
- D. Additional concerns to the regular adult autopsy include preservation of the thymus, which sits in the anterior mediastinal area and has the brachiocephalic vein embedded into it. Care should be taken not to cut through the brachiocephalic vein and to extract the entire thymus including the lobes that sit along the sides of the trachea and can extend upward to the level of the mandible depending on the age of the infant/child.
- E. Mediastinal structures including great vessels, heart and lungs should be examined in-situ for the possibility of congenital defects. If congenital heart/lung defects are a concern, the thoracic organs should be eviscerated en-block including the descending aorta to the level of the diaphragm en-block so as not to miss coarctation of the aorta.
- F. The tongue is usually removed along with the neck organs or with a block evisceration.
- G. Inspect the intestines and abdominal organs for correct placement (rule out inversus in-situ) and locate route of the umbilical vessels.
- H. How the brain is removed is dependent on gestational age.
 - 1. In general, full gestational age fetuses or post-delivery infants have sturdy enough skulls that the brain can be removed like an adult autopsy.
 - a. Otherwise, the membranes separating the sutures of the skull can be opened with scissors, and the four major bones of the skull can be opened like the petals of a flower to expose the brain.
 - b. There is less distortion of the brain, no matter what gestational age, when the skull is opened in the adult-type fashion.
 - i. Place a 4 X 4 gauze pad over the exposed cerebrum before severing the anterior brain attachments and optic tract. Gently allow the semi-liquid brain to fall into the gauze as the remaining attachments are severed.
 - ii. In exceptionally soft brains (IUFD, very premature infants), open the skull under water and allow the brain to be buoyed up by the water as the attachments are severed.
 - c. Rains in IUFDs and premature infants are preserved in formalin by placing the brain in a bouffant cap.
 - i. Suspend the cap in the formalin bucket with string.
 - ii. If dura, spinal cord or other organs are kept, document on form and sign-in sheet.
 - iii. Post-delivery infants can usually be suspended in formalin in the adult fashion.

2. In suspected child abuse cases, the parietal pleura should be stripped from the thoracic cavities to better visualize the ribs.
 - a. No vitreous fluid is aspirated from the eyes until after the brain is removed and the pathologist has examined the optic nerves.
 - i. The vitreous from babies should be collected only after the pathologist has decided not to save the eyes.
 - ii. The vitreous from both eyes should be placed in a plastic "baby" bullet tube, case # written on bullet and put in a plain 20cc tox tube with a label.

I. Placenta Examination

1. Optimally, the placenta should accompany the fetus or infant if death occurred shortly after delivery.
 - a. If the placenta is submitted without fixative, place in formalin only after the pathologist has procured any necessary tissue for possible Cytogenetic evaluation.
 - b. If the pathologist does not need to retain the placenta after the examination, release the placenta with the body.
 - i. If not, fix the tissue in formalin and place in the pathologist's designated area.

J. Examination of the placenta should include the following:

1. Attachment of the fetal membranes (i.e., circumvallate, marginal, etc.), color of the fetal membranes, attachment of the umbilical cord (i.e., central, marginal, etc.), three vessel cord, presence of true or false knots, length of cord, weight of placenta with cord and fetal membranes stripped, 3 dimensional measurements of the placental disc, percentage involvement of the disc by chronic or acute infarct if present, location and measurement of retroplacental hematoma if present, estimation of disruption or loss of cotyledons if present, any other abnormalities.
 - a. If the placenta arrives after the fetal/infant examination, place it in the walk-in and inform the pathologist assigned to the case that it has arrived.
 - b. If the placenta is not to be retained for any reason, contact the morphology supervisor or investigator who will arrange with the family how the placenta is to be disposed of.

K. Eye Removal (Posterior Approach)

1. If child abuse is suspected, vitreous fluid should not be extracted until after the brain is removed, the optic nerves are examined, and the pathologist approved the extraction.
 - a. After the brain and dura are removed, make shallow saw cuts on each side of the optic nerve in an anterior-posterior direction forming the sides of a triangle.
 - b. Complete the triangle by making a shallow saw cut into the orbital plate adjacent to the anterior frontal bone to make the base of the triangle.
2. Carefully chip away the orbital plate bone to expose the periorbital fat.
 - a. Remove the periorbital fat with pick-ups to expose the eye-

- globe.
- b. Remove the eye by cutting the muscular attachments on the superior, inferior and lateral aspects of the eye as the eye is gently retracted backward.
 - i. It will be necessary to cut through the sclera in order to retract the eye so that the inferior muscular attachment can be exposed.
 - ii. Be careful not to cut through the eyelid or cut the eyelashes.
- 3. Remove the eye with all or most of the optic nerve.

L. Lung Inflation

1. The following procedure is used only at the specific request of the attending pathologist.
 - a. The lungs of infants of this age often collapse quite readily upon opening the thoracic cage, it may be difficult to evaluate the degree to which this collapse is postmortem artifact or a real pathological finding.
2. This procedure is the simple mechanism of passing a double ligature around the trachea immediately below the lower border of the larynx.
 - i. This should be pulled tightly in order to prevent air from escaping as the thoracic cage is entered, and should be accomplished prior to any sharp dissection entering the thoracic cage.
 - ii. The tie should be left in place until the pathologist has had an opportunity to examine the lungs.

M. Infant Neck Dissection

1. There are several features about infants and children under 2 years of age warranting a special neck dissection procedure.
 - a. The features include the possibility of tonsillitis, pharyngitis, and upper airway obstruction.
 - b. The neck dissection will allow the identification of larger foreign bodies, which never gain access to the hypopharynx by virtue of their size, i.e., marshmallows, hot dog segments, toys, etc
 - c. Procedure: the tongue, hypopharynx, and epiglottis should be excised in continuity with the entire larynx and upper airway.
 - i. This is best accomplished by ensuring that the primary Y-shaped incision extends high up on the anterior aspect of the shoulder in such a way that.
 - ii. Upon incision through the skin and subcutaneous tissue, blunt dissection with one or two fingers may be used beneath the skin flap up to the underside of the mandible around its entire anterior and lateral circumference.
 - iii. Upon freeing up this skin flap and reflecting it anteriorly with the fingers of one hand, a scalpel may then be introduced up toward the midline of the posterior border of the mandible.

- (a) Thereafter sharp dissection continued laterally to and including the paravertebral tissues on one side, returning it back to the midline, reversing the direction of the sharp edge of the scalpel, and continuing across the midline to the opposite side of the neck.
 - (b) Keeping the incision medial to the carotid arteries.
- 2. Upon completing this sharp dissection, a finger should be introduced up through the incision into the mouth to insure that the floor of the mouth has been cut around its entire anterior and lateral circumferences.
 - a. If not, it should be re-incised until it is completely free.
 - b. Upon freeing the floor of the mouth a sturdy surgical instrument, preferably a clamp, in which there are teeth, should be introduced up beneath the skin flap to grasp the anterior one-third of the tongue (not the tip as it will tear free).
 - c. This is then reflected down with the skin flap reflected forward in such a way that, with the neck hyperextended, the posterior wall of the hypopharynx may be visualized.
 - d. Upon this visualization, with sharp dissection, make a cut across the posterior wall of the hypopharynx and inferiorly reflect.
 - e. This block then is continued by blunt dissection down through the neck, keeping the carotid vessels lateral, to the upper pleural reflection.
 - f. Where sharp dissection is then again needed in order to free up the neck block in continuity with remaining thoracic structures.
- 3. To prevent any error, such as creating a buttonhole, the scalpel should be introduced carefully into the posterior wall of the mandible with the blunt edge directed in an anterior direction with the skin flap is maintained forward of this.

N. Closing the Body

- 1. Wipe excess fluids, loose tissue and excrement from body cavities.
- 2. Place organs inside plastic bags, tie the bags closed, and place inside of the thoracic cavity.
- 3. Replace the chest plate and tack the chest and abdominal skin together over the chest plate and bags of organs.
- 4. Replace the skullcap and tack scalp together over the skull.
- 5. Wash off the outside of body with disinfectant solution. Then rinse with clean water from the hose.
- 6. Clean out the body bag.
 - a. Replace only if torn or contaminated with glass.
 - b. Place the body back into the body bag on a gurney.
 - c. Label body bag with a specimen label and wipe down bag if grossly contaminated.
 - d. If the decedent is a carrier of any infectious diseases, be sure to write an obvious caution on the body bag.

- e. If the brain is on hold until the pathologist receives some instruction from the family, write "Brain hold" on the body bag.
- f. The outer surface of the body bag must be decontaminated with 10% bleach solution.
 - i. Once body bag has been surface decontaminated, place body in body transfer unit.
- 7. Any unnecessary incisions, skin tears, buttonholes or severed neck vessels must be documented on appropriate OMI letterhead for the funeral home.
 - a. Superglue may be used for small incisions.
 - b. Inform the senior technician of the day or the morphology supervisor of any defects.

O. EXCEPTIONS

- 1. If the body continues to leak (as in hospital cases infused with fluid), place a blue pad absorbent side down in the body cavity before placing the bag of organs inside.
 - a. A blue pad should also be placed in the head cavity.
- 2. Native American decedents are more frequently full-sewn due to their religious and cultural beliefs.
 - a. The morphology technician can check CME exam status for instructions to full sew.
 - i. The investigations department enters this information to CME.
 - ii. If still unsure about the full-sew status, the central office investigator can be called.
 - b. There may also be requests for babies, family pickups, orthodox religions, and some direct service funeral homes.
 - c. The latter will be sewn on a request basis only.

XVI. Sewing of Bodies Post Autopsy

- A. The Office of the Medical Investigator is statutorily obligated to conduct investigations including performance of autopsies to determine cause and manner of deaths. This institution realizes the concerns held by other people, specifically Native Americans, regarding the condition of the decedent's body after an autopsy has been performed.
 - 1. Although not required by law, our internal policy states that the Office of the Medical Investigator will completely sew a body closed for those decedents who have been identified to us as proceeding directly to home burial or who have been identified to us as being Native American or Orthodox Jewish who are not proceeding to a funeral home for burial preparations.
 - i. This procedure will be followed to the best of our abilities. Since this office cannot perform extensive pre-existing reconstruction, certain conditions do not allow the complete sewing of the body.

- ii. These include the following: massive injuries, bodies in states of decomposition, fetuses, and extensive thermal injuries with charring of the tissue.
- B. This institution will completely sew closed those defects that were made as part of the autopsy procedure whenever possible.
 - 1. Defect repair does not include accidental defects made by the morphology staff, because the funeral homes prefer their own reparation practices to our own sutures.

XVII. Decomposed Bodies

- A. All decomposed bodies will be examined in the isolation rooms. Depending on the severity of decomposition, the organs may not be solid, so ask the pathologist how many histology cassettes they need.
 - 1. It can be difficult or impossible to draw fluids for toxicology.
 - a. In cases where routine toxicology samples cannot be drawn, it is necessary to collect tissue samples such as liver, brain, kidney, and muscle. Identification is also an issue with decomposed remains.
 - b. X-rays and/or fingerprints may be requested to aid in identification of the body. A vacuum is available to clean insects from the body or floor if necessary.

XVIII. Skeletal

- A. See also “Unidentified Remains” in the Investigator Procedure Manual.
- B. All skeletal remains received are put in a body bag and stored in the walk-in refrigerator with all other OMI remains.
 - 1. A nametag or seal with the standard information, including case number, is to be attached to the bag.
 - 2. In general, complete x-rays and photographs are ordered.
 - 3. The pathologist, anthropologist, and/or odontologist will determine what photos and x-rays are necessary.
 - 4. DNA sections may also be ordered and preserved.
 - 5. Skeletal remains may be placed in the anthropology pass through and examined in the anthropology exam lab if the pathologist, anthropologist or odontologist requires further examination.
 - a. Remains must be sent back through the pass through when exam is completed and placed in the walk in with all other OMI cases.

XIX. Infectious Cases

- A. The attending pathologist who will also determine if any special procedures will be needed to perform a risk assessment.
- B. All confirmed or suspected infectious cases (including M. tuberculosis) will be examined in the isolation room.
 - 1. The door to the isolation room must be closed at all times while doing an infectious case to maintain the negative air pressure.

2. If the case involves suspected CJD, Hantavirus, or another suspected infectious disease, infectious case procedures must be followed. See infectious case procedures.
- C. Infectious Disease Procedures
1. Tuberculosis (TB)
 - a. All items used during an infectious case autopsy and the surfaces that may come into contact with biohazardous tissues and fluids should be cleaned with a cleansing solution that is approved by the EPA to disinfect against tuberculocidal activity.
 2. Creutzfeldt-Jakob Disease (CJD)
 - a. CJD suspected or confirmed autopsies are limited to the head only.
 - b. Autopsies of decedents that are suspected or confirmed to have CJD should be autopsied in the isolation room with the door closed.
 - c. Any items that will not be used during the autopsy should be moved into the adjoining airlock until the room is disinfected. See section on infectious cases.
 - d. You may be asked to take cultures or save frozen tissue.

XX. Unidentified Remains

- A. Imaging: It may be necessary to take x-rays as directed by the pathologist, odontologist, anthropologist, or investigator. These may include:
1. Dental x-ray – lateral oblique at a 15° angle with the mouth open if possible
 2. Chest – AP including the clavicles
 3. AP skull
 4. Locations that may have rods or pins from a prior surgery.
- B. Photographs:
1. It may be necessary to take additional photographs to identify the decedent.
 2. The pathologist, odontologist, investigator or anthropologist will order the necessary photographs.
- C. Fingerprints: In general all unidentified remains receive fingerprints.
1. The CME section has an “Exam/Fingerprint status” field under the ‘Morphology’ section.
 2. Click the small box above the ‘Fingerprint’ field, then place the body on Prints: ‘HOLD’, if necessary.
 3. The yellow page has two areas that note ‘fingerprint hold’, located at the top in the evidence section and the bottom in the status section.

XXI. Homicide

A. Sequence of events:

1. Set out additional equipment and supplies as directed by the yellow page.
2. Do not move the body to a table without approval by the pathologist.

3. Photograph as directed by pathologist.
 - a. Some photos may require in-the- bag shots.
- B. Assist with trace evidence collection as directed by the case pathologist.
 1. It is important to keep track of all trace evidence by packaging the small evidence as soon as possible.
 2. If the evidence cannot be packaged immediately, be sure to place the evidence in an appropriately written filter paper envelope.
- C. With permission from the pathologist, undress the body and place the clothing on a labeled evidence rack.
 1. Record inventory on form attached to receiving form and indicate that clothing and/or valuables are to be held for evidence.
 2. Both types of inventory should be accurately recorded within CME as either release or evidence items.
 3. Be sure that the yellow sheet, white inventory form, the valuables sticker, and the CME inventory field are consistent.
- D. Move the body to a table and clean the body.
 1. Finish photographs
 2. Evidence collection if needed.
- E. Begin pre-evisceration tasks.
 1. A thumbprint is not necessary if fingerprints are ordered.
- F. Proceed with evisceration.
 1. Once evisceration is complete, prepare the body for release.
 2. Check for any 'holds' to be entered in computer.
 3. Have the pathologist sign all forms and labels.
 4. Be sure to have all of the evidence labels complete and signed prior to the pathologist leaving the autopsy suite.
- G. Package small evidence
 1. If the evidence is dry, move rack with clothing and other evidence to the evidence room.
 2. Extra labels with the pathologists' signature are to be generated for packaging evidence.
 3. Package evidence as soon as it is thoroughly dry.
 - a. Damp evidence will mildew and ruin items as evidentiary value.

XXII. Aircraft Accident Evidence

- A. Date and initial the evidence seal before adhering the seal over the black tape.**
 - 1. The completed Chain of Custody and Accident Information forms are placed on top of the sealed bag.**
 - 2. Complete a Fed Ex air bill and seal the Tox-Box with the The Federal Aviation Administration sends boxes with containers for toxicology specimen collection for all accidents involving aircraft.**
 - 3. The members of the flight crew must have toxicology specimens collected; and occasionally, passengers may be tested for carboxyhemoglobin.**
 - a. The boxes are located on the top of the toxicology refrigerator in the processing room.**

- b. One box is required per case.
- B. The Tox-Box kit comes with a sheet that provides a listing of all contents within the box.
 1. Check that all items are included and set the items out according to the steps provided.
 2. There are clear instructions provided within the box for collection and packaging of the toxicological specimens.
 - a. All specimens are each affixed with a label completed with all requested information about the decedent, the case physician, and the date/time of the autopsy.
 3. When finished with the case, the tissues and the ice packs can be frozen in a freezer, and the blood specimens should be stored in the toxicology refrigerator until the case physician completes both the Chain of Custody and the Accident Information forms.
 - i. Once the pathologist provides the completed forms, package the specimens.
 - ii. Place the absorbent pads at the bottom before placing all of the specimens inside of the black bag.
 - iii. Place the frozen ice packs on top of the specimens before closing the bag with a twist tie.
 - iv. Affix the provided black tape around the twist tie use remaining black tape.
 - v. Call the CAMI office at (405) 954-4866 to announce the pending shipment of specimens before shipping the Tox-Box to the office.

SUMMARY OF CHANGES

This is a new procedure beginning April 2010

DOCUMENT APPROVAL & TRACKING

Item	Contact	Date	Approval
Official Owner	Ross Zumwalt M.D., Chief Medical Investigator		
Official Signature	Electronic Signature 10/10/11		
Consultant(s)	Kurt Nolte M. D., Asst Chief Medical Investigator and Biosafety Officer Ross Reichard M.D., Asst. Chief Medical Investigator and Director of Neuropathology Amy Boule Director of Operations Yvonne Villalobos Supervisor of Morphology Services		

Official Biosafety Approver	Kurt Nolte M. D., Asst Chief Medical Investigator and Biosafety Officer	

Appendix J
BSL-3 Autopsy Protocol



Applies To:	Office of the Medical Investigator
Component(s):	Office of the Medical Investigator
Responsible Department:	

Title: Entry Procedures For BSL-3 autopsy suite and Personal Protective Equipment	Procedure
Target Group:	(x) Pathologists (x) Morphology Technicians (x) Visitors

DESCRIPTION/OVERVIEW

The Office of the Medical Investigator (OMI) performs autopsies within a BSL-3 autopsy suite that potentially expose personnel to blood borne and aerosolized pathogens. Performing autopsies within the BSL-3 zone requires diligence from all personnel entering the suite. The Entry procedure is designed to maintain biocontainment of the facility. This procedure is to be followed under normal working conditions.

AREAS OF RESPONSIBILITY

The OMI is committed to maintaining a safe work environment at all times. This commitment requires that employees be knowledgeable of correct procedures, receive proper training, and rigorously adhere to safety practices. Every person entering and exiting has the responsibility of following procedure for the safety of all employees. Failure to meet any of these expectations will result in immediate removal of BSL-3 autopsy suite access privileges.

Bio safety Alerts!!!

Safety guidelines for entering the BSL-3 autopsy suite include all required PPE (see below). Once inside the BSL-3 autopsy suite all PPE must remain on until stand down is in effect. Failure to do so may result in disciplinary action.

PROCEDURE

Personal Protective Equipment (PPE) is one of the numerous controls that reduce the spread of biohazards found in the BSL-3 autopsy suite. PPE is considered contaminated if used while autopsy procedures are being performed. Therefore it is important that PPE is properly worn to protect the individual from biohazards, and properly removed to protect all others working outside of the BSL-3 from biohazards. PPE comes in two forms, disposable and non-disposable.

Disposable: Shoe covers, gloves, aprons, sleeve covers, N-95 respirators, earplugs and tyvek jumpsuit.

Non- Disposable: PAPR hoods, hoses, belts and battery packs, goggles, chemical

respirators, aprons, face shields, and cut resistant gloves.

I. Entrance to the BSL-3 autopsy suite:

- A. Through the morphology bathrooms/changing rooms. If escorting a visitor, ensure that the visitor reads all available summary sheets and signs visitor's log. Visitor's log and summary sheets are available at each locker room entrance.
- B. All OMI personnel entering the BSL-3 autopsy suite are required to scan in and out using their designated proximity card. It is prohibited that others enter on a designated card unless they are being escorted and have signed visitor's log.

II. Dressing for the BSL-3 autopsy suite:

- A. Remove street clothing and don OMI- issued BSL-3 scrubs. Place all street clothing in designated locker.
 - 1. All minor skin abrasions should be protected by applying bandages. Personnel who have skin abrasions, cuts or conditions that seriously impair the integrity of the skin should not enter the BSL-3.

- B. Confirm negative pressure in the "PPE On" room by reading the magnehelic gauge. It should read negative.

- 1. If the needle indicates positive pressure do not enter. Report the event to the morphology supervisor. If supervisor is not available contact building maintenance.
- 2. If magnehelic indicates negative pressure, enter the "PPE On" room.



Magnehelic Gauge

- C. Don PPE in this order: shoe covers, head cover, blue gown, apron, respirator, first layer of gloves and disposable sleeves. One pair of gloves should be layered under the sleeves. Once inside the BSL-3 autopsy suite put on cut resistant gloves and second pair of disposable gloves. If wearing a PAPR, put on prior to putting on the blue gown.

- 1. For N-95 users:
 - a. Separate the two straps.
 - b. Put the metal strip up so that it will form around the nose.
 - c. Pull the straps over your head, top strap on the crown of head, and bottom under ears.
 - d. Move the respirator around on face to make sure it is not crooked.
 - e. Feel chin and make sure the respirator is not folded or tucked under your chin. Make sure it is completely cupping the chin.
 - f. Use both hands to mold the respirator to nose. Start at the center and work out.
 - g. Perform a negative pressure test. Take a deep breath through your mouth. If you feel cool air coming in, this indicates a poor seal. Re-

mold the respirator. Perform the negative pressure test again. If the respirator collapses some, you have a good seal. Figure I-1.



Figure I-1

2. For PAPR users:
 - a. Select a PAPR motor blower that has a green light on the battery re-charge unit. Do not select a motor blower without a green light. The absence of a green light indicates that the battery is still charging.
 - b. Close the plug on the motor blower to protect the electrical connection.
 - c. Inspect pre-assigned hood and hose and check for defects. If defective set aside and get new hood or hose. Attach hose to motor.
 - d. Use airflow indicator to test airflow. Airflow must be checked each time PAPR is used. If airflow is adequate, attach hose to hood.
 - e. Adjust belt on motor blower so it fits snug on waist. The belt is worn under the gown.
 - f. Pull hood over head and adjust inner headband. Inner headband must be one inch over eyebrows. If wearing a tyvek jump suite, use full shroud hoods and tuck the inner shroud inside the jump suite leaving the outer shroud lying smoothly over the shoulders.
 - g. Verify that the hose runs freely from the motor-blower to the hood.

Steps 2-a through 2-g are shown in Figure I-2.



Fig. I-2

- D. You are now ready to enter the BSL-3 autopsy suite. Check the magnehelic and enter if airflow indicates negative pressure.
 1. Call supervisor if airflow is positive.
 2. Doors leading to autopsy suite are interlocked. Wait for the green light above the door to enter.

Proper N-95 PPE



ddfasdf

Proper PAPR PPE



DEFINITIONS

Magnehelic gauge- Differential pressure gauge used to assure unidirectional airflow in room.

PAPR- Powered Air Purifying Respirator. Unit uses a blower to pass contaminated air through a HEPA filter, which removes the contaminant and supplies purified air to face piece.

N-95 – Full barrier PPE. Employees must be medically cleared and fit tested prior to use and annually thereafter.

SUMMARY OF CHANGES

This is a new procedure beginning August 2010

Respirator Training at SHEA	Safety, Health and Environmental Affairs 277-0

DOCUMENT APPROVAL & TRACKING

Item	Contact	Date	Approval
Official Owner	Ross Zumwalt, M. D., Chief Medical Investigator		
Official Signature			
Consultant(s)	Kurt Nolte, M.D., Asst. Chief Medical Examiner & Biosafety Officer Ross Reichard, M. D. Asst. Chief Medical Investigator and Director of Biosafety Yvonne Villalobos Supervisor of Morphology Services		
Official Biosafety Approver	Kurt Nolte, M.D., Asst. Chief Medical Investigator & Biosafety Officer		Y

Official Signature		[Day/Mo/Year]
Official Approver	Ross Reichard, M. D. Asst. Chief Medical Investigator and Director of Biosafety	
Official Signature		[Day/Mo/Year]
Effective Date	September 13, 2010	[Day/Mo/Year]
	Origination Date	[Month/Year]
Issue Date		

ATTACHMENTS
NONE

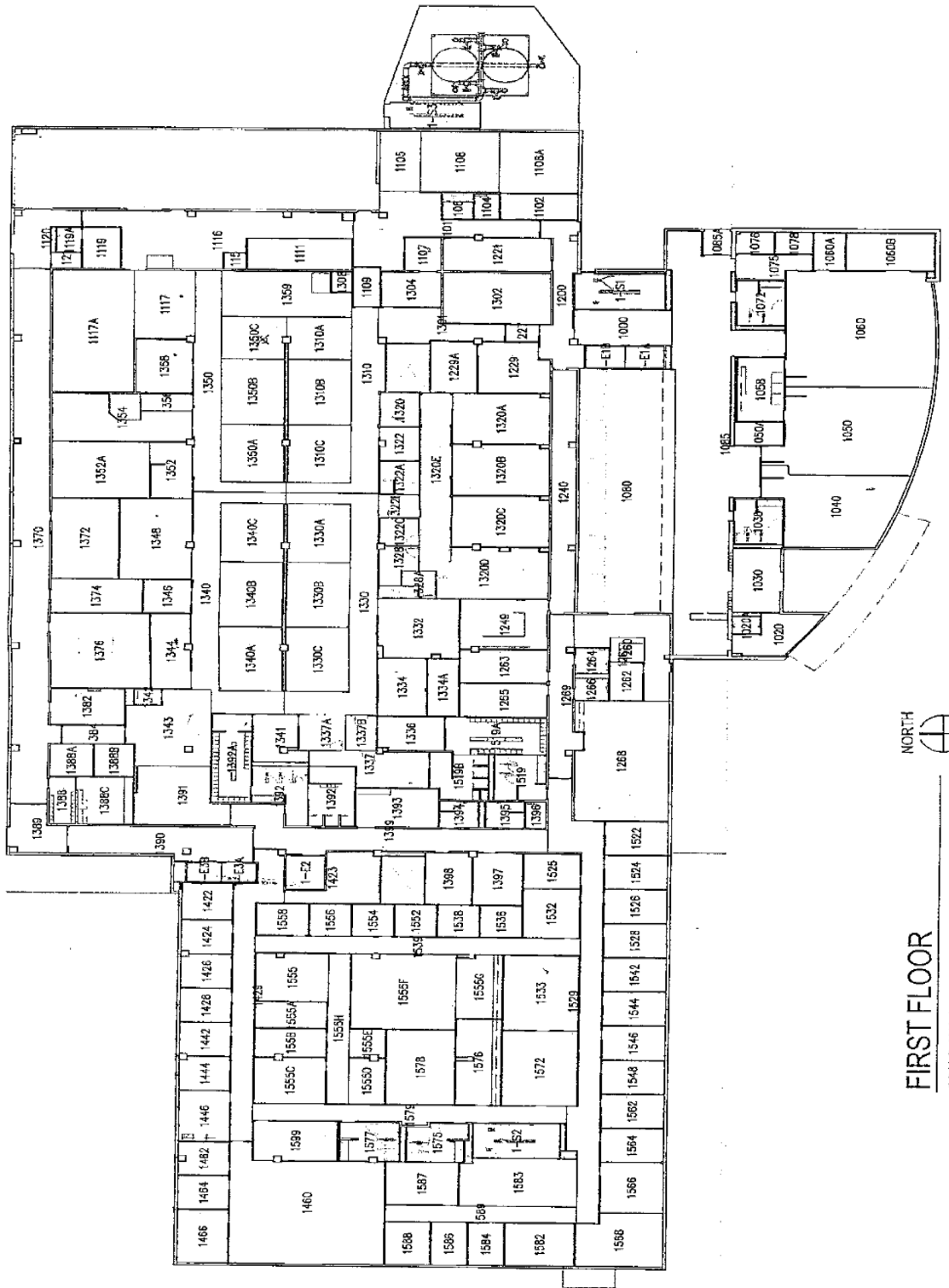
Appendix K
Infectious Diseases

Infectious Diseases

This section covers epidemic diseases with significant mortality such as pandemic influenza and outbreaks that are a consequence of deliberate actions (bioterrorism, etc.). The OMI currently has an active surveillance model (Med-X) that recognizes fatal infectious diseases such as influenza and potentially bioterrorism-related infections at a stage when the numbers of fatalities are low. This surveillance system has been continuously operational since 2000; investigators and pathologists evaluate all jurisdictional cases for potential capture, processing, and reporting to the Department of Health. The OMI has recognized outbreaks of infectious diseases in the past when the numbers of fatalities were small (hantavirus pulmonary syndrome, etc.).

In addition to surveillance issues, infectious disease outbreaks require specific procedures for diagnosis and biosafety. For the purposes of this document, biosafety issues are discussed under the section for biosafety. The OMI uses the Scientific Laboratory Division (SLD) of the NM Department of Health for routine microbiology diagnostic procedures. SLD is also a Centers for Disease Control and Prevention (CDC) certified select agent laboratory qualified to handle the infectious agents of bioterrorism. The OMI also has an established relationship with the CDC Infectious Disease Pathology Branch for more advanced diagnostic tests (immunohistochemistry, PCR, electron microscopy, laser microdissection, etc.). During infectious disease outbreaks with mass fatalities, the OMI would use these same laboratory resources.

Appendix L
Autopsy Floor Plan



FIRST FLOOR

SCALE: NOT TO SCALE



Appendix M
Exposure/Accident Report Form



THE UNIVERSITY of
NEW MEXICO

Department of Safety & Risk Services

FIRST REPORT OF ACCIDENT – WCA E1.1

Print F

RETURN TO: UNM RISK MANAGEMENT DEPARTMENT
ONATE HALL, ROOM 137

THIS FORM TO BY COMPLETED BY EMPLOYEE AND HIS/HER SUPERVISOR

1. Name of Employer University of New Mexico				2. Department Name			
3. Department mailing address				4. Department Phone#		5. Employee Work Phone #	
6. Name: Last		First		Middle	7. Male <input type="radio"/>	Female <input type="radio"/>	8. Social Security #
10. Home Address				11. City or Town		12. State	13. ZIP Code
14. Date of Birth		15. Age	16. Marital Status Married <input type="radio"/> Single/Divorced <input type="radio"/> Separated <input type="radio"/> Unknown <input type="radio"/>				17. No. of children under 18 yrs.
18. Date Hired	19. No. of hours worked/day		20. No. of days worked/week		21. Normal starting time <input type="radio"/> AM <input type="radio"/> PM		22. Average earnings: hour week bi-week month year \$ PER <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
23. Date of injury	24. Time of injury <input type="radio"/> AM <input type="radio"/> PM	25. First date unable to work		26. Was injured paid in full for this day? <input type="radio"/> YES <input type="radio"/> NO		27. Did injury occur on employer's premises? <input type="radio"/> YES <input type="radio"/> NO	
28. Where did accident, illness, or exposure occur?			29. City or town		30. State NM	31. Zip Code	
32. Occupation when injured		33. Were these normal duties? <input type="radio"/> YES <input type="radio"/> NO		34. If no, describe normal duties			
35. If occupational illness, date of diagnosis		36. Estimated time off work From To		37. Date employee returned to work		38. If fatal, date of death	
39. Describe in detail how the injury/illness occurred and what the employee was doing when the injury/illness occurred.							
40. Identify objects/substances which directly injured the employee (e.g. machine, vapor, poison, radiation, chemical, etc.)							
41. Describe the nature of the injury or disease in detail and indicate the part of the body affected (e.g. amputation, broken bone, inhalation, etc.)							
42. Name, address and phone number of witness(es)							
43. Name & address of physician treating injury/illness				44. Name & address of hospital or facility where treated			

DO NOT
WRITE
THIS
COLUMN
ORG CODE
JOB CODE
LOCATION C
ENTERED BY
DATE ENTER

PLEASE COMPLETE REVERSE SIDE. FORM MUST BE COMPLETED ON BOTH SIDES.

FORM E1.1 REVISED 7/2008

45. DESCRIPTION OF ACCIDENT: Circle the most appropriate description in each category (total of four circles):

Source of Accident (Circle Only one)	Causative Action (Circle Only one)	Body Part Injured (Circle Only one)	Injury Result (Circle Only one)
Airpollutants S01	Bite(s), sting(s) C01	Abdomen, Internal organs 4101	Amputation 1001
Blood S02	Bodily assault C02	Ankle(s) 5201	Burn, chemical 1301
Bodily motion S03	Caught in or between C03	Arms (both) 3181	Burn, heat 1201
Bodily fluid—patient S04	Contact with: C04	Arm, lower 3151	Cardiovascular condition 5101
Boxes, barrels, etc. S05	Flying/falling object(s) C04	Arm, upper 3111	Concussion 1401
Building structural parts S06	Hot object(s), substance(s) C05	Back, lower 4202	Contusion, crushing, bruise 1601
Cart S07	Stationary object(s) C06	Back, upper 4201	Cut, laceration, puncture 1701
Chair S08	Conductive surface(s) C07	Brain 1101	Damage to prosthetic device 9501
Chemical liquids/vapor S09	Frayed wire(s) C08	Buttocks 4402	Dislocation 1901
Cleaning compound(s) S10	Intact wire(s) C09	Chest 4301	Electric shock, electrocution 2001
Door S11	Irritant(s) C10	Chin 1401	Exposure to:
Dust,particle(s), chip(s) S12	Machinery C11	Ear(s), outside 1211	Chemical(s) 2702
Elevator S13	Moving object(s) C12	Ear(s), inside 1241	Contagious agent(s) 1502
Employee S14	Exposure to:Chemical(s) C14	Elbow(s) 3130	Hepatitis B 3301
Fire, smoke S15	Cold C15	Eye(s) 1301	Hepatitis C 3302
Food S16	Contagious agent(s) C16	Face 1481	HIV 2721
Glass S18	Heat C17	Finger(s) 3401	Measles 2703
Hand tool (manual) S19	Hepatitis B C18	Foot or feet 5301	Radiation 2901
Hand tool (power) S20	Hepatitis C C19	Groin 4401	Tuberculosis 1571
Heparin lock S21	HIV C20	Hand(s) 3301	Other,specify 2704
Hospital bed S32	Tuberculosis C22	Head 1001	Fracture 2101
IM Injection S22	Other,specify C21	Heart 4304	Hearing loss or impairment 2301
Insulin Injection S23	Fall from:Chair C23	Hip(s) 4401	Heat stroke 2401
IV catheter S24	Seat C24	Jaw 1411	Hernia, rupture 2501
IV direct push S25	Vehicle C25	Knee(s) 5131	Infection 1501
IV piggyback S26	Foreign object(s) C26	Legs (both) 5181	Influenza, pneumonia, asthma 5720
IV pole S27	Handlingtrash C27	Leg, lower (calf) 5151	Joint(s) Inflammation 2601
Linen S28	Ingestion C28	Leg, upper (thigh) 5111	Mental disorder(s) 5401
Machinery S29	Inhalation C29	Lung(s) 4303	Multiple injuries 4001
Office equipment, furniture S30	Lifting C30	Mouth 1442	Needle stick—clean 1702
Other, specify S99	Needle handling C31	Multiple body parts 7001	Needle stick—contaminated 1703
	Needle handling trash C32	Neck 2001	Neoplasm, tumor 5501
	Needle resheathing C33	Non-Intact skin 9991	Nervous system condition 5601
	Other, specify C99	Nose 1461	No illness 8001
	Pushing/pulling C34	Other,specify 7001	No Injury 9001
	Repetitive motion: C35	Ribs 4302	Occupational disease, specify 9901
	Leg(s), arm(s) C35	Scalp 1501	Other injury, specify 9951
	Torso C36	Shoulder(s) 4501	Poisoning 2701
	Wrist(s) C37	Skull 1601	Repetitive stress injury 2651
	Restraining patient C38	Throat 1441	Respiratory system condition 5701
	Restraining visitor/other C39	Thumb(s) 3401	Scratch(es), abrasion(s) 3001
	Sharp disposal C40	Toe(s) 5401	Sharp object Injury 1704
	Sharp handling trash C41	Tooth or teeth 1443	Skin condition 1891
	Sharp object handling C42	Wrist(s) 3201	Sprain(s), strain(s) 3101
	Shock C44		Strangulation 1101
	Slip/trip—no fall C45		
	Slip/trip/fall: C46		
	Ladder/scaffolding C46		
	Same level C47		
	Stair/ramp C48		
	Splash/splatter blood C49		
	Splash/splatter body fluid C50		
	Twisting torso C52		
Enter Accident Code	Enter Action Code	Enter Injury Code	Enter Results Code

46. Date supervisor knew of injury	47. Was safety device or regulation provided? <input type="radio"/> YES <input type="radio"/> NO <input type="radio"/> N/A	48. Was safety device or regulation used? <input type="radio"/> YES <input type="radio"/> NO	49. Was injury caused by injured's failure to use safety device? <input type="radio"/> YES <input type="radio"/> NO
------------------------------------	---	---	--

50. If injury was caused by failure to use safety device, please describe.

51. Supervisor comments

52. Supervisor Name (Please Print) <i>Yvonne Villalobos</i>	53. Supervisor UNM E-Mail <i>yvillalobos@salud.unm.edu</i>	54. Date	55. Supervisor phone # <i>505-925-0590</i>
56. Supervisor's Signature <i>[Signature]</i>		57. Supervisor title <i>Supervisor of Morphology Service</i>	
58. Employee Signature			59. Date

Appendix N
Pandemic Influenza

Pandemic Influenza

Pandemic influenza is one type of MFI, with numbers in the hundreds of thousands, with which the U.S. has had experience, albeit in 1918. During the H1N1 Spanish influenza epidemic of 1918-1919, between 50 and 100 million people are estimated to have died worldwide, with 650,000 deaths reported in the US, particularly in young, previously healthy people. Routine mechanisms for handling remains were rapidly overwhelmed, with families often having to store bodies in homes. With recent reports of avian influenza in humans in Asia, and the 2009 outbreak of H1N1 influenza originating in Mexico and spreading throughout the world, pandemic flu has attracted more attention and increasing concern. It is likely that ME/Cs will be the first to recognize unusual patterns of influenza deaths. Although flu is considered primarily a risk to the elderly, flu-related deaths and illnesses in the U.S. in the past 60 years show a pattern of occurrence in younger people and in deaths occurring outside of hospital facilities. In the 2003-2004 flu season in the US, 153 flu-related deaths among children were reported to the CDC, occurring in 40 states. Approximately a third (31%) of these children died outside of healthcare settings, and 29% died within three days of the onset of illness. Rapid deaths outside of hospitals, such as these, will fall under ME/C jurisdiction and require ongoing communication between ME/C offices, state public health laboratories, and state public health departments to ensure appropriate public health measures are taken as quickly and comprehensively as possible following autopsies of flu deaths that are unusual in their temporal occurrence, affecting larger than usual numbers of people, or causing death rapidly after onset of symptoms.

1) Special Considerations

- a. Deaths during pandemic influenza might occur both within and outside of a hospital. Unattended deaths fall under the jurisdiction of OMI. However, attended natural disease deaths are certified by care-taking physicians. Given the importance to public health of accurate mortality tracking and body management, the OMI will, with the agreement of the Department of Health, manage these functions for both unattended and attended deaths.
- b. As the pandemic worsens, it is unlikely that full autopsies can be performed in all cases; diagnoses can be confirmed by culture or PCR from a nasopharyngeal swab.
- c. When hospitals and funeral homes have numbers of fatalities that exceed their capacity to manage the bodies, they can contact the

OMI and avail themselves of OMI mortality management, including biosafety retrieval, storage, and disposal of remains. The OMI will be responsible for storage of bodies. If the storage capacity for bodies is exceeded, the OMI will consult with the Secretary of Health, the Secretary of Public Safety, and the Chairman of the Board of Thanatopractice to determine the proper measures to store or dispose of the bodies/human remains.

- d. Maintaining both normal OMI operations and handling pandemic fatalities in light of staff shortages caused by illness or unwillingness of key staff members to leave their families or risk exposure might be impossible. In such a situation, the office will triage only the most important cases for autopsy and focus on transporting other bodies to storage facilities to be processed as staffing allows.

2) Diagnosis

- a. At autopsy, obtain a nasopharyngeal swab for viral culture and PCR and bilateral bacterial lung cultures as individuals with influenza often have secondary bacterial pneumonia and individuals presenting with pneumonia often have antecedent influenza. Also, obtain histologic samples from main bronchus and trachea so that can be used, if necessary, for immunohistochemistry. Save the standard battery of frozen Med-X tissues (heart, lungs, liver, kidney, brain, spleen, and serum) to be potentially be used for PCR and serology. In early cases, pathologists should conduct widespread histologic sampling to characterize the pathologic effects (myocarditis, encephalitis, primary or secondary pneumonia, etc.) of a potentially novel influenza virus and to help guide clinicians with treatment strategies. Once the numbers of fatalities have exceeded the capacity for autopsy, nasopharyngeal swabs can be obtained by the investigators or pathologists in conjunction with an external examination in order to confirm the diagnosis.

3) Steps to be taken

- a. The Chief will contact Incident Commander or State Epidemiologist when fatal cases are initially recognized or widespread influenza is occurring
- b. When fatalities exceed the capacity of hospitals and funeral homes, arrange to divert cases to OMI
- c. Determine whether additional regional or central storage facilities for bodies will be necessary
 - i. Three OMI refrigerated trailers for storage or mobile morgue facilities will be available

- ii. If refrigerated trailers do not meet the needs for storage, consider rail containers (2 to 4 degrees C or 36 to 40 degrees F) or renting/purchasing local refrigerated trucks
- iii. If refrigerated trailers or rail containers are not available and additional storage is needed, bodies can be buried in temporary trench graves
 - 1. About 5 feet deep
 - 2. At least 700 feet away from drinking water sources
 - 3. Single layer of bodies
- iv. If trenches can't be dug, group bodies in clusters of 20 (single layer) with 2 feet of dry ice in low wall around each group and cover with tarps
- v. Do not put regular ice on bodies
- d. Perform autopsies on designated remains
 - i. Perform external examinations on all remains if possible
 - ii. Confirm identity for all decedents
- e. Establish a Family Assistance Center
- f. Maintain contact with Family Assistance Center and Department of Health media liaison

Appendix O

Bioterrorism

Bioterrorism

The numbers of fatalities resulting from bioterrorist attacks in the U.S. have been low. Letters with anthrax spores resulted in five deaths in 2001, shortly after the September 11 terrorist attacks. However, the lethality of potential bioterrorist agents such as *Y. pestis*, *B. anthracis*, and hemorrhagic fever viruses is high. Deaths as a consequence of bioterrorism are homicides and therefore fall under medical examiner jurisdiction.

Biologic agents are categorized based on their risk to national security, with high risk, Category A agents, which include *B. anthracis*, *Y. pestis*, *F. tularensis*, *Clostridium botulinum*, smallpox virus, and hemorrhagic fever viruses such as Ebola and Marburg viruses, able to be easily disseminated and/or transmitted person-to-person and with high potential mortality. Category B agents are more moderate in their morbidity and mortality and are less easy to disseminate. Category C agents are emerging infections that have high potentials for easy dissemination and resulting morbidity and mortality.

The OMI might be alerted to a potential act of bioterrorism by the occurrence of an endemic disease at an unusual time or location, clusters of patients from one location, or large numbers of rapidly fatal cases.

1) Special Considerations

- a. Specific guidance for medical examiners to manage bioterrorism fatalities is provided in: Centers for Disease Control and Prevention. Medical Examiners, Coroners, and Biologic Terrorism: A Guidebook for Surveillance and Case Management. MMWR 53 (No. RR-8):1-36, 2004. This report is attached and covers background information, biologic agents, consequent clinicopathologic diseases, autopsy procedures, diagnostic tests, biosafety risks and autopsy precautions, surveillance issues, operational and evidentiary concerns, and federal resources for support. The OMI will follow the guidance in this report.
- b. Ideally, complete autopsies with extensive histologic, microbiologic, and serologic testing will be performed on any cases suspected of being the victims of bioterrorism.
- c. In the case of a large-scale bioterrorist attack, full autopsies with extensive tissue sampling on all cases might become impossible if the numbers of fatalities exceed the capacity of the medicolegal death investigation system. With some bioterrorism-related diseases (smallpox, viral hemorrhagic fevers), diagnoses can be made with immunohistochemistry on skin samples without an autopsy.

- d. Chain of custody must be maintained for these cases as legal proceedings will require autopsy reports and laboratory test results as evidence in prosecution of cases.
 - e. When bioterrorism is suspected, the OMI must work with the IC to determine what biosafety level will be required for OMI and non-OMI personnel retrieving remains and evidence and if prophylactic vaccination or antibiotic administration will be needed.
 - f. The OMI will be the content expert for the safe handling of bodies and the gatekeeper for law enforcement personnel's access to infectious disease experts, epidemiologists, and public health responders.
- 2) Diagnosis
- a. Diagnostic specimens and testing will be obtained as under guidance in 1a above. Frozen and formalin-fixed tissue samples will allow specialized testing at local laboratories, such as polymerase chain reaction (PCR) and immunohistochemistry and direct fluorescent antibody testing (DFA) at the CDC. Samples will be submitted to the state public health laboratory (unless smallpox, requiring BSL 4 is suspected) and potentially to the CDC as determined by the submitting ME/C and laboratorian.
- 3) Steps to be taken
- a. The Chief will contact the IC or State Epidemiologist when fatal cases are initially recognized or clinical cases are occurring
 - b. Determine whether additional regional or central storage facilities for bodies will be necessary.
 - i. Utilize the three OMI refrigerated trailers/mobile morgues. If trailers are not available or body number exceeds capacity, request refrigerated trucks or rail containers (2 to 4 degrees C or 36 to 40 degrees F)
 - ii. If refrigerated trucks or rail containers are not available and additional storage is needed, bodies can be buried in temporary trench graves
 - 1. About 5 feet deep
 - 2. At least 700 feet away from drinking water sources
 - 3. Single layer of bodies
 - iii. If trenches can't be dug, group bodies in clusters of 20 (single layer) with 2 feet of dry ice in low wall around each group, cover with tarps
 - iv. Do not put regular ice on bodies

- c. Perform autopsies on designated remains
 - i. Perform external examinations on all remains if possible
 - ii. Confirm identity for all decedents
- d. Establish a Family Assistance Center

Appendix P
Conventional Explosives

Conventional Explosives

While much recent preparedness planning focuses on bioterrorism or the use of chemical or radiologic weapons, historically most victims of terrorist attacks have been injured by conventional explosives. Even recently in the U.S., conventional bombs have wrought significant destruction, from the first attack on the World Trade Center (WTC) in 1993, which killed six people, to the destruction of the Murrah Federal Building in Oklahoma City using fertilizer and fuel oil to kill 168 people.

As opposed to bioterrorism attacks and natural disasters, explosions often result in fragmentation of bodies, which usually results in recovery of remains over a period of time. Other unique factors in mass disasters from explosives are the need to preserve forensic evidence to assist law enforcement agencies in their investigations, and the need for rigid safety procedures during recovery.

Steps to be taken

- a. Law enforcement and OMI will respond to the scene and assess safety issues
- b. If there is a potential for chemical contamination, law enforcement or OMI will contact the local HazMat personnel
- c. If there is a potential for radioactive contamination, the law enforcement or OMI will contact the State Director of Homeland Security and Emergency Management
- d. If there is an assessed need for heavy equipment or stabilization of the explosion site, recovery personnel will not enter the scene until safety issues are addressed
- e. If the State Emergency Operation Plan is activated, recovery personnel will enter the scene and assist in recovery under the direction of the IC
- f. Document remains on site after safety of site ensured. All remains should have individual identification numbers and GPS location
- g. Establish temporary morgue to hold remains at site until they can be transported to a more permanent processing site

Additional Morgue procedures for fragmented remains

- a. All bodies and fragments are received at the morgue based on their recovery identification numbers
- b. All bodies and fragments are photographed and x-rayed
- c. Intact bodies are scanned by CT

- d. Depending on the number of remains the forensic odontologist is notified and may elect to activate additional forensic odontologists
- e. Depending on the number of bodies and remains the forensic anthropologist may elect to activate additional forensic anthropologists
- f. The bodies and remains are examined by forensic pathologists with a special goal to recover and retain forensic evidence
- g. Body handlers and forensic pathologists take special caution to avoid injury during handling of bodies and removal of shrapnel
- h. Appropriate samples are taken of fragmented remains for potential DNA evaluation
- i. Fragmented remains are retained under their recovery identification numbers for possible identification after DNA evaluation

Appendix Q
Nuclear Detonations/Radioactive Contaminations

Nuclear Detonations/Radioactive Contamination

Any mass disaster that results in contamination of individuals or the surrounding environment with radioactive material requires a unique approach to recovery of victims, handling of personal effects, examining and disposal of the remains. Management of large numbers of radioactive victims would be beyond the scope of the state facilities and would require federal assistance. Assets available to states are listed in Appendix D of the National Response Plan: Nuclear/Radiological Incident Annex

www.fema.gov/.../nrf/nrf_nuclearradiologicalincidentannex.pdf

In any death or deaths where contamination with radioactive material is strongly suspected, the OMI should contact the State Director of Homeland Security and Emergency Management to determine whether or not to activate the State Emergency Operations Plan. In incidents where there is a death or low numbers of deaths with a low suspicion of radioactive contamination, the OMI should respond with a Geiger Counter to determine the possibility of radioactive contamination. If a Geiger Counter is not readily available the OMI responder should not transport the victim(s) until the possibility of contamination is confirmed or eliminated. Assistance with radioactive monitoring is available

As with other MFIs, the OMI will report to the designated IC to coordinate the retrieval, processing, decontamination, and disposal of human remains. The OMI must work within the contamination control boundaries established by the IC and use any required radiation monitoring equipment provided by the Radiation Authority for both their own safety and for determining the radiation levels and decontamination needs of the remains.

- 1) Steps to be taken if there are a large number of fatalities from an obvious incident involving contamination with radioactive material. In such a situation there will have been activation of the State Emergency Operations Plan and probably a federal response.
 - a. Contact IC upon arrival at scene. OMI reports to IC
 - b. All OMI personnel adhere to instructions from Radiation Authority and will enter the scene with a Radiation Authority escort
 - c. Authority/IC will provide information to OMI personnel regarding radiation hazards, monitoring requirements, and when remains are safe to remove from site

- d. Assess the scene and document photographically, but do not touch human remains other than placing a Radioactive Tag on the remains for radiation monitoring
- e. Department of Energy recommends leaving bodies in place for a minimum of 72 hours following the incident
- f. Radiation Authority will conduct radiologic survey of remains and identify contaminated areas
- g. Follow the decontamination measures put in place by Radiation Authority who will conduct a gross decontamination of contaminated remains and personal effects
- h. Radiation Authority and authorized personnel will monitor remains following decontamination and will determine if double gloving, double bagging, etc. are needed
 - i. Remains will be decontaminated in the “hot zone” (75 feet around incident site), re-surveyed by Radiation Authority, and moved to “warm zone” (contamination reduction zone)
 - ii. Re-surveyed for radiation in the warm zone and decontaminated again if needed
 - iii. Once “radiologically clean”, remove from site, place Radiation Tag on body bag, and custody is transferred to OMI
 - iv. Move bodies/remains to morgue for additional autopsy/identification procedures
 - v. Radiation Authority will be responsible for proper disposal of all decontamination and autopsy waste
 - vi. Radiation Authority will determine if a radioactivity report will need to be attached to the death certificate

2. Radiation Protection Precautions in the Morgue

- a. Establish a triage station for a technician with a survey meter
- b. Bodies registering more than 100 millirem per hour should be moved to an isolated refrigerated area (refrigerator truck) to allow for radioactive decay to decrease the dose rate.
- c. Bodies with no contamination can be handled in the main morgue
- d. Bodies with measurable contamination below 100 millirems per hour will be examined in the isolation suites.
- e. The radiation safety officer will establish worker’s doses measured on the dose rates from the decedents and the number to be processed.

f. Utilize one person at the table at a time when possible. Worker's not actively involved in the examination should move away from the work area.

g. If the victim contains radioactive shrapnel, remove it from the body as soon as possible and place it in a bucket with forceps (not hands) and place bucket at least 30 feet from the work area.

h. If there is internal contamination, do not perform and autopsy unless absolutely necessary.

i. After the victim identification and forensic examination are completed, the victim is moved to a secondary decontamination area where dry vacuum with a HEPA filter or spray and wet wipe is performed until the body meets the decontamination standard set by the radiation officer

j. If autopsy is necessary and there is no internal contamination try to wait until exterior of body is decontaminated.

Appendix R
Chemical Releases

Chemical Releases

The appropriate decontamination procedures for accidental or intentional chemical releases will depend on the specific agent, and the OMI may not handle remains until decontamination is complete. The NIMS includes a HAZMAT Branch Director and Victim Decontamination Unit Leader who will direct the response activities of medical personnel attending to survivors as well as ME/C handling potentially contaminated remains. The New Mexico State Police Emergency Response Officer is in charge of all hazmat scenes per New Mexico statute.

- 1) Steps to be taken (from Department of Justice/Department of Defense Guidelines)
 - a. Obtain information from the IC
 - i. Type of release and potential hazards
 - ii. Estimated number of remains
 - iii. Location of scene and accessibility of remains
 - iv. Location of incident command post
 - b. Form evaluation team with hazmat directors and law enforcement agencies
 - c. Check and confirm required level of PPE
 - d. Perform evaluation
 - i. Determine relevant issues (fragmentation, needed excavation, etc.)
 - ii. Take initial photographs
 - iii. Assess the number of remains and locations and determine the initial number of autopsies
 - e. Coordinate specific operations with law enforcement, hazmat, DMORT, DOH, etc.
 - i. Coordinate security requirements with IC
 - ii. Designate locations for holding morgue and temporary morgue
 - iii. Hazmat unit directors will determine chemical monitoring methods and safe handling procedures and when and where PPE must be worn. The county or city and/or state emergency management office will have contact information for hazmat response capabilities and department of health resources.
 - iv.
 - v. Only trained, certified, and authorized OMI personnel will be permitted into the hazardous environment

- vi. Establish autopsy criteria
- vii. Create infrastructure to process remains
- viii. Establish effective communications between holding morgue, temporary morgue, FAC, and OMI headquarters
- ix. Avoid 24-hour operations whenever possible
- f. Remains processing
 - i. Assign tasks to each agency assisting in recovery
 - ii. Determine order in which each agency's personnel will enter the site to perform tasks
 - iii. Use waterproof tags for remains and personal effects
 - iv. Triage remains: autopsy or external examination
 - v. Bodies/remains will move from a hot zone through decontamination and monitoring to a warm zone and to a cold zone when cleared by hazmat unit director (similar to the procedure for decontamination following nuclear events)
 - vi. OMI personnel will take custody of bodies/remains for autopsy and identification only when remains are determined as clean by hazmat directors
- g. Holding morgue
 - i. Establish private area at incident site for:
 - 1. Evidence collection
 - 2. Initial external evaluation
 - 3. Initial ID check
 - 4. Removal and tagging of personal effects
 - ii. Determine if law enforcement is needed to help identify evidence and the need for additional procedures (swabs, clothing samples, etc.)
 - iii. Obtain refrigeration units based on situation and bulk storage for personal effects (could use 55 gallon drums or unused paint cans)
 - iv. Establish an area to perform decontamination
 - 1. Water and bleach/decontamination agents
 - 2. Minimize run-off of contaminated water
 - 3. Use double body bags; the first sealed with duct tape
- h. Transportation and storage
 - i. Obtain refrigerated vehicles: trucks, railroad cars, portable morgue trailers
 - 1. Do not stack remains (use shelving units)
 - 2. Do not place remains higher than waist level of workers
- i. Morgue operations

- i. Determine if all morgue operations can be centralized in one location or if several smaller locations will be needed
- ii. Establish morgue flow
 - 1. May need to perform detailed decontamination and monitoring if remains are not previously verified clean
 - 2. Perform autopsies on designated remains
 - 3. Perform external examinations on all remains
 - 4. Perform identification procedures

- j. Final disposition
 - i. Determine location for storage until final disposition
 - ii. Determine if a public health hazard exists
 - iii. Dispose of remains
 - 1. Returned to families (sealed casket or voluntary cremation)
 - 2. Government-sponsored disposition (burial or cremation)

Appendix S
Hazardous Materials – EMO- Albuquerque



April 18, 2012

**Jodi Perry, Assistant
Dr. Ross Zumwalt, Chief Medical Investigator
University of New Mexico
Office of the Medical Investigator
505-925-6648**

Hello Jodi:

The sequence of response for a hazardous materials event would be as follows:

- 911 would pass the event to the AFD Fire Alarm Room
- Alarm room would dispatch a hazardous materials initial response (Stations 4 & 13)
- Alarm Room would simultaneously notify the NM State Police and the NM Department of Homeland Security (NMDHSEM) (505) 476-9635
- With 5 or more casualties reported from the scene, the Alarm Room would create an MCI “Banner” on the EMTrack web based system and notify:
 - 1) Sal Baragiola, COA Emergency Management Director, (505) 833-7381 or Cell (505) 259-8206
 - 2) Brigitte Bellsong, COA EOC Officer, (505) 833-7247 or Cell (505) 917-4841
 - 3) Lt. Jeff Hankins, AFD Hazardous Materials Program Manager, (505) 452-7407
- All hospitals, COA-EOC Health & Medical, and first response agencies would be alerted of the banner
- AFD would request assistance through the Alarm Room from the 64th Civil Support Team (CST) located in Rio Rancho for sample collection and testing. (505)771-7807; Cell (505)235-0330
- The 64th CST would conduct a presumptive test on scene and would deliver a second sample to the New Mexico State Health Lab.
- With a possible radiological incident, in addition to the 64th CST, AFD could request assistance from the Radiological Assistance Program with Sandia Labs. The RAP team is activated under DOE. So the call would go from AFD Alarm to the Sandia Labs EOC (284-5276; 844-6511; 844-6515) requesting a RAP response and they would offer support until the end of the event. AFD has the basic equipment to alarm for radioactive material, but RAP would respond anywhere in the state with a Geiger counter and other equipment.
- With an activation of the COA EOC, the contact numbers would be:
 - 1) (505) 833-7335, 36, 37 Message Desks
 - 2) (505) 833-7361 Health and Medical Desk

Appendix T
Natural Disasters

Natural Disaster

In most natural disasters pertinent to New Mexico including floods, earthquakes, tornados, blizzards and forest fires, fatalities will be due to traumatic injuries or drowning resulting in largely intact remains without the fragmentation seen in bombings and airline crashes and will be without the immediate infectious threats resulting from pandemics and bioterrorism. In New Mexico with a large geographical territory and a low population, a natural disaster will unlikely involve very large numbers of bodies.

Since the health risk to the general public resulting from numbers of dead bodies is minimal, and OMI should work with the assigned information officers to convey reassurance to the public.

Local infrastructure may be badly damaged, presenting logistical challenges and significant delays for the arrival of supplies and personnel, as was seen in the case of Hurricane Katrina. The practical problems associated with a mass fatality due to a natural disaster include bodies spread over a large area, difficulty in getting access to the victims, difficulty in finding and recovering the victims and difficulty in transporting and storing victims to prevent decomposition.

1) Steps to be taken

- a. OMI will contact the Incident Commander (IC) to determine what level of response is needed
- b. The Chief Medical Investigator of the OMI will make a preliminary determination of the extent of disaster location, and estimate numbers and locations of remains.
- c. The Chief Medical Investigator will appoint a Director of Field Operations responsible for coordinating the recovery of remains who will work with law enforcement/search and rescue personnel to create approach and needed resources, including those no longer available locally
- d. The Director of Field Operations will identify or establish (in coordination with the Incident Commander) a field command base where recovery personnel will receive assignments and safety instruction.
- e. The Chief Medical investigator in consultation with the Director of Field Operations and the Incident Commander will, if necessary, activate DMORT
- f. The Director of Field Operations will designate locations for Holding/Temporary Morgue

- g. The Director of Field Operations will request refrigerated trucks or mobile morgues to the Holding/Temporary Morgue if necessary
- h. The Director of Field Operations will institute field recovery operations as described earlier in this plan (Page 16) and determine additions and alterations of the recovery process unique to the type of natural disaster.
- i. The Director of Field Operations will determine storage, transportation and disposal needs with particular emphasis on preventing decomposition of bodies
 - i. If available, refrigerated trucks are preferred for temporary storage.
 - ii. If refrigerated trucks are not available and there are too many bodies for immediate transportation, bodies may be buried in temporary burial trenches
 - 1. About 5 feet deep
 - 2. At least 700 feet away from drinking water sources
 - 3. Bodies in body bags placed side by side, not stacked
 - a. If trenches cannot be dug, group bagged bodies in clusters of 20 (not stacked) with two feet of dry ice in a low wall around each group and cover with tarps. Do not place regular ice on bodies.
 - iii. Take samples for DNA analysis if there is inability to transport bodies before decomposition

Appendix U

Fires

Fires

Most preparedness planning information for fires focuses on medical triage and treatment of surviving burn victims and coping with the resource strains on local burn units. ME/Cs will be working closely with other investigating agencies in cases of fires not only for victim identification and determination of cause of death but with determination of the cause of the fire and its movement and effects throughout the burned area. Fires with multiple victims are all too common, from house fires to hotels to nightclubs, and all ME/C jurisdictions need to have a plan in place to handle large numbers of burn victims.

1) Special Considerations

- a. Interagency cooperation: accidental fires versus arson/government agency involvement (Branch Davidian compound)
- b. Accelerants/solvents present on remains; potential need to preserve and collect evidence
- c. Commingled remains
- d. Storage of victims while awaiting identification

2) Steps to be taken

- a. As with other mass fatalities, OMI will contact either the IC or Fire Marshal in charge of scene
- b. Determine safety of scene and extent of destruction
- c. Attempt to locate a manifest of potential victims (building occupants)
- d. Work with the fire department and law enforcement to assign needed tasks and determine the order of each agency entering the scene
- e. Document the scene with photographs, video, mapping, etc.
- f. Establish a holding morgue for collection of remains at the scene
- g. Determine where more extensive processing, autopsying, and identification will be done, either close to the scene or transport the remains to OMI
- h. Identify storage capability for remains

Appendix V
Aviation Disasters

Aviation Disasters

Unlike nuclear detonations and bioterrorism, most ME/C offices will have had experience with airplane-related fatalities, even if only small aircraft with few fatalities. The crash of a commercial airliner with hundreds of potential fatalities would severely strain most ME/C offices and should be included in MFI preparedness planning.

The FBI is the primary law enforcement agency for all aviation crashes. The NTSB has absolute authority over the aircraft wreckage and legal authority to investigate and to determine the cause(s) of air crashes. The ME/C is responsible for the deceased except if the crash is located on exclusive federal jurisdiction (e.g. air force base). The ME/C's objective is to determine what, if any, human factors caused or contributed to the initiation of the crash.

- 1) Type of crash
 - a. Large commercial airliner versus small private aircraft
 - b. When crash occurred: on take-off or landing will have larger, more intact remains, mid-air collisions or explosions result in extreme fragmentation and scattering of remains
 - c. Location of debris field: remote areas, water, heavily populated areas
 - d. Fires: either on plane causing crash, or after impact
- 2) Special considerations
 - a. Recognition of data recorders, for retrieval and analysis by FAA or NTSB
 - b. Presence of jet fuel on bodies and evidence
 - c. Difficulty of retrieving remains, particularly in remote or challenging areas
 - d. Resources available to retrieve and identify all remains
 - e. Mapping of remains and personal belongings
 - f. Most likely will not have widespread disruption of communication or risk of infection as with other MFIs
 - g. Storage of remains while awaiting identification and release
 - h. Need for holding morgue at crash site
 - i. Transportation of remains to morgue
 - j. Contact other forensic pathologists, odontologists, and anthropologists, particularly those with aviation disaster expertise
 - k. Implementation of Federal Family Assistance Plan for Aviation Disasters
- 3) New Mexico Federal Aviation Administration: part of FAA's Southwest Region (with TX, OK, LA, AR)
Federal Aviation Administration, Southwest Region

Airports Division ASW-600
2601 Meacham Boulevard
Fort Worth, TX 76137-4298
Phone: 817-222-5600

Fax: 817-222-5984

4) Steps to be taken

- a. Contact the IC
- b. Assist IC with restricting access to site and debris fields
 - i. Establish a secure perimeter and entry/exit corridors (check identification to limit entry and preserve the scene)
- c. The IC and/or Supervisor of Search and Recovery will survey the crash site and debris field, and if possible, conduct an aerial survey
 - i. Note essential information, such as number of bodies, security issues, worker safety issues, and special requests by investigating agencies
 - ii. Develop a search plan for the area and identify the number of personnel, equipment, and special resources needed
 - iii. Brief the Search and Recovery Unit members prior to commencing activities
- d. Mark outlying debris, remains, and personal effects using a visible indicator
 - i. Equipment needed: GPS, pin flags, clothes pins with bright colored flagging tape, spray paint, etc.
- e. Obtain manifest of passengers and crew on board and determine needed resources
- f. If needed, contact search and rescue personnel familiar with retrievals in rugged or challenging landscapes (mountains, deep canyons, remote desert locations, cadaver dog services, etc.)
 - i. Cadaver dog service
 1. Christine “Kryisia” Baron, Law Enforcement Office for the U.S. Department of Agriculture, Forest Service
Tijeras, New Mexico
505-281-3304
505-281-1176 fax
kbaron@fs.fed.us
- g. Decide whether to process remains near crash site or transport to OMI
- h. Federal guidance for family assistance plan:
<http://www.nts.gov/doclib/tda/Federal-Family-Plan-Aviation-Disasters-rev-12-2008.pdf>

- i. Assign tasks by agency, working with IC and FAA
- i. Documentation of the crash site
 - i. When applicable, the site will be divided into sectors and then grids.
 - 1. Equipment needed: stakes, heavy duty string, metric fiberglass measuring tapes, North arrows with scale, GPS units
 - ii. Photography
 - 1. Equipment needed: digital cameras with removable digital storage cards, standard and telephoto lenses for existing digital SLR camera body, digital SLR tripod
 - iii. Mapping
 - 1. Equipment needed: GPS, Total station and prisms
 - 2. Sketch mapping of grids
 - a. Equipment needed: clipboards, compasses, grid paper, scale rulers, GPS units
 - iv. Description and numbering of remains and items recovered, including reference to location found
 - 1. Equipment needed: clip boards
- j. Blood samples gathered from all remains at the scene, prior to removal (lessens impact of decomposition in the field)
 - i. Equipment needed: blood spot cards, large supply currently at ME/C
- k. After full documentation of crash site (remains, personal effects, debris), coordinate removal of remains with responding agencies
- l. In conjunction with IC, FAA and NTSB, identify an area where debris can be moved to (hangar, warehouse, etc.)
- m. Process and hold at temporary morgue or arrange for transportation to more permanent morgue facility (may be done at temporary site if it is too far to transport remains to Albuquerque)
- n. Establish morgue work flow
 - i. Perform autopsies on designated remains
 - ii. Collect additional samples from pilots/crew for FAA Tox Boxes
 - 1. Equipment needed: FAA Tox Boxes provided by FAA
 - iii. Perform external examination on all remains
 - iv. Perform identification procedures
- o. Determine disposition of remains and unidentified common tissue

Appendix W
NM OMI Odontology Manual

New Mexico Office of the Medical Investigator Mass Fatality Incident Odontology Manual

New Mexico Office of the Medical Investigator
Albuquerque, New Mexico 87131

2012 Revision
Peter W. Loomis DDS

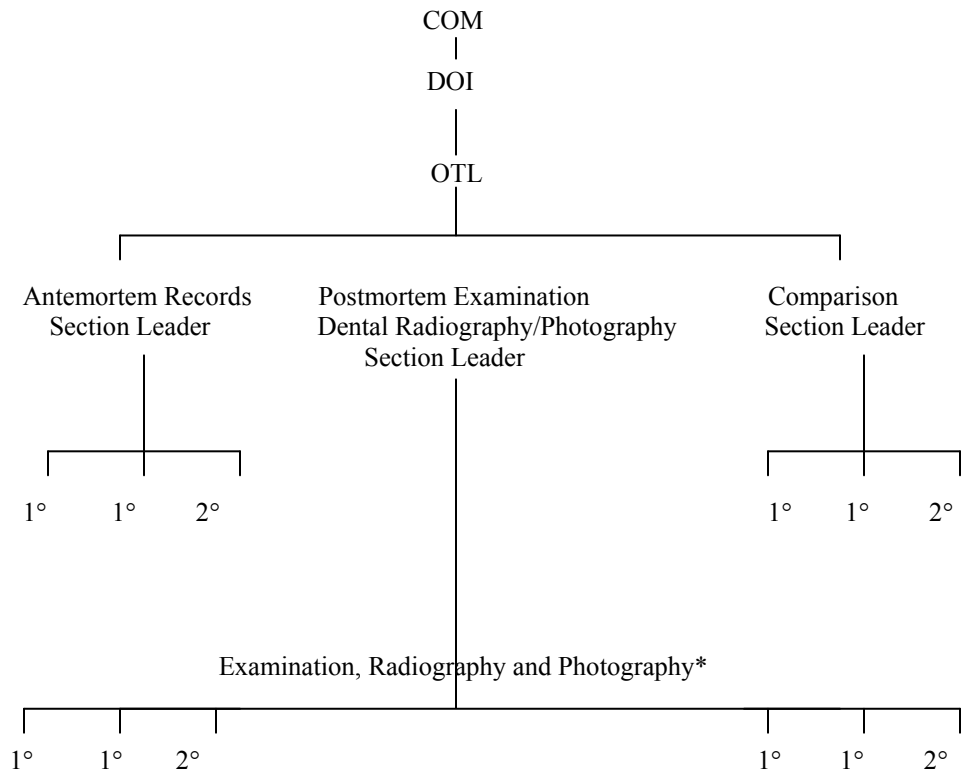
Contents

Contents.....	100
Organization	101
Antemortem Records Section.....	102
Postmortem Examination/Radiographic/Photography Section	104
Comparison Section.....	106
Odontology Team Leader.....	108
Section Requirements (Facility, Equipment, Supplies)	
AntemortemSection.....	109
Postmortem Examination/Radiography/Photography Section....	110
Comparison Section.....	111
Protocols Upon Activation.....	112
Postmortem Dental Examination Protocol.....	113
Photography Protocol.....	116
Antemortem Records Protocol.....	118
Comparison Protocol.....	120
Forms Used.....	121
WinID Codes.....	127
WinID User Manual.....	128

Odontology Team Organization

The odontology team will be led by the Odontology Team Leader (OTL), under the direction of the Chief of Morgue Operations (COM) and Director of Identifications (DOI) of the New Mexico Office of the Medical Investigator.

The Odontology team will consist of the OTL and members of the antemortem section, postmortem exam/dental radiography/dental photography section, and comparison section.



Each team consist of at least two members

*More or less personnel may be needed, depending on the magnitude of the disaster.

1° Primary Team – Initial response Team

2° Secondary Team – Back-up or relief for Primary Teams

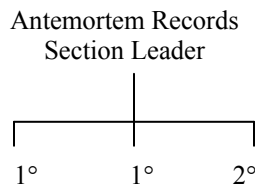
The composition of each section may vary depending upon the size of the incident. In all cases, an experienced forensic odontologist will be the leader of each section. All team members should be knowledgeable in all team positions, so they placed on different section teams as needed.

Antemortem Section

Functions:

1. Assist in the collection of antemortem records. Copy all antemortem records received.
2. Prepare packet for antemortem records, log and file the records
3. Interpret antemortem records received, scan antemortem x-rays and produce a composite dental chart for manual and computer comparison.
4. Enter all dental information (including x-rays) into WinID3 and set up file system for easy retrieval of the hard copies of the original and copied records

Personnel:



Each team consists of at least two members

1. Section leader and alternate
2. Teams consisting of at least two members:
 - One dentist interprets antemortem records and produces a composite dental chart of findings.
 - A second dentist reviews findings and confirms accuracy of interpretation and entry in the composite chart and computer database.
 - One auxiliary
 - Each member may be needed to assist in collection of antemortem records
3. If manpower allows, secondary teams should be established for relief of primary teams.

Antemortem Section Leader and Member Responsibilities:

Antemortem Section Leader

1. On call 24 hours per day.
2. Upon notification by OTL, will initiate contact of section members.
3. Will designate one member of subsection as alternate supervisor.
4. After initial meeting with OTL supervisor, will set up work schedule for section members and insure that members respond.
5. If needed, will make arrangements to collect antemortem records.
6. Check all antemortem records for accuracy of transcription prior to computer entry and deliver to comparison section after signing antemortem form with section member.
7. Attend all programs concerning antemortem record collection and processing.

Antemortem Section Members

1. Must be able to respond within 12 hours of notification.
2. Proficient with interpreting written and computerized antemortem dental records and in the generation of a composite dental record from them. This includes knowledge of the various domestic and international charting methods and familiarity with the dental forms and computer database entry procedures used by the odontology team.
3. Familiar with copying and scanning procedures for written as well as radiographic records.
4. Proficient in using WinID.

6. Secondary teams will be established for relief of primary teams if manpower allows.

Postmortem Section Leader and Member Responsibilities:

Postmortem Section Leader

1. On call 24 hours per day.
2. Upon notification by OTL, will initiate contact of section members.
3. Will designate one member of subsection as alternate supervisor.
4. After initial meeting with OTL supervisor, will set up work schedule for section members and insure that members respond.
5. Will make arrangements for collection and/or delivery of required equipment and supplies.
6. If requested will organize dental personnel for search teams at disaster site.
7. Supervise postmortem examinations and radiography of all dental remains, insuring accuracy and quality of both, prior to submission of records to comparison section.
8. Attend all programs concerning the examination and radiography of postmortem dental remains.

Postmortem Section Members

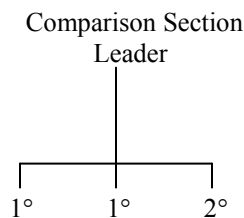
1. Must be able to respond within 12 hours of notification.
2. All dentists in this section will be familiar with oral autopsy procedures.
3. All members in this section will be familiar with the use of the Nomad x-ray unit, Dexis digital x-rays system and radiographic techniques used for dental remains.
4. All members must be familiar with the postmortem protocol manual in the use of WinID.
5. All members are required to attend meetings and training sessions concerning postmortem examination and radiography.

Comparison Section

Functions:

1. Organize all antemortem and postmortem dental records for manual and/or computer comparison.
2. Compare the records to make the identifications.
3. Once the identification has been established assist in the copying and return of antemortem records.
4. Complete antemortem packets for victims identified which include:
 - a. Originals and copies of antemortem records
 - b. Antemortem computer composite form
 - c. Postmortem examination chartings (printout from WinID)
 - d. Comparison form
 - e. Report identifying remains
5. Communicate with postmortem examination team and/or victim's dentist to resolve any discrepancies between antemortem and postmortem records.
6. Deliver packets to OTL and justify the identification.

Personnel:



Each team consist of at least two members

1. Section leader and alternate.
2. Comparison teams consisting of at least two members (two must be dentists):
 - a. One member at a computer terminal assisting and/or entering comparison information.
 - b. One dentist compares antemortem records with postmortem records to establish an identity.

- c. One dentist reviews comparison and confirms accuracy.
3. After establishing available manpower following notification of disaster, primary teams will be formed for initial response.
4. If manpower allows, secondary teams should be established for relief of the primary teams.
5. Antemortem Section may be combined with Comparison Section depending on size of incident.

Comparison Section Leader and Member Responsibilities:

Comparison Section Leader

1. On call 24 hours per day.
2. Will act as alternate for OTL in his absence and be familiar with his responsibilities.
3. Will designate one member of the section as alternate supervisor.
4. Upon notification by OTL, will initiate contact of the section members.
5. Will make arrangements for the collection and/or delivery of the necessary equipment and supplies.
6. After initial meeting with OTL supervisor, will set up work schedule for section members and insure that members respond.
7. Check accuracy and completeness of comparisons and records prior to submission to OTL.
8. Attend all programs concerning the Odontology Team.

Comparison Section Members

1. All members will be familiar with the use of antemortem and postmortem record forms and be trained in the procedures of using manual and computer for initial comparison.
2. Members will be familiar with copying procedures for forms and radiographs.
3. Members required to attend training sessions on comparison procedures and techniques.

Odontology Team Leader (OTL)

1. Will act as liaison between the Team and the COM and DOI.
2. Will keep appropriate agencies informed of the activities of the Team including meetings, training and mock disaster exercises.
3. Will be on call 24 hours per day.
4. Upon notification of the need for Team activation, the OTL will contact section supervisors and alternates so they may begin contacting their members of the potential need of their services.
5. Upon establishment of manpower needs, the OTL will meet with the section supervisors and assist in establishing work schedules.
6. Will supervise the set-up of required equipment.
7. Will supervise all aspects of the odontology team.
8. Will verify and present all dental identifications to the DOI or designate.
9. Will be familiar with all aspects of the Team and function where needed.
10. Organize Team meetings, training sessions and mock drills to insure competency of the Team and its members.
11. Will appoint section supervisors.
12. Will attend all programs concerning the Team or make arrangements for an alternate to attend.

ANTEMORTEM SECTION REQUIREMENTS

FACILITY REQUIREMENTS:

1. At least two phone lines for local and long distance phone calls.
2. Electrical outlets for lights and x-ray view boxes.
3. Tables and chairs for each team.
4. Internet access

EQUIPMENT:

X-ray View Boxes

Access to Copy Machine

Computers and peripherals (two flatbed transparency scanners, two printers, backup storage devices)

Computer software – Adobe Photoshop, WinID, Dexis, Microsoft Office , Adobe Professional

SUPPLIES:

Adhesive Labels

Security Badges

Clipboards (Legal Size)

Stapler and remover

Felt tip pens, indelible, red & black

Transparent Tape

Loupes (Optional)

X-ray Mounts

Magnifying Glass (Optional)

X-ray Copy Film (if x-rays will be copied)

Envelopes and manila folders, legal size

Pens, pencils, sharpeners, erasers

Note Pads

Hanging files and file boxes or cabinets

POSTMORTEM SECTION REQUIREMENTS

FACILITY REQUIREMENTS:

1. Suitable lighting including flashlights and/or headlamps
2. Work surface large enough to accommodate individual remains for each team.
3. Table or desk and chair(s) for laptop computer(s).

EQUIPMENT:

Two NOMAD x-ray units

Two Dexis digital x-ray sensors

Two laptop computers load with current version of WinID3, Dexis software and networked to other dental computers in AM and comparisons sections

Two digital SLR cameras with appropriate storage media, lenses, photography mirrors and cheek retractors

Stryker saw and lopping shears

INSTRUMENTS and SUPPLIES:

Adhesive Labels

Boxing Wax and clay

Clipboards

Note pads, pencils, pens

Manila Envelopes (legal size)

Felt Tip Pens, indelible, red & black

Flashlight and/or Headlamp

Magnifying Glass or Loops (optional)

Isopropyl alcohol

Saran Wrap and tape

Small step ladder

X-ray holder sleeves

Paper towels

Dish soap/water in sterilizer tray

ABFO scales

Mouth Mirrors (disposable)

Explorers

Scalpel Handles with Blades

Hemostats, Large and Small

4 Molt mouth props (2 large, 2 small)

Toothbrushes

Tongue Blades

Zip-Lock Bags
Gauze Sponges (4x4)

Cotton Rolls and swabs
Blue absorbent pads

COMPARISON SECTION REQUIREMENTS

FACILITY REQUIREMENTS:

1. At least two phone lines for local and long distance phone calls.
2. Electrical outlets for lights and x-ray view boxes.
3. Tables and chairs for each team.
4. Internet access

EQUIPMENT:

Access to Copy Machine

Two X-ray View Boxes

Computers and Peripherals (flatbed transparency scanner, two printers, backup storage devices)

Computer software – Adobe Photoshop, WinID, Dexis, Microsoft Office, Adobe Professional

SUPPLIES:

Adhesive Labels	Envelopes and manila folders, legal size
Paper Clips	Masking Tape
Clipboards	Paper Pads (8 1/2 " x 11")
Felt Tip Pens, indelible, red & black	Pens, pencils, Sharpeners, and Erasers
Film Mounts	Rubber Bands
Loupes	Scissors
Magnifying Glasses	Security Badges

Stapler and remover

Hanging files and file boxes or cabinets

Transparent Tape

Protocols upon Activation

OTL and Section Leaders:

1. Upon notification the OTL will contact all section leaders or their alternates.
2. The section leaders will contact their section members and keep a list of who will be available and when they will be available. The list will be referred to later upon establishment of manpower needs.
3. The OTL will make sure that all equipment and supplies are readily available.

Members of the Odontology Team:

1. If needed, will be notified by the OTL or section leader. They are not to call the Medical Investigator's office.
2. Upon notification of potential need, member will review responsibilities of section, the NMDIT manual, and the detailed protocol for their section
3. Will need to notify scheduled patients and adjust office schedule to meet the needs of the Team.

NMDIT Postmortem WinID/Dexis Protocol

Personnel:

Postmortem section leader

Personnel for Stations 1-3

#1 - Performs Dental Autopsy

#2 - Assists #1 and operates Aribex Nomad X-ray generator

#3 – Enters data into computer and controls pace of examination

Photographer – Acquires and manages all images for all stations

Rover – Monitors stations supplies and equipment. Substitutes for any position as needed.

3 - Open WinID3 (by postmortem leader only on initial startup)

Click on the “WinID3.4.9 Icon” Choose the network shortcut “XXXX.mdb”.

#3 directs the exam. Correct radiographs and data entry are imperative.. Do things according to protocol at your pace. Do not let #1 and #2 get ahead of you.

Postmortem

1. Receive gurney from the tracker.
2. #3 click on “Add New”, choose “Postmortem” and a RED Bordered Screen will open.
3. Enter the Body number and the full name of person entering record. Next **verify** (by voice confirmation) the number by repeating the number to the tracker. Once you have number confirmation, click OK.
4. The Unique case number will appear automatically.
5. Enter the ‘Post Mortem Condition’ field in the ‘Name’ tab.
6. Click on the ‘Identifiers’ tab and fill in the ‘Sex’ field (only if it can be determined), and in the fields of ‘P1’ and ‘P2’ enter the following:
 - a. P1:, enter the name of the photographer
 - b. P2: enter the words “per protocol”.
 - i. After the photographer is done with his photographs, he will report the number of pictures taken. Enter this number in front of the “per protocol”.
7. While you are performing steps 4 – 6,
 - a. The #1 and #2 position will be cleaning the mouth and getting the oral cavity ready for charting and x-rays, using isopropyl alcohol, soap, water, 4x4 gauze and paper towels. Any post mortem exfoliated teeth are replaced if possible.
 - b. Once the area is cleaned, the photographer will take the following pictures:
 - i. Body label under the chin for the facial photo.
 - ii. Anterior edge of teeth (slightly open to reveal the Maxillary and Mandibular incisal edges.
 - iii. Maxillary occlusal view.
 - iv. Mandibular occlusal view.
 - v. Any additional photos that will aid in the identification.
8. Once the photos are done prepare to record the post mortem x-rays.
9. Click on the ‘Graphics’ tab and then click on the ‘**DEXIS**’ button. The **DEXIS** window opens over top of the WinID window.

10. **DEXIS** will create the new **DEXIS** file with the same body number.



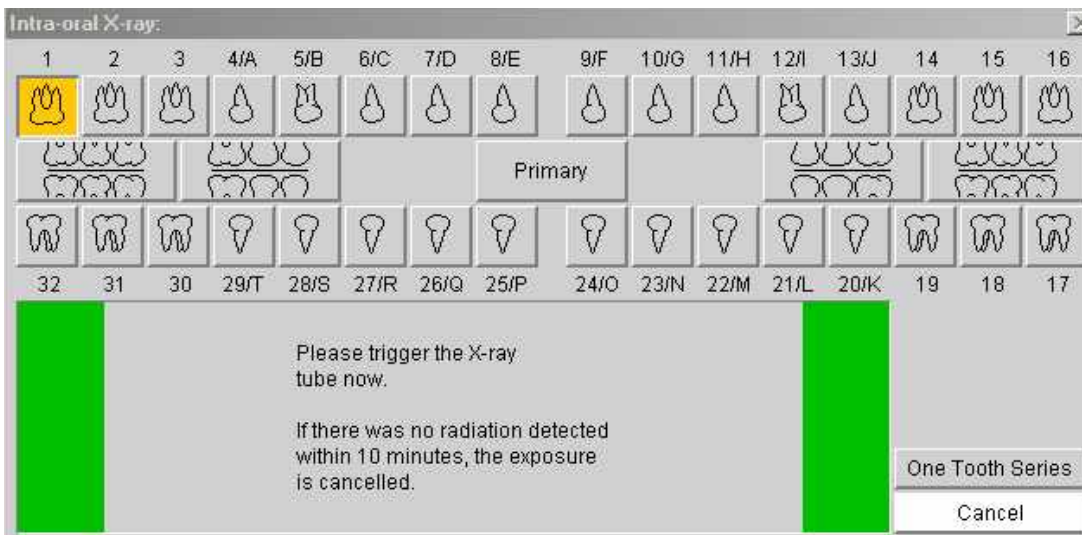
11. Make sure the 'tooth icon' is highlighted if a full mouth series is to be taken



12. Click on the 'x-ray icon'. A dialog box will appear, just click the 'DONE' button.

13. Click on the 'OMI FMX.button. Make sure the correct serial number of the x-ray sensor is highlighted. Check with OTL if unsure. This will begin an 18-film series sequence automatically prompting which area of mouth is to be exposed next.

You will see a screen that looks like:



For this operation the sequence is:

- | | |
|--------------------------------|---------------------------------|
| 1. Max R. Molar | 10. Mand R. Molar |
| 2. Max R. Premolar | 11. Mand R. Premolar |
| 3. Max R. Bitewing Projection | 12. Mand R. Bitewing Projection |
| 4. Mand L. Molar | 13. Max R. Canine |
| 5. Mand L. Premolar | 14. Max Centrals |
| 6. Mand L. Bitewing Projection | 15. Max L. Canine |
| 7. Max L. Molar | 16. Mand L. Canine |
| 8. Max L. Premolar | 17. Mand Centrals |
| 9. Max L. Bitewing Projection | 18. Mand R. Canine |

14. Direct #1 to place the sensor using the Orange colored odontogram as your guide. (Green bars indicate **DEXIS** is 'ready').

****#3 should periodically look to see if #1 is placing the sensor in the correct location!!**

15. The #1 will place the sensor and the #2 will trigger the x-ray.
- When the green bars turn to red, the sensor is fully exposed. The #3 should yell **'radiation'** to tell the #1 and #2 that the sensor is exposed.

- b. The x-ray will appear in the area between the green / red bars.
 - c. #3 should make the judgment of whether to accept or retake the x-ray and inform the #1 of the decision.
 - d. A **persistent yellow dot** means that the radiation levels needs to increase (#2 should check the Nomad and increase the exposure time). A **persistent red dot** means that the radiation levels needs to decrease (decrease the exposure time).
16. Continue to follow the changing odontogram until the series is completed. There will be no excuse for a poor quality x-ray (cone-cuts, missing the apex, or poor angulations, etc.). Retakes can be taken immediately by pressing the “back” button to allow a retake while sensor still placed in the same area of the mouth. If you need to re-shoot an x-ray, do so immediately. It avoids unnecessary changes in equipment and positioning.
 17. When the set is complete, verify that all images are optimal (remake if necessary) and arranged with no overlapping images. Use the home ICON (you cannot come back after next step)
 - a. Click on an x-ray and it will enlarge. You can adjust brightness and contrast by placing the cursor in the x-ray, holding down the left mouse button, and dragging the cursor.
 18. Once you are satisfied with your adjustments, have the #1 and #2 review and if they accept, verify that all images are optimal and arranged with no overlapping images you are ready to save and export. Use the home ICON to get rid of overlap.
 19. Click on the ‘Export file’ icon.
 20. On the pop-up window that appears, click on the ‘Export All’ button. Make sure that all the checkboxes have a checkmark in them.
 21. Click on the ‘Export All to WinID’.
 22. When this pop-up window disappears, the x-rays have been exported.
 23. Minimize ‘DEXIS’. You should see the WINID post mortem form.
 24. Click on the ‘Name’ tab. Then click on the ‘Add graphic’ button.
 - a. A dialog box will open that has all the files of the x-rays that will be linked to WinID. Navigate to the file where the name matches the Patient ID number. For instance, if your patient is 10-101010, then the x-ray file to link to WinID post mortem is ‘10-101010.jpg’.
 - b. Select the proper .jpg file and then click the ‘Open’ button.
 - c. The path to this file will appear in the textbox next to the ‘Add graphic’ button.
 25. Click on the ‘Graphic’ tab and you should see the x-rays on the screen in WinID.
 26. Click on the ‘Dental’ tab.
 27. Chart the teeth. #3 to call out the teeth numbers and the #1 will reply with an answer. Record the answer.
 - a. #3 or the #1,2 will need to look at the X-rays to make a determination. To refer to the x-rays, maximize the **DEXIS** screen. These are the most accurate x-rays.
 - b. Record any significant comments in the ‘Comment’ tab.
 28. Once charting is completed, verify the chart with the #1 by reading back your odontogram.
 29. Review all entries for quality control. Be sure that in the “Identifiers” tab that in the ‘**P2**’ field **that you have the actual number of photographs taken.**
 30. **CLOSE DEXIS NOW**
 31. Call for tracker and sign off on the following:
 - a. Dental examination
 - b. Dental Radiographs
 - c. Dental Photographs
 - d. Number of photographs taken.
 32. Confirm the body ID number with tracker.
 33. Release the body to the Tracker.
 34. Close WinID post mortem window and wait for next case.

Postmortem Dental Photography Protocol

Beginning of day procedures:

1. Create a new folder on the desktop of one of the PM laptop computers for today's photo session. entitled "MM.DD.YY photos" (where MM is the month, DD the day and YY the last digits of the year).
2. Set up the camera equipment.
3. Check the number of available exposures remaining on the Compact Flash Card by looking at the "Top Control Panel" to make sure you have enough memory for the days work.
4. Take a sample photo & check the camera settings for optimal operation.
5. Delete the sample photo.


Photograph protocol:

1. When the Tracker brings a new case to the Dental Section, prepare a label with case number.
2. 1st photo: close up of the label with case number.
3. 2nd photo: Full-face photo with case number label visible in the field. (prior to cleaning teeth)
4. Allow the dental autopsy team to clean up the teeth & any removable appliances.
5. 3rd photo: Anterior teeth close-up.
6. 4th photo: Maxillary arch photo.
7. 5th photo: Mandibular arch photo.
8. Supplemental photos as needed (i.e. unique restorations, removable appliances, malocclusions, etc.)
9. Final photo: close up of the label with case number.
10. Count how many photos were taken (include label photos in the count).
11. Initial & sign the tracker's paperwork for Dental Photography & fill in the space for number of photos taken (includes label photos in the count).
12. Tell total photo count to the person on the dental postmortem computer.




Photographic file management:

Transfer photo files from the camera to the photo computer.

- a. Plug camera into USB port on computer.
- b. Open WinID, postmortem records and go to the case number. Check all tabs (name, identifiers, dental, comments and graphics) for proper entries.
- c. Go to "graphics" window and click on "Dexis".
- d. Click on "camera" icon.
- e. Scroll through "import images" until drive "e" appears, which is the Nikon camera (or other camera).
- f. Double click on the "e" drive, "DCIM", and "100ND2HS" (or other)
*The above process can also be done with the images stored on jump drive or memory card (see below)**
- g. Find the first image of the case by referring to the corresponding case number in the photo log and click on it once to highlight it. Click the "import" button once.
- h. After a moment the highlighted image number moves to the next image. Continue importing until the last image of the case is imported.

- i. Click “done” and the images appear on the screen. Use the “rotate” tool to rotate any images as needed.
 - j. Close Dexis and backup files onto the Jump Drive.
- * If the images have been transferred from the camera to a jump drive or file folder then do the following:*
- a. Open WinID, postmortem records and go to the case number. Check all tabs (name, identifiers, dental, comments and graphics) for proper entries.
 - b. Go to “graphics” window and click on “Dexis”.
 - c. Click on the “pen” icon. 
 - d. Click on the “import” icon.
 - e. Scroll through the directories until the drive or folder with the images appears.
 - f. Find the first image of the case by referring to the corresponding case number in the photo log and click on it once to highlight it. Click the “import” button once.
 - g. After a moment the highlighted image number moves to the next image. Continue importing until the last image of the case is imported.
 - h. Click “done” and the images appear on the screen. Use the “rotate” tool to rotate any images as needed.
 - i. Close Dexis and backup files onto the Jump Drive.

NMDIT Antemortem WinID/Dexis Protocol

1. Prepare a manila envelope with a new number for these records.
 - a. Use a preprinted number (from the sheet of tear off numbers), and tape to outside of envelope.
 - b. Attach preprinted large label to outside of envelope and complete it.
2. Record on the master “Records Received” sheet the records received.
 - a. Number
 - b. Date
 - c. Name, gender, date of birth, social security number
 - d. Received from
 - e. Records received (type and number of each)
3. Prepare an antemortem dental chart/worksheet.
4. Reading x-rays with view box and all chartings, written treatment notes, lab slips, etc. complete the antemortem dental chart/worksheet. This needs to be done by two dentists to verify and confirm the findings, signed by each and presented to section leader to reconfirm.
5. Enter the dental charting and any comments of unusual findings from the antemortem dental chart/worksheet into the WinID database. This will be done by two persons to verify the proper WinID coding.
6. From the “graphics” tab in WinID open Dexis to scan radiographs. Make sure x-rays are scanned “dot down”, and they are not touching each other. Don’t worry about proper sequence at this point. If FMX, BWs, or PAs are mounted, remove from mount and just place individual films on scanner glass. After scanning, adjust for proper orientation and brightness/contrast, and export the radiographs into the WinID folder. Then from the “name” tab in WinID, link the graphic of these radiographs. (Leave Dexis open) **Specifically:**
 - a. Click on the ‘Graphics’ tab and then click on the ‘**DEXIS**’ button. The **DEXIS** window opens over top of the WinID window. **DEXIS** will create the new **DEXIS** file with the same ID number.
 - b. Make sure the “tooth icon” is highlighted if a full mouth or partial series of x-rays is to be scanned, 
 - c. If a panoramic x-ray is to be scanned highlight the icon with the body profile. 
 - d. Click on the ‘scanner button’  A dialog box will appear, and follow scanner instructions. Resolution for scanning should be 300dpi for fmx, PA and BW x-rays, or 150 dpi for panoramic x-rays.
 - e. Arrange x-rays in Dexis to correspond to proper tooth numbers.
 - f. When the set is complete, verify that all images are optimal (rescan if necessary) and are arranged with no overlapping images. Use the “home” icon (you cannot come back after next step)
 - Click on an x-ray and it will enlarge. You can adjust brightness and contrast by placing the cursor in the x-ray, holding down the left mouse button, and dragging the cursor.

- g. Once you are satisfied with your adjustments, have another team member review and if they accept, verify that all images are optimal and arranged with no overlapping images and you are ready to save and export.
 - h. Click on the 'Export file' icon.
 - i. On the pop-up window that appears, click on the 'Export All' button. Make sure that all the checkboxes have a checkmark in them.
 - j. Click on the 'Export All to WinID'.
 - k. When this pop-up window disappears, the x-rays have been exported.
 - l. Minimize 'DEXIS'. You should see the WINID post mortem form.
 - m. Click on the 'Name' tab. Then click on the 'Add graphic' button.
 - a. A dialog box will open that has all the files of the x-rays that will be linked to WinID. Navigate to the file where the name matches the Patient ID number. For instance, if your patient is 10-101010, then the x-ray file to link to WinID post mortem is '10-101010.jpg'.
 - b. Select the proper .jpg file and then click the 'Open' button.
 - c. The path to this file will appear in the textbox next to the 'Add graphic' button.
 - n. Click on the 'Graphic' tab and you should see the x-rays on the screen in WinID.
 - o. Scan any photographs into Dexis as necessary. (Ask section leader) (Close Dexis)
7. Place all records, x-rays, notes and antemortem chart/worksheet into the envelope and file alphabetically by last name with other antemortem records.

Dental Comparison Protocol

1. Use WinID “best match” algorithm to sort for most likely matches on either an antemortem or postmortem record. There are five match windows that will appear giving different information on “hits”, “misses” “possible” and “no-info”. Use one of these to begin the comparison process.
2. Usually begin with the postmortem records and work forward through the postmortem records unless instructed otherwise.
3. Become familiar with using the “filtering” button at bottom of the record window to filter for specific characteristics.
4. Click on potential match and view odontogram and graphic in WinID. Use arrow button continue searching next most likely matches.
5. To view x-rays of individual case close-up, go to the “graphic” tab in WinID then click on “Dexis”. This will open the original Dexis x-ray file. Here you may enlarge, enhance, invert, etc. to help in you comparison.
6. If there is a possible match, pull the manila antemortem file envelope and examine closely.
7. Use the entire antemortem record (charts, x-rays, health history, treatment notes, lab slips, insurance filings etc.) to aid in the process. Don’t hesitate to call the provider if more information is needed. Photographs showing teeth might help. Ask section leader for guidance in using Photoshop for digital enhancement, superimposition and resizing of photos.
8. Confer with other team members and section leader on the comparison.
9. Prepare a Dental ID Record describing the comparison and have it signed by one other team member and the section leader. You will need to justify the comparison verbally to the section leader.
10. Once identified change the “Disposition” in the pull down window on the “name” tab in WinID to “Identified” on both the newly identified postmortem record, and the antemortem record.

11. Complete the "Identified as:" blank on the label on the outside of the manila antemortem file envelope with the postmortem remains number, and place all of the records back into the envelope.
12. Prepare a one page Word report with embedded graphics to justify the comparison/identification.
13. Give the section leader the completed envelope and the report.

Antemortem Dental Record

ID# _____

Last: _____

First: _____ MI: _____

Date: _____ Sex: _____

Race: _____ Age/DOB : _____

Height: _____ Weight: _____

Eye: _____ Hair: _____ Blood Type: _____

Team Member: _____

Confirm by: _____

Type, Date and Number of X-Rays _____

Codes	
Primary Codes	Secondary Codes
M – Mesial	A – Annotation
O – Occlusal	B – Deciduous
D – Distal	C - Crown
F – Facial	E - Resin
L – Lingual	G - Gold
I – Incisal	H - Porcelain
U – Unerupted	N - Non-Precious
V – Virgin	P - Pontic
X – Missing	R - Root Canal
J – Missing Cr	S - Silver Amalgam
/ - No Data	T - Denture Tooth
	Z - Temporary

Comments: _____

Section Leader _____

ID As: _____

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				Description	Code
1	18				
2	17				
3	16				
4	15	A	55		
5	14	B	54		
6	13	C	53		
7	12	D	52		
8	11	E	51		
9	21	F	61		
10	22	G	62		
11	23	H	63		
12	24	I	64		
13	25	J	65		
14	26				
15	27				
16	28				
17	38				
18	37				
19	36				
20	35	K	75		
21	34	L	74		
22	33	M	73		
23	32	N	72		
24	31	O	71		
25	41	P	81		
26	42	Q	82		
27	43	R	83		
28	44	S	84		
29	45	T	85		
30	46				
31	47				
32	48				

Post Mortem Dental Record

ID#: _____

Date: _____

Sex: _____

Race: _____

Estimated Age: _____

Height: _____ Weight: _____ Eye: _____ Hair: _____ Blood Type: _____

Used only when computer down

Code	Description				
				16	3
				17	2
				15	4
		55	A	14	5
		54	B	13	6
		53	C	12	7
		52	D	11	8
		51	E	21	9
		61	F	22	10
		62	G	23	11
		63	H	24	12
		64	I	25	13
		65	J	26	14
				27	15
				28	16
				38	17
				37	18
				36	19
		75	K	35	20
		74	L	34	21
		73	M	33	22
		72	N	32	23
		71	O	31	24
		81	P	41	25
		82	Q	42	26
		83	R	43	27
		84	S	44	28
		85	T	45	29
				46	30
				47	31
				48	32

Team member: _____

Confirm: _____

Type and Number of X-Rays _____



WinID Codes	
Primary Codes	Secondary Codes
M - Mesial	A - Annotation
O - Occlusal	B - Deciduous
D - Distal	C - Crown
F - Facial	E - Resin
L - Lingual	G - Gold
I - Incisal	H - Porcelain
U - Unerupted	N - Non-Precious
V - Virgin	P - Pontic
X - Missing	R - Root Canal
J - Missing Cr MPM	S - Silver Amalgam
/ - No Data	T - Denture Tooth
	Z - Temporary

A: _____

B: _____

Body ID As: _____

Comments: _____

Identification Record

Ante ID#: _____ Post ID#: _____

Last: _____ First: _____ MI: _____

Sex: _____ Race: _____ Age/DOB : _____

Height: _____ Weight: _____ Eye: _____ Hair: _____ Blood Type: _____

		Ante		Post	
1	18				
2	17				
3	16				
4	15	A	55		
5	14	B	54		
6	13	C	53		
7	12	D	52		
8	11	E	51		
9	21	F	61		
10	22	G	62		
11	23	H	63		
12	24	I	64		
13	25	J	65		
14	26				
15	27				
16	28				
17	38				
18	37				
19	36				
20	35	K	75		
21	34	L	74		
22	33	M	73		
23	32	N	72		
24	31	O	71		
25	41	P	81		
26	42	Q	82		
27	43	R	83		
28	44	S	84		
29	45	T	85		
30	46				
31	47				
32	48				

Comparison of antemortem and postmortem dental records and radiographs. Describe matching dental characteristics.

Date: _____

Time: _____

- Positive ID
- Possible ID
- Unidentified
- Insufficient Data:

Print Name and Signature of Examiners:

Describe records and radiographs utilized:

Comments:

A: _____
B: _____
C: _____

Approved: _____
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NM DIT ANTEMORTEM RECORDS RECEIVED

NMDIT#	DATE	NAME (Last, First)	M/F	DOB	SSN	Recv'd from	Type & number of records

BLANK PAGE

**PLEASE TEAR OFF THE NEXT ANTEMORTEM NUMBER BELOW
TAPE THE NUMBER TO THE OUTSIDE OF THE ANTEMORTEM FILE FOLDER**

NMDIT-0001

NMDIT-0002

NMDIT-0003

NMDIT-0004

NMDIT-0005

NMDIT-0006

NMDIT-0007

NMDIT-0008

NMDIT-0009

NMDIT-0010

NMDIT-0011

NMDIT-0012

NMDIT-0013

WinID3 Codes □ Primary Codes

- **M** - *mesial* surface of tooth is restored.
- **O** - *occlusal* surface of posterior tooth is restored.
- **D** - *distal* surface of tooth is restored.
- **F** - *facial* surface of tooth is restored.
- **L** - *lingual* surface of tooth is restored.
- **I** - *incisal* edge of anterior tooth is restored.
- **U** - tooth is *unerupted*
- **V** - non-restored tooth - *virgin*
- **X** - tooth is missing- *extracted*
- **J** - tooth is *missing postmortem* or the clinical crown of the tooth is not present for examination. Also used for avulsed tooth. The root or an open socket is present, but no other information is available.
- / - *no information* about tooth is available

Secondary Codes

- **A** - an *annotation* is associated with this tooth. Specifics of the annotation/anomaly may be detailed in the comments section.
- **B** - tooth is *deciduous*
- **C** - *crown*
- **E** - *resin* filling material.
- **G** - *gold* restoration.
- **H** - *porcelain*.
- **N** - *non-precious* filling or crown material. Includes stainless steel.
- **P** - *pontic*. Primary code must be **X** to indicate missing tooth.
- **R** - *root canal* filled.
- **S** - *silver* amalgam.
- **T** - *denture* tooth. Primary code must be **X** to indicate missing tooth.
- **Z** - *temporary* filling material. Also indicates *gross caries* (used sparingly).

-
- **MODFL-S** mesial occlusal distal facial lingual silver amalgam restoration
 - **DL** tooth has distal lingual restoration
 - **MODFL-CG** gold crown
 - **MODFL-CHR** endodontically treated tooth with porcelain crown
 - **MI-E** mesial incisal resin
 - **X** tooth missing
 - **V-B** virgin deciduous tooth
 - **MO-SB** mesial occlusal silver amalgam in deciduous tooth
 - **X-PN** missing tooth replaced with non-precious pontic
 - **X-T** missing tooth replaced with denture tooth
 - **J** missing postmortem or clinical crown missing because of fracture
 - **MO-AZ** mesial occlusal temporary filling (or caries) on tooth with an anomaly
 - **V** or **V-A** tooth with mesial and distal caries
 - **X-AHNP** implant retained porcelain crown with non-precious metal

- **V-AE or V** tooth with occlusal sealant
- **O or O-AE** tooth with very shallow occlusal resin, but has been prepared with a bur
- **X-AHNP** Maryland bridge pontic (non precious with porcelain)
- **ML-AN** abutment tooth of Maryland bridge with connector on mesial lingual surfaces
- **MO-ABS** retained deciduous tooth with MO amalgam restoration, no permanent successor
- **MOD-ES or MOD-AES** tooth with an MO amalgam and a DO resin restoration

WinID3 Users Manual

WinID3 is a computer program that will assist the forensic dentist or forensic investigator in establishing and maintaining a missing persons / unidentified bodies database. WinID3 is also useful in mass disaster situations.

WinID3 is a Windows based program developed with Microsoft Visual Basic 6 and Microsoft Access2000. WinID3 uses ADO data structures. WinID3 will run on Windows95, Windows98, Windows ME, Windows 2000, Windows NT, and Windows XP platforms.

To start WinID3 double click the WinID3 icon. The WinID3 database called sample.mdb comes pre-loaded with sample data and graphics. Additional copies of Sample.mdb are available for download at Winid.com.

The data structures of WinID3 are contained in a Microsoft Access Database named sample.mdb. The database contains two tables of interest to users; the Ante table, and the Post table. Each table will contain one or more antemortem or postmortem respectively. Each record contains a large number of fields. Each field contains a specific type of information such as age or race or height.

WinID3 and the underlying Microsoft Access Database can be readily modified in Microsoft Access to include additional fields and generate reports. Care should be taken to append additional fields to the ends of the database tables as WinID3 expects certain fields to be in a specific location in some calculations.

Installation

To place WinID3 on your computer follow either the download instructions or the install from CD Rom instructions.

Download

To download and install WinID3 on your computer: Start your browser, log-on to the Internet, and navigate to <http://winid.com>. Select *FTP-download files* from the menu at the left. Read the directions on the page, then click the link to <ftp://ftp.winid.com>. Click on the WinID3 directory. There are 7 files in this directory. Highlight all 7 files, right click and select copy to folder. Select a folder to accept the 7 files. The download may take 45 minutes or more depending on the speed of your modem and link. After the files have been downloaded, log-off from the Internet. Run setup.exe to install WinID3. The default directory to install WinID3 into is C:\program files\WinID3

CD Rom

To install WinID3 from CD Rom place the disk into the CD Rom drive. Select RUN from the START button. Type in D:\setup.exe. Press OK. The default directory to install WinID3 into is C:\program files\WinID3. Your computer may have another drive letter associated with the CD Rom drive, if so change the D:\ in the above example to the appropriate letter.

Finish the Installation

The setup program that installs WinID3 will also place several coding forms, the users manual and coding help files into the WinID3 folder. Make a note of the directory in which WinID3 is installed.

WinID Icon

To place the WinID icon on your desktop right click on the desktop in any location that does not contain an icon. Choose NEW then choose Shortcut. Press the BROWSE button on the create shortcut window. Navigate to C:\program files\WinID3 Select winid3.exe and press OK. Now press NEXT and then FINISH. The WinID3 icon is now on your desktop.

SCREEN RESOLUTION

Check the screen resolution of your computer. WinID3 needs the resolution set to 800 x 600 or greater. WinID is optimized for a screen resolution of 1024 x 768.

SMALL FONTS

WinID3 will give a message on start-up if you screen does not display small fonts. Check the size of your fonts. To change the font size press the *Start* button, choose *Settings*, choose *Active Desktop*, choose *Customize My Desktop*, and select the *Settings* tab. If running Windows95 select *Small Fonts* on the dropdown list box. If running Windows98 press *Advanced*, now select *Small Fonts* on the dropdown list box.

WinID3 uses that folder in which WinID3 was installed as the default directory. All files associated with WinID3 are best kept in this directory. These would include database and graphic files. The default installation directory is C:\program files\WinID3.

Security of the data is as good as the physical security of the mass disaster operations site.

Backup, Backup, Backup

Updates

Updates are available from time to time on WinID.com. From the FTP site on winid.com, select the *Updates* directory. Download the file WinID3.exe Replace the current WinID3.exe in the WinID3 directory with the newly downloaded file WinID3.exe. This will complete the update. From the WinID3 Help menu select about to find the version number of WinID3 that you are using.

Using WinID3

Network Issues

WinID3 has been successfully used in network installations where each individual computer has a copy of winid.exe and the database for the specific incident has been placed on the server.

Multiple users should be aware that newly entered data and records may not be updated to all computers in the network until the Ante or Post screen containing the new data has been closed and then reopened. The closing and reopening assures repainting of current data to the screen of current interest.

Navigation

When WinID3 starts up, two screens are visible, the Antemortem and postmortem screens. Either screen can be brought to the front and made the current record by clicking its title bar, or by clicking directly on the screen or by pressing the Ante or Post items on the menu at the left. The screens can be moved to the most convenient positioning for the task at hand.

Each screen has several tabs at the top. Clicking one of the tabs will take you to a specific page. Similar data fields have been grouped on each tabbed page. One tabbed page will present the dental data for the dental record and the odontogram. Another tabbed page will display the linked graphic.

Arrows at the bottom of the screen allow a different record to be displayed on the screen. Single arrows move to the next or previous record. Double-arrows move to the first or last records.

When the filter is not in use, all records can be viewed by using the First-Previous-Next-Last arrows. Using the filter will display a subset of all the records available as defined by the filter.

Entering Data

The name of the current database is displayed along the lower right hand corner of the WinID3 screen

The *current record* is that record which is to the front, either Ante or Post. The ID# of the current record is displayed in the title bar of the current record.

Use the tab button to go to the next field. Pressing the tab button when at the last field on a page will navigate to the next page. Pressing the tab button while holding the shift button moves backwards to the previous field. The mouse can be used to move to any field, or to click on a tab to go to a different tabbed page.

Data may be entered onto any field on any page. The ID# cannot be changed. This is intentional and serves to keep ID# as unique entries. If necessary the ID# of a record can be changed in Microsoft Access. Most fields can accommodate up to 25 characters, the comment fields can hold 250 characters. Some fields have a down-arrow. Press the arrow to see a list of choices, or type in an entry.

Some data fields require a valid date. Once initialized the date field must contain a valid date. WinID3 will substitute 9/9/9999 as a placeholder date for invalid date entries.

Age, height and weight entries require a valid numerical entry. If the correct value is not known, use a numeral zero.

WinID3 uses WinID3 codes for entering dental characteristics. WinID3 dental codes are an extension of CAPMI codes. Col. Lew Lorton of the US Army developed CAMPI. The default value for all dental entries is the / (slash - no information available).

By default all new records have their disposition set to active. Change the disposition to identified when the case is IDed. When a record is IDed, enter the matching antemortem or postmortem case number in the IDed as field. Records may be filtered by their disposition status.

At the right of the dental page are a series of buttons that allow information to be entered for a complete dental arch with one button. Teeth can be marked as virgin, missing, replaced with denture or no information.

A series of *User Defined / Site Specific* fields and comment boxes are available. These fields can be used to enter and hold values that been established to accomplish the mission at hand. These fields can be filtered and manipulated in Microsoft Access. Microsoft Access can also be used to generate reports for this data. Data in user specified fields can be filtered by entering a custom filter string from the filter screen.

Menus (across the top)

The *File* menu will display message boxes with information about how to rename the current database or the *Save* the current database to a different location. The file menu also allows another database to be selected as the current database. Database replication issues make it impossible to copy sample.mdb while WinID3 is running.

Sample.mdb contains the sample data and graphics for WinID3, create a new database with a unique name for each project or deployment.

Changes to the data of the current database are saved immediately. Saving the current database at the end of a WinID3 session is not necessary.

The file menu allows a *New* database to be constructed. The new database will contain two dummy records that serve as placeholders. The dummy records should be deleted after new records are entered. Do not delete the last Ante or Post record. WinID3 requires at least one record in the Ante and Post tables. Deleting the last record will cause WinID3 to not function properly.

The FILE menu has an *Exit* selection that will properly close WinID3.

The *Display* menu allows the user to toggle between US units of measure and the US tooth numbering system; and metric units of measure and the FDI tooth numbering system. English, French, German or Spanish languages can also be selected.

Pressing the *Graphics* Menu Item will drop down a menu. There are three items on the drop down menu.

Clicking the *Ante - Modify PATH of linked graphics* menu item will bring up an input box that will allow the path of graphics files linked to all of the Ante records to be changed at one time. This feature is used to point WinID3 to the location of graphic files found in a different location than was specified when the Ante records were last modified. This feature is helpful when all Ante graphics file are located on a floppy disk, CD or DVD. Enter the path to be added to the graphic files in the input box. Once changed this action cannot be reversed. Accept the default *Remove All Path* to remove all paths associated with the graphics files. *Remove All Path* is useful when all the graphics files are stored in the same folder (directory) as WinID3.exe is stored. Press CANCEL to stop any changes from taking place.

Clicking the *Post - Modify PATH of linked graphics* menu item will bring up an input box that will allow the path of graphics files linked to all of the Post records to be changed at one time. This feature is used to point WinID3 to the location of graphic files found in a different location than was specified when the Post records were last modified. This feature is helpful when all Post graphics file are located on a floppy disk, CD or DVD. Enter the path to be added to the graphic files in the input box. Once changed this action cannot be reversed. Accept the default *Remove All Path* to remove all paths associated with the graphics files. *Remove All Path* is useful when all the graphics files are stored in the same folder (directory) as WinID3.exe is stored. Press CANCEL to stop any changes from taking place.

The *View additional graphics* menu item will launch a Windows Explorer window. In Windows Explorer navigate to a graphics file to be displayed. Double click the graphics file to display the graphic. When finished with the graphic, close or minimize the windows to return to WinID3. The default graphics viewer should already be designated for jpg, gif and bmp type files. To set the default viewer for these file types: From the Start button select *Settings*, then *Folder Options*. The *File Type* tab allows the program that will run jpg, gif and bmp type files to be identified and selected as default. Iexplore is a good choice for default viewer.

The *Window* menu allows the various visible screens to be arranged in different ways.

The *Help* menu allows the help file to be displayed and the about window to be displayed. Help can be displayed on various topics by pressing the F1 button. Many controls on the screens of WinID3 have tool tips where information will be displayed if the mouse pointer lingers over the control.

Menu screen (along the side)

The *GoTo* allows rapid movement to a specific Ante or post record by entering an ID#

Ante opens the Antemortem screen, or brings the Antemortem screen to the front.

Post opens the postmortem screen, or brings the postmortem screen to the front.

The Ante, Post and GoTo screens should be minimized, not closed, when not needed. Once closed these screens take several seconds to reopen due to issues associated with repopulating recordsets.

Add New allows a new Antemortem or postmortem record to be added. When *Add New* is pressed a box will appear that will request the ID# of the new record. The ID# is used as the index of the database. Each record must have a unique, not-duplicated ID#. For an Antemortem record the last name with or without middle initial makes a good choice for ID#. For a postmortem record use a number or a combination of digits and letters. In many situations the accession number of the remains is utilized. The name of the person entering the record must also be entered. These entries are mandatory. A new record will not be created unless both ID# and name are entered successfully.

The *Delete* button will remove the current record. Once removed the record cannot be restored. Care should be used in removing the last record in a database, as this will delete the database.

Pressing *Grid* will bring up a table for the current record. When the filter is not in use, the table contains all fields for all records in either the Ante or Post collections. The grid is displayed in a large table format. Either the Ante or Post grid will be displayed depending on which screen is to the front. Each grid corresponds to a table in the underlying Microsoft Access Database. Click a column header to sort on that field. The sort and filter buttons on the grid allow a filter expression to be entered to modify the display of the grid. Highlight a specific cell in the data grid then press GoTo to navigate to that specific record and to close the data grid.

Status opens the status screen. The status screen displays counts of Antemortem and postmortem records as grouped by their disposition category. The status report may be printed and used as a daily report.

Persist O+G opens an odontogram screen and a graphics screen for the current record. The odontogram screen displays an odontogram of the dental data of the current record. The graphics screen displays the graphic linked to the current record. These screens can be dragged to any location. Multiple odontogram and graphics screens can be displayed simultaneously for many records.

Exit closes all open windows, closes the database and properly exits from WinID3. Always use the *Exit* to leave WinID3.

The *Best Match* button brings up a new window with four tables. The calculations used to form the four tables may take a considerable period of time in large databases. The tables display the best matches to the current record in ranked order. Each table displays the best matches ranked by different criteria. Double clicking a listing from one of the tables displays a comparison window where identifier comparisons, dental comparisons or graphic comparisons can be viewed.

On the comparison screen the *Next Record* and *Previous Record* buttons will allow the user to scroll up or down the list from where the record was chosen, and allow visualization of the identifier comparison, dental comparison or graphic comparison tabbed pages. This feature allows quick comparisons of many records. A comparison report can be printed. Exact matches to identifier and dental matches are indicated in green.

The *Best Match* button can be used with both antemortem and postmortem records. Best Matches are returned for the current record.

The *Print* button will print the current record.

LIST TOOL

The list tool box will memorize and then print a list of antemortem or postmortem record numbers. The ANTE button placed the current Antemortem record on the list. The POST button placed the current Postmortem record on the list. The AP and PP buttons will print the current list. The AC and PC buttons will clear the list. The contents of both lists are cleared when the list tool is closed.

Filter Button

The *Filter* button is located along the lower edge of the Ante and Post screens. The *Filter* button allows the filter screen to be displayed. The filter screen is composed of two tabbed pages, one for identifier information the other for dental information.

By default the filter will always pass *active* records. Other identifier information can be used to filter the records.

Two types of dental filters are available. One used the LIKE operator, the other used the = (equals) operator. The LIKE operator will pass any occurrence to the specified WinID3 primary code. The = operator will pass only exact matches to the specified WinID3 primary code. Toggle between LIKE and = by pressing the number of a specific tooth. Yellow background indicates LIKE, purple indicates =.

In general it is better to use loose filters that return too many records than it is to use tight filters that return too few records.

Once a filter is in place only the filtered records can be displayed in the Ante or Post screens. A red *Filter in Use* box is displayed. Clicking on the red *Filter in Use* box will display the current filter expression. To change the filter, cancel the current filter and construct a new filter. A list previously used filters is available. Double click on a previously used filter expression to use that filter again.

Use the filter to restrict the number of comparisons used with *Best Match*. First filter the Post records, select an Ante record then press Best Match or filter the Ante records, select a Post record then press Best Match.

Mirror Record Button

The *Mirror Record* Button on the name page of the Ante and Post screens constructs a copy of the current record with a mirror image of its dental information. This feature is useful in situations where the right-left orientation of radiographs cannot be determined. The mirrored record will have the same ID# as the current record with **M* appended to the ID#.

Rectify Dental Data

Occasionally dental data can be corrupted and cause a *type mismatch* error when best match is used. The dental data will need to be rectified to correct this problem. The Ante and Post dental data will each need to be rectified separately. The *Rectify Data* button is a small-unmarked button on the dental page of both the Ante and Post screens. The button is located in the lower right hand corner of the box that contains the button that allows all entries to be marked as no information. Press this button to start the rectification process.

Coding Forms

Microsoft Word document files that contain WinID3 Antemortem and postmortem coding forms are included in the setup files of WinID3. Open either Data-a.doc or Data-p.doc in Microsoft Word. The coding form will be displayed. Print copies as needed. The file coding.doc is also available. This file gives examples of WinID3 dental coding.

Graphics

WinID3 will handle and display images. The images may be of radiographs, photographs of the victim, personal effects, accident scene photographs, or other information best presented in a visual format.

There are three necessary steps to place an image for use by WinID3.

1) Create an electronic image.

An electronic image can be created by a digital camera, obtained from video capture of a displayed image, or produced by a scanner. Digital cameras and video capture are best for 3-D images, while a scanner with a transparency attachment is best for flat subjects such as radiographs. Once the image has been captured, save the image in *.bmp, or *.gif or *.jpg format. GIF and JPG allow for compression and will have smaller files sizes. A BPM image will display quickly as there will be no need to decompress the image. When linking a

graphic, be sure to include the full path of the saved image. As an example, the full path of the graphic stored in the graphics folder, known as test1.bmp would be c:\graphics\test1.bmp

2) Edit the image

Once you capture an image electronically, you can view and edit it with image editing software. Editing an image allows you to get rid of unnecessary details and modify the image's dimension and graphic size so the image will quickly fill the screen space allotted by WinID3.

Picture It!, PhotoDeluxe, PhotoShop, Paint Shop Pro, and LivePix are commercially available image editors. Free and shareware editors may be found at <http://www.tucows.com>, or <http://www.shareware.com>. You can also use Microsoft's Picture Editor, which is shipped with the Microsoft Office Suite.

WinID3 will display images that are less than 2000 pixels in width and less than 2000 pixels in height. WinID3 will only display BMP, GIF and JPG formats.

Time taken to arrange radiographs to be displayed will be rewarded with graphics that are easy to use in the comparisons screen. Arrange that radiographs so that the most significant radiographs are along the top of the image. The most significant radiographs may be the most recent set of bitewings or a panoramic radiograph. Using the image editing software adjust the height of the most significant radiographs so that they are about 200 pixels tall.

3) Link the graphic to a WinID3 record

Display the record to be associated with the graphic. Go to the record's Names and Numbers tabbed page. Press the *Add Graphics* button. Navigate to and highlight the desired graphic. Press open. Go to the graphics tabbed page to see the graphic displayed.

Comments, additions and corrections are welcomed.

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Appendix X

Article on Biologic Terrorism

Medical Examiners, Coroners, and Biologic Terrorism

A Guidebook for Surveillance and Case Management

Prepared by

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Summary

Medical examiners and coroners (ME/Cs) are essential public health partners for terrorism preparedness and response. These medicolegal investigators support both public health and public safety functions and investigate deaths that are sudden, suspicious,

violent, unattended, and unexplained. Medicolegal autopsies are essential for making organism-specific diagnoses in deaths caused by biologic terrorism. This report has been created to 1) help public health officials understand the role of ME/Cs in biologic terrorism surveillance and response efforts and 2) provide ME/Cs with the detailed information required to build capacity for biologic terrorism preparedness in a public health context. This report provides background information regarding biologic terrorism, possible biologic agents, and the consequent clinicopathologic diseases, autopsy procedures, and diagnostic tests as well as a description of biosafety risks and standards for autopsy precautions. ME/Cs' vital role in terrorism surveillance requires consistent standards for collecting, analyzing, and disseminating data. Familiarity with the operational, jurisdictional, and evidentiary concerns involving biologic terrorism-related death investigation is critical to both ME/Cs and public health authorities. Managing terrorism-associated fatalities can be expensive and can overwhelm the existing capacity of ME/Cs. This report describes federal resources for funding and reimbursement for ME/C preparedness and response activities and the limited support capacity of the federal Disaster Mortuary Operational Response Team. Standards for communication are critical in responding to any emergency situation. This report, which is a joint collaboration between CDC and the National Association of Medical Examiners (NAME), describes the relationship between ME/Cs and public health departments, emergency management agencies, emergency operations centers, and the Incident Command System.

Introduction

Terrorist events in recent years have heightened awareness of the risk of terrorist acts involving unconventional agents, including biologic and chemical weapons. The need for

terrorism preparedness and planning for response at multiple levels is now recognized, including planning and response by medical examiners, coroners (ME/Cs), and the medicolegal death-investigation system.

Federal, state, and local agencies have developed plans to detect and respond to terrorism by using a multidisciplinary approach that requires active participation of health-care providers, law enforcement, and public health and safety staff. Because ME/Cs have expertise in disease surveillance, diagnosis, deceased body handling, and evidence collection, they serve a vital role in terrorism preparedness and response. ME/Cs should ensure that their role in surveillance for unusual deaths — and response to known terrorist events — is a critical part of the multidisciplinary response team. Terrorism-related drills and practical exercises conducted by public health, law enforcement, and public safety agencies should include training on postmortem operations and services.

This report, prepared as a joint effort between the National Association of Medical Examiners (NAME) and CDC, is a first step in providing specific guidance to ME/C death investigators and public health officials. This report can help bridge gaps that exist in local terrorism preparedness and response planning. By discussing the substantial contributions of ME/Cs, this report can also serve as a foundation for identifying the needs of medicolegal death-investigation systems and for addressing those needs through adequate training and funding.

This report provides guidance, identifies support services and resources, and discusses the roles and responsibilities of ME/Cs and affiliated personnel in recognizing and responding to potential biologic terrorism events. Certain questions being asked by ME/Cs and their public health partners are answered in this report, including the following:

- What are the likely biologic agents to be encountered?
- What are the expected case fatality rates and time courses for the different agents?
- What types of ongoing surveillance are needed to detect potential biologic terrorism-associated incidents?
- What protective equipment and procedures are needed to ensure the safety of death investigation and forensic pathology personnel?
- What are the appropriate facilities in which to perform postmortem examinations in cases of suspected biologic terrorism?
- What are the best methods for ensuring biosafety during the mortuary process?
- How will hospitals, emergency personnel, health departments, and ME/Cs effectively communicate during a suspected or known incident?
- How will local ME/C systems interact with the Federal Bureau of Investigation (FBI) and other investigative agencies?
- What is the minimum extent of examination that will be required? For example, will a complete autopsy be required in every suspected case to support the criminal justice process?
- What pathology-specific tests are available; which ones are the best to use to make an accurate diagnosis; and which ones are the best for making a rapid diagnosis?
- Which laboratories are best suited to perform the necessary postmortem testing?
- What role does public health law play in determining disposition of bodies?
- What legal authority do public health agencies have in making decisions during potential biologic terrorism events?
- What federal resources are available to assist ME/Cs?

Background

Medicolegal Death Investigators

CDC has identified medicolegal death investigators (i.e., ME/Cs) as essential partners in terrorism preparedness and response (1). This report is designed to assist ME/Cs and their

public health partners in developing appropriate capacity for recognizing and responding to deaths that are potentially a consequence of biologic terrorism.

The organization of medicolegal death investigative systems within the United States varies by state (2). As ME/Cs and public health and public safety departments prepare to respond to terrorism-associated events, each state should consider how its medicolegal death investigation system is organized. These systems can be medical examiner-based (21 states and the District of Columbia), coroner-based (10 states), or both (19 states) (Figure 1).

Typically, coroners are elected lay persons who use medical personnel to assist in death investigation and autopsy performance. Medical examiners are usually appointed physicians and pathologists who have received special training in death investigation and forensic pathology.

Medicolegal death investigation systems can be either centralized (i.e., investigations emanate from one state-level office) or decentralized (i.e., investigations are conducted in more than one regional-, county-, or city-based office). A total of 23 states plus the District of Columbia have centralized systems. 27 states are decentralized. States with medical examiner systems might have a state-based medical examiner office, and also have county-level autonomous medical examiner offices that perform their own autopsies and manage their own data and administrative systems.

ME/C offices can also vary in their organizational position within the government. ME/C offices might be a component of the public health department or the public safety department, or be independent of other government agencies. All types of medicolegal death investigation systems should be considered when determining the roles, responsibilities, and participation of ME/Cs in a jurisdiction's terrorism preparedness and response plans.

Biologic Terrorism

Biologic terrorism is defined as “the use or threatened use of biologic agents against a person, group, or larger population to create fear or illnesses for purposes of intimidation, gaining an advantage, interruption of normal activities, or ideologic activities. The resultant reaction is dependent upon the actual event and the population involved and can vary from a minimal effect to disruption of ongoing activities and emotional reaction, illness, or death” (3). In the United States in 1984, an outbreak of terrorism-related *Salmonella* dysentery caused 715 persons to become ill, but no fatalities resulted (4). In 2001, the intentional distribution of anthrax spores through the U.S. Postal Service resulted in five deaths from inhalational anthrax (5–8). MEs were critical members of the response team during the anthrax outbreak, performing autopsies on each fatality to confirm the cause of death as anthrax and to identify the manner of death as homicide. ME/Cs have state statutory authority to investigate deaths that are sudden, suspicious, violent, unattended, or unexplained (9); therefore, these investigators have a role in recognizing and reporting fatal outbreaks, including those that are possibly terrorism-related, and a role in responding to a known terrorist event (10–12). Deaths of persons at home or away from health-care facilities fall under the jurisdiction and surveillance of medicolegal death investigators (13), who often identify infectious diseases that are not terrorism-related. For example, in 1993, MEs recognized an outbreak of hantavirus pulmonary syndrome, a disease with symptoms that can mimic terrorism-related illnesses (14). Deaths of patients in hospitals can also fall under medicolegal jurisdiction if the patient dies precipitously before an accurate diagnosis is made

or if a public health concern exists (10). Fatalities caused by known terrorist events are homicides and therefore fall under the statutory jurisdiction of ME/Cs.

Risk assessment for potential biologic terrorism is an uncertain process. Hypothetical terrorism scenarios can involve a limited number of cases or millions of cases, with proportionate numbers of fatalities. For example, in 2002, the Dark Winter smallpox exercise included in the scenario 3 million fourth-generation cases of smallpox and approximately 1 million deaths (15). In 2000, the TOPOFF (Top Officials) plague exercise included in the scenario 2,000 fatalities in a 1-week period (16). Given such possibilities if a biologic terrorist event occurred, ME/Cs should proactively identify appropriate resources and links to the public health, emergency response, health-care, and law enforcement communities. With appropriate resources and links, ME/Cs can assist with surveillance for infectious disease deaths possibly caused by terrorism and provide confirmatory diagnoses and evidence in deaths clearly linked to terrorism. Conversely, public health agencies should recognize ME/Cs as a vital part of the public health system and keep them informed of infectious disease outbreaks occurring in their jurisdictions so that they are better able to recognize related fatalities. Additionally, public health agencies should provide ME/Cs with appropriate resources to enhance their surveillance and response capacities for terrorism.

An ME/C's principal diagnostic tool is the autopsy. This procedure enables pathologists to identify the dead, observe the condition of the body, and reach conclusions regarding the cause and manner of death. Autopsies are valuable in diagnosing unrecognized infections, evaluating therapy, understanding the pathogenesis and route of infection for uncommon or emerging infections, and developing evidence for subsequent legal proceedings (10,17). In 1979, an anthrax outbreak occurred that was associated with an unintentional release of

spores from a bioweapons factory in the Soviet city of Sverdlovsk; pathologists used autopsies to identify the cause of death as anthrax and the route of infection as inhalation (18). In a 1945 smallpox outbreak, autopsy pathologists, rather than clinicians, were the physicians who recognized the sentinel case (19).

Probable Biologic Terrorism Agents, Diseases, and Diagnostic Tests

Agent Categories

In this report, the list of potential biologic terrorism agents has been prioritized on the basis of the risk to national security (Box 1) (1). Biologic agents are classified as high-risk, or Category A, because they can 1) be easily disseminated or transmitted person to person; 2) cause high mortality, with potential for major public health impact; 3) might cause public panic and social disruption; or 4) require special action for public health preparedness. The second highest priority, or Category B, agents include those that 1) are moderately easy to disseminate; 2) cause moderate morbidity and low mortality; or 3) require enhanced disease surveillance. The third highest priority, or Category C, agents include emerging pathogens that can be engineered for future mass dissemination because of 1) availability; 2) ease of production and dissemination; or 3) potential for high morbidity and mortality and major health impact.

Recognizing pathologic features of different biologic agents is important, as demonstrated by the inhalational and cutaneous anthrax cases that occurred in the United States during 2001 (5,8,20–23). The autopsy of the index patient was performed to determine how the person had acquired anthrax (cutaneous, gastrointestinal, or inhalational). After inhalational anthrax

was diagnosed, public health officials were able to better define potential sources of the airborne *Bacillus anthracis* spores.

BOX 1. Classification of biologic terrorism agents

Category A Agents

- *Variola major* (smallpox)
- *Bacillus anthracis* (anthrax)
- *Yersinia pestis* (plague)
- *Clostridium botulinum* toxin (botulism)
- *Francisella tularensis* (tularemia)
- Hemorrhagic fever viruses, including
 - Filoviruses including Ebola and Marburg hemorrhagic fever
 - Arenaviruses, including Lassa (Lassa fever) and Junin (Argentine hemorrhagic fever) and related viruses

Category B Agents

- *Coxiella burnetii* (Q fever)
- *Brucella* species (brucellosis)
- *Burkholderia mallei* (glanders)
- Alphaviruses including Venezuelan encephalomyelitis and eastern and western equine encephalomyelitis viruses
- Ricin toxin from *Ricinus communis* (castor beans)
- Epsilon toxin of *Clostridium perfringens*
- *Staphylococcus* enterotoxin B
- Food- and waterborne pathogens
 - *Salmonella* species
 - *Shigella dysenteriae*
 - *Escherichia coli* O157:H7
 - *Vibrio cholerae*
 - *Cryptosporidium parvum*

Category C Agents

- Nipah virus
- Hantaviruses
- Tickborne hemorrhagic fever viruses
- Tickborne encephalitis viruses
- Yellow fever virus
- Multidrug-resistant *Mycobacterium tuberculosis*

Diagnostic Tests

If possible, given the constraints of case volume and biosafety concerns, complete autopsies with histologic sampling of multiple organs should be performed in deaths potentially caused by infections with biologic terrorism agents. Autopsy diagnostic procedures for the Category A agents include microscopic examination, combined with the collection of specimens for additional tests that will aid in determining a definitive organism-specific diagnosis. Blood, cerebrospinal fluid, and tissue samples or swabs should be placed in transport media that will allow bacterial and viral isolation. Serum should be collected for serologic and biologic assays. Tissue samples should be frozen for polymerase chain reaction (PCR). Tissue samples should also be placed in electron microscopy fixative (glutaraldehyde). Microscopic examination of formalin-fixed, paraffin-embedded tissues stained with hematoxylin and eosin (H&E) is essential to characterizing the patterns of tissue damage defining a syndrome

and establishes a list of possible microorganisms in the differential diagnosis. To enhance surveillance for these conditions, a matrix of potential pathology-based syndromes (Table 1) has been developed to guide autopsy pathologists in recognizing potential cases (24). Special stains (e.g., tissue Gram and silver impregnation stains [Steiner's or Warthin-Starry]), can be helpful in identifying bacterial agents. Additionally, specific immunohistochemical (IHC) and direct fluorescent assays (DFA) for the Category A terrorism agents have been developed and are available at CDC.† These tests can be performed on formalin-fixed tissues. Clinical and pathologic characteristics of the Category A agents and corresponding diagnostic methods are summarized in this report (Tables 2 and 3).

TABLE 1. Matrix of autopsy pathologic syndromes and potential terrorism-related illnesses* or agents

<u>Illness or agent</u>	<u>Autopsy pathologic syndrome</u>
Plague, tularemia, Q fever, inhaled staph enterotoxin B, ricin	Community-acquired pneumonia; diffuse alveolar damage
Smallpox, viral hemorrhagic fevers, T-2 mycotoxins	Diffuse rash
Plague, tularemia, anthrax, viral hemorrhagic fevers mycotoxins	Sepsis syndromes (i.e., disseminated intravascular ,T-2 coagulopathy [DIC])
Anthrax	Hemorrhagic mediastinitis or meningitis
Brucellosis, viral hemorrhagic fevers	Hepatitis, fulminant hepatic necrosis
Venezuelan equine encephalitis and other equine encephalomyelitis agents	Encephalitis, meningitis
Viral hemorrhagic fever (Lassa)	Pharyngitis, epiglottitis and other upper airway infections
Cutaneous anthrax, bubonic plague, tularemia	Soft tissue infections-cellulitis, abscess, necrotizing fasciitis
Escherichia coli and Shigella colitis, gastrointestinal anthrax	Hemorrhagic colitis

*Adapted from Med-X, New Mexico Surveillance Program.

TABLE 2. Selected epidemiologic characteristics of illnesses caused by Category A biologic agents*

Disease	Incubation period	Duration of illness	Case fatality rates
Inhalational anthrax	1–6 days	3–5 days	Untreated, 100% Treated, 45%
Botulism	6 hr–10 days	24–72 hrs	Outbreak-associated,

			First patient 25% Subsequent patients 4% Overall 5%-10%
Tularemia	1–21 days	2 weeks	Untreated, 33% Treated, <4%
Pneumonic plague	2–3 days	1–6 days	Untreated, 40%–70% Treated, 5%
Smallpox	7–17 days	4 weeks	Overall, 20%–50%
Viral hemorrhagic fevers	4–21 days	7–16 days	Overall, 53%–88%

Source: CDC. Bioterrorism : agent summary. Atlanta, GA: US Department of Health and Human Services, CDC, 2001.

TABLE 3. Primary pathologic features and differential diagnoses of Illnesses

Agent/disease	Primary pathologic features	Differential diagnosis
Smallpox virus (<i>variola major</i>)	Multiloculated vesicles, ballooning degeneration of epithelial cells, intracytoplasmic inclusions (Guarnieri bodies)	Chicken pox, monkeypox, parapox, tanapox, herpes simplex, secondary syphilis
<i>Bacillus anthracis</i> (anthrax)	Inhalational anthrax — hemorrhagic mediastinitis, hemorrhagic lymphadenitis, hemorrhagic pleural effusion	Inhalational anthrax — community acquired pneumonia, pneumonic tularemia or plague, hantavirus pulmonary syndrome, bacterial/fungal/tuberculous mediastinitis or meningitis, fulminate mediastinal tumors, aortic dissection
	Cutaneous anthrax — hemorrhage, edema, necrosis, perivascular infiltrate, vasculitis	Cutaneous anthrax — rickettsialpox, spider bite, ecthyma gangrenosum, ulceroglandular tularemia
	Gastrointestinal anthrax — hemorrhagic enteritis, hemorrhagic lymphadenitis, mucosal ulcers with necrosis in the terminal ileum and cecum, peritonitis	
<i>Yersinia pestis</i> (plague)	CNS involvement — hemorrhagic meningitis	
	Bubonic plague — acute lymphadenitis with surrounding edema	Bubonic plague — tularemia, other bacterial adenitis
	Pneumonic plague — severe, confluent, hemorrhagic, and necrotizing bronchopneumonia, often with fibrinous pleuritis	Pneumonic plague — inhalational anthrax, community acquired pneumonia, pneumonic tularemia, hantavirus pulmonary syndrome
	Septicemic plague — generalized lymphadenitis, foci of necrosis in lymph nodes and other reticuloendothelial organs, disseminated intravascular coagulation (DIC) with widespread hemorrhages and thrombi	Septicemic plague — other bacterial sepsis
<i>Francisella tularensis</i> (tularemia)	CNS involvement — meningitis	Plague meningitis — other bacterial or fungal meningitis
	Ulceroglandular tularemia — skin ulcer with associated suppurative necrotizing lymphadenitis	Ulceroglandular tularemia — cutaneous anthrax, rickettsialpox, spider bite, ecthyma gangrenosum
	Glandular tularemia — suppurative necrotizing lymphadenitis without associated skin ulcer	Glandular tularemia — pyogenic bacterial infections, cat-scratch disease, syphilis, chancroid, lymphogranuloma venereum, tuberculosis, nontuberculous mycobacterial infection, toxoplasmosis, sporotrichosis, rat-bite fever, anthrax, plague
	Oculoglandular tularemia — eyelid edema, acute conjunctivitis and edema, small conjunctival ulcers, regional lymphadenitis	Oculoglandular tularemia — pyogenic bacterial infections, adenoviral infection, syphilis, cat-scratch disease, herpes simplex virus infection
	Pharyngeal tularemia — exudative pharyngitis or tonsillitis with ulceration, pharyngeal membrane formation, regional lymphadenitis	Pharyngeal tularemia — streptococcal pharyngitis, infectious mononucleosis, adenoviral infection, diphtheria
	Typhoidal tularemia — systemic involvement, DIC, focal necrosis of major organs	Typhoidal tularemia — typhoid fever, brucellosis, Q fever, disseminated bacterial, mycobacterial or fungal infection, rickettsioses, malaria
	Pneumonic tularemia — acute inflammation, diffuse alveolar damage	Pneumonic tularemia — community-acquired pneumonia, pneumonic plague, hantavirus pulmonary syndrome
Viral hemorrhagic fevers	Filoviruses (Ebola and Marburg) — massive hepatocellular necrosis, filamentous inclusions in hepatocytes, extensive necrosis in other major organs, diffuse alveolar damage	Other systemic infections caused by viral, bacterial, or rickettsial agents
	Arenaviruses (Lassa, Junin, Machupo, Guanarito) — massive hepatic necrosis, diffuse alveolar damage	

Anthrax

Agent: *Bacillus anthracis*

Pathologic Findings. Anthrax has three pathologic forms. Cutaneous anthrax is characterized by an eschar that forms where the bacteria entered the skin. Microscopically, the epidermis has necrosis and crusts, whereas the dermis demonstrates necrosis, edema, hemorrhage, perivascular inflammation, and vasculitis. The lymph nodes that drain the skin site eventually become enlarged, necrotic, and hemorrhagic. Gastrointestinal anthrax is distinguishable by hemorrhagic ulcers in the terminal ileum and caecum accompanied by mesenteric hemorrhagic lymphadenitis and peritonitis. Inhalational anthrax is characterized by hemorrhagic mediastinal lymphadenitis accompanied by pleural effusions. Histologically, lymph nodes have abundant edema, hemorrhage, and necrosis with limited inflammatory infiltrate (18,25–29). As any of the three anthrax forms progresses, the bacteria can spread to abdominal organs, producing petechial hemorrhages, and to the central nervous system, producing hemorrhagic meningitis

Diagnostic Specimens. Performing a complete autopsy with histologic sampling of multiple organs will help determine the distribution of bacilli and the portal of entry. The specimens that harbor the highest number of *B. anthracis* organisms vary by the pathologic form of anthrax. For example, diagnosis of cutaneous anthrax requires skin samples from the center and periphery of the eschar, whereas for inhalational anthrax, pleural fluid cell blocks, pleura tissue, and mediastinal lymph nodes have the highest amounts of bacilli and antigens.

Diagnostic Tests. If the patient has not received antibiotics, bacilli can be observed in tissues with H&E, Gram, and silver impregnation stains and IHC assays (Figures 6 and 7). However, after antibiotic treatment has been instituted, only silver stains and IHC assays will highlight the bacilli. IHC assays for *B. anthracis* can demonstrate bacilli, bacillary fragments, and

granular bacterial fragments in formalin-fixed tissues, even after 10 days of antibiotic treatment. Although a DFA test is available for *B. anthracis*, it is not used on formalin-fixed tissues.

Plague

Agent: *Yersinia pestis*

Pathologic Findings. Similar to anthrax, the clinicopathologic manifestations of plague are classified on the basis of the portal of entry of *Y. pestis*. Bubonic plague refers to an acute lymphadenitis that occurs after the bacteria have penetrated the skin (Figure 8). Usually, skin lesions are inconspicuous or have a small vesicle or pustule that might not be evident at the time the infected lymph node (bubo) appears. Histologically, the bubo exhibits edema, hemorrhage, necrosis, and a groundglass amphophilic material that represents masses of bacilli. Primary pneumonic plague refers to the infection caused by inhalation of airborne bacteria, producing intra-alveolar edema accompanied by varying amounts of acute inflammatory infiltrate and abundant bacteria. Primary septicemic plague occurs when *Y. pestis* enters through the oropharyngeal route. In septicemic plague, the cervical lymph nodes draining the infected region will display the previously described pathologic features. As the disease progresses, bacteria are distributed widely throughout the body, and findings consistent with shock and disseminated intravascular coagulation are observed. Septicemic plague with bacterial seeding of the lungs results in secondary pneumonic plague (30–35).

Diagnostic Specimens. Performing a complete autopsy with histologic sampling of multiple organs will help determine the distribution of bacteria and the portal of entry. Enlarged, soft, hemorrhagic lymph nodes should be sampled and tested for *Y. pestis*. The lungs should be sampled to determine whether a primary or secondary infection existed (30).

Diagnostic Tests. *Y. pestis* can be visualized in formalin-fixed tissues by using H&E, Gram, silver impregnation, and Giemsa stains; however, specific identification of the bacilli in tissues can only be performed by using IHC or DFA.

Tularemia

Agent: *Francisella tularensis*

Pathologic Findings. Tularemia can also have multiple clinicopathologic forms, depending on the portal of entry, including ulceroglandular, oculoglandular, glandular, pharyngeal, typhoidal, and pneumonic. In all forms, the primary draining lymph nodes demonstrate necrotizing lymphadenitis surrounded by a neutrophilic and granulomatous inflammatory infiltrate. In the ulceroglandular form, a skin ulcer or eschar with corresponding lymph node involvement is present, but skin lesions are absent in the glandular form. In the oculoglandular form, the eye exhibits conjunctivitis with ulcers and soft-tissue edema. The pharyngeal form is characterized by pharyngitis or tonsillitis with ulceration. The lungs in pneumonic tularemia exhibit abundant fibrinous necrosis accompanied by varying amounts of mixed inflammatory infiltrate. Typhoidal tularemia refers to systemic involvement with focal areas of necrosis in the major organs and disseminated intravascular coagulation, but lacks a group of primary draining lymph nodes (36–40). In cases of tularemia sepsis, organisms can be seen with blood smears.

Diagnostic Specimens. Performing a complete autopsy with histologic sampling of multiple organs will help determine the distribution of bacteria and the portal of entry. Enlarged, necrotic lymph nodes should be sampled and tested for *F. tularensis*. Culture swabs from the potential portals of entry (e.g., skin, conjunctiva, or throat) can be useful.

Diagnostic Tests. The microorganisms are difficult to demonstrate with special stains; however, IHC and DFA have been successfully used in formalin-fixed tissues to demonstrate the bacteria.

Botulism

Agent: Absorption of *Clostridium botulinum* Toxin

Pathologic Findings. *C. botulinum* elaborates a potent, preformed neurotoxin. The most important diagnostic feature of botulism is the clinical history because the histopathologic changes are nonspecific (e.g., central nervous system hyperemia and microthrombosis of small vessels (41).

Diagnostic Specimens. When botulism is suspected because of a symmetrical, descending pattern of weakness and paralysis of cranial nerves, limbs, and trunk, the pathologist should obtain tissue for anaerobic cultures from the suspect entry sites (i.e., wound, gastrointestinal tract, or respiratory tract) and serum for botulinum toxin mouse bioassay.

Diagnostic Tests. Microbiologic culture and botulinum toxin mouse bioassay with serum are necessary.

Smallpox

Agent: Variola virus (Orthopoxvirus)

Pathologic Findings. Smallpox is an acute, highly contagious illness caused by a member of the *Poxviridae* family. Variola major refers to the form with a higher mortality rate, and variola minor or alastrim is a milder form. The lesions develop at approximately the same time and rate, starting in the palms and soles and spreading centrally; they first appear as macules and papules, and then progress to vesicles and umbilicated pustules, followed by scabs and crusts, and end as pitted scars. Occasionally, a hemorrhagic and uniformly fatal

form occurs. This form has extensive bleeding into the skin and gastrointestinal tract and can be grossly taken for meningococemia, acute leukemia, or a drug reaction (42).

Microscopically, the skin exhibits multiloculated, intraepidermal vesicles; ballooning degeneration of epithelial cells; intracytoplasmic, paranuclear, and eosinophilic viral inclusions (i.e., Guarnieri bodies) and occasionally intranuclear viral changes. Secondary infections (e.g., bronchitis, pneumonia, and encephalitis) can complicate the clinical appearance (43–48).

Diagnostic Specimens. Cutaneous lesions are the most important sample for smallpox. Samples should include fluid from vesicles to be studied by electron microscopy, and skin samples fixed in formalin for histopathology and immunohistochemistry. Performing a complete autopsy with histologic sampling of multiple organs will help determine the extent and distribution of the virus, as well as the occurrence of secondary infections.

Diagnostic Tests. Electron microscopic studies of vesicle fluid or skin samples can identify characteristic viral particles. IHC studies have demonstrated the virus in the epithelial cells and in the subjacent fibroconnective tissue.

Viral Hemorrhagic Fevers

Agents: Multiple

Viruses that can cause hemorrhagic fevers belong to different families, including *Filoviridae* (Ebola, Marburg viruses), *Flaviviridae* (yellow fever, dengue viruses), *Bunyaviridae* (Rift Valley fever, Crimean Congo, Hantaan, Sin Nombre viruses), and *Arenaviridae* (Junin, Machupo, Guanarito, Lassa viruses).

Pathologic Findings. The term viral hemorrhagic fever is reserved for febrile illnesses associated with abnormal vascular regulation and vascular damage. Common pathologic

findings at autopsy include petechial hemorrhages and ecchymoses of skin , mucous membranes, and internal organs.

Although systemic hemorrhages occur in the majority of viral hemorrhagic fevers, certain agents infect specific cells and thus histopathologic features can differ among agents.

Necrosis of liver and lymphoid tissues, as well as diffuse alveolar damage, occur in the majority of viral hemorrhagic fevers, but can be more prominent for certain infections (e.g., midzonal hepatocellular necrosis is prominent in yellow fever, but not in dengue). Viral inclusions can be visualized in hepatocytes with Ebola or Marburg infections by using light and electron *microscopy* (49–54).

Diagnostic Specimens. Performing a complete autopsy with sampling of multiple organs can determine the extent of the disease and help identify the specific virus. After a specific etiologic agent has been isolated or identified from an index case, targeted sampling of additional cases with similar symptoms can decrease the exposure of autopsy personnel to these hazardous agents and still yield diagnostic material. For example, during outbreaks of Ebola hemorrhagic fever in Africa, using IHC on skin punch biopsy samples was sufficient to provide a diagnosis in a substantial number of fatalities and minimized the risk to the medical personnel who obtained the specimens (49).

Diagnostic Tests. Serum and skin samples can be tested by using PCR, immunohistochemistry, and electron microscopy (Figure 17). Additionally, serum can be inoculated into experimental animals or culture cells for viral isolation.

Laboratory Response Network

CDC, in collaboration with the Association of Public Health Laboratories (APHL), the FBI, and other federal agencies, has developed the Laboratory Response Network (LRN) as a multilevel system of linked local, state, and federal public health laboratories as well as

veterinary, food, and environmental laboratory partners (55–57). The primary components of LRN are the state public health laboratories representing each of the 50 states. Within certain states, laboratories are located in different counties and more populated cities. In addition, federal laboratories within LRN include CDC, the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), and other Department of Defense laboratories.

Each laboratory has been assigned a designation (Table 4), predicated on their diagnostic capability, ranging from sentinel status (i.e., Level A for presumptive-level screening) through national laboratory status (i.e., Level D for genetic subtyping and confirmatory testing) (55–57). Hospital clinical laboratories are designated as sentinel laboratories (Level A); they have a rapid rule out and forward mission when handling presumptive clinical cases. County, city, and state public health laboratories are designated as confirmatory reference facilities (Level B, core, or Level C, advanced), depending on their degree of containment capacity and technical proficiency in performing agent-specific confirmatory analyses and rapid presumptive testing by PCR for nucleic acid amplification and time-resolved fluorescence for antigen detection. The Level D designation is reserved for CDC and USAMRIID laboratories. No regional laboratories exist; the network functions by channeling the specimens through the designated levels to a pathogen-specific conclusion. ME/Cs should submit specimens from suspected biologic terrorism-related cases to the state public health laboratory through the local or county laboratory that serves their jurisdiction, unless their standard reporting protocol makes them a direct client of the state laboratory. These primary laboratories conduct the tests that fall within the scope of their ability and refer specimens to the state laboratory for more advanced tests. The state laboratory

processes and refers specimens in a similar manner to other state laboratories or CDC. Contact information for all state diagnostic laboratories is included in this report (Appendix A). The point of contact for ME/Cs should remain the laboratory where the specimens were first submitted, unless they are directed to contact a reference laboratory (e.g., a state laboratory) to track the progress of the testing. Before the need for LRN services arises, ME/Cs should establish contact with the public health laboratory serving their jurisdiction and determine how the laboratory services can be best accessed when needed. Such a relationship might require a memorandum-of-understanding, which should be prepared and agreed to in advance. All specimens that are to be tested for potential biologic terrorism pathogens are handled through the same reporting and submission process except specimens potentially containing smallpox virus. Because smallpox virus should only be handled in a Biosafety Level 4 facility, the specimen should be transported to CDC (57). If ME/Cs suspect this agent, they should notify their state public health department, which can test for other agents that cause a vesiculopustular rash (i.e., varicella zoster, vaccinia, and monkeypox viruses) and either further test or refer the specimen for rapid presumptive screening for smallpox virus by PCR. The same laboratories will be able to coordinate submission of the specimen to CDC as needed for pathogen confirmation. In advance, ME/Cs should establish contact with the state health department representative who would coordinate smallpox specimen submission. In their surveillance capacity and concurrent with specimen submission, ME/Cs should notify the epidemiologic investigation unit in their local or state health department of the suspected smallpox-infected decedent.

Biosafety Concerns

Autopsy Risks

Biosafety is critical for autopsy personnel who might handle human remains contaminated with biologic terrorism agents. Tularemia, viral hemorrhagic fevers, smallpox, glanders, and Q fever have been transmitted to persons performing autopsies (i.e., prosectors); certain infections have been fatal (49,58–70). Infections can be transmitted at autopsies by percutaneous inoculation (i.e., injury), splashes to unprotected mucosa, and inhalation of infectious aerosols (71). All of the Category A pathogens are potentially transmissible to autopsy personnel, although the degree of risk varies considerably among these organisms. Additionally, autopsies of persons who die as the result of terrorism-related infections might expose autopsy personnel to residual surface contamination with infectious material. For example, botulinum toxin has the potential to be inhaled by autopsy personnel if it is present on the body surface at the time of examination (72). Heavy surface contamination of the body is unlikely because of the incubation period for the majority of infectious agents and the likelihood that a victim will have bathed and changed clothes after exposure and before becoming symptomatic and dying (73). However, if such residual material (e.g., powder) is present, examination and specimen collection should be undertaken by using appropriate biosafety procedures to protect autopsy and analytic laboratory personnel from possible exposure to more concentrated infectious material. Because human remains infected with unidentified biologic terrorism pathogens might arrive at autopsy without warning, basic protective measures described in this report should be maintained for all contact with potentially infectious materials

(74,75). In addition to these measures, certain high risk activities (e.g., use of oscillating saw) are known to increase the potential for worker exposure and should be performed with added safety precautions.

TABLE 4. Selected characteristics and capabilities by functional level of the Laboratory Response Network for terrorism

Laboratory level	Biosafety level (BSL)	Capabilities	Testing Resource
D	BSL-4	<ul style="list-style-type: none"> • Probe for universal agents • Perform all Level A–C tests • Validate new assays • Detect genetic recombinants • Provide specialized reagents • Bank isolates • Molecular typing • Negative stain electron microscopy for smallpox virus 	CDC; U.S. Army Medical Research Institute of Infectious Diseases
C	BSL-3	<ul style="list-style-type: none"> • Nucleic acid amplification assays • Molecular typing • Toxicity testing • Provide surge capacity 	Selected state public health laboratories
B	BSL-3R or BSL-2 facilities with BSL-3 practices	<ul style="list-style-type: none"> • Rule in specific agents • Isolate and identify • Forward specimens to higher level laboratories • Process environmental samples • Perform confirmatory testing • Antimicrobial susceptibility testing 	Selected state and county public health laboratories and other veterinary, environmental, and food testing laboratories
A	BSL-2	<ul style="list-style-type: none"> • Rule out specific agents • Early detection of presumptive cases • Forward specimens to higher level laboratories 	Clinical and other sentinel laboratories

Autopsy Precautions

Existing guidelines for biosafety and infection control for patient care are designed to prevent transmission of infections from living patients to care providers, or from laboratory specimens to laboratory technicians (76,77). Although certain biosafety and infection-control guidelines are applicable to the handling of human remains, inherent differences exist in transmission mechanisms and intensity of potential exposures during

autopsies that require specific consideration (71). As with any contact involving broken skin or body fluids when caring for live patients, certain precautions must be applied to all contact with human remains, regardless of known or suspected infectivity. Even if a pathogen of concern has been ruled out, other unsuspected agents might be present. Thus, all human autopsies must be performed in an appropriate autopsy room with adequate air exchange by personnel wearing appropriate personal protective equipment (PPE) (71). All autopsy facilities should have written biosafety policies and procedures; autopsy personnel should receive training in these policies and procedures, and the annual occurrence of training should be documented.

Standard Precautions are the combination of PPE and procedures used to reduce transmission of all pathogens from moist body substances to personnel or patients (77). These precautions are driven by the nature of an interaction (e.g., possibility of splashing or potential of soiling garments) rather than the nature of a pathogen. In addition, transmission-based precautions are applied for known or suspected pathogens.

Precautions include the following:

- airborne precautions — used for pathogens that remain suspended in the air in the form of droplet nuclei and that can transmit infection if inhaled;
- droplet precautions — used for pathogens that are transmitted by large droplets traveling 3–6 feet (e.g., from sneezes or coughs) and are no longer transmitted after they fall to the ground; and
- contact precautions — used for pathogens that might be transmitted by contamination of environmental surfaces and equipment.

All autopsies involve exposure to blood, a risk of being splashed or splattered, and a risk of percutaneous injury (71). The propensity of postmortem procedures to cause gross soiling of

the immediate environment also requires use of effective containment strategies. All autopsies generate aerosols; furthermore, postmortem procedures that require using devices (e.g., oscillating saws) that generate fine aerosols can create airborne particles that contain infectious pathogens not normally transmitted by the airborne route (71,78–81).

PPE

For autopsies, Standard Precautions can be summarized as using a surgical scrub suit, surgical cap, impervious gown or apron with full sleeve coverage, a form of eye protection (e.g., goggles or face shield), shoe covers, and double surgical gloves with an interposed layer of cut-proof synthetic mesh (71). Surgical masks protect the nose and mouth from splashes of body fluids (i.e., droplets $>5 \mu\text{m}$); they do not provide protection from airborne pathogens (82,83). Because of the fine aerosols generated at autopsy, prosectors should at a minimum wear N-95 respirators for all autopsies, regardless of suspected or known pathogens (84). However, because of the efficient generation of high concentration aerosols by mechanical devices in the autopsy setting, powered air-purifying respirators (PAPRs) equipped with N-95 or high-efficiency particulate air (HEPA) filters should be considered (85–87). Autopsy personnel who cannot wear N-95 respirators because of facial hair or other fit limitations should wear PAPRs.

Autopsy Procedures

Standard safety practices to prevent injury from sharp items should be followed at all times (77). These include never recapping, bending, or cutting needles, and ensuring that appropriate puncture-resistant sharps disposal containers are available. These containers should be placed as close as possible to where sharp items are used to minimize the distance a sharp item is carried. Filled sharps disposal containers should be discarded and replaced

regularly and never overfilled (77). Protective outer garments should be removed when leaving the immediate autopsy area and discarded in appropriate laundry or waste receptacles, either in an antechamber to the autopsy suite or immediately inside the entrance if an antechamber is unavailable. Handwashing is requisite upon glove removal (77).

Engineering Strategies and Facility Design Concerns

Air-handling systems for autopsy suites should ensure both adequate air exchanges per hour and correct directionality and exhaust of airflow. Autopsy suites should have a minimum of 12 air exchanges/hour and should be at a negative pressure relative to adjacent passageways and office spaces (84). Air should never be returned to the building interior, but should be exhausted outdoors, away from areas of human traffic or gathering spaces (e.g., air should be directed off the roof) and away from other air intake systems (88,89). For autopsies, local airflow control (i.e., laminar flow systems) can be used to direct aerosols away from personnel; however, this safety feature does not eliminate the need for appropriate PPE. Clean sinks and safety equipment should be positioned so that they do not require unnecessary travel to reach during routine work and are readily available in the event of an emergency. Work surfaces should have integral waste-containment and drainage features that minimize spills of body fluids and wastewater.

Biosafety cabinets should be available for handling and examination of smaller infectious specimens; however, the majority of available cabinets are not designed to contain a whole body (76,90). Oscillating saws are available with vacuum shrouds to reduce the amount of particulate and droplet aerosols generated (80). These devices should be used whenever possible to decrease the risk of dispersing aerosols that might lead to occupationally acquired infection.

Vaccination and Postexposure Prophylaxis

Vaccines are available that convey protection against certain diseases considered to be potentially terrorism-associated, including anthrax, plague, and tularemia (76). However, these workers are at low risk. Consistent application of standard safety practices should obviate the need for vaccination for *B. anthracis* and *Y. pestis*. In 2003, the U.S. Department of Health and Human Services (DHHS) initiated a program to administer vaccinia (smallpox) vaccine to first responders and medical personnel. In this context, persons who might be called on to assess remains or specimens from patients with smallpox should be included among this group (91) (Box 2).

The administration of prophylactic antibiotics to autopsy workers exposed to potentially lethal bacterial pathogens is sometimes appropriate. For example, autopsy personnel exposed to *Y. pestis* aerosols should consider receiving such treatment regardless of vaccination status (92). Similarly, because tularemia can result from infection with a limited number of organisms, an exposure to *F. tularensis* should also prompt consideration of antimicrobial prophylaxis. However, decisions to use antimicrobial postexposure prophylaxis should be made in consultation with infectious disease and occupational health specialists, with consideration made of vaccination status, nature of exposure, and safety and efficacy of prophylaxis.

BOX 2. Smallpox immunization considerations for medicolegal death investigators*

Because the distribution of the smallpox vaccine to the civilian U.S. population was discontinued in 1983, essentially all U.S. residents having contact with a smallpox case are at increased risk for infection.

Although probably susceptible to smallpox, with appropriate precautions, medicolegal death investigators can reduce their risk of smallpox infection if they must examine or autopsy a decedent suspected to be infected with smallpox.

Three risk-reduction activities during the postmortem period might be considered, 1) voluntary vaccination after the occurrence of smallpox has been confirmed in the community; 2) modification of autopsy procedures to limit the possible aerosolization of smallpox virus; and 3) exclusion of embalming procedures (see text).

In the event of mass fatalities resulting from a smallpox outbreak, CDC recommends that health departments consider planning for vaccinating mortuary personnel and their families. This recommendation is relevant for medical examiners, coroners, and other forensic death investigators who have a high likelihood of handling smallpox-infected decedents during a mass fatality event.

In considering vaccination plans, attention should be given to the risk of adverse effects from smallpox vaccination as well as to its potential benefits. During a smallpox-associated mass fatality event, the federal government might propose that vaccinia inoculations be offered on a voluntary basis to appropriate personnel. Vaccinia inoculations have been effective in preventing smallpox infection but also pose certain risks for causing adverse reactions in the vaccine and, less

frequently, for spreading the vaccinia virus to other close contacts. Because of the increased risk of adverse effects, the Advisory Committee on Immunization Practices (ACIP) recommends that the following persons not receive vaccinia inoculation: persons with immunosuppressive conditions; those receiving immunosuppressive medical treatments or pharmaceutical regimens;

- those with eczema or who have a close contact having eczema;
- anyone who is allergic to the vaccine or any of its components;
- women who are breastfeeding;
- anyone aged <12 months; and
- pregnant women or women expecting to become pregnant within 4 weeks.

ACIP recommends that persons be excluded from the pre-event smallpox vaccination program who have known underlying heart disease, with or without symptoms, or who have >3 known major cardiac risk factors (i.e., hypertension, diabetes, hypercholesterolemia, heart disease at age 50 years in a first-degree relative, and smoking). Persons at increased risk for adverse reactions to the vaccine should be counseled regarding the potential risks before being vaccinated.

***Source:** Adapted from Payne DC. Smallpox considerations for forensic professionals. National Association of Medical Examiners (NAME) News 2003;11(1):2.

Decontamination of Body-Surface

Contaminants

If human remains with heavy, residual surface contamination (i.e., visible) must be assessed, they should be cleansed before being brought to the autopsy facility and after appropriate samples have been collected in the field. Surface cleaning should be performed with an appropriate cleaning solution (e.g., 0.5% hypochlorite solution or phenolic disinfectant) used according to manufacturer's instructions. If the number of remains requiring autopsy is limited (i.e., one or two), cleaning of heavily contaminated remains can be undertaken in an autopsy facility that has the infrastructure, capacity, and hazardous materials (HAZMAT)-trained personnel to perform the cleaning safely. Heavily contaminated remains should not be brought to facilities where patient care is performed. Both personnel carrying contaminated remains and personnel occupying areas through which remains are being carried should wear PPE. HAZMAT personnel should perform largescale decontamination outdoors in a controlled setting. To ensure mutual understanding of the roles and responsibilities of HAZMAT and death-investigation personnel in situations with contaminated remains, ME/Cs should develop response protocols with HAZMAT personnel before such an event occurs.

Waste Handling

Liquid waste (e.g., body fluids) can be flushed or washed down ordinary sanitary drains without special procedures.

Pretreatment of liquid waste is not required and might damage sewage treatment systems. If substantial volumes are expected, the local wastewater treatment personnel should be consulted in advance. Solid waste should be appropriately contained in biohazard or sharps containers and incinerated in a *medical waste incinerator* (73,75).

Storage and Disposition of Corpses

The majority of potential biologic terrorism agents (*B. anthracis*, *Y. pestis*, or botulinum toxin) are unlikely to be transmitted to personnel engaged in the nonautopsy handling of a contaminated cadaver. However, such agents as the hemorrhagic fever viruses and smallpox virus can be transmitted in this manner. Therefore, Standard Precautions (77) should be followed while handling all cadavers before and after autopsy.

When bodies are bagged at the scene of death, surface decontamination of the corpse-containing body bags is required before transport. Bodies can be transported and stored (refrigerated) in impermeable bags (double-bagging is preferable), after wiping visible soiling on outer bag surfaces with 0.5% hypochlorite solution. Storage areas should be negatively pressured with 9–12 air exchanges/hour. The risks of occupational exposure to biologic terrorism agents while embalming outweigh its advantages; therefore, bodies infected with these agents should not be embalmed. Bodies infected with such agents as *Y. pestis* or *F. tularensis* can be directly buried without embalming. However, such agents as *B. anthracis* produce spores that can be long-lasting and, in such cases, cremation is the preferred disposition method. Similarly, bodies contaminated with highly infectious agents (e.g., smallpox and hemorrhagic fever viruses) should be cremated without embalming. If cremation is not an option, the body should be properly secured in a sealed container (e.g., a Zigler case or other hermetically sealed casket) to reduce the potential risk of pathogen transmission. However, sealed containers still have the potential to leak or lose integrity, especially if they are dropped or are transported to a different altitude (93). ME/Cs should work with local emergency management agencies, funeral directors, and the state and local health departments to determine, in advance, the local capacity (bodies per day) of existing crematoriums, and soil and water table characteristics that might affect interment. For planning purposes, a thorough cremation produces approximately 3–6 pounds of

ash and fragments. ME/Cs should also work with local emergency management agencies to identify sources and costs of special equipment (e.g., air curtain incinerators, which are capable of high-volume cremation) and the newer plasma incinerators, which are faster and more efficient than previous incineration methods. The costs of such equipment and the time required to obtain them on request should be included in state and local terrorism preparedness plans.

ME/C's Role in Biologic Terrorism Surveillance

ME/Cs should be a key component of population-based surveillance for biologic terrorism. They see fatalities among persons who have not been examined initially by other physicians, emergency departments, or hospitals. In addition, persons who have been seen first by other health-care providers might die precipitously, without a confirmed diagnosis, and fall under medicolegal jurisdiction. Autopsies are a critical component of surveillance for fatal infectious diseases, because they provide organism-specific diagnoses and clarify the route of exposure (94). With biologic terrorism-related fatalities, organisms identified in autopsy tissues can be characterized by strain to assist in the process of criminal attribution.

Models for ME surveillance for biologic terrorism mortality include sharing of daily case dockets with public health authorities (e.g., King County, Washington, and an active symptom-driven case acquisition and pathology syndromebased public health reporting system developed in New Mexico [24]). Different areas of responsibility exist for ME/Cs regarding their role in effective surveillance for possible terrorism events. The following steps should be taken in local jurisdictions to enable ME/Cs to implement biologic terrorism surveillance:

- Death-investigation laws should be changed to enable ME/Cs to assume jurisdiction and investigate deaths that might constitute a public health threat, including those threats that are probably communicable.
- Any unexplained deaths possibly involving an infectious cause or biologic agent should be investigated to make etiology (organism)-specific diagnoses (94).

- Uniform standards for surveillance should be used. For example, the Med-X system developed in New Mexico (24) uses a set of antemortem symptoms to determine autopsy performance. The system's syndromic approach to postmortem diagnosis allows alerting of public health authorities to specific constellations of autopsy findings that could represent infectious agents before the specific agent is identified. Diseases caused by biologic terrorism agents are rare. To enhance surveillance for these conditions, a matrix of potential pathology-based syndromes (Table 1) has been developed to guide autopsy pathologists in recognizing potential cases (24).
- Electronic information and data systems should be designed to allow rapid recognition of excess mortality — incorporating the ability to assess possible commonalities among cases — and rapid communication/notification of such information to public health authorities who can use the information for effective response.
- Close working relationships should be developed between ME/Cs and local or state health departments to facilitate two-way communication that includes alerts to ME/Cs of possible outbreaks or clusters of nonfatal infectious diseases, which might have unrecognized fatal cases, and appropriate reporting by ME/Cs to public health authorities of notifiable disease conditions. Additionally, public health authorities should notify ME/Cs of the epidemiology of biologic terrorism-associated and other emerging infectious diseases in their community.

ME/C's Role in Data Collection, Analysis, and Dissemination

For public health surveillance, criminal justice, and administrative purposes, ME/Cs should promptly, accurately, and thoroughly collect, document, electronically store, and have available for analysis and reporting, case-specific deathinvestigation information. Initially, depending upon local resources and legal restrictions, all aspects of data management and use might not need to occur in-house. Recognizing that numerous entities use medicolegal death-investigation data, ME/Cs should establish collaborations with public health and law enforcement professionals to achieve the goal of complete, accurate, and timely case-specific death-investigation data. Advance planning and policy development should also clarify to whom such data may be released and under which circumstances. To facilitate this process, the following steps should be taken:

- Death-investigation information should be documented on standard forms that are consistent in content, at a minimum, with the Investigator's Death Investigation Report Form (IDIRF) and Certifier's Death Investigation Report Form (CDIRF) (95).
- Death-investigation data should be stored in an electronic database consistent with, at a minimum, the content outlined in the Medical Examiner/Coroner Death Investigation Data Set (MCDIDS) (96). These data elements should be updated periodically.
- Electronic death-investigation data sets should include the results of laboratory tests that are performed in the case in question.
- Entry of data into an electronic database should be prompt so that the database is current.
- Electronic databases should allow searching for and grouping of cases by disease or injury and circumstances of death.
- Electronic death-investigation data should be stored in open, nonproprietary formats so that it can be shared as needed.
- Death-investigation records should be stored in accordance with state or local regulations. Ideally, these records should be stored in perpetuity in a format that ensures future retrieval. The format or media of electronic records might require periodic updating.
- Mechanisms should be in place to ensure that electronic death investigation data can be shared with public health authorities, law enforcement agencies, and other death investigation agencies while providing for appropriate confidentiality and control of the release of information to authorized personnel or organizations only.
- ME/Cs should have specific policies that outline the organizations and agencies that are authorized to receive death-investigation information and the conditions in which such information may be released.
- Policies and mechanisms should be in place to avoid releasing death-investigation information inappropriately and to avoid withholding information that should be available to the public.
- ME/C offices should consider establishing links with state/ local public health agencies, academic institutions, or other health organizations to promote epidemiologic analysis and use of their medicolegal death-investigation data in an ongoing manner. Certain ME/C offices have determined that employing a staff epidemiologist is beneficial.

Jurisdictional, Evidentiary, and Operational Concerns

Federal Role

On February 28, 2003, Homeland Security Presidential Directive 5 (HSPD-5) modified federal response policy (97). Under the new directive, the Secretary of Homeland Security is the principal federal official for domestic incident management. Pursuant to the Homeland Security Act of 2002 (Public Law 107-296), the Secretary of the U.S. Department of Homeland Security (DHS) is responsible for coordinating federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies. The Secretary will coordinate the federal government's resources used in response to or recovery from terrorist attacks, major disasters, or other emergencies if and when any one of the following four conditions applies:

- 1) a federal department or agency acting under its own authority has requested the assistance of the Secretary;
- 2) the resources of state and local authorities are overwhelmed and federal assistance has been requested by the appropriate state and local authorities;
- 3) more than one federal department or agency has become substantially involved in responding to the incident;
- 4) the Secretary has been directed to assume responsibility for managing the domestic incident by the President.

HSPD-5 further stipulates that the U.S. Attorney General, through the FBI, has lead federal responsibility for criminal investigations of terrorist acts or terrorist threats by persons or groups inside the United States, or directed at U.S. citizens or institutions abroad, where such acts are within the federal criminal jurisdiction of the United States. The FBI, in cooperation with other federal departments and agencies engaged in activities to protect national security, will also coordinate the activities of the other members of the law enforcement community to detect, prevent, preempt, and disrupt terrorist attacks against the United States. In the event of a weapons of mass destruction (WMD) threat or incident, the local FBI field office special agent in charge (SAC) will be responsible for leading the federal criminal investigation and law

enforcement actions, acting in concert with the principal federal officer (PFO) appointed by the U.S. Department of Homeland Security and state and local officials. The FBI has a WMD coordinator in each of the agency's 56 field offices (Appendix B). These persons are responsible for pre-event planning and preparedness, as well as responding to WMD threats or incidents. ME/Cs are encouraged to contact their local FBI WMD coordinator before an incident to clarify roles and responsibilities, and ME/Cs should contact the coordinator in any case where concerns or suspicions exist of a potential WMD-related death.

The FBI assertion of jurisdiction at the scene of a terrorist event would not necessarily usurp (or relieve) ME/Cs from their statutory authority and responsibility to identify decedents and determine cause and manner of death. Such an arrangement is consistent with the performance of medicolegal death investigation where other federal crimes are involved. ME/Cs who conduct terrorism-associated death investigations should be prepared to present their medicolegal death investigation findings in federal court.

Public Health Agency Authority

State public health laws might establish the health department's specific authority to control certain aspects of operations, personnel, or corpses in a public health emergency. For example, the Center for Law and the Public's Health at Georgetown and Johns Hopkins Universities, at the request of CDC, has created a model state emergency health powers act for adoption by states (98). Different states have either enacted versions of this act or are in the process of introducing similar legislative bills (99). ME/Cs should know specifically how existing state laws might provide for the health department to take control and dictate the disposition of human remains (burial or cremation). A state's emergency health powers act might also provide for

- mandatory medical examinations for ME/C personnel;
- isolation and quarantine of the public or ME/C personnel;
- vaccination against and treatment for illnesses among

ME/Cs; and

- control, use, and destruction of facilities.

ME/Cs and health departments should work together as part of the emergency planning process to determine which emergency health powers might be established by the health department and under what circumstances these might be invoked for each potential biologic terrorism agent.

Determining how health departments and ME/C operations can best interact, including documenting concerns regarding the availability of death-investigation personnel and the control and disposition of human remains, should be emphasized. ME/Cs should take part in community exercises to clarify and practice their role in the emergency response process.

General Operations

In the majority of terrorism-associated scenarios, ME/Cs are responsible for identifying remains and determining the cause and manner of death. To that end, ME/Cs might need to enlist additional local, state, or federal assistance while maintaining primary responsibility for death investigation. ME/Cs should request this assistance from the local or state emergency operations center (EOC), as appropriate. The probable source of federal assistance is the Disaster Mortuary Operational Response Team (DMORT). However, DMORT has not yet developed capacity to respond to events precipitated by the release of biologic agents (further details regarding DMORT and other federal agencies are discussed in following sections).

Where possible, postmortem examinations for identifying remains and determining cause and manner of death should occur within the local or state jurisdiction where victims have died.

Local resources dictate whether the statutory ME/C system can accomplish this with existing personnel and within existing facilities, or whether additional local, state, or federal assistance is necessary. Moving substantial numbers of human remains, particularly those contaminated by a biologic agent (known or unknown) to locations considerably distant from the scenes of death is

neither feasible nor safe. Two potential strategies can be used to augment the biosafety capacity of local agencies having limited resources. One strategy would be to develop a mobile Biosafety Level 3 autopsy laboratory. Another strategy would be to develop regional Biosafety Level 3 autopsy centers that can handle cases from surrounding jurisdictions or states. A combination of the two approaches will probably achieve the best coverage of national needs.

Postmortem Examinations and Evidence Collection

A large-scale biologic event might create more fatalities than combined local, state, and federal agencies can store and examine (15). Small or rural jurisdictions might be overwhelmed by a relatively limited number of fatalities, whereas larger state or city ME/C offices could conceivably process greater numbers of human remains. No formulas exist that can be used to determine in advance the autopsy rate and the extent of autopsy that might be needed. In the event of a biologic event, ME/Cs should perform complete autopsies on as many cases as feasible on the basis of case volume and biosafety risks. These autopsies should meet the standards that forensic pathologists usually meet for homicide cases. Conferring with the FBI and appropriate prosecutorial authorities early in the process will ensure that appropriate documentary and diagnostic maneuvers are employed that will support the criminal justice process. Similarly, interacting with public health authorities early in the death-investigation process should ensure that appropriate diagnostic evaluations are conducted to support the public health investigation and response. After the etiologic agent has been determined, certain (or all) other potentially related fatalities can be selectively sampled to confirm the presence of the organism in question. ME/Cs should coordinate the decision to transition from complete autopsies to more limited examinations with law enforcement and public health professionals. Selective sampling could include skin swabs and needle aspiration of blood or other body fluids, tissues for culture, or biopsies of a particular tissue or organ for histologic diagnostic tests (e.g.,

immunohistochemical procedures and electron microscopy). The required specimens from a limited autopsy and the diagnostic procedures employed will be dictated by the nature of the biologic agent. Guidelines for targeted organs or tissues for culture or analysis were discussed previously. As with all homicides, chain-of-custody for specimens should be maintained at all times. Whenever a complete autopsy is performed, the goals should be to 1) establish the disease process and the etiologic agent; 2) determine that the agent or disease is indeed the cause of death; and 3) reasonably rule out competing causes of death. When limited autopsies or external examinations are performed, ME/C personnel should:

- identify the deceased;
- document the appearance of the body;
- establish that the presenting clinical symptoms and signs are consistent with the alleged etiologic agent;
- confirm the presence of the etiologic agent in the body;
- state with reasonable probability that the alleged agent was the underlying cause of death (e.g., inhalational anthrax infection); and
- state with reasonable probability the likely immediate cause of death (e.g., pneumonia, meningitis, or mediastinitis).

Forming a reasonably sound medical opinion regarding cause and manner of death can be accomplished with knowledge of the presenting syndrome and circumstantial events, external examination of the body, and testing of appropriate specimens to document the etiologic agent. For example, in a confirmed smallpox outbreak, identifying the deceased, externally examining the body and photographing the lesions, and obtaining samples from the lesions for culture or electron microscopy might be adequate.

Biologic evidence obtained at autopsy can be sent to local or state health department laboratories, and other physical evidence can be sent to the usual crime laboratory, unless otherwise instructed by the FBI. Laboratories within LRN, as described previously, are

responsible for coordinating the transfer of evidence or results to the FBI, U.S. Attorney General, or local and state legal authorities, as appropriate. Consistent with routine practice, ME/Cs should document all evidence transfers adequately.

Cause and Manner of Death Statements

Death certificates are not withheld from the public record, even when the cause of death is terrorism-related. The cause of death section should be used to fully explain the sequence of the cause of death (e.g., “hemorrhagic mediastinitis due to inhalational anthrax”). If death resulted from a terrorism event, the manner of death should be classified as homicide. The “how injury occurred” section on the death certificate should be completed, and it should reflect how the infectious agent was delivered to the victim (e.g., “victim of terrorism; inhaled anthrax spores delivered in mail envelope”). The place of injury should be the statement of where (i.e., geographic location) the agent was received.

Reimbursement for Expenses and Potential Funding Sources

Additional funding for ME/Cs might be needed for either preparedness or use during an actual biologic terrorism event. ME/Cs should prepare financially for potential future terrorist events that might be similar to the anthrax attacks of October–November 2001. In crisis situations, funding is retroactive but no less a concern.

Preparedness funding can support multiple activities, including training of ME/Cs for large-scale terrorism events. Certain activities involving training of ME/Cs have occurred through DMORT, a program authorized by the DHHS Office of Emergency Preparedness to rapidly mobilize ME/Cs to respond to incidents of mass fatality. Preparedness funding can also support surveillance activities in ME/C offices. As part of the Bioterrorism Preparedness and Response cooperative agreements with state health departments, CDC has provided funding to New Mexico and other states that are pursuing ME/C surveillance systems as an enhancement to their

traditional surveillance systems. The New Mexico Office of the Medical Investigator has been a recipient of this funding through the New Mexico Department of Health since the inception of the cooperative agreement program. This funding has supported development of specialized surveillance techniques for deaths caused by potential agents of biologic terrorism (24) and recognition of ME/Cs as a key resource for all phases — early detection, case characterization, incident response and recovery — of a public health emergency response. CDC encourages pursuit of this enhanced (ME/C) surveillance capacity through cooperative agreements with states, if the state has made adequate progress with other critical capacity goals.

ME/Cs might obtain preparedness funding by integrating their response activities into the existing EOCs that have been established at selected state and county levels (integration of ME/C offices into this framework is discussed in Communications and the Incident Command System). When ME/C offices are integrated into the emergency response system, ME/Cs have an opportunity to make emergency management officials aware of ME/C emergency responsibilities and resource needs.

The sources of funding for consequence management, including medicolegal death investigation, will depend on the scope of the terrorism event. In events with a limited number of deaths, funding for activities related to the detection and diagnosis might remain at the office level. Because terrorism deaths are homicides, these deaths will contribute to an office's jurisdictional workload, and future planning for preparedness funding should be considered. Certain ME/C offices are already a part of the local or state public health department or are already affiliated with an EOC. ME/C offices, health departments, and EOCs are strongly encouraged to forge links for effective preparedness and response and to participate in joint training exercises to maximize preparedness funding. In events with multiple deaths, a federal emergency might be declared. As long as ME/Cs' offices are officially working through the state or local EOC, certain expenses associated with the response (e.g., cost of diagnostic testing) can be submitted

to the Federal Emergency Management Agency (FEMA) for reimbursement. In the majority of localities, these requests for resources required for appropriate response during an event should be submitted through local emergency management agencies that are part of state and local EOCs. Costs will probably be covered by the agency that has jurisdiction over the disaster (e.g., FEMA). In cases where a presidential disaster declaration is made, testing costs, victim identification, mortuary services, and those services that are covered by the National Disaster Medical System (a mutual aid network that includes DHHS, the Department of Defense, and FEMA) (100) are reimbursable under Emergency Support Function 8 (Health and Medical) of the Federal Response Plan (FRP).

Under FRP, FEMA covers 75% of reimbursement costs; the remaining 25% are covered by the state through emergency funds or in-kind reimbursement. FEMA also supports state emergency funds through the DHHS electronic payments management system. In an emergency, all requests for reimbursement flow from their point of origin, in this case from an ME/C, through the state EOC/emergency management agency, to FEMA. § Before an event, ME/Cs should clarify the procedures to follow to ensure that they will be reimbursed for expenses incurred as part of their emergency response.

DMORT

DMORT is a national program that includes volunteers, divided into 10 regional teams responsible for supporting death investigation and mortuary services in federal emergency response situations involving natural disasters and mass fatalities associated with transportation accidents or terrorism. Team members are specialists from multiple forensic disciplines, funeral directors, law enforcement agents, and administrative support personnel. Each team represents a FEMA region. DMORT members are activated through DHS after mass fatalities or events

involving multiple displaced human remains (e.g., a cemetery washout after a flood). The primary functions of DMORT include the identification of human remains, evidence recovery from the bodies, recovery of human remains from the scene, and assisting with operation of a family assistance center. Whenever possible, identification of the bodies is made by using commonly accepted scientific methods (e.g., fingerprint, dental, radiograph, or DNA comparisons). Upon activation, DMORT members are federal government employees. When DMORT is activated, representatives from DHS are also sent to manage the logistics of deployment. The FBI most commonly staffs the fingerprint section of the morgue. The Armed Forces DNA Identification Laboratory in Rockville, Maryland, has traditionally performed DNA analyses; the arrangements for this testing are negotiated separately with the local ME/C.

After a request for DMORT assistance has been made, one of two Disaster Portable Morgue Units (DPMUs) and DMORT staff are sent to the disaster site. DPMUs contain specialized equipment and supplies, prestaged for deployment within hours to a disaster site. DPMUs include all of the equipment required for a functional basic morgue with designated workstations and prepackaged equipment and supplies. DPMUs can operate at Biosafety Level 2, but do not have the ventilatory capacity necessary to protect prosecutors and other nearby persons from airborne pathogens. DPMUs also contain equipment for site search and recovery, pathology, anthropology, radiology, photography, and information resources, as well as office equipment, wheeled examination tables, water heaters, plumbing equipment, electrical distribution equipment, personal protective gear, and temporary partitions and supports. DPMUs do not have the materials required to support microbiologic sampling. When a DPMU is deployed, members of the DPMU team (i.e., a subset of DMORT) are sent to the destination to unload the DPMU equipment and establish and maintain the temporary morgue. Additional equipment is required locally after DMORT activation. At a minimum, this equipment includes a facility in which to house the morgue equipment, a forklift to move the DPMU equipment into the temporary

morgue facility, and refrigerated trucks to hold human remains. ME/Cs can request DMORT response after a mass fatality or after an incident resulting in the displacement of a substantial number of human remains. ME/Cs should follow state protocols for DMORT requests.

Typically, ME/Cs contact the state governor's office, which then requests DMORT from DHS.

The request should include an estimate of how many deaths occurred (if known), the condition of the bodies (if known), and the location of the incident. When deployed, DMORT supports ME/Cs in the jurisdiction where the incident occurred. All medicolegal death investigation records created by DMORT are given to ME/Cs at the end of the deployment, and ME/Cs are ultimately responsible for all of the identifications made and the documents created pertaining to the incident.

DMORT-WMD Team

The DMORT-WMD team is composed of national rather than regional volunteers. The primary focus of DMORTWMD is decontamination of bodies when death results from exposure to chemicals or radiation. DMORT-WMD is developing resources to respond to a mass disaster resulting from biologic agents. However, this team might have difficulty in responding to such an event if the deaths occur in multiple locations.

The major forensic disciplines (i.e., forensic dentistry, forensic anthropology, and forensic pathology) as well as funeral directors, law enforcement, criminalists, and administrative support persons are represented on the DMORTWMD team. Members of DMORT-WMD undergo specialized training that focuses on chemical and radiologic decontamination of human remains.

The DMORT-WMD unit has separate equipment, stored separately from the DPMU, including PPE (up to and including level A suits), decontamination tents, and equipment to gather contaminated water. DMORT-WMD teams are requested and deployed in the same manner as general DMORTs.

Communications and the Incident Command System

ME/Cs are key members of the biologic terrorism detection and management response team in any community and should be integrated into the comprehensive communication plan during any terrorism-associated event. Routine and consistent communication among ME/Cs and local and state laboratories, public health departments, EOCs, communication centers, DMORT, and other agencies, is critical to the success of efficient and effective biologic terrorism surveillance, fatality management, and public health and criminal investigations. Planning for different emergency scenarios and participation in disaster response exercises are necessary to ensure effective response to a terrorism event. Each state and certain counties have some type of emergency operation center that has been organized to provide a coordinated response during a terrorism event. ME/Cs should verify their jurisdiction's EOC contact point and work with them periodically regarding concerns related to preparedness and response.

All EOCs follow the Incident Command System (ICS) (100), an internationally recognized emergency management system that provides a coordinated response across organizations and jurisdictions. The ICS structure allows for individual EOC decision making and different information flow in each state. ME/Cs should determine how the EOC functions in their jurisdiction.

Each ICS is composed of a managing authority that directs the response of health department, law enforcement, and emergency management officials during a planning exercise, emergency, or major disaster. In addition to assessing the incident and serving as the interagency contact, ICS also coordinates the response to information inquiries and the safety monitoring of assigned response personnel. The ICS organizational framework, includes planning, operations, logistics, and finance/administration sections (101). ME/Cs are most likely to participate in the operations

team, which makes tactical decisions regarding the incident response and implements those activities defined in action plans. This team might also include public health, emergency communications, fire, law enforcement, EMS, and state emergency management agency staff.

During a suspected terrorism event, ME/Cs should be responsible for the following actions to facilitate communication:

- Promptly inform laboratory, public health, and law enforcement personnel of findings of investigations of suspected biologic terrorism-related deaths as well as personnel needs and new developments. To expedite information exchange, ME/Cs should familiarize themselves with the appropriate contact persons and agencies for response in their jurisdictions.
- Answer the EOCs' requests to collect and report data in a timely manner.
- Coordinate communication of their activities with the state emergency management agency and EOCs for their jurisdiction to avoid release of confidential or speculative information directly to the public or media (102).

Conclusion

ME/Cs are essential public health partners for terrorism preparedness and response. Despite state and local differences in medicolegal death-investigation systems, these investigators have the statutory authority to investigate deaths that are sudden, suspicious, violent, and unattended, and consequently play a vital role in terrorism surveillance and response. Public health officials should work with ME/Cs to ensure that these investigators can assist with surveillance for infectious disease deaths possibly caused by terrorism and provide confirmatory diagnoses and evidence in deaths linked to terrorism. This process should involve an assessment of local ME/C standards for accepting jurisdiction of potential infectious disease deaths and performing autopsies, laboratory capacity for making organism-specific diagnoses, and autopsy biosafety capacity.

Ideally, ME/Cs should

- perform complete autopsies with histologic sampling of multiple organs in deaths potentially caused by biologic terrorism agents, given the constraints of case volume and biosafety concerns;
- have access to routine microbiologic testing for organismspecific diagnoses in potential infectious disease deaths;
- ensure protection from both airborne and bloodborne pathogens for all occupants of the autopsy facility (Biosafety Level 3);
- participate in a standardized ME/C surveillance model for infectious disease mortality (e.g., Med-X); and
- document death investigative information on standard forms that are stored in an searchable electronic format and that can be shared with public health authorities.

If biologic terrorism-related fatalities occur, ME/Cs are responsible for identifying remains and determining the cause and manner of death. Routine and consistent communication among ME/Cs and local and state laboratories, public health departments, EOCs, law enforcement, and other agencies is critical to the success of efficient and effective biologic terrorism surveillance, fatality management, and public health and criminal investigations. To prepare for this possibility, ME/Cs should

- contact their local FBI WMD coordinator to clarify roles and responsibilities;
- understand how local public health laws might impact ME/C function;
- become familiar with the capacity of local or state EOCs, ICS, and the process for submitting response-associated expenses for federal reimbursement;
- be aware of the process for submitting biologic and physical evidence in potential biologic terrorism-related fatalities;
- understand the procedure for writing cause and manner of death statements in terrorism-related fatalities; and

- identify appropriate health department officials for the reporting of notifiable or suspicious infectious diseases or potential biologic terrorism-related deaths.

The majority of ME/C facilities do not have the capacity to perform autopsies at Biosafety Level 3 as a consequence of facility design features that are expensive to fix. In addition, DMORT does not have the capacity to respond to events precipitated by the release of biologic agents. These limitations might affect local, state, and national surveillance for infectious disease deaths of public health importance, including those deaths potentially caused by terrorism. Two potential strategies might be used in the future to augment the biosafety capacity of local agencies having limited resources. One strategy would be to develop a mobile Biosafety Level 3 autopsy laboratory. Another strategy might be to develop regional Biosafety Level 3 autopsy centers that can handle cases from surrounding jurisdictions or states. A combination of the two approaches will probably achieve the best coverage of national needs.

Appendix Y
Radiology Manual

New Mexico Office of the Medical Investigator
Mass Fatality Incident
Radiology Manual

New Mexico Office of the Medical Investigator
Albuquerque, New Mexico 87131

2012 Revision
Chandra Gerrard R.T. (R) (CT)

Contents

Radiographic Survey Form (International Association of Forensic Radiographers – IAFR).....	266
Technique Chart.....	274
Radiographic Protocol for Postmortem Identification.....	300



RADIOGRAPHIC SURVEY FORM (RSF 8)

SITE CODE
CASE (URN) NUMBER

Pages completed: 1 2 3 4 5 6 7
(Please circle)

Initialed:
(Not all pages need to be completed)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

	Name	Signature	Time/Date
Odontologist:	_____	_____	_____
Pathologist:	_____	_____	_____
Anthropologist:	_____	_____	_____
Database entry by:	_____	_____	_____

Recorded by _____
Signature _____
Date _____

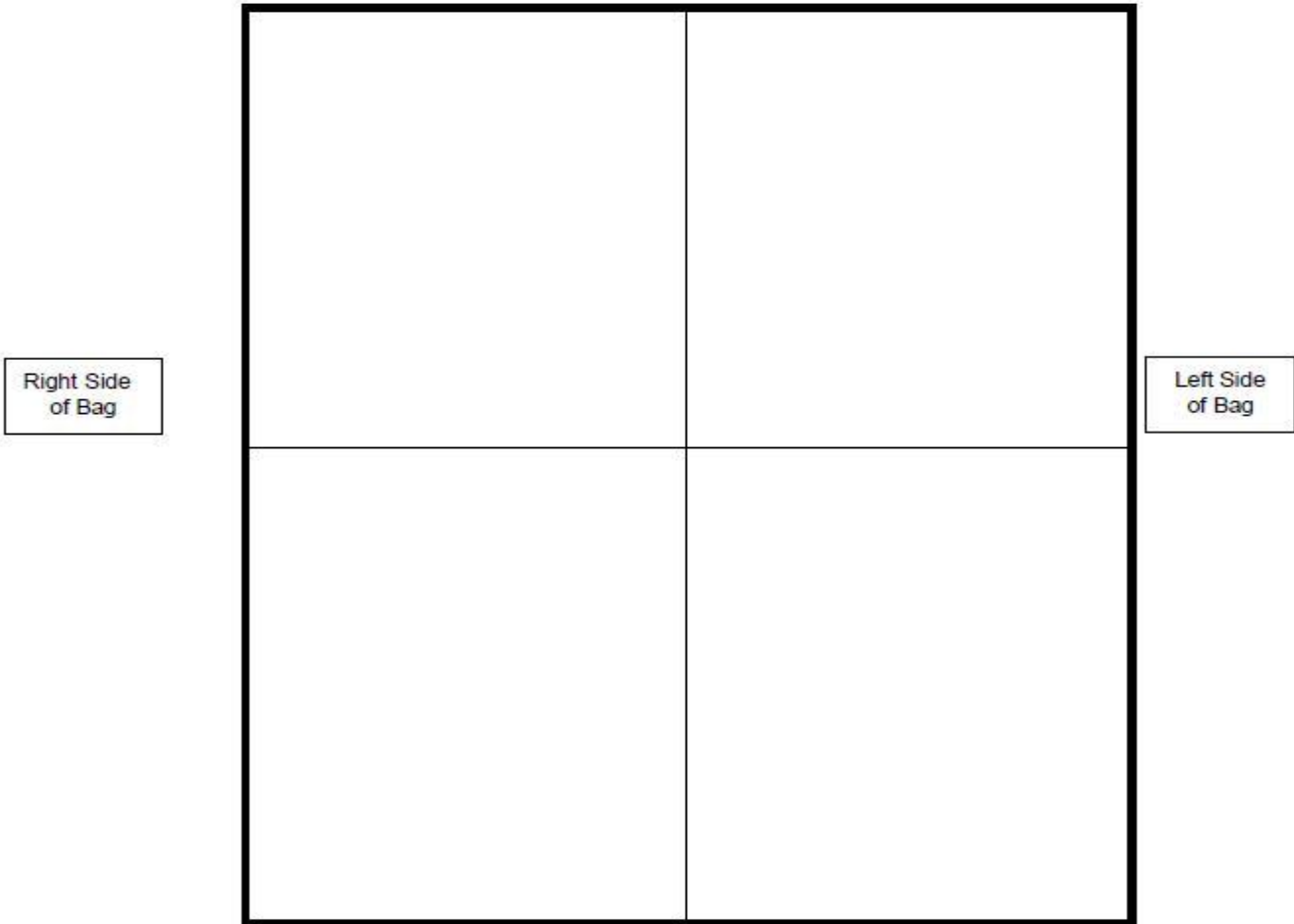


Site Code _____

Body Number _____

RADIOLOGY PRIMARY SURVEY:
ARTEFACT LOCATION DIAGRAM

Top of Bag



KEY (Add F for Fragment)					
B: Bullet	C: Cartridge Case	CC: Credit card	BE: Belt	J: Jewelry	P: Pen
BA: Battery	KN: Knife or Blade	CO: Coin	BU: Button	MP: Mobile Phone	W: Watch
S: Shrapnel	R: Razor Blade	CL: Cigar lighter	E: Electrical device	K: Key	N: Needle
G: Glasses	M: Metal (Unknown)	H: Hazard	O: Other (describe)	Z: Zip	

Recorded By _____

Signature _____

Date _____



Site Code _____

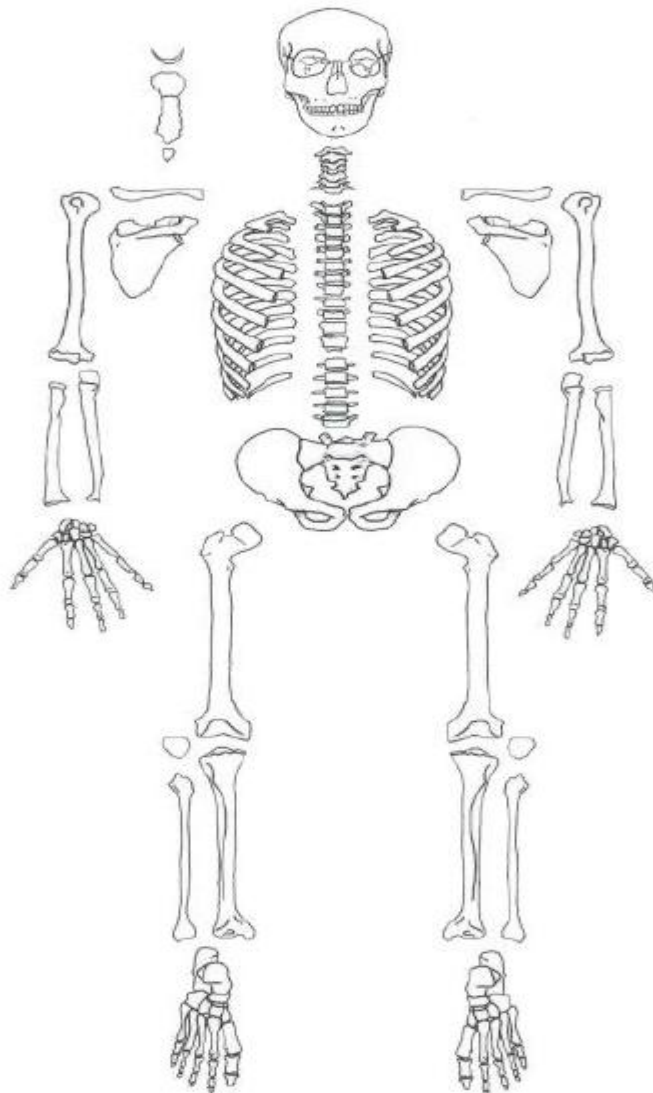
Body Number _____

INJURY / PATHOLOGY LOCATION DIAGRAM

Top of Bag

Right side
of bag

Left side
of bag



KEY
#: Fracture
— : Amputation
P: Pathology
M: Metal work

Recorded By _____

Signature _____

Date _____



Site Code _____

Body Number _____

Secondary Survey: a) Skeletal Survey

Date of examination:		Time of examination:	
Radiographer 1	Print:	Signed:	
Radiographer 2	Print:	Signed:	

Skeletal Survey

Examination Performed	View	Side	Exhibit No.
Skull			
Face			
Mandible			
Chest / Ribs			
Abdomen			
Pelvis / Hip			
C Spine			
T Spine			
L/S Spine			
Humerus			
Radius & Ulna			
Hand			
Femur			
Tibia & Fibula			
Foot			

Image format _____

Handed to: _____ (Please print)
 Signed: _____ Position: _____



Site Code _____

Body Number _____

Recorded By _____

Signature _____

Date _____



Site Code _____

Body Number _____

Date of examination:		Time of examination:	
Radiographer 1	Print:	Signed:	
Radiographer 2	Print:	Signed:	

Secondary Survey: b) Dental Survey

Periapical / Bitewings

Circle each tooth or area radiographed

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

R L

Occlusal Views: 	Exhibit No. 	Mandible Views 	Exhibit No.
-------------------------	---------------------	------------------------	---------------------

Comments:

Image format: 	Handed to _____ (Please print) Signed: _____ Position: _____
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Weight	Anatomy		kVp		mAs	
0-4 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	<i>Towne's</i>	N	50	65	1	3
	C-Spine					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	T-Spine					
	<i>AP</i>	N	50	70	1	3
	<i>Lat</i>	N	50	70	1	3
	L-Spine					
	<i>AP</i>	N	50	70	1	3
	<i>Lat</i>	N	50	70	1	3
	Chest					
	<i>AP</i>	N	55	70	1	3
	<i>Lat</i>	N	55	70	1	3
	Abdomen					
	<i>AP</i>	N	55	70	1	3
	<i>Lat</i>	N	55	70	1	3
	Pelvis					
	<i>AP</i>	N	55	65	1	3
	<i>Lat</i>	N	55	65	1	3
	Ribs					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	<i>LPO (oblique)</i>	N	50	65	1	4
	<i>RPO (oblique)</i>	N	50	65	1	4
	Shoulder					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
Humerus						
<i>AP</i>	N	50	60	1	3	
<i>Lat</i>	N	50	60	1	3	
Elbow/Forearm						
<i>AP</i>	N	50	60	0.5	3	
<i>Lat</i>	N	50	60	0.5	3	

Weight	Anatomy		kVp		mAs	
0-4 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	50	60	0.5	2
	<i>Lat</i>	N	50	60	0.5	2
	Hip					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	Femur					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	Knee					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
	Tibia/Fibula					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
	Ankle					
	<i>AP</i>	N	50	60	0.5	2
	<i>Lat</i>	N	50	60	0.5	2
	Foot					
	<i>AP</i>	N	50	60	0.5	2
<i>Lat</i>	N	50	60	0.5	2	

Weight	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
4-8 lbs						
	Skull					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	<i>Towne's</i>	N	60	70	1	4
	C-Spine					
	<i>AP</i>	N	55	70	1	4
	<i>Lat</i>	N	55	70	1	4
	T-Spine					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	L-Spine					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	Chest					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	Abdomen					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	8
	Pelvis					
	<i>AP</i>	N	60	70	1	6
	<i>Lat</i>	N	60	70	2	8
	Ribs					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	<i>LPO (oblique)</i>	N	60	70	2	8
	<i>RPO (oblique)</i>	N	60	70	2	8
	Shoulder					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
Humerus						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	
Elbow/Forearm						
<i>AP</i>	N	60	65	2	4	
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
4-8 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	55	60	1	3
	<i>Lat</i>	N	55	60	1	3
	Hip					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	Femur					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	Knee					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Tibia/Fibula					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Ankle					
	<i>AP</i>	N	55	65	1	3
	<i>Lat</i>	N	55	65	1	3
	Foot					
	<i>AP</i>	N	55	65	1	3
<i>Lat</i>	N	55	65	1	3	

Weight	Anatomy		kVp		mAs	
8-12 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	<i>Towne's</i>	N	60	70	2	8
	C-Spine					
	<i>AP</i>	N	55	70	2	6
	<i>Lat</i>	N	55	70	2	6
	T-Spine					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	8
	L-Spine					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	8
	Chest					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	10
	Abdomen					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	10
	Pelvis					
	<i>AP</i>	N	60	75	2	6
	<i>Lat</i>	N	60	75	4	8
	Ribs					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	8
	<i>LPO (oblique)</i>	N	60	70	4	10
	<i>RPO (oblique)</i>	N	60	70	4	10
	Shoulder					
	<i>AP</i>	N	60	70	2	8
	<i>Lat</i>	N	60	70	4	8
Humerus						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	
Elbow/Forearm						
<i>AP</i>	N	60	65	2	4	
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
8-12 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	55	60	1	3
	<i>Lat</i>	N	55	60	1	3
	Hip					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	8
	Femur					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	8
	Knee					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Tibia/Fibula					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Ankle					
	<i>AP</i>	N	60	65	1	3
	<i>Lat</i>	N	60	65	1	3
	Foot					
	<i>AP</i>	N	60	65	1	3
<i>Lat</i>	N	60	65	1	3	

Weight	Anatomy		kVp		mAs	
12-20 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	8
	<i>Towne's</i>	N	60	70	4	12
	C-Spine					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	8
	T-Spine					
	<i>AP</i>	N	60	75	4	10
	<i>Lat</i>	N	60	75	4	10
	L-Spine					
	<i>AP</i>	N	60	75	4	10
	<i>Lat</i>	N	60	75	4	10
	Chest					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	10
	Abdomen					
	<i>AP</i>	N	70	80	4	8
	<i>Lat</i>	N	70	80	4	10
	Pelvis					
	<i>AP</i>	N	70	80	4	8
	<i>Lat</i>	N	70	80	4	10
	Ribs					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	8
	<i>LPO (oblique)</i>	N	60	75	4	10
	<i>RPO (oblique)</i>	N	60	75	4	10
	Shoulder					
	<i>AP</i>	N	65	75	4	8
	<i>Lat</i>	N	65	75	4	8
	Humerus					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
Elbow/Forearm						
<i>AP</i>	N	60	65	2	4	
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
12-20 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	65	1	3
	<i>Lat</i>	N	60	65	1	3
	Hip					
	<i>AP</i>	N	60	75	2	8
	<i>Lat</i>	N	60	75	2	8
	Femur					
	<i>AP</i>	N	65	75	4	8
	<i>Lat</i>	N	65	75	4	8
	Knee					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Tibia/Fibula					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Ankle					
	<i>AP</i>	N	60	65	2	4
	<i>Lat</i>	N	60	65	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
20-40 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	75	8	12
	<i>Lat</i>	N	65	75	8	12
	<i>Towne's</i>	N	65	75	8	16
	C-Spine					
	<i>AP</i>	N	65	80	4	8
	<i>Lat</i>	N	65	80	4	10
	T-Spine					
	<i>AP</i>	N	65	75	6	12
	<i>Lat</i>	N	65	75	6	12
	L-Spine					
	<i>AP</i>	N	65	75	6	12
	<i>Lat</i>	N	65	75	6	12
	Chest					
	<i>AP</i>	N	70	80	4	10
	<i>Lat</i>	N	70	80	4	12
	Abdomen					
	<i>AP</i>	N	70	80	4	10
	<i>Lat</i>	N	70	80	4	12
	Pelvis					
	<i>AP</i>	N	70	80	4	10
	<i>Lat</i>	N	70	80	4	12
	Ribs					
	<i>AP</i>	N	65	75	6	10
	<i>Lat</i>	N	65	75	6	10
	<i>LPO (oblique)</i>	N	65	75	6	14
	<i>RPO (oblique)</i>	N	65	75	6	14
	Shoulder					
	<i>AP</i>	N	70	80	4	8
	<i>Lat</i>	N	70	80	4	10
Humerus						
<i>AP</i>	N	65	70	2	6	
<i>Lat</i>	N	65	70	2	6	
Elbow/Forearm						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	

Weight	Anatomy		kVp		mAs	
20-40 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	65	1	4
	<i>Lat</i>	N	60	65	1	4
	Hip					
	<i>AP</i>	N	65	75	4	8
	<i>Lat</i>	N	65	75	4	8
	Femur					
	<i>AP</i>	N	65	75	4	8
	<i>Lat</i>	N	65	75	4	8
	Knee					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Tibia/Fibula					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Ankle					
	<i>AP</i>	N	60	65	2	4
	<i>Lat</i>	N	60	65	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
40-75 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	80	8	14
	<i>Lat</i>	N	65	80	8	14
	<i>Towne's</i>	N	65	80	8	20
	C-Spine					
	<i>AP</i>	N	65	80	4	10
	<i>Lat</i>	N	65	80	4	12
	T-Spine					
	<i>AP</i>	Y	70	80	10	16
	<i>Lat</i>	Y	70	80	10	24
	L-Spine					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Chest					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Abdomen					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Pelvis					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Ribs					
	<i>AP</i>	Y	65	75	6	12
	<i>Lat</i>	Y	65	75	6	12
	<i>LPO (oblique)</i>	Y	65	75	8	16
	<i>RPO (oblique)</i>	Y	65	75	8	16
	Shoulder					
	<i>AP</i>	Y	70	80	6	10
	<i>Lat</i>	Y	70	80	6	12
	Humerus					
	<i>AP</i>	N	65	75	2	6
	<i>Lat</i>	N	65	75	2	6
Elbow/Forearm						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	

Weight	Anatomy		kVp		mAs	
40-75 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	Hip					
	<i>AP</i>	Y	70	80	4	10
	<i>Lat</i>	Y	70	80	4	12
	Femur					
	<i>AP</i>	Y	65	80	4	10
	<i>Lat</i>	Y	65	80	4	12
	Knee					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	Tibia/Fibula					
	<i>AP</i>	N	60	75	2	4
	<i>Lat</i>	N	60	75	2	4
	Ankle					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
Foot						
<i>AP</i>	N	60	65	2	4	
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
75-100 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	80	8	14
	<i>Lat</i>	N	65	80	8	14
	<i>Towne's</i>	N	65	80	8	20
	C-Spine					
	<i>AP</i>	N	65	80	4	10
	<i>Lat</i>	Y	70	80	10	24
	T-Spine					
	<i>AP</i>	Y	70	80	10	16
	<i>Lat</i>	Y	70	80	10	24
	L-Spine					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Chest					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Abdomen					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Pelvis					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Ribs					
	<i>AP</i>	Y	65	75	6	12
	<i>Lat</i>	Y	65	75	6	12
	<i>LPO (oblique)</i>	Y	65	75	8	16
	<i>RPO (oblique)</i>	Y	65	75	8	16
	Shoulder					
	<i>AP</i>	Y	70	80	6	10
	<i>Lat</i>	Y	70	80	6	12
	Humerus					
	<i>AP</i>	N	65	75	2	6
<i>Lat</i>	N	65	75	2	6	
Elbow/Forearm						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	

Weight	Anatomy		kVp		mAs	
75-100 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	Hip					
	<i>AP</i>	Y	70	80	4	10
	<i>Lat</i>	Y	70	80	4	12
	Femur					
	<i>AP</i>	Y	65	80	4	10
	<i>Lat</i>	Y	65	80	4	12
	Knee					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	Tibia/Fibula					
	<i>AP</i>	N	60	75	2	4
	<i>Lat</i>	N	60	75	2	4
	Ankle					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
Foot						
<i>AP</i>	N	60	65	2	4	
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
100-150 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	80	8	14
	<i>Lat</i>	N	65	80	8	14
	<i>Towne's</i>	N	65	80	8	20
	C-Spine					
	<i>AP</i>	N	70	80	4	10
	<i>Lat</i>	Y	70	80	10	32
	T-Spine					
	<i>AP</i>	Y	70	80	10	16
	<i>Lat</i>	Y	70	80	10	32
	L-Spine					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	24
	Chest					
	<i>AP</i>	Y	80	100	6	12
	<i>Lat</i>	Y	80	100	6	24
	Abdomen					
	<i>AP</i>	Y	70	80	6	16
	<i>Lat</i>	Y	70	80	6	24
	Pelvis					
	<i>AP</i>	Y	70	80	6	16
	<i>Lat</i>	Y	70	80	6	24
	Ribs					
	<i>AP</i>	Y	65	80	10	16
	<i>Lat</i>	Y	65	80	10	16
	<i>LPO (oblique)</i>	Y	65	80	12	32
	<i>RPO (oblique)</i>	Y	65	80	12	32
	Shoulder					
	<i>AP</i>	Y	70	80	10	16
	<i>Lat</i>	Y	70	80	10	20
Humerus						
<i>AP</i>	N	65	75	4	8	
<i>Lat</i>	N	65	75	4	8	
Elbow/Forearm						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	

Weight	Anatomy		kVp		mAs	
100-150 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	70	2	5
	<i>Lat</i>	N	60	70	2	5
	Hip					
	<i>AP</i>	Y	70	80	10	24
	<i>Lat</i>	Y	70	80	14	32
	Femur					
	<i>AP</i>	Y	70	85	8	16
	<i>Lat</i>	Y	70	85	10	24
	Knee					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	8
	Tibia/Fibula					
	<i>AP</i>	N	60	75	2	6
	<i>Lat</i>	N	60	75	2	6
	Ankle					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
150-200 lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	80	10	16
	<i>Lat</i>	N	65	80	10	16
	<i>Towne's</i>	N	65	80	12	24
	C-Spine					
	<i>AP</i>	N	70	80	10	20
	<i>Lat</i>	Y	70	80	16	50
	T-Spine					
	<i>AP</i>	Y	70	80	10	32
	<i>Lat</i>	Y	70	80	10	60
	L-Spine					
	<i>AP</i>	Y	70	80	10	32
	<i>Lat</i>	Y	70	80	10	60
	Chest					
	<i>AP</i>	Y	100	120	8	20
	<i>Lat</i>	Y	100	120	12	40
	Abdomen					
	<i>AP</i>	Y	80	90	8	32
	<i>Lat</i>	Y	80	90	12	60
	Pelvis					
	<i>AP</i>	Y	80	90	8	32
	<i>Lat</i>	Y	80	90	12	60
	Ribs					
	<i>AP</i>	Y	70	85	14	24
	<i>Lat</i>	Y	70	85	14	32
	<i>LPO (oblique)</i>	Y	70	85	16	50
	<i>RPO (oblique)</i>	Y	70	85	16	50
	Shoulder					
	<i>AP</i>	Y	70	80	12	20
	<i>Lat</i>	Y	70	80	16	32
Humerus						
<i>AP</i>	N	65	75	6	12	
<i>Lat</i>	N	65	75	6	12	
Elbow/Forearm						
<i>AP</i>	N	60	70	2	6	
<i>Lat</i>	N	60	70	2	6	

Weight	Anatomy		kVp		mAs	
150-200 lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	70	2	5
	<i>Lat</i>	N	60	70	2	5
	Hip					
	<i>AP</i>	Y	70	80	8	32
	<i>Lat</i>	Y	70	80	12	60
	Femur					
	<i>AP</i>	Y	70	85	8	24
	<i>Lat</i>	Y	70	85	12	32
	Knee					
	<i>AP</i>	N	60	70	4	10
	<i>Lat</i>	N	60	70	4	10
	Tibia/Fibula					
	<i>AP</i>	N	60	75	2	6
	<i>Lat</i>	N	60	75	2	6
	Ankle					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

Weight	Anatomy		kVp		mAs	
200+ lbs		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	80	10	16
	<i>Lat</i>	N	65	80	10	16
	<i>Towne's</i>	N	65	80	12	24
	C-Spine					
	<i>AP</i>	N	70	80	10	20
	<i>Lat</i>	Y	70	80	16	60
	T-Spine					
	<i>AP</i>	Y	70	80	10	40
	<i>Lat</i>	Y	70	80	20	80
	L-Spine					
	<i>AP</i>	Y	70	80	10	40
	<i>Lat</i>	Y	70	80	10	80
	Chest					
	<i>AP</i>	Y	110	120	12	32
	<i>Lat</i>	Y	110	120	16	60
	Abdomen					
	<i>AP</i>	Y	80	90	12	32
	<i>Lat</i>	Y	80	90	16	60
	Pelvis					
	<i>AP</i>	Y	80	90	12	32
	<i>Lat</i>	Y	80	90	16	60
	Ribs					
	<i>AP</i>	Y	70	85	16	32
	<i>Lat</i>	Y	70	85	16	40
	<i>LPO (oblique)</i>	Y	70	85	20	80
	<i>RPO (oblique)</i>	Y	70	85	20	80
	Shoulder					
	<i>AP</i>	Y	70	80	14	20
	<i>Lat</i>	Y	70	80	16	40
Humerus						
<i>AP</i>	N	65	75	6	12	
<i>Lat</i>	N	65	75	6	12	
Elbow/Forearm						
<i>AP</i>	N	60	70	2	6	
<i>Lat</i>	N	60	70	2	6	

Weight	Anatomy		kVp		mAs	
200+ lbs		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	70	2	5
	<i>Lat</i>	N	60	70	2	5
	Hip					
	<i>AP</i>	Y	70	80	8	32
	<i>Lat</i>	Y	70	80	12	60
	Femur					
	<i>AP</i>	Y	70	85	12	24
	<i>Lat</i>	Y	70	85	16	40
	Knee					
	<i>AP</i>	N	60	70	4	10
	<i>Lat</i>	N	60	70	4	10
	Tibia/Fibula					
	<i>AP</i>	N	60	75	2	6
	<i>Lat</i>	N	60	75	2	6
	Ankle					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

Burned / Charred	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	60	70	4	8
	<i>Lat</i>	N	60	70	4	8
	<i>Towne's</i>	N	60	70	4	12
	C-Spine					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	8
	T-Spine					
	<i>AP</i>	N	60	75	4	10
	<i>Lat</i>	N	60	75	4	10
	L-Spine					
	<i>AP</i>	N	60	75	4	10
	<i>Lat</i>	N	60	75	4	10
	Chest					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	10
	Abdomen					
	<i>AP</i>	N	70	80	4	8
	<i>Lat</i>	N	70	80	4	10
	Pelvis					
	<i>AP</i>	N	70	80	4	8
	<i>Lat</i>	N	70	80	4	10
	Ribs					
	<i>AP</i>	N	60	75	4	8
	<i>Lat</i>	N	60	75	4	8
	<i>LPO (oblique)</i>	N	60	75	4	10
	<i>RPO (oblique)</i>	N	60	75	4	10
	Shoulder					
	<i>AP</i>	N	65	75	4	8
	<i>Lat</i>	N	65	75	4	8
Humerus						
<i>AP</i>	N	60	70	2	6	
<i>Lat</i>	N	60	70	2	6	
Elbow/Forearm						
<i>AP</i>	N	60	65	2	4	
<i>Lat</i>	N	60	65	2	4	

Burned / Charred	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	65	1	3
	<i>Lat</i>	N	60	65	1	3
	Hip					
	<i>AP</i>	N	60	75	2	8
	<i>Lat</i>	N	60	75	2	8
	Femur					
	<i>AP</i>	N	65	75	4	8
	<i>Lat</i>	N	65	75	4	8
	Knee					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Tibia/Fibula					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Ankle					
	<i>AP</i>	N	60	65	2	4
	<i>Lat</i>	N	60	65	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

Fragments - Skeletal Remains	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	<i>Towne's</i>	N	50	65	1	3
	C-Spine					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	T-Spine					
	<i>AP</i>	N	50	70	1	3
	<i>Lat</i>	N	50	70	1	3
	L-Spine					
	<i>AP</i>	N	50	70	1	3
	<i>Lat</i>	N	50	70	1	3
	Chest					
	<i>AP</i>	N	55	70	1	3
	<i>Lat</i>	N	55	70	1	3
	Abdomen					
	<i>AP</i>	N	55	70	1	3
	<i>Lat</i>	N	55	70	1	3
	Pelvis					
	<i>AP</i>	N	55	65	1	3
	<i>Lat</i>	N	55	65	1	3
	Ribs					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	<i>LPO (oblique)</i>	N	50	65	1	4
	<i>RPO (oblique)</i>	N	50	65	1	4
	Shoulder					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
	Humerus					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
Elbow/Forearm						
<i>AP</i>	N	50	60	0.5	3	
<i>Lat</i>	N	50	60	0.5	3	

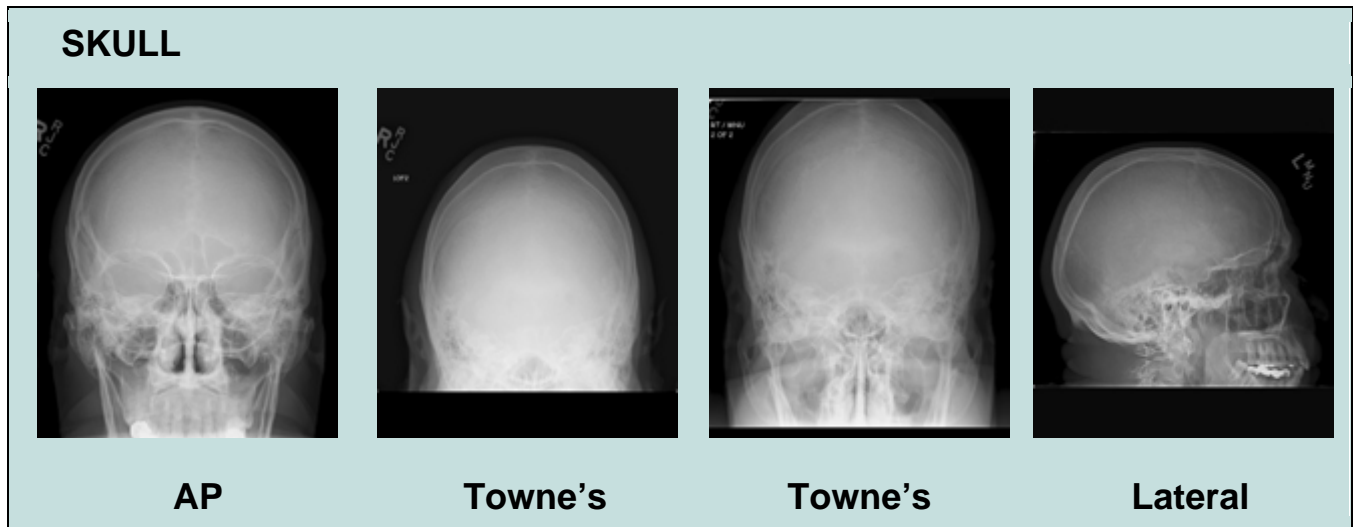
Fragments - Skeletal Remains	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	50	60	0.5	2
	<i>Lat</i>	N	50	60	0.5	2
	Hip					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	Femur					
	<i>AP</i>	N	50	65	1	3
	<i>Lat</i>	N	50	65	1	3
	Knee					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
	Tibia/Fibula					
	<i>AP</i>	N	50	60	1	3
	<i>Lat</i>	N	50	60	1	3
	Ankle					
	<i>AP</i>	N	50	60	0.5	2
	<i>Lat</i>	N	50	60	0.5	2
	Foot					
	<i>AP</i>	N	50	60	0.5	2
<i>Lat</i>	N	50	60	0.5	2	

Decomposed	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
	Skull					
	<i>AP</i>	N	65	80	8	14
	<i>Lat</i>	N	65	80	8	14
	<i>Towne's</i>	N	65	80	8	20
	C-Spine					
	<i>AP</i>	N	65	80	4	10
	<i>Lat</i>	Y	70	80	10	24
	T-Spine					
	<i>AP</i>	Y	70	80	10	16
	<i>Lat</i>	Y	70	80	10	24
	L-Spine					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Chest					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Abdomen					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Pelvis					
	<i>AP</i>	Y	70	80	6	12
	<i>Lat</i>	Y	70	80	6	16
	Ribs					
	<i>AP</i>	Y	65	75	6	12
	<i>Lat</i>	Y	65	75	6	12
	<i>LPO (oblique)</i>	Y	65	75	8	16
	<i>RPO (oblique)</i>	Y	65	75	8	16
	Shoulder					
	<i>AP</i>	Y	70	80	6	10
	<i>Lat</i>	Y	70	80	6	12
	Humerus					
	<i>AP</i>	N	65	75	2	6
<i>Lat</i>	N	65	75	2	6	
Elbow/Forearm						
<i>AP</i>	N	60	70	2	4	
<i>Lat</i>	N	60	70	2	4	

Decomposed	Anatomy		kVp		mAs	
		Grid	Min	Max	Min	Max
	Wrist/Hand					
	<i>AP</i>	N	60	70	1	4
	<i>Lat</i>	N	60	70	1	4
	Hip					
	<i>AP</i>	Y	70	80	4	10
	<i>Lat</i>	Y	70	80	4	12
	Femur					
	<i>AP</i>	Y	65	80	4	10
	<i>Lat</i>	Y	65	80	4	12
	Knee					
	<i>AP</i>	N	60	70	2	6
	<i>Lat</i>	N	60	70	2	6
	Tibia/Fibula					
	<i>AP</i>	N	60	75	2	4
	<i>Lat</i>	N	60	75	2	4
	Ankle					
	<i>AP</i>	N	60	70	2	4
	<i>Lat</i>	N	60	70	2	4
	Foot					
	<i>AP</i>	N	60	65	2	4
<i>Lat</i>	N	60	65	2	4	

RADIOGRAPHIC PROTOCOL

FULL BODY SURVEY – POSTMORTEM EVALUATION



CERVICAL SPINE



AP



Lateral



Swimmer's

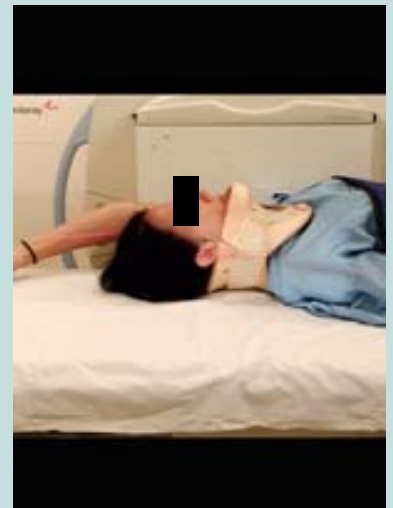
AP



Lateral



Swimmer's



CHEST



AP



Lateral

AP or PA

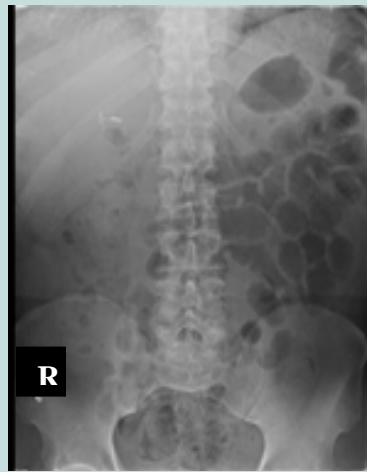
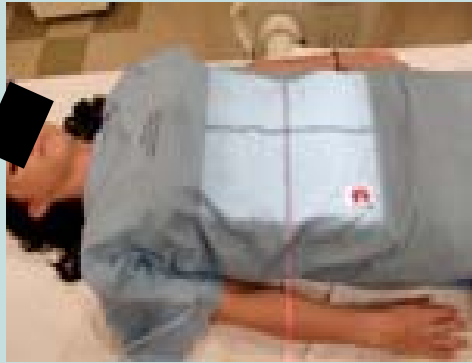


Lateral



ABDOMEN & PELVIS

AP



UPPER EXTREMITIES

AP

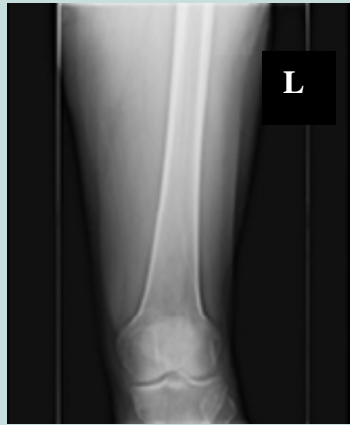
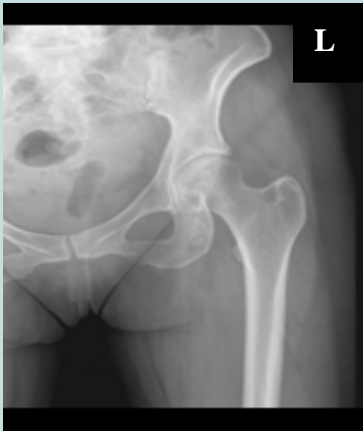


AP HUMERUS

AP FOREARM



LOWER EXTREMITIES –



AP



AP



AP



AP



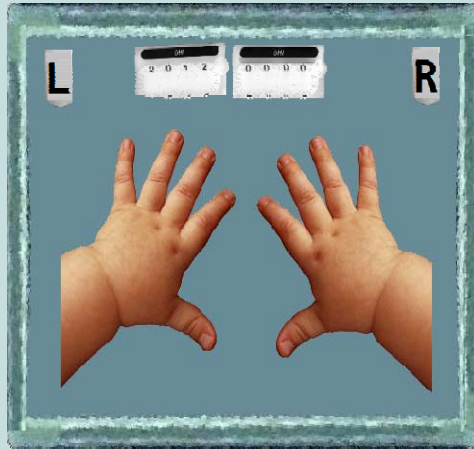
LOWER EXTREMITIES – TIBIA / FIBULA

AP



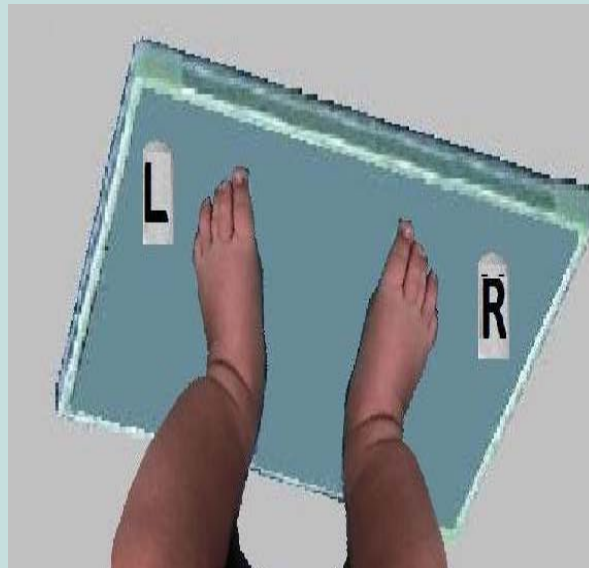
BILATERAL HANDS

AP



BILATERAL FEET

AP



Terms and Abbreviations Used in This Report

APHL Association of Public Health Laboratories

CDIRF Certifier's Death Investigation Report Form

CR Computed Radiography
CT Computed Tomography
DFA direct fluorescent assays
DHHS U.S. Department of Health and Human Services
DHS U.S. Department of Homeland Security
DMORT Disaster Mortuary Operational Response Team
DPMU Disaster Portable Morgue Unit
EPA Environmental Protection Agency
EOC emergency operations center
FBI Federal Bureau of Investigation
FDA Food and Drug Administration
FEMA Federal Emergency Management Agency
FRP Federal Response Plan
H&E hematoxylin and eosin
HAZMAT Hazardous materials
HEPA high-efficiency particulate air
HSPD 5 Homeland Security Presidential Directive 5
ICS Incident Command System
IDIRF Investigator's Death Investigation Report Form
IHC immunohistochemical
LRN Laboratory Response Network
MCDIDS Medical Examiner/Coroner Death Investigation Data Set
ME/Cs medical examiners and coroners
MRI Magnetic Resonance Imaging
NAME National Association of Medical Examiners
NDMS National Disaster Medical System
PACS Picture Archiving and Communications System
PAPRs powered air-purifying respirators
PCR polymerase chain reaction
PFO principal federal officer
PPE personal protective equipment
RT Radiologic Technologist
SAC special agent in charge
TLD Thermoluminescent Dosimeter
USAMRIID United States Army Medical Research Institute of Infectious Diseases
WMD weapons of mass destruction

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index.asp.

Terms and Abbreviations Used in This Report

APHL Association of Public Health Laboratories
CDIRF Certifier's Death Investigation Report Form
DFA direct fluorescent assays
DHHS U.S. Department of Health and Human Services
DHS U.S. Department of Homeland Security
DMORT Disaster Mortuary Operational Response Team
DPMU Disaster Portable Morgue Unit
EPA Environmental Protection Agency
EOC emergency operations center
FBI Federal Bureau of Investigation
FDA Food and Drug Administration
FEMA Federal Emergency Management Agency
FRP Federal Response Plan
H&E hematoxylin and eosin
HAZMAT Hazardous materials
HEPA high-efficiency particulate air
HSPD 5 Homeland Security Presidential Directive 5
ICS Incident Command System
IDIRF Investigator's Death Investigation Report Form
IHC immunohistochemical
LRN Laboratory Response Network
MCDIDS Medical Examiner/Coroner Death Investigation Data Set
ME/Cs medical examiners and coroners
NAME National Association of Medical Examiners
NDMS National Disaster Medical System
PAPRs powered air-purifying respirators
PCR polymerase chain reaction
PFO principal federal officer
PPE personal protective equipment
SAC special agent in charge
USAMRIID United States Army Medical Research Institute of Infectious Diseases
WMD weapons of mass destruction

Appendix Z
Radiology Requirements – ASFR 2007

Mass Fatality Mortuaries Radiography Facilities And Requirements

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2 30/01/2007

1. Process & Workflow

Exact requirements for radiography will be dependent upon the precise nature of the incident. However, experience from previous large-scale incidents involving aircraft or terrorist attacks has emphasised the need for radiography facilities to be available on site in the Major Incident Mortuary. (*Lichtenstein et al 1980, Mulligan et al 1988, Nye et al 1996*).

The main uses of radiography will be:

Primary Survey – to be undertaken on all remains prior to examination

Secondary Surveys – A routine examination for Identification purposes, the necessity for which is decided as part of the identification protocol. Such surveys may include;

- Full dental survey for odontology identification and/or age determination by anthropologist
- Full skeletal survey for radiological identification (only useful in certain circumstances)

Tertiary examinations – for documentation of forensic evidence or identifying features; prostheses, healed fractures, anatomical variants.

1. Primary Survey

It is advised that this be used in all cases for the initial examination of all bodies & body parts at the mortuary. Bodies will be taken direct from the body store to the primary survey area. Primary survey may be undertaken using Fluoroscopy, Digital X-Ray or CT scanning. At the present time, the modality of choice for bodies is Fluoroscopy due to its speed and versatility. Direct digital x-ray is the method of choice for multiple body parts.

Fluoroscopy

A radiographer and forensic pathologist or 2 radiographers will undertake fluoroscopic Examination. The police or coroners officer will be present at the examination.

Direct Digital X-Ray

2 radiographers will undertake the examination. The police or coroners officer will be present at the examination

CT Scanning

The use of CT scanning in Mass Fatality incidents is in its infancy. However, it is clear that in certain circumstances (particularly in cases of contaminated fatalities) CT scanning has significant advantages. In such cases, CT is likely to replace fluoroscopy as the initial examination, and may negate further imaging (including dental imaging and identification) At this time however, there is no clear scientific evidence for its suitability in the case of Mass fatality incidents involving large numbers of fragmented or skeletalised

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3 30/01/2007

remains, where its application is likely to be time-consuming. CT scanners

are highly specialised and expensive items of Imaging equipment, and as yet, no national facilities exist for their routine application as part of an emergency response.

The primary examination will yield all or some of the following information:

Description of contents of body bag:

- Whole cadaver or Body Part with description of anatomical parts seen.
- Indication as to whether more than one individual is present (if possible)
- Location and nature (if possible) of any hazardous material – unexploded ordnance, metallic sharps, glass etc.
- Location of any projectile fragments with possible associated bony injury
- Location of metallic personal effects e.g.: Jewellery, Cigarette Lighters, Keys, Wallets etc. (This may be particularly useful in cases of cremated bodies, where these artefacts may be difficult to locate)
- Presence of any unique identifying features which may require further radiographic investigation following autopsy and/or odontology:
 - Previous healed fractures
 - Anatomical Variants
 - Dental work (Bridges, crowns, root canal treatments etc)

Images will be taken of any artefacts or variants.

Following primary survey the body bag will be transferred direct to the pathology area for examination & autopsy. It should be noted that in some cases it will be necessary to return the cadaver or clothing/effects to fluoroscopy if artefacts identified at the primary survey cannot be found

2. Secondary Survey

Secondary survey direct digital Radiographic examination may prove useful for identification of unique dental and skeletal features are present which have been previously documented in ante-mortem records. Practice in many previous mass fatality incidents has been for complete skeletal survey of all bodies & body parts. However, the use of high definition digital fluoroscopy should provide sufficient information for the primary survey, and the time taken for full radiography survey does, in most cases, not justify routine application of skeletal radiography. Full dental radiography survey is however recommended.

Dental X-Ray

The precise requirements for dental radiography will be determined by the working practices of the forensic odontologists. **It is recommended that it be**

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4 30/01/2007

assumed for the purpose of planning, that a full dental radiography survey be undertaken by the radiographers as part of the procedure.

3. Tertiary Examinations

It is suggested that direct digital skeletal x-ray be performed on a tertiary examination basis, and be reserved for:

- **Any unique skeletal features seen on fluoroscopy or identified at**

autopsy by the pathologist, anthropologist or odontologist

- **For those cases which are proving difficult to identify via other means, and for which is considered that radiography may be useful**

2 radiographers will undertake the examination. The police or coroners officer will be present at the examination

2. Design of Radiography Area

Space Requirements

At any incident, there will need to be facilities for fluoroscopy, & dental examinations. In some circumstances plain film x-ray facilities will be required. The precise numbers of radiography stations will depend upon the numbers of pathologists/ autopsy tables in use. However, assuming that experienced forensic radiographers are utilised, the fluoroscopic survey on each body should take no longer than 5-10 minutes, and therefore it is assumed that for the majority of incidents 1 fluoroscopy unit will be sufficient.

Dental surveys will probably take between 30 minutes to an hour, depending upon the film sequence required. This period could be considerably shortened using digital equipment (See equipment, below)

The requirement for plain film x-rays will be highly dependent upon the nature of the incident, the degree of damage to soft tissues/cremation, degree of fragmentation etc. A full skeletal survey could take up to 2 -3 hours, and again, this period could be considerably shortened using digital equipment.

Workflow & Location

It is recommended that:

- i) Fluoroscopy & Plain/Dental film x-ray areas are separated.

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5 30/01/2007

- ii) Fluoroscopy area is located close to the body store and pathology as the first stage of the process. (Note bodies may need to return to fluoroscopy from pathology if artefacts/projectiles cannot be found)

- iii) Plain/Dental x-ray areas are located close to Odontology/Anthropology/Pathology & co-located with darkroom facilities (Note: Darkroom access is NOT required for fluoroscopy)

Radiology Workflow

Body Receipt

and holding area

Fluoroscopy / Digital

Radiography or CT

Scan

Dental

Radiography

Strip & Search

External Exam &

Anthropology

Odontology

(Note: Bodies may return to primary survey after initial examination)

Plain Film Digital
Skeletal
Radiography
PM / Autopsy

Primary

Survey

Secondary

Survey or

Tertiary

Exam

Secondary

Survey

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6 30/01/2007

3. Health & Safety

There is much discussion about the need for lead protective screens for radiography. Radiological protection is a complex subject, and is dependent upon a number of factors such distance from the source, nature of the material of any protective barrier, occupancy factor of adjacent spaces, frequency of use etc.

It is therefore recommended that the advice of a qualified radiation physicist be sought in relation to the final layout and be appointed as Radiation Protection Advisor. In addition, it will be necessary to have a set of "Radiation Protection Local Rules" based upon a risk assessment of the area. These will need to be read and signed by all staff working in the mortuary. Upon deployment, an AFR Response Team will undertake a radiation risk assessment. And this will need to be signed off by the radiation Protection Advisor.

In most circumstances where radiography is employed in a non-permanent situation, (E.g.: Hospital Wards, Operating Theatres, Hospital Mortuaries) lead protective barriers are not employed, but radiation protection measures such as establishing a "controlled area" around the unit, restricting access to essential staff only, and the deployment of lead rubber aprons for personnel are used.

It is clear that in this situation, the fluoroscopy area in particular is likely to be in the centre of the operational area, which may make it difficult to establish an exclusion zone around the controlled area. The use of lead screens for this area in particular may therefore be advisable. The radiation physicist will be able to advise.

With reference to the Plain/Film & Dental radiography areas, if these are located in a position away from the main activity, but close to anthropology/Odontology & accessible to pathology it may be possible to make use of distance as an adequate radiation protection measure.

If processing chemistry is used on-site, this will need to be covered under COSHH risk assessments and appropriate safety equipment provided.

Arrangements for the disposal of waste chemical products will need to be made in order to comply with Environmental Protection Legislation.

4. Staffing

Radiographers

The temporary mortuary situation presents unique challenges for radiographers. Most hospital radiographers have little experience of forensic radiography in their clinical workplace, and therefore lack the level of skill and knowledge that is required (Hughes & Baker 1997). Those that do undertake examinations of cadavers & specimens do so on a volunteer basis and it is

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7 30/01/2007

thus important that the provision of a radiology service within the mortuary is undertaken by adequately trained volunteer radiographers.

The Association of Forensic Radiographers is recognised by the Society & College of Radiographers as the Special Interest Group for Trauma and Forensic Radiography. Since 1998 it has worked to set up appropriate postgraduate

training programmes, and establish a register of trained volunteer radiographers who can be called upon to assist with Mass Fatality incidents. This register (The UK Forensic Radiography Response Team) now has nearly 50 radiographers, all of whom have completed a practical and theoretical training course in temporary mortuary and human identification procedures. Many of the team have experience training number of these radiographers have experience of working in temporary mortuary situations in the UK (Selby, Tsunami & 7/7), the Republic of Ireland, The Former Yugoslavia, Sierra Leone, Sri Lanka and Thailand

The Association of Forensic Radiographers will assist with planning of temporary mortuaries and can be contacted via UKFRRT@afr.org.uk. The AFR also maintains a 24 hour contact number for mass fatality response. The **AFR emergency response number is: 07092-840977**

Radiologists

The radiography team will be required within hours of the incident. However the importance of the role of specialist forensic radiologists may well prove essential to the identification process in a small number of cases, once the ante-mortem and post-mortem records are available for comparison. The precise radiological staffing requirement will depend upon the availability of ante-mortem data as well as the nature of the incident itself.

It is suggested that a mechanism for securing forensic radiological support is established such that the Coroner or supervising pathologist can call upon appropriate expertise as and when necessary.

5. Equipment

The Home Office Mass Fatalities Team has now purchased full digital x-ray equipment suitable for deployment. This equipment can be activated via the Home Office Mass Fatalities Team.

In addition, the Association of Forensic Radiographers does have some equipment that can be made available in the event of an emergency.

Equipment includes; Fluoroscopy, X-ray and Dental X-Ray Machines, film processing and dental processing equipment

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Summary

Uses

Radiology can be a valuable tool in the investigation of mass fatality incidents for

- **Evaluation** of the nature of the remains; the presence of hazardous material, remains of more than one individual, to document injuries and identifying features and to locate and retrieve small body fragments, personal effects and forensic evidence.

- **Identification** of individuals by comparison of ante mortem and post mortem radiological data.

Methods

In mass fatality incidents, radiology should be systematically employed as an integral part of the examination process as follows;

- **Primary Survey** – Initial triage and assessment
- **Secondary Survey**– Standard examination of specific body parts (eg dentition)
- **Tertiary Examinations** – Specific examinations performed in response to findings during primary or secondary surveys or during pathology, odontology or anthropology assessment.

Equipment

At the present time, the radiography equipment of choice for mass fatality incidents is;

- **Fluoroscopy** – for the primary survey and tertiary examination for rapid location and retrieval of personal effects or evidential items
- **Direct Digital Dental Radiography** – for secondary dental radiography survey as part of the odontological evaluation
- **Direct Digital Radiography (DR)** – for secondary skeletal surveys and tertiary examinations.

The use of CT scanning for mass fatality incidents is in its infancy but may prove to be a very valuable tool

Planning

The use of radiological techniques should be considered as essential and integral to the examination of mass fatality incidents. Mass fatality plans should address;

- **Equipment** - Dedicated equipment and the space and infrastructure to support it
- **Health and Safety** – A safe working environment for the use of ionising radiation
- **Staff** - The requirement for trained, experienced radiographers.

The nature of the techniques, equipment and hazards requires considerable planning & coordination

and should involve the appropriate imaging specialists – Radiographers, Radiation Physicists and Radiologists. The AFR will assist with planning: UKFRRT@afr.org.uk

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