PRELIMINARY REPORT

ON

AMERICA'S MEDICOLEGAL OFFICES

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by

THE NATIONAL ASSOCIATION OF MEDICAL EXAMINERS
430 PRYOR STREET, SW
ATLANTA, GA 30312
404.730.4781

This report was prepared by the National Association of Medical Examiners (NAME), the primary professional organization for medical examiners and forensic pathologists in the United States. Established in 1965, NAME currently has nearly 1,000 members, of which approximately 80% are physicians and 20% are affiliate lay death investigators or administrators who work in medical examiners' offices. As the professional organization dedicated to representing medical examiner/coroner offices, NAME, along with its partners in the Consortium of Forensic Science Organizations (CFSO), has been invited by the National Institute of Justice (NIJ) and the United States Congress to participate in an evaluation of the status and needs of the forensic sciences and death investigation systems in the United States. NAME appreciates this opportunity to assist the Government in improving America's medicolegal death investigative process which serves the criminal and civil justice systems and affords protection to the public health and safety of our citizens.

National Association of Medical Examiners
Ad Hoc Committee for the Preparation of the 180-Day Study

Michael A. Graham, M.D., NAME President and NIJ Summit Representative
Fred B. Jordan, M.D., NAME Vice President and Ad Hoc Committee Chair
Victor W. Weedn, M.D., J.D., NIJ Summit Representative
James C.U. Downs, M.D., NIJ Summit Representative
Jonathan L. Arden, M.D.
Joseph H. Davis, M.D.
Vincent DiMaio, M.D.
Gerald J. Dziecichowicz, M.S.W.
Randy L. Hanzlick, M.D.
Jeffrey M. Jentzen, M.D.
Bruce P. Levy, M.D.
Joseph A. Prahlow, M.D.
Lakshmanan, Sathyavagiswaran, M.D.
Susan E. Carr, J.D., NAME Executive Vice President

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EXECUTIVE SUMMARY

Medicolegal death investigation is an essential government function, yet the medicolegal death investigation system in this country is a frayed patchwork of medical examiner, coroner, and hybrid systems that loosely covers the landscape: 21 states have medical examiner systems, 11 have coroner systems and 18 have mixed systems. Regardless of the type of system, only approximately half of the population of this country is served by systems with forensic pathologists. The "system" as it exists today is neither uniform nor complete; it is dominated by county offices (stemming from the old English coroner system) that often cannot support full death investigation systems. It is readily apparent that quality of service varies greatly from one area to another. Unfortunately, with any particular person's death, the quality of the medicolegal death investigation is predicated on where that death occurs. While there are many high-quality medicolegal offices, in order to ensure excellent death investigation throughout the entire nation, we must improve those offices that are lacking in funding, competent staff, and facilities.

Medicolegal death investigation requires a high level of competence, professionalism and ethics. The work itself is critical and has widespread impact on not only the criminal and civil justice systems, but on the families of the deceased, the community, and issues of public health. The basis for a quality death investigation system is through the integrated practice of various highly trained and certified professionals.

Medicolegal death investigation systems operate at the interface between law and medicine. As noted above, there are two basic types of systems--coroner systems and medical examiner systems, with some areas having hybrid systems.

The non-uniformity of terminology used throughout the "system" engenders confusion and contributes to difficulties in accurately assessing, understanding and comparing medicolegal jurisdictions. In every system, specific individuals are charged with officially investigating deaths falling under medicolegal jurisdiction, determining and certifying the cause and manner of death and fulfilling other jurisprudential and public health functions.

Elected county officials ("coroners" or "justices of the peace") are responsible for these duties in most coroner systems. In some states the coroner must be a physician; in many other coroner systems, such a requirement does not exist. In California the Sheriff may serve as the coroner. In many coroner systems, important decisions such as whether or not to perform an autopsy are made by persons without the appropriate medical education, training and experience.

Medical examiners most commonly are licensed physicians appointed to perform official medicolegal death investigations and conduct postmortem examinations. As most medical examiners are not pathologists and are therefore not trained to perform autopsies, they must rely on pathologists (ideally qualified forensic pathologists) to perform autopsies. Although there are many pathologists currently performing medicolegal autopsies, relatively few of them are trained and credentialed in the subspecialty of forensic pathology. Pathologist medical examiners are most often government employees but may be private practice or academic pathologists engaged to work for a particular medicolegal jurisdiction.

In some jurisdictions "medical examiner" is the title for non-pathologist physicians who respond to the initial notification of death and are responsible for screening and referring appropriate cases for further evaluation by a forensic pathologist. The term "medicolegal death investigator" or "death investigator" is commonly used for frontline lay investigators.

More and more jurisdictions are choosing to use "lay" (non-physician) investigators to perform scene and background investigations in support of physician medical examiners and forensic pathologists. The American Board of Medicolegal Death Investigators (ABMDI) registers and certifies such practitioners in accordance with the NIJ *National Guidelines for Death Investigation.* This, however, is a voluntary program, and in some jurisdictions, investigators are not required to have any formal education in basic death investigation procedures. It is perhaps axiomatic that the accuracy of the forensic pathologist's determinations is contingent upon important decisions and procedures initiated by the individual who receives the first notification of death and performs the initial investigation.

Working closely with the criminal justice system and law enforcement agencies, ME/Cs must remain independent and objective watchdogs for the public they serve. Lack of qualified investigators and forensic pathologists, insufficient and outdated facilities, shortfalls in equipment and supportive manpower, insufficient funding, and disparate availability of needed consultative services can result in miscarriages of justice or unacceptable risks to the public's health: Homicides may be missed, the innocent may be wrongly accused and/or incarcerated, the guilty may be wrongly exonerated, civil actions and outcomes may be flawed, or infectious disease epidemics can spread.

The most highly educated and trained group in the death investigation field is the forensic pathologists. Forensic pathology is the distinct subspecialty within the medical field of pathology that deals specifically with the investigation of cause and manner of death and the performance of medicolegal autopsies and ancillary studies. The American Board of Pathology (ABP) defines the educational and training requirements of this field and has provided specialty certification in this area since 1959. Most forensic pathologists undergo at least nine years of years of formal education after college, including a medical degree, postgraduate residency in pathology, and additional formal training in forensic pathology and medicolegal death investigation, after which they must pass examinations in anatomic and forensic pathology in order to become board-certified by the ABP.

As of 2003, there were 989 board certified forensic pathologists in the United States. Only about 600 appear to be active practitioners, however, and less than 400 function as full-time dedicated forensic pathologists working within and/or directing statutorily constituted medicolegal death investigation systems. Current estimates are that America needs a workforce of at least 800 full-time, board certified forensic pathologists to maintain medicolegal autopsy loads at acceptable levels. The limited availability of forensic pathologists suggests that many current practitioners are exceeding recommended caseloads and/or many medicolegal autopsies are being conducted by non-forensic pathologist practitioners. The potential hazards of this practice include errors, autopsies being performed by unqualified personnel (or not being performed at all), and manpower burnout and attrition.

In this day and age, less than half of the nation's citizens benefit from proper death investigation practices. Death investigation needs to be conducted in a timely manner and performed correctly and professionally the first time, every time. A functional, high-quality death investigation system requires the development and promotion of accreditation and professionalism in the autopsy facility, the performance of the forensic autopsy, and the associated investigation of the circumstances pertinent to the death and of the death scene itself. Unfortunately, however, of the 465 facilities performing forensic autopsies in this country, only 40 are accredited by NAME, the applicable accrediting body: The majority of offices have not attempted to become accredited or cannot meet accreditation standards because they have inadequate staff, facilities, equipment, funding or a combination of these factors. Many offices do not have such basic equipment as an x-ray machine and at least one-third do not meet the federal government's minimum safety guidelines. Some do not have available necessary laboratory services such as histology, microbiology, clinical testing, and genetic/metabolic services that are essential to competent and timely death investigation services.

As medical examiners, forensic pathologists are generally forced to accept lower salaries than those received by practicing hospital pathologists or other physicians in general. These uniquely and highly skilled physicians provide the public with unbiased, legally and scientifically defensible determinations of cause and manner of death as well as expert answers to other issues that may arise in evaluating a particular death or series of deaths. By systematically investigating death, they are able to recognize previously unsuspected homicides as well as deaths caused by conditions that might constitute a threat to public health. It is difficult to recruit and retain these physicians with substandard salaries, especially when most physicians have significant debt as a result of the high cost of a medical education.

The daily practice of forensic pathology extends far beyond questions related to medicine and forensic pathology and often involves dealing with political entities, the media, law enforcement, the judicial system, healthcare systems, families of the deceased and members of the general public. Forensic pathologists serve as expert consultants to investigators, courts, prosecutors, and defense counsel. Resources available to and salaries for these busy practitioners must be significantly updated in order to protect the sanctity and quality of the investigation of the deaths of our citizens that fall jurisdictionally under their auspices. Medical examiners and forensic pathologists are part of the fabric of homeland security and have been and will continue to be frontline participants in the event of terrorist acts. They are actively involved in surveillance for biological terrorism and newly emerging infectious diseases, and their testimony will be of critical importance in any trials that occur subsequent to any future terrorist events that the United States experiences.

Part of the frustration and difficulties MEs experience results from the fact that they fall between the cracks as an orphaned community, not truly owned or supported by law enforcement, public health, or traditional medicine. In addition, ME/C offices must be independent of law enforcement and political influence in order to avoid potential conflicts of interest and serve as an impartial representative of the deceased, speaking for those who are no longer able to speak for themselves.

To date, the federal government has focused limited attention on medicolegal death investigation. Although traditionally a state or local function, medicolegal death investigation also serves the federal interests, since assuring citizen safety is a basic function of government. The federal government should thus recognize the value of medicolegal death investigation for criminal justice, public health, and homeland security and should actively support it via the NIJ for law enforcement issues, the Centers for Disease Control and Prevention (CDC) for public health issues, and the Department of Homeland Security (DHS) for homeland security and mass fatality issues. These agencies should take the lead in developing programs to assist medicolegal death investigation systems in the United States.

The only current federal medical examiner system is the Armed Forces Medical Examiner System (AFMES), a specialty operation that primarily serves military combat and training casualties. The federal government could begin to establish the infrastructure of a national support system by consolidating the Disaster Mortuary Operations Response Team (DMORT) division of the National Disaster Medical System (NDMS), which can be and has been mobilized to assist state and local agencies in times of a declared disaster.

The proper way to improve America's death investigation system is to ensure competent coverage for all citizens, no matter where they die—or live. Perpetrators of crimes should understand that no matter where in the United States a crime is committed, an expert investigation will be conducted. Furthermore, families of victims as well as the general public should be confident that a thorough and proficient death investigation will be conducted regardless of the jurisdiction in which a death, criminal or otherwise, occurs. Several groups are vitally important in addressing the weak links in the current system. NAME is willing to take the lead on many of these issues, but needs the support of local, state, and federal government officials and agencies that are responsible for public health and safety concerns.

In order to address the deficiencies within forensic death investigation services, NAME recommends that the federal government should act to ensure that the nation is blanketed by forensic pathologist-based medicolegal death investigation to ensure adequate competent medicolegal death investigation no matter where a murder is committed or a public health threat is posed. Specifically, NAME recommends:

National Infrastructure:

1. **Congress should fully fund the Paul Coverdell (National Forensic Science Improvement) Act ($700M/5 years).**

2. **The federal government should develop an active interest in medicolegal death investigation and should designate lead agency assignment**

3. **The federal government should ensure medicolegal death investigation by adequately supported and professionally-staffed forensic pathologist-based death investigation systems**

4. **The Department of Health and Human Services should establish policies and programs to 1) encourage and enable more physicians to enter the field of forensic pathology and pursue their employment within medical examiner systems and 2) retain currently practicing forensic pathologists**

5. **The federal government should support the NAME accreditation program and NAME's development of professional performance parameters for medicolegal death investigation**

6. **Medical Examiners should be designated as homeland security "first responders", eligible for first responder funds**

Federal Structure:

7. **The federal government should establish a federal medical examiner's liaison office within the Department of Homeland Security**

8. **The federal government should develop and fund a system of information-sharing between medical examiners offices and relevant federal government agencies**

Scientific Foundations:

9. **The federal government should sponsor research and policy discussions on forensic pathology and medicolegal death investigation issues**

INTRODUCTION

The National Association of Medical Examiners (NAME) is the primary organization for forensic pathologists (FPs) in the United States. Established in 1965, NAME currently has nearly 1,000 members, of which approximately 80% are physicians and 20% are affiliate lay death investigators or administrators who work in medical examiner offices.

Forensic pathology is the medical subspecialty that deals specifically with the investigation of death and the performance of medicolegal autopsies. The American Board of Pathology (ABP) defines the educational and training requirements, provides a standard examination and has provided special certification in this area since 1959. As of 2003, there were 989 board-certified FPs in this country, approximately 600 of which were active practitioners.

Medical examiners perform their duties for the sake of the living and play important roles in law enforcement, public health, and other public good, realizing a sense of satisfaction from helping society. Unfortunately, their value is not always recognized—MEs may be regarded by uninformed public officials as mere technicians that handle and dissect bodies.

Forensic pathologists provide an important function in the criminal justice system through the application of medical science to death investigation. Sometimes the FP will recognize an apparently natural or "accidental" death as a homicide; at other times, examination may reveal that a suspected homicide is due to a suicide, natural disease or other process, consequently preventing unnecessary legal action and inappropriate use of other agencies' investigative and laboratory personnel and resources. Forensic pathologists provide expert consultation to, among others, investigators, courts, prosecutors and defense counsel. They provide unbiased, legally and scientifically defensible determinations of the cause and manner of death; interpret the nature and mechanism of injuries; determine the significance of particular injuries and natural diseases; collect evidence; rule out potential confounding conditions, including natural disease processes; and, provide attorneys with essential information. Forensic pathologists are also sometimes asked about the role in causing or contributing to death of an intoxicating substance, the time of death, the order of deaths in a series of deaths or assess whether or not the decedent might have experienced pain. Although neutral, the forensic pathologist often provides the critical expert evidence in homicide prosecutions.

The same reasons that make forensic pathology expertise important to criminal investigations also apply to civil litigation involving death. Forensic pathologists match injuries and diseases to the reported causes and mechanisms of death and then testify accordingly, thereby supporting appropriate litigation and mitigating frivolous lawsuits.

The independent, objective, and scientific opinions of forensic pathologists educate society and supply answers to questions concerning suspicious deaths sensitive to the community: Forensic pathologists are key players in the human rights issues of war crimes and mass atrocities, often providing facts to the media that reduce the potential for uninformed community reaction and civil unrest. American FPs have also begun to use their expertise in wound recognition for examinations of living patients, a long-standing practice in England.

Forensic pathologists also serve as front-line public health officials committed to preserving health and identifying causes of preventable and unnecessary deaths. As custodians of death records, they maintain the integrity, accessibility, and proper storage of data to be used in investigations and research, providing data for public health officials, manufacturers, pharmaceutical companies, and policy makers, among others. The death certificates from forensic pathologists are generally considered to be of higher quality than those from other physicians. Moreover, forensic pathologists are specifically responsible for the reporting of non-natural death statistics for the jurisdiction (consequently, some ME offices now use forensic epidemiologists).

Since the autopsy is the ultimate quality assurance measure, as the rate of hospital autopsies continues to decline, MEs, as neutral governmental venues, may become increasingly called upon as arbiters of deaths in hospitals from suspected therapeutic misadventure and medical errors or otherwise.

Many of the organs and tissues obtained for transplantation come from non-natural fatalities, most commonly accidents. As such, forensic pathologists must decide whether to authorize the removal of particular organs/tissues for transplantation and assist families and organ procurement agencies in assessing the suitability of the decedent for organ/tissue donation. Maximizing organ/tissue retrieval while fulfilling medicolegal requirements in a particular case requires the expertise of a forensic pathologist and often necessitates altering standard procedures in order to ensure all medicolegal requirements are adequately satisfied. This can significantly stress a medicolegal system, especially one that has marginal or inadequate resources.

Historically, physicians have played important roles in the development of forensic science, particularly in the late nineteenth and early twentieth century. The scientific grounding in the medical tradition meant that physicians brought an analytic and technical background that typical detectives of the time did not have. The origins of toxicology, fingerprinting, serology, and ballistics can be traced back to or were otherwise strongly associated with physician involvement.

In an infrastructure survey by NAME in 2001, approximately 37% of medical examiner offices have their own toxicology laboratories, 14% their own DNA laboratories, and 14% their own crime laboratories. These figures are not surprising, since toxicology is the laboratory discipline most closely associated with responsibilities of MEs. In offices without toxicology labs, tests performed on the tissues and fluids of bodies may be performed in crime labs or by commercial laboratories. Not only do these laboratories search for controlled and abused substances, but also carbon monoxide, poisons, and therapeutic drugs. The latter, particularly antidepressant and anticonvulsant concentrations, often offer important insight into determining the cause and manner of death.

In the in-house DNA laboratory, tests are performed in cases of potential matching to evidentiary materials, for resolution of identity issues, or for potential clinical genetic testing. Medical examiner offices have begun storing DNA from autopsy cases. The most common request for

these postmortem DNA samples is in cases of parentage disputes, but exclusion as a suspect is the second most common request.

In some jurisdictions, ME offices have full crime laboratories that serve the police or sheriff as well as the office itself.

Forensic pathologists are becoming increasingly recognized as an important resource of medical knowledge for law enforcement, the courts, and the medical profession. They are involved in all aspects of medical education and provide autopsy experience for medical students and pathology residents and also educate non-physicians involved in death investigation (e.g., funeral directors, attorneys, law enforcement officials, forensic scientists, death investigators and coroners). Moreover, MEs educate the public through lectures at schools, to convicted offenders, and to public audiences on issues as varied as drunk driving, drugs, sexual assault and child abuse. Forensic pathologists participate in, and often lead, death review teams that look into pediatric deaths, deaths resulting from domestic violence, elderly abuse and suicides; they also serve as valuable participants on injury boards, public health boards, mine safety boards, and transportation safety boards.

MANPOWER AND EQUIPMENT

INTRODUCTION

A medical examiner's office should consist of four components, at a minimum: Medical, Investigative, Administrative, and Technical Support. In addition, the toxicology laboratory should also be an integral component in the medical examiner's office. Staffing should be appropriate for the numbers of deaths evaluated and autopsies performed. Investigators should be properly trained in medicolegal investigation and employees of the medicolegal death investigation system, not agents of law enforcement. The toxicology laboratory should be on the premises and under the authority of the Chief Medical Examiner. Other supporting laboratory functions without particularly unique features in an ME setting, such as histology or microbiology, may also be a part of the medical examiner office or those services may be obtained by contract.

This section addresses medical examiner staffing, infrastructure, and equipment and focuses on ways to improve the supply and availability of forensic pathologists, the capabilities of medical examiner offices, the safety of facilities, and the integrity of the forensic death investigation system. Estimated costs to meet these requirements and to purchase needed equipment are provided in the attached Appendices.

STAFFING

Over the past 25 years, NAME has studied staffing requirements and workload capabilities for medicolegal offices and forensic pathologists. Based on these studies, NAME has recommended that a forensic pathologist *who has no administrative duties* should perform no more than 250 autopsies per year. When the number of autopsies performed exceeds this threshold, there is a tendency for a forensic pathologist, no matter how skilled, to engage in shortcuts (e.g., performing partial autopsies when a full autopsy is warranted) or make mistakes (most commonly errors of omission such as failing to examine an injury or organ or to record complete relevant findings). By the time the workload exceeds 350 autopsies per year, mistakes are more likely to be flagrant and involve errors in judgment (e.g., a case may not be autopsied that should have been, or a diagnosis may be hastily made without sufficient basis, thought, or circumspection). Further, high caseloads may result in burnout and manpower attrition.

Each death case potentially involves issues of personal liberty, financial responsibility, culpability, criminal justice, public health, and/or public safety. Shoddy work can result in wrongful prosecutions, faulty attributions of blame, wrongful exonerations, missed homicides and other non-natural deaths, and threats to public health and safety. It is imperative that each death investigation be conducted correctly and professionally the first time, every time, by those who have proper skills and time to conduct the investigation.

There are approximately 2,800,000 deaths per year in the United States, 15-20% of which fall under the jurisdiction of ME/C offices. Estimates are that approximately 90% of all traumatic or suspicious deaths should be autopsied. Further, at least 50% of cases handled by most medicolegal offices are sudden, unexpected natural deaths, about 33% of which require autopsy

to identify the specific causes of death. On the basis of these observations, approximately 195,000 forensic autopsies should have been performed in 2002 (*See Appendix A*).

Based on the need for forensic autopsies and recommended maximum workload, at least 780 board certified forensic pathologists are needed to perform the autopsies that need to be done. Unfortunately, there are only 350-400 board-certified forensic pathologists practicing full time in the United States. In a NAME survey of 128 medicolegal facilities, 40% of forensic pathologists reported doing more than the maximum recommended 250 autopsies per year; nine percent indicated they performed more than 350. In actuality, more than 780 forensic pathologists are needed because a ratio of one FP to 250 autopsies assumes uniform distribution of cases and FPs. Further, FPs with administrative duties and those in areas in which there are high homicide or litigation rates require more time for court and related preparation should perform less than 250 autopsies annually. Some contend that one FP to 200 autopsies is more desirable ratio, which would require 975 forensic pathologists to manage the United States caseload.

To be a board certified forensic pathologist, one must have graduated medical school; obtained a medical license; spent a minimum of three to four years training in general ("hospital") pathology (usually AP/CP or AP) and one year additional subspecialty training in forensic pathology. Following satisfactory performance in an accredited training program, one must then take and pass examinations in both general pathology and forensic pathology. Only then does a physician become a board-certified forensic pathologist.

Unfortunately, not only are there insufficient numbers of qualified forensic pathologists in this country, but there is an uneven distribution, as well. Forensic pathologists tend to be concentrated in metropolitan areas; in more rural areas, access to FPs may be limited or non-existent. The insufficient number and unavailability of FPs means that forensic autopsies are either not being performed as needed, being performed by unqualified individuals, or being performed by overburdened FPs. Consequently, in addition to increasing the number of forensic pathologists, a plan for more even geographical distribution also needs to be undertaken.

Many political entities and the criminal justice community, including the courts, do not grasp the concept of board certification or the distinct differences in the training of forensic pathologists. As a result, in a number of jurisdictions throughout the US, physicians who are not qualified are performing forensic autopsies. These individuals fall into three categories: 1) board-certified hospital pathologists who are not forensic pathologists and have not been trained in this field (for them to do forensic autopsies is analogous to a general surgeon performing heart surgery; no hospital would permit such practice); 2) physicians who have gained experience in forensic pathology but have not been able to qualify for or pass the board examination in basic or forensic pathology (failure to pass a board examination after repeated attempts indicates failure to demonstrate requisite minimal knowledge in the field); and 3) physicians who have not even trained in pathology. Physicians in each of these three groups need to be supplanted by fully trained and qualified, board-certified forensic pathologists.

The most costly feature of upgrading and running a medicolegal office is the compensation of medical examiners. The average salary for a hospital pathologist in the United States is about $270,000, whereas in many areas of the U.S., Chief Medical Examiners are earning less than

$150,000, with other medical examiners making approximately $120,000, or less. With such a depressed salary range, a significant increase in the number of medical examiners is not very likely. About 30 forensic pathologists are trained annually, but approximately one-third practice hospital pathology only or forensic pathology only part-time, and another third drop out within 10 years. Low salaries contribute to medical examiner offices traditionally drawing a small core of highly qualified dedicated individuals and a host of people with marginal qualifications. In order to attract and retain qualified, competent, board-certified forensic pathologists, starting salaries should approximate $150,000 a year, plus benefits, with cost of living increases and adjustments based on experience and time in the position. Chief Medical Examiner salaries should begin at $200,000.

Although the federal government cannot force local governments to raise salaries, it can fund new grant positions at the proposed higher salaries. If coupled with mandatory accreditation of medical examiner offices, the marketplace will cause all salaries to be raised and help draw talented individuals into forensic pathology. NAME requests that federal funds be appropriated to create 100 new forensic pathology positions nationwide at a salary of $150,000 per year (plus overhead and benefits) and 20 Chief Medical Examiner positions at a base salary of $200,000. Additional monies are needed to provide equipment, create in-house toxicology laboratories, and otherwise enable ME offices to become and remain accredited.

A variety of other methods might also be employed to attract high-caliber individuals into the field of forensic pathology. Currently, ACGME does not require pathology residents to receive FP training during anatomic pathology training. Ensuring such training would cause increased forensic pathology exposure to those persons most likely to consider entering the field, which may in turn ultimately boost the number of forensic pathologists. In addition, requiring forensic pathology training during general pathology residency would help equip non-forensic pathologists who must perform medicolegal autopsies until there are sufficient numbers of FPs. Another method by which persons might be attracted into the field would involve federal student loan forgiveness programs for medical, and perhaps even undergraduate, education for persons entering the field of FP and working as government (local, state, or federal) employed forensic pathologists, particularly in underserved areas. Finally, increased funding for forensic pathology fellowship programs would likely result in more FPs.

EQUIPMENT AND FACILITIES

Medicolegal offices are often poorly equipped and inadequately housed. Response to a recent NAME survey of 128 medical examiner and autopsy-performing coroner offices revealed that eight percent of them did not have the x-ray equipment necessary to make basic diagnoses or locate radio-opaque objects such as bullets. Significant numbers of forensic autopsies are done in funeral homes, where not only is x-ray equipment lacking, but so are other necessary equipment such as adequate lighting and scales to weigh the body and organs.

Thirty-eight percent of the offices surveyed did not have in-house toxicology laboratories and some were thus dependent on state or police crime labs that could take several months to a year to report results, posing difficulties for families and all parties involved in case disposition. Moreover, crime labs often perform limited toxicological analyses, using methods not sanctioned

by the American Board of Forensic Toxicology (ABFT), resulting in incomplete toxicological information and fodder for challenges in the courts. Other offices must rely on private toxicology laboratories or clinical laboratories. It is highly desirable that all medical examiner offices have dedicated support laboratories and appropriate toxicology professionals in-house. The basic equipment cost to set up an in-house toxicology lab to handle 400 autopsies per year is over $300,000; thus, many jurisdictions cannot afford to equip, much less staff an in-house toxicology laboratories (*see Appendix C).* Funding deficits will continue to mount since all such facilities will soon have to be accredited by the ABFT.

Funding and availability of basic services for case management such as histology, microbiology, clinical laboratory testing, and genetic/metabolic lab services need to be assured to provide competent and timely death investigation services. Even these basic, requisite services are unavailable or underutilized in some areas due to lack of funding or access to services.

In many areas, bodies must be transported long distances for autopsy, which results in delays, hampers communication, endangers evidence preservation and integrity, and can complicate the interpretation of postmortem findings. Death investigation services with fully qualified forensic pathologists and support staff need to be readily available in all areas of the United States—not just in metropolitan areas.

Currently, the medicolegal death investigation system has many holes. There are approximately 2200 medicolegal offices in the U.S., more than half of which are coroner systems in which a non-physician has the ultimate authority to make medicolegal rulings as to cause and manner of death—even if their rulings conflict with the findings of the doctors they employ. Less than half of the nation's citizens are covered by a medical examiner system with a board-certified forensic pathologist in charge. There are commonly deaths occurring and autopsies being performed in areas remote from accredited medicolegal facilities. Further problems arise in jurisdictions that cannot afford to pay for autopsies. Many medicolegal offices are under a Sheriff or police agency, a clear conflict of interest for an entity that must be objective and impartial. For example, how can a death investigation office under the administrative and financial control of the police impartially evaluate a police shooting or an allegation that death resulted from police malfeasance? Such incestuous systems are more likely to foster pubic mistrust and claims of conspiracy or cover-up, whether perceived or real. Although some ME/C offices are within law enforcement agencies, typically this setup has occurred because the funding of law enforcement agencies has been given preference in recent years compared with that for other governmental agencies. In a model system, however, medicolegal systems should be independent of law enforcement in order to remain impartial and to avoid the appearance of impropriety and conflicts of interest. Federal assistance in upgrading and constructing adequate facilities would not only improve the medicolegal environment, but would help ME/C offices to become and remain independent from law enforcement.

SAFETY

Workplace quality and safety are important considerations in any environment, but particularly so in forensic facilities. In many areas, adequate facilities needed to perform forensic autopsies

are simply non-existent; in others, they are quite old and do not meet CDC or OSHA specifications for workplace safety. To protect workers from respiratory and blood-borne pathogens, CDC recommends, and OSHA requires, autopsy rooms to have: separate air supply and ventilation; a location physically separate from administrative areas; downdraft ventilation; at least 12 air exchanges per hour; negative air pressure relevant to surrounding areas with air flowing from clean to less clean areas; and HEPA-filtered exhaust to prevent release of pathogens into the environment.

Poor facility design and HVAC problems have resulted in the spread of tuberculosis in more than one ME office. Facilities still exist that lack drains; consequently, blood and other body fluids must be collected in buckets and dumped down a sink or toilet. At least one-third of facilities lack appropriate design and airflow systems to facilitate control of airborne and other pathogens. Finally, even though deaths involving intentional use of bioterrorism or chemical agents are homicides and fall under the jurisdiction of the ME/C, many autopsy facilities cannot function at the Bio-safety Level 3 required for handling some agents likely to be used in bioterrorism or occasionally seen in the general community.

FORENSIC DEATH INVESTIGATION

By systematically investigating deaths, MEs can recognize undetected homicides and other deaths from wrongdoing, as well as those caused by diseases constituting a threat to the public. It is the local ME, rather than the local police detective, who has the expertise to evaluate the medical aspects of homicides. It is the ME who will appear in court to testify as to the cause of death, generally a prerequisite to the prosecution of a homicide, and other medical aspects pertinent to the case. Federal funds need to include appropriate support for the forensic death investigation system that is a forensic science just as important as any other.

The federal government should specifically develop a goal of quality medicolegal death investigation available to all U.S. citizens. Such a system should be based upon professional death investigation systems employing fully trained and qualified forensic pathologists with competent investigative and support staffs. Specifically, coroner systems should be eventually replaced by medical examiner systems wherein forensic pathologists oversee death investigations and certify the cause, manner, and circumstances of investigated deaths.

The first important step is to enable appropriate distribution of forensic pathologists throughout the United States so they are readily available to all systems. Death investigation systems should be regionally based where needed to create a sufficient population to support the system. The federal government should develop incentives and programs to help states attain this goal. Since there is currently an insufficient number of board-certified forensic pathologists to adequately staff the United States, the Department of Health and Human Services (DHHS) should establish policies to help attract physicians into the practice of forensic pathology. The federal government should help promote coverage of all Americans by board-certified forensic pathologists by fully funding the Coverdell Act and providing such additional federal monies as are necessary to build a national infrastructure and attract and train additional forensic pathologists, create additional full-time FP positions, and help retain practicing FPs with competitive salaries and reasonable workloads.

The federal government could help medicolegal investigation by providing funding for needed support staff such as investigators, technicians, toxicologists, and clerical staff, as well as for services and technology to improve collaboration between forensic pathologists and allied specialists such as neuropathologists, pediatric pathologists and other consultative experts.

FORENSIC PATHOLOGY EDUCATION

INTRODUCTION

Pathology is the medical specialty that involves the study of the basic nature and features of disease and injury. It broadly encompasses clinical (laboratory medicine) pathology as well as anatomic (diagnoses via gross and microscopic examination of tissue samples from biopsies, tissues removed during surgery, or at autopsy) pathology. Forensic pathology is a recognized area of special competence within the field of pathology that requires additional training and experience for it to be competently practiced. As stated previously, forensic pathologists must complete a standard pathology residency and an additional year of forensic pathology training and pass examinations in both anatomic and forensic pathology in order to become board certified. Until recently, persons could also qualify to sit for the forensic pathology board examination by documenting sufficient experience within the field of forensic pathology, but this option is no longer allowed.

Medicolegal opinions are based on an integrated investigation of the circumstances pertinent to death, death scene, the body of the decedent and ancillary diagnostic studies such as laboratory tests and radiographs. One of the most important tools of the forensic pathologist is the medicolegal autopsy--a medical/surgical procedure performed on the dead body.

Autopsies are of two general types: hospital (medical) autopsies, performed on patients who expectedly die of natural causes while under a physician's care and medicolegal autopsies, performed on persons who die suddenly and unexpectedly or as a result of violence.

As part of formal general pathology residency training, all pathologists are required to become proficient at "hospital" autopsy performance; however, as the number of hospital autopsies performed annually continues to dwindle, fewer autopsies are required to be performed as a part of pathology residency training. In addition, forensic autopsy exposure and experience are quite variable from one pathology residency program to another.

Due to the scarcity of forensic pathologists, hospital pathologists practicing "anatomic" or "clinical" pathology are often consulted about forensic pathology issues. However, hospital autopsies and medicolegal autopsies differ from one another in many very important ways. No matter how competent these pathologists are in the practice of anatomic or clinical pathology, however, only licensed physicians with formal training and expertise in the theory and practice of forensic pathology should perform medicolegal autopsies.

Death investigators are usually non-physicians working within medicolegal death investigation system who are responsible for investigating medicolegal deaths, including all those related to trauma or drugs, and those that are sudden and unexpected. Various other case types may also be included, depending on jurisdictional law. In certain jurisdictions, these "front-line" death investigators are required to be physicians, and in even rare instances, forensic pathologists. In most jurisdictions, however, there are no such requirements.

Death investigators are responsible for receiving the official notification about any death that is required to be reported to the medicolegal death investigation agency. They perform death investigations, including scene investigations, often working closely with law-enforcement agencies and frequently communicating with medical personnel and family members. In some jurisdictions death investigators are responsible for determining whether or not an autopsy will be performed. In other jurisdictions (typically, medical examiner offices), the decision about whether or not to perform an autopsy is the responsibility of forensic pathologists.

FORENSIC PATHOLOGISTS AS EDUCATORS

With their special training and experience, forensic pathologists are best equipped to direct death investigation systems in the United States and to educate the general public and professional and allied personnel who should have a basic understanding of forensic pathology, including death investigators, pathology residents, forensic pathology fellows, (non-FP) physicians, nurses, hospital and clinic personnel, emergency medical workers, nursing home/long-term care facility staffs, law enforcement personnel, and funeral home workers. In addition, it is extremely important that local, state, and national government officials understand the importance of forensic pathology and death investigation.

It is imperative that all of the foregoing groups have appropriate knowledge of forensic pathology and related forensic issues if we are to attain nationwide, high quality, consistent, professional, and comprehensive death investigations. In particular, medical and funeral home personnel must be aware of which cases are to be referred to the death investigation agency, and to know appropriate ways to deal with bodies, evidence, etc. Local, state, and federal government personnel and elected officials should understand the profession of forensic pathology, its role in society, and what it requires to provide the best possible service to society. Death investigators must have adequate training and perform their duties at or above minimally acceptable standards.

While many jurisdictions have attained such high-quality operation, many more have not. Even within certain statewide systems, there can be wide variation in death investigation practices between locales. When judging the state of death investigation, it is important to remember that a system is only as strong as its weakest link. Therefore, we must not be satisfied with the nation's death investigation system until every jurisdiction has attained high-quality death investigation practices. Better forensic pathology education is a vital component of this process. The federal government can help by providing funds to: develop curricula for various groups; enable NAME liaisons to travel to meet with various governmental agencies that impact FP practice; and establish federal loan forgiveness programs for persons who become employed as government-paid MEs in areas of critical need. Further, the federal government could encourage the adoption of uniform adequate standards for competent death investigation by providing federal subsidies to states that require and provide certified medicolegal death investigator training in accordance with the NIJ's *National Guidelines for Death Investigation* and ensure forensic pathology education and experience for all anatomic pathology residents via grants for positions and courses to be included in ACGME- approved training. Finally, forensic pathology fellowship training and research would benefit greatly from additional federal funding.

CONTINUING EDUCATION FOR FORENSIC PATHOLOGISTS

Continuing education of forensic pathologists remains of great importance. Forensic pathologists not only require the services of the crime lab, but also are themselves forensic scientists who conduct their own forensic investigations. At the least, forensic pathologists need to be aware of the forensic laboratory analytic capabilities that can be applied to evidentiary material found on bodies and should know how to conduct a thorough examination and how to collect, preserve, and document evidentiary material. This requires knowledge of current forensic science principles and capabilities. The forensic sciences have been greatly expanding and maturing in recent years and it has been difficult for forensic pathologists to keep current with this burgeoning field.

Funding for educational activities, national meetings, and research are all methods of fostering continuing education for forensic pathologists. Although NAME, AAFS, ASCP, and CAP have excellent forensic conferences and continuing education programs, all are cash-strapped. Further, continuing education costs run approximately $1500 per year for each forensic pathologist, investigator, toxicologist and administrator. Many offices cannot afford to defray or reimburse these costs, thus shifting the burden to individuals who can ill-afford them. Therefore, federal grant money is needed to support continuing education and encourage participation in professional meetings and conferences.

PROFESSIONALISM AND ACCREDITATION

INTRODUCTION

"Professionalism is defined as the basis of medicine's contract with society. It demands placing the interests of the patient above those of the physician, setting and maintaining standards of competence and integrity and providing expert advice to society on matters of health."[1] This definition applies to all aspects of the medical examiner's practice: death scene investigation, autopsy practice, public health reporting, expert testimony and public service. NAME believes appropriate death investigation rests on an integrated system, a three-legged stool with the legs representing the forensic facilities/resources, forensic autopsies and investigations. In order to have a competent functional system, accreditation and professionalism in each of these areas must be developed and supported.

Comprehensive accreditation for medical examiner systems already exists. NAME has a broad-based inspection and accreditation system, which includes facilities, safety, personnel, death notification, case acceptance, release of human remains, investigations, evidence and specimen collection, support services, reports and records, mass-disaster planning and quality assurance. Unfortunately, the majority of offices in this country have not attained NAME accreditation, in many cases because of inadequate staffing, inadequate facilities, inadequate equipment, or a combination of these factors. This is particularly problematic in light of Coverdell's mandate that facilities be accredited or in the accreditation process to qualify for funding.

ACCREDITATION

Since 1975, NAME has provided a system of accreditation and inspection for the operation and practice of medical examiner facilities. The accreditation program has been successful, although slow to develop and expand. Offices that have gone through the accreditation process have experienced improvements in quality of their facilities and practices, but there are only 40 accredited offices in the United States out of a total of 465 facilities. Many autopsies are performed in areas remote from accredited medicolegal facilities. Only 23% of the population is served by an accredited facility.

The reasons for the low number of accredited offices are varied but relate mainly to the lack of resources and the absence of compelling incentives, both positive and negative. The accreditation process is difficult, time consuming and potentially costly. Some offices obtain increased political and financial support as a result of the accreditation process, but otherwise realize few tangible incentives other than assuring the community that the office is functioning under the best practice the profession can enforce. Moreover, there are currently no negative repercussions for a non-accredited office, either professional or financial. An office that attempts to obtain accreditation but fails may motivate local authorities to increase support for the office, but may also open itself up to public ridicule, embarrassment, or courtroom criticism.

[1] "Medical Professionalism in the New Millennium: A physician charter," Project of the ABIM Foundation, ACP-ASIM foundation, and European Federation of Internal medicine, Ann Internal Med, 2002, 136; 3:246.

The only way to systemically upgrade the medical examiner offices nationwide is to require accreditation by NAME. This could be directly stimulated by requiring any medicolegal office receiving *any* federal grants to be accredited (unless the grant money is being used to help achieve accreditation) or indirectly stimulated by requiring any district attorney's office or court receiving federal grants to require the medicolegal agency they deal with to be accredited. The ABFT has recently developed an accreditation system for medical examiner-based toxicology laboratories. This accreditation and inspection program is of high quality, comparable with other accreditation programs accepted by the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO).

THE PRACTICE OF FORENSIC PATHOLOGY

Nationally, many pathologists without adequate forensic training elect and are permitted to perform medicolegal autopsies. This practice leads to errors in both the performance and interpretation of the results of forensic autopsies.

Since there currently are far too few forensic pathologists available to perform all of the forensic autopsies that are required, many jurisdictions rely on non-forensic (hospital- based) pathologists to perform medicolegal autopsies. Non-FP pathologists typically receive training in hospital autopsy performance, which is not sufficient preparation to perform a medicolegal autopsy. There are many issues of forensic interest that are typically not at issue or routinely addressed during hospital autopsies. Although some of these pathologists may do an adequate job in routine, uncomplicated cases, others do not. Moreover, even non-forensic pathologists who are capable of handling simple, straightforward cases will inevitably encounter cases that initially appear straightforward but subsequently become complex. In some cases, overt or subtle indications that a medicolegal autopsy is necessary may not be recognized by practitioners unskilled in forensic pathology resulting in failure to perform the appropriate examination. Unfortunately, there is no way to know how many homicides or other complex cases have been missed or improperly evaluated for these reasons.

From a medical standpoint, allowing general pathologists to perform forensic autopsies is similar to having general surgeons attempt to perform open-heart surgery. It is doubtful that any patient would consent to an operation under those circumstances—if indeed any hospital would allow it. Therefore, NAME recommends that we work toward a national goal of having all medicolegal autopsies performed only by ABP-certified forensic pathologists.

In 1998, CAP's forensic pathology committee published the "Practice Guideline for Forensic Pathology" in an attempt to codify the practice of forensic pathology. Implementation of the guidelines was voluntary and lacked incentive for pathologists to attain long-lasting change. NAME is currently working to articulate performance parameters for forensic autopsies.

PROFESSIONAL DEATH SCENE INVESTIGATION

Parameters for the examination of the body at a death scene should be set forth in the medical examiner or coroner's policy and procedures. Generally, the body is in the custody of the

medical examiner or coroner while the larger scene is the custody of law enforcement. The involvement of medical examiners at the scene is not uniform: Some medical examiners personally attend the death scene while others delegate the work to investigators with varying levels of training and experience.

Over the decades, medicolegal death investigators have become valuable members of the medicolegal office team. Until recently, these individuals received on-the-job training but had no specified educational background or curriculum. Essential skills required of a death investigator now have been defined and have become the basis for professional certification by the American Board of Medicolegal Death Investigators (ABMDI). The ABMDI currently has approximately 800 registered death investigators.

Additionally, in 1998, NIJ sponsored the development of *National Guidelines for Death Scene Investigation*, which contains 29 identified investigative tasks to be performed at every death scene, "Every scene—Every time." These guidelines are voluntary but have been incorporated into the standard office practices of a number of law enforcement and ME/C offices.

Many states have created statutory requirements for death scene investigators. For example, Tennessee requires 100 hours of certified training, and Indiana requires completion of a 40-hour training program supplemented with standardized testing. Many other state medical examiner and coroner associations and academic institutions have provided various levels of training for death investigators.

The largest challenges underlying inadequate scene investigations are the shortage of adequate personnel and the funds to train them. Death investigators at every level should have adequate training and perform their duties in accord with professionally accepted standards. The federal government can help by providing funding for training and professional certification of death investigators

COLLABORATION BETWEEN THE FEDERAL GOVERNMENT AND STATE AND LOCAL FORENSIC LABORATORIES

INTRODUCTION

To date, there has been limited interest in or support for medicolegal death investigation from the federal government, despite the fact that protection of citizen safety is a fundamental government function. By systematically investigating deaths, medical examiners recognize unsuspected homicides and other deaths from wrongdoing, as well as those deaths caused by diseases or other means constituting a threat to the public. The independent, objective, and scientific opinions of forensic pathologists educate society and help appropriately illuminate suspicious deaths. The federal government should recognize and actively support competent professional medicolegal death investigation as a critical component of criminal justice, public health, and homeland security, with value that transcends state and local interests.

NATIONAL INFRASTRUCTURE

Criminal Justice: In the criminal justice system, MEs apply medical science to death investigation. It is the medical examiner, not law enforcement personnel, who has the expertise and responsibility for addressing the medical issues that arise in homicidal deaths. The medical examiner, rather than the detective, will appear in court to testify as to the cause of death—generally a prerequisite to the prosecution of a homicide—and addressing the medical issues pertinent to the case. Identification of the deceased, range of gunfire, recognition of a patterned abrasion, assessing intoxication, and evaluating whether or not a decedent experienced pain may be other important issues to which the medical examiner testifies. Perhaps most important is the ability to distinguish when facts and accounts fit the mechanism of death or injury and when they do not. Sometimes, the forensic pathologist will recognize an apparent natural death to be a homicide, and at other times examination may reveal a death to be a suicide, natural disease or other process rather than from a homicidal act.

NIJ is the logical federal body to support medical examiners in their criminal justice mission. The agency has previously catered to the crime laboratory component, but has shown interest in the medical examiner community, having funded such areas as forensic entomology and linguistics and, more recently, an Institute of Medicine (IOM) Workshop on Medicolegal Death Investigation in the U.S. The most significant NIJ support was for the establishment of the Death Investigation Guidelines, which have, in fact, had a substantial impact on the community. However, the only NIJ funds that have been expended for medical examiner infrastructure have been from the recent and poorly-funded Coverdell Act.

Public Health: Medical examiners are public health officials committed to preserving health and identifying causes of preventable and unnecessary deaths. Standardized death reporting allows for statistical medical research and epidemiological studies providing information on population-based disease, injury patterns, and the effectiveness of therapy, thereby benefiting the population as a whole. Since MEs currently perform most autopsies in the United States, they

provide the best source of information on causes of death, especially those that are sudden and unexpected and those due to violence. These data will be used not only by public health officials, but also by product manufacturers, pharmaceutical companies, OSHA, etc. The National Vital Statistics System receives approximately one third of its information and all its non-natural and sudden and unexplained deaths data from medical examiner and coroner offices. Medical examiners provide valuable information on deaths from drugs and alcohol, domestic violence, child abuse, and other patterns of injury and disease that affect the community at large. They provide surveillance for emerging infectious diseases, dangerous work environments, environmental conditions, adverse drug reactions, defective products and medical therapy-related deaths. Examples of key impacts include the SIDS-related "back-to-sleep" campaign in which infants are recommended to sleep in a supine position; latches on the inside of car trunks; infant car seats; correct spacing of infant crib railing; and, collapsible automotive steering wheels.

The CDC is the logical choice as lead agent for public health issues. In the past, CDC has actively attempted to facilitate the computerization of medical examiner offices with minor success due to inadequate funding. Specifically, the CDC began the Medical Examiner/Coroner Information Sharing Program (MECISP) in the 1980s but it has collapsed due to lack of ongoing CDC support. The CDC has funded a few projects, such as investigation of unrecognized sudden deaths due to infectious diseases. Most recently, CDC has funded a National Violent Death Reporting System pilot project that directs public health officials to work with medical examiners. There has also been some minor inclusion of MEs in bioterrorism surveillance efforts. The support of the CDC has waxed and waned over the years and has neither garnered significant consistent high-level CDC support nor substantially systemically impacted medical examiner office infrastructure.

Homeland Security: Forensic pathologists are part of the fabric of homeland security and should be recognized as "first responders". Medical examiners and coroners have state statutory authority to investigate deaths that are sudden, suspicious, violent, unattended and unexplained. Fatalities due to terrorist events are homicides and therefore fall under ME/C statutory jurisdiction. Medical examiners will confirm the cause of death, generate and collect evidence necessary for attribution of terrorist acts, and testify to the deaths of victims in subsequent legal proceedings. Accordingly, the deaths from the anthrax-laced letters of 2001 were performed in medical examiner's offices. In mass fatality incidents, such as in the World Trade Center attacks, forensic pathologists lead the efforts to not only determine the causes of deaths but to identify the victims. Hypothetical scenarios such as the "Dark Winter" smallpox exercise resulted in three million 4th generation cases of smallpox and 1 million deaths. The "TOPOFF" plague exercise had 2,000 fatalities in a one-week period, illustrating the profound need for medical examiner involvement in homeland security preparedness. The DHS has now subsumed Federal Emergency Management Agency (FEMA) and NDMS as homeland security resources.

Moreover, medical examiners are a key component of surveillance for emerging infections, terrorist threats, and infectious epidemics. The CDC has identified medical examiners as essential partners in bioterrorism preparedness. A victim of a bioagent (or, for that matter, a chemical agent) may be first recognized at the postmortem examination. Most biothreat agents begin with flu-like symptoms and may be thought to be such. It is not unusual for people with infections to die at home without being seen by a clinician or after being seen by a physician that

does not recognize the illness for what it is. Even people who die in hospitals of potential infectious diseases might fall under medicolegal jurisdiction if they die precipitously before an accurate diagnosis is made or if there is a public health concern. Autopsy pathologists rather than clinicians were the physicians who recognized the sentinel case of smallpox in a 1945 outbreak. In the 1979 Sverdlovsk outbreak from an accidental release of anthrax spores, autopsies allowed pathologists to identify the cause of death as anthrax and also the route of infection as inhalation. In 1993, medical examiners recognized an outbreak of the Hantavirus pulmonary syndrome which has symptoms that can mimic bioterrorism-related illnesses. The threats to the public from emerging infections, bioterrorism and other attacks do not respect political boundaries. As state and local jurisdictions discover and grapple with them separately, precious time is lost until a coordinated response can be mounted. Clearly, this is of prime federal interest.

FEDERAL MEDICAL EXAMINER SERVICE AND SUPPORT

The only federal medical examiner system in the United States is the AFMES. Pursuant to 10 USC 1471, the Armed Forces Medical Examiner (AFME) has primary jurisdiction over all cases in areas of exclusive federal jurisdiction on military installations. This jurisdiction can extend to investigations outside areas of exclusive federal jurisdiction where other federal investigative agencies such as the FBI are involved. This includes use of the AFMES assets by the FBI under Title 18. Overseas, the AFME may engage in case of the death of military members and dependents with either primary or secondary jurisdiction in accordance with local law and Status of Forces Agreements.

Until recently, The AFMES has not been well supported by the military. The AFMES is a specialty operation that primarily serves military combat and training casualties in addition to traditional civilian forensic pathology. As the only federal medical examiner office, the AFMES is often consulted by other federal agencies and it does, in fact, participate in many interesting and important cases. For instance, the FBI has no internal medical examiner capability and will often consult with the AFMES for forensic pathology expertise. The AFMES also serves the pathology community through consultation, education, and research. The AFMES will review civilian cases submitted to them for a fee as mandated by 10 USC 176, however the numbers of civilian cases submitted are relatively few. The most important area in which the AFMES has assisted local medical examiners is in mass disaster situations, again when requested and usually for a fee, where they do have considerable expertise.

The Disaster Mortuary Response Team (DMORT), an element of NDMS that can be mobilized to assist state and local efforts in times of a declared disaster, has provided a valuable service to jurisdictions in need. Their services are particularly valuable when a multiple fatality incident occurs in a coroner jurisdiction with no forensic pathology resources, training, or experience; but even well-resourced offices often have limited contingency capacity. Currently, DMORT lacks capacity for microbiologic diagnosis and autopsy biosafety that mirrors the inadequacies in many local jurisdictions and substantially limits the federal capacity to respond to fatal episodes of bioterrorism. Some degree of federal oversight is necessary to develop either regional autopsy centers for potential infectious diseases or a mobile Biosafety level 3 autopsy laboratory. Under the Federal Response Plan (and, presumably, the National Response Plan), DMORT has been

limited to victim identification services only. DMORT, along with other relevant operations, has moved into the newly formed Department of Homeland Security, however it has not yet been formally reconstituted and it is not clear what form it will take in this organization. The Catastrophic Incident Response Annex (CIRA) to the National Response Plan drafted by the DHS that outlines the actions for mass disasters is replete with appendices concerning logistics, safety, transportation and medical care but Appendix eight, entitled "Mass Fatalities" is still largely blank for want of expertise in this area.

The District of Columbia Office of the Chief Medical Examiner (OCME) is a unit of the local D.C. government, but it handles cases of significance and with implications for the federal government. This medical examiner's office has been inadequately supported by the troubled D.C. government and could benefit from federal assistance.

A federal medical examiners liaison office within the DHS would permit coordination with state and local agencies as a surveillance network for terrorist incidents and also serve to integrate the well-qualified and capable state and local medical examiners into the federal antiterrorist investigative system.

FEDERAL AGENCY SUPPORT

Medical examiners fall between the cracks in an orphaned community, not truly claimed by law enforcement, public health, or traditional medicine. Law enforcement sees us as public health, public health sees us as law enforcement, and traditional medicine scarcely acknowledges our existence.

There is currently no lead agency or proponent for forensic pathology and medicolegal death investigation issues within the federal government. The NIJ should be a lead agent for law enforcement, the CDC should be the lead agent for public health issues, and the DHS should be a lead agent for homeland security and mass fatality issues. These agencies should develop programs to assist medicolegal death investigation systems in the United States.

Congress should fully appropriate the funding as designated in the Coverdell authorization language. This is the only existing mechanism to directly assist state and local medical examiner and coroner offices with infrastructure as they see fit. Funding is contingent upon a state plan and accreditation.

The CDC and NIJ should foster an effort to computerize and connect offices to permit information sharing between medical examiner offices and agencies of the local, state, federal governments. This effort could be an expansion of the currently developing National Violent Death Reporting System (NVDRS). A National Office of Death Investigation Affairs (NODIA) should be established to include the CDC, NIJ, NCVHS, CPSC, NTSB, DOT, OSHA, BMS, NIDA, and DHS, among others. The agencies should pay a small fee for use of the data extracted from this network.

Despite a greater than $2 trillion budget, the NIH has not been a source of significant research funding for the medical examiner community. Medical examiners deal with many high priority

health issues and are the last stronghold of autopsy pathology. Nonetheless, most forensic pathology research is not considered basic research, but rather applied (or translational) research, and is otherwise not a favored area of research for funding by NIH. The NIH should develop a program of research on causes and mechanisms of deaths that is accessible to forensic pathologists in medical examiner offices; topics should include child abuse, gun violence, drug overdoses, transportation safety, autopsy surveillance for medical errors, etc. Investigators involved in projects dealing with such topics should be encouraged to include forensic pathologists in their studies. The NIJ should convene technical working groups of forensic pathologists and others to deal with related law enforcement issues.

NEED FOR NATIONWIDE COVERAGE BY FORENSIC PATHOLOGIST-BASED DEATH INVESTIGATION SYSTEMS

The level of expertise and the amount of training and continuing education of front-line death investigators (be they within medical examiners systems or coroners systems) vary widely from one jurisdiction to another, and sometimes within a given jurisdiction. A particularly striking weak link in the current national situation is the fact that in many jurisdictions, front-line death investigators who are not forensic pathologists are for all intents and purposes responsible for deciding whether or not autopsies will be performed in specific cases. Instead of having a well-organized system where the ultimate decisions regarding many important aspects of death investigation rest on a forensic pathologist, these systems allow important decisions to be made by persons with far less training and experience. Because of this, in the year 2004, there are still many areas within the USA where various case types (SIDS-like deaths, infant drownings, etc.) might not be autopsied. For this reason, it is imperative to establish nationwide, forensic pathologist-based death investigation systems.

APPENDIX A

Forensic Pathologists Required to Handle U.S. Autopsy Caseload

Traumatic/Suspicious Deaths

Homicides	17,000
Suicides	30,000
Accidents	102,000
SIDS	2,000
Undetermined	4,500
Other	500
Total	156,000

Total Autopsies Needed

Manner	Cases	Autopsy Rate	Autopsies
Trauma	156,000	90%	140,000
Natural	156,000**	33%	55,000
			195,000

* National Vital Statistics Reports - CDC (numbers rounded) for 2002

** Assumes Natural deaths constitute 50% of cases handled by Office

Forensic Pathologists Needed to Perform 195,000 Autopsies *

250 Autopsies/FP	200 Autopsies/FP
~800	~980

* Assumes uniform distribution of cases, which does not occur

** 250 is the recommended caseload for FPs without administrative duties; therefore, 200 Autopsies/FP is a more realistic workload

APPENDIX B

Recommended Staffing of Medical Examiner Offices

Autopsies per Year	Chief Medical Examiner	Medical Examiner	Administrator	Diener (Forensic Technician)	Photography	Statistician	Attendant	Receptionist	Clerk	Secretary	Investigator	Chief Toxicologist	Toxicologist/Chemist	Histologists	Maintenance	Custodian
400	1	1	1	2	0	-	1	1	1	2	5	1	2	1	1	1
600	1	2	1	3	0	-	2	1	1	2	6	1	2	1	1	1
800	1	3	1	4	1	-	2	1	1	3	7	1	3	1	1	2
1000	1	4	1	5	1	1	3	1	1	4	8	1	4	1	1	2
1200	1	5	1	6	2	1	3	1	2	5	9	1	5	2	1	2
1400	1	6	1	6	2	1	4	1	2	5	10	1	7	2	1	2
1600	1	7	2	7	2	1	4	1	2	6	11	1	8	2	1	3
1800	1	8	2	8	3	2	5	1	3	6	12	1	9	2	1	3
2000	1	9	2	9	3	2	5	1	3	8	13	1	10	3	1	3

(For small- to medium-sized offices only; multiples will not work for systems handling > 2000 autopsies/year)

Suggested Salaries

Chief Medical Examiner	$ 200,000	Lead Secretary	$ 55,000
Associate Medical Examiner	150,000	Secretary	27,000
Administrator	82,000	Chief Investigator	74,000
Diener (Forensic Technician)	28,000	Senior Investigator	62,000
Senior Photographer	40,000	Investigator	51,000
Photographer	28,000	Chief Toxicologist	85,000
Statistician	60,000	Toxicologist	60,000
Attendant	25,000	Histologist	35,000
Receptionist	24,000	Maintenance	31,000
Clerk	26,000	Custodian	21,000

Additional Positions in Larger Offices:

Transcriptionist	35,000
Evidence/Computer Manager	59,000
Grant Writer	44,000
Epidemiologist	58,000

NOTE: Add 39% of salary to the above to cover overhead/benefits

APPENDIX C

COST TO EQUIP A BASIC[1] TOXICOLOGY LABORATORY

Equipment	Quantity	Unit Cost	Extended Cost
Gas Chromatographs	3	$ 46,775	$ 140,325
Gas Chromatograph – Mass Spectrometer	1	105,000	105,000
CO-oximeter	1	9,000	9,000
Spectrophotometer	1	18,000	18,000
Immuno-assay	1	35,000	35,000
			=========
Total Equipment Costs			**$ 307,325**

BASELINE STAFFING REQUIREMENTS/COSTS

1 Board-Certified Chief Toxicologist @ $60,000-70,000/year (plus 39% overhead/benefits)
2 Toxicologists/Forensic Chemists @ $40,000-$50,000/year (plus 39% overhead/benefits)

[1] These estimates are sufficient for a facility that handles up to 400 autopsies or less/year; staff and equipment needs increase as the number of autopsies increase. Additional equipment should be added in the following increments:

Autopsies/year	Additional Equipment Needed
800	Gas Chromatograph – Mass Spectrometer 1 Immunoassay
1200	2 Gas Chromatographs 1 Gas Chromatograph – Mass Spectrometer 1 Immunoassay
1600	1 Gas Chromatograph 1 Gas Chromatograph – Mass Spectrometer 1 Immunoassay
2000	1 Gas Chromatograph 1 Gas Chromatograph – Mass Spectrometer 1 Immunoassay

APPENDIX D

COST TO EQUIP A BASIC HISTOPATHOLOGY LAB

Equipment:

Tissue processor	$ 50,000
Slide stainer	40,000
Cryostat	43,000
Auto cover slipper	35,000
Embedding units	11,000
Microtone knives (2)	20,000
Paraffin wax dispenser	2,000
Microscope	4,000
File cabinet	2,000
Hot water baths (2)	800
Lab oven/incubator	1,500
Alcohol cabinet	600
Misc. Lab items	7,600
Annual cost for supplies and chemicals	12,500
	=======
TOTAL	**$230,000**

Salaries (plus 39% load per person):

Certified lab manager $51,000
Histo/lab technicians $35,000

Note: If there is a community facility available, it may be more economical to contract for histopathology services.

APPENDIX E

Equipment Requirements for Medical Examiner Offices

Autopsy Equipment

Digital X-ray with stations and printers	$140,000
Surgical Microscope	20,000
Dental X-ray	4,500
Video Colposcope	7,750
Dissecting Scope	1,500
Laser alternative light source	8,000
Evidence Drying Cabinet	8,000
Digital cameras	625
	=======
Total Autopsy Equipment	**$ 191,750**

Medical Examiner

Desk Microscope	$ 4,500
Cell Phone	150
	=======
Total per Medical Examiner	**$ 4,650**

Investigator

Vehicle (SUV 4x4)	$ 27,000
Laptop computer, hardened	4,000
Digital cameras	285
Cell Phone	625
	=======
Total per Investigator	**$ 31,910**

Office Equipment

Networked computer with printer access included in overhead costs for each employee

APPENDIX F

Overview of Medicolegal Death Investigation

Typically, the ME's work begins when he or she receives a death report from police. If jurisdiction (determined by enabling statute) is accepted, the ME generates a case number and takes charge of the body. Medicolegal death investigators (and in some instances the forensic pathologist) then go to the scene to investigate the death and write a written narrative (independent of the police) in accordance with the NIJ National Guidelines for Death Investigation, place the body in a body bag and transport it to the medical examiner morgue where it is held in a cooler pending examination.

After reviewing the investigative report and any available medical records, the forensic pathologist decides whether to sign out the case and release the body or to perform a postmortem examination, either an inspection (external examination only) or an autopsy (external and internal examination). Deaths generally undergoing autopsy include, among others, known and suspected homicides, other deaths by violence, unexpected and unexplained deaths, deaths in police custody or associated with police action, unidentified remains, workplace-related deaths.

The examination begins with a determination of the sufficiency of the presumptive identification, if any. Standard identification procedures include taking a photograph of the face with a case number, a DNA specimen and, in some jurisdictions, fingerprints. When identification is not established or is questioned, additional procedures such as x-rays and dental comparisons may be performed.

After preliminary identification procedures are completed, the ME conducts a careful external examination, which is often the most important aspect of an autopsy. The ME photographs the body, generally "as is" (clothed and with hospital appliances attached), weighs and measures it, and then searches for trace evidence, first documenting and then removing and sending clothing out for further forensic examination, if warranted. The ME also notes postmortem changes, such as rigor mortis (muscle stiffness), livor mortis (pooling of the blood), and state of decomposition, and describes any evidence of injury (by type, location, size, shape, and pattern) or disease. Additional detailed photographs are taken when warranted.

The ME then opens the body with a "Y" incision, cutting from each shoulder to mid-chest and extending the incision through the midline to the pubis to allow the in-situ examination and evisceration of the thoracic and abdominal cavities, after which the scalp is opened using an incision extending from behind one ear to behind the other ear to allow removal of the calvarium, the brain and the dura. The tongue and neck organs are also removed. The ME then examines, weighs, and serially sections each organ, and saves specimens for appropriate toxicologic, histologic and/or other laboratory studies.

The ME may perform special examinations in specific circumstances (e.g, pubic combings, swabs and smears of the vaginal, anal, and oral orifices, and obtaining exemplar hairs in cases of sexual assault; removing the eyes in cases of suspected infant abuse).

Although the typical autopsy dissection may require less than three hours (with complicated cases taking much longer), the ME then must analyze the autopsy findings, dictate the autopsy report, examine and interpret the microscopic slides, incorporate the toxicology results and other consultation reports, perform further investigations and calls to others about the case, and prepare the final postmortem report and death certificate. The entire process may take many hours spread over several weeks.

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