

# Medical Examiners, Coroners, and Public Health

## A Review and Update

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● **Context.**—Traditionally, the emphasis of work done by medical examiners, coroners, and the death investigation community has been viewed as serving the criminal justice system. During the last several decades, however, an important role for these 3 groups has emerged within public health.

● **Objective.**—To provide important background information on death investigation systems, the evolution and framework of public health entities that rely on information gathered by medical examiners and coroners, and the role of medical examiners and coroners in epidemiologic research, surveillance, and existing public health programs and activities.

● **Data Sources.**—Previous articles on epidemiologic aspects of forensic pathology and the role of medical examiners and coroners in epidemiologic research and sur-

veillance; a review of the Web sites of public health and safety agencies, organizations, and programs that rely on medical examiner and coroner data collected during medicolegal investigations; and a review of recent public health reports and other publications of relevance to medical examiner and coroner activities.

● **Conclusions.**—The role of medical examiners and coroners has evolved from a criminal justice service focus to a broader involvement that now significantly benefits the public safety, medical, and public health communities. It is foreseeable that the public health role of medical examiners and coroners may continue to grow and that, perhaps in the not-too-distant future, public health impact will surpass criminal justice as the major focus of medicolegal death investigation in the United States.

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Never in history have medical examiners and coroners in the United States been as involved as they are today with issues, programs, projects, and agencies having a public health focus. A July 2005 search of the Centers for Disease Control and Prevention's (CDCs) Web site at [www.cdc.gov](http://www.cdc.gov) disclosed 292 *Morbidity and Mortality Weekly Report* articles and 3411 overall hits for the words "medical examiner" or "coroner" within various CDC publications. Although the current state of affairs has evolved for decades, the interactions and working relationships among medical examiners, coroners, and public health workers is still—in many areas of the country—in its adolescence, if not its infancy. This article provides background information on the field of public health as it relates to medicolegal death investigation and includes information about various public health activities, projects, and programs that involve a joint effort among the public health community, medical examiners, and coroners.

### DEFINITIONS

For the purpose of this review article, the following definitions are provided:

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● **Death Investigation.** An investigation officially conducted by a medical examiner or coroner.

● **Medical Examiner and Coroner.** The titular head of a death investigation system that operates under provision of state law to investigate deaths that are sudden, unexpected, and unexplained or that are thought or known to involve external causes such as injury, poisoning, violence, or circumstances that warrant special investigation such as deaths in custody of law enforcement personnel or agencies. The differences between medical examiners and coroners are discussed elsewhere.<sup>1</sup>

● **Death Investigation System.** An official agency, administered by a medical examiner or coroner, charged by statute to conduct death investigations in 1 or more geopolitical jurisdictions such as a city, county, region or district, or state.

● **Jurisdiction.** The state, district or region within a state, county, or city for which a medical examiner or coroner conducts official death investigations.

● **Public Health.** An allied health and medical specialty area having the major goals of improving and promoting the population's health and welfare and reducing or preventing morbidity (illness/injury) and mortality (death).

● **Epidemiologic Research.** Epidemiologic research involves 3 basic elements that include describing, explaining, and predicting. The health status of populations is *described* by enumerating the occurrence of conditions (disease or injury), obtaining the relative frequencies within groups, and discovering important trends; the etiology of conditions is *explained* by determining factors that cause specific disease or trends; and the number of occurrences and the

distribution of health status within populations is *predicted* with the goal of controlling the distributions of conditions in the population.<sup>2-4</sup>

● **Public Health Surveillance.** The ongoing systematic collection, analysis, and interpretation of outcome-specific data for use in the planning, implementation, and evaluation of public health practice. Surveillance includes prompt dissemination of results to those who need to know to take action. Surveillance does not include epidemiologic research or implementation of delivery programs but can be used to portray the natural history of selected conditions, to detect epidemics, to document the distribution and spread of selected conditions, to test hypotheses, to evaluate control and prevention measures, and to monitor changes in selected conditions.<sup>2-5</sup>

### **BACKGROUND INFORMATION: DEATH INVESTIGATION SYSTEMS**

Death investigation systems are usually established on a state-wide, regional or district, or county level.<sup>6-8</sup> Each system is administered by a medical examiner or coroner or someone such as a sheriff or justice of the peace acting in that capacity under provision of state law. Usually, medical examiners are physicians, often pathologists or forensic pathologists, who are appointed by the governing authority of the jurisdiction. Coroners are usually elected by the voters in the jurisdiction and, in all but 4 states with coroners, are not required to be physicians. Coroners must usually rely on pathologists (coroner's pathologists) to assist in investigations and to conduct postmortem examinations.

Among the 3137 counties in the United States, there are approximately 2185 death investigation jurisdictions. There are 22 states (systems) in which the death investigation system is organized on a state-wide basis, and the remaining states have systems organized on a county basis (2068 systems) or on a regional or district group of multiple counties (95 systems). Although there are many more coroner jurisdictions than medical examiner jurisdictions, slightly more than half the US population lives in areas served by medical examiner systems, which tend to exist in populated metropolitan areas. Many of the specific features of individual death investigation systems have been summarized elsewhere.<sup>6-8</sup>

Death investigation systems and the respective offices are often autonomous departments of the governing authority, but they may be administratively part of a law enforcement, forensic science, public safety, or public health department. Being elected, coroners do not typically operate within public health agencies or departments. Of the various states that have medical examiner systems, there are only a few that are administratively within a health department or who are appointed by a commissioner, board, or department of public health. These include the state medical examiners in Alaska, Delaware, North Carolina, Tennessee, Utah, Vermont, Virginia, and West Virginia.<sup>8</sup> Thus, with the exception of these 8 states, the administrative structure of the death investigation system does not provide for an official, daily, working, administrative, or fiduciary relationship between the health department and the death investigation system, posing 1 obstacle to formal, ongoing programs or research of public health interest.

Organizations that are specifically dedicated to death investigation in the United States include the National As-

sociation of Medical Examiners (NAME; [www.thename.org](http://www.thename.org)) and the International Association of Coroners and Medical Examiners ([www.theiacme.com](http://www.theiacme.com)). The American Academy of Forensic Sciences ([www.aafs.org](http://www.aafs.org)) also has a significant membership of medical examiners, coroners, and death investigators. The American Board of Medicolegal Death Investigators ([www.slu.edu/organizations/abmdi/](http://www.slu.edu/organizations/abmdi/)) is a registry and certification body for death investigators who work as death scene investigators for medical examiner and coroner offices. To-date, most public health agencies that have sought organizational support or participation from the medical examiner and coroner communities have worked with the NAME and, to some extent, the International Association of Coroners and Medical Examiners. Many states also have state coroner associations or coroner or medical examiner societies with members from multiple states.

### **BACKGROUND INFORMATION: PUBLIC HEALTH**

In essence, the backbone of public health in the United States is the CDC, a center within the US Department of Health and Human Services. Unlike many federal agencies, the CDC does not regulate. Simply put, CDC makes recommendations, and state health departments develop programs to comply with the recommendations, often with the assistance of funding from the CDC for developing and implementing specific programs. In turn, in areas where county or district health departments exist, they in turn try to implement the recommendations put forth by the CDC and the state health department.

The CDC's interest in medical examiners, coroners, and death investigation did not exist from day 1 of the CDC. A history of the CDC is available elsewhere, but a few relevant details are presented here.<sup>9</sup> Originally established in the 1940s as the United States Public Health Service Malaria Control in War Areas Unit, the agency's name was changed in 1946 to the Communicable Disease Center, having its emphasis on parasites and biowarfare (it's interesting that after many years, bioterrorism is currently a major interest!). The CDC was originally located in Atlanta, as it is today, on land donated to it by Emory University. In the 1950s, emphasis was primarily on infectious disease, but in the 1960s interests expanded into family planning, lead poisoning, and even space travel. By 1967, the CDC was known as the National Communicable Disease Center. Renamed again in the 1970s, the Center for Disease Control became a formal agency within the Public Health Service and expanded into health areas involving the environment, smoking, violence, and natural disasters. This was the first time environmental and injury issues received specific attention within the CDC structure. In 1980, the CDC was renamed the Centers (plural) for Disease Control and began to establish various centers within the CDC such as the National Center for Environmental Health (NCEH). In 1986, within NCEH, the Medical Examiner and Coroner Information Sharing Program (ME-CISP) was established, after the CDC recognized that much of the information it needed for various studies and programs resided in the offices of the nation's medical examiners and coroners and that information there was more complete than that on the death certificate.<sup>3,10</sup>

The CDC's first step in addressing injury on an organizational level was when the name of NCEH was changed to the National Center for Environmental Health and Injury Control in the late 1980s, thus marking the first

official center that had little to do with infectious or communicable disease. This led to subsequent changes in 1992 in which the CDC again changed its name to the Centers for Disease Control and Prevention and, in that same year, established a National Center for Injury Prevention and Control. Interestingly, the MECISP remained within the National Center for Environmental Health and Injury Control (environmental health) rather than the National Center for Injury Prevention and Control (injury center) until the MECISP was transferred organizationally to the CDC's Epidemiology Program Office in year 2000. Until recently, MECISP was part of the Epidemiology Program Office's Division of Public Health Surveillance and Informatics, and, at the time of this writing, organizational changes were underway that have not yet been finalized. Reorganization has included the concept of *coordinating centers* that oversee multiple centers such as the NCEH and the National Center for Injury Prevention and Control, which used to be separate but have some common interests and are now contained within 1 coordinating center (see [www.cdc.gov/maso/mab\\_Charts.CCCO.htm](http://www.cdc.gov/maso/mab_Charts.CCCO.htm)) so that projects may be better organized without duplication of effort. Regrettably, funds for the MECISP have all but disappeared, and presently there is less than 1 full-time equivalent assigned to the MECISP. Sadly, the MECISP has gone from being an active and productive program in the 1980s and 1990s to a program that lacks a clear or certain future, and there is no coordinating center dedicated to projects involving medical examiners and coroners. Perhaps the CDC should develop a *Coordinating Center for Death Investigation Projects and Data*.

In the past, the MECISP would work closely with the medical examiner and coroner community, its specific death investigation offices, and professional organizations concerned with death investigation. The MECISP served as the interface and liaison between the CDC and the death investigation community. That has all but disappeared. Now, 2 patterns have emerged. One is a pattern of the long-ago past in which someone in a CDC center contacts a medical examiner or coroner directly to propose a specific project. For example, I was recently contacted by a staff person in NCEH proposing a study of unexpected deaths because of asthma. The MECISP was not involved in this process. The second pattern is one in which state health departments receive grant or program money from the CDC and are expected to engage medical examiners and/or coroners in projects of public health importance. One such example is the evolution toward electronic death certification and registration.<sup>11</sup>

Public health personnel with whom most medical examiners and coroners work are usually epidemiologists. Strictly speaking, an *epidemiologist* (often referred to as an "Epi") does not have a medical degree but does possess a Masters Degree in Public Health. A *medical epidemiologist* (often referred to as a "Med-Epi") is usually a physician who also possesses a Masters Degree in Public Health. The CDC has an Epidemiologic Intelligence Service in which Epidemiologic Intelligence Service officers are trained to conduct epidemiologic and surveillance activities for the CDC (see [www.cdc.gov/eis/](http://www.cdc.gov/eis/)). Many of these are ultimately assigned to a specific state to conduct specific programs in that state. Also, there are about 50 schools of public health in the United States (the first was at Johns Hopkins) that offer a Masters Degree in Public Health. A list of these is available on the American Public

Health Association Web site ([www.apha.org/public-health/schools.htm](http://www.apha.org/public-health/schools.htm)).

Major organizations involved in public health are the American Public Health Association ([www.apha.org](http://www.apha.org)), the National Association of Public Health Statistics and Information Systems ([www.naphsis.org](http://www.naphsis.org)), the Association of State and Territorial Health Officials ([www.astho.org](http://www.astho.org)), the Council of State and Territorial Epidemiologists ([www.cste.org](http://www.cste.org)), and the National Association of County and City Health Officials ([www.naccho.org](http://www.naccho.org)). The membership of these organizations typically consists of epidemiologists, state vital records directors, vital records registrars and related staff, and directors of health departments at various levels of government.

Within each state's health department, there is a vital records office that keeps official vital statistics for the state. The National Center for Health Statistics ([www.cdc.gov/nchs](http://www.cdc.gov/nchs)), located in Hyattsville, Maryland, but administratively part of the CDC, collects vital statistics from each state through a Vital Statistics Cooperative Program and produces national statistics for births, deaths, marriages, divorces, and fetal deaths. The National Center for Health Statistics (NCHS) also prepares various data files for public and nonpublic use. Routinely published NCHS reports are available on the National Center for Health Statistics Web site and all are published annually, and some are published monthly with year-to-date and 12 months-ending totals.

The essential services of public health have been enumerated as follows: monitor health status, inform and empower people, develop policies and plans, link people to health services, evaluate quality, diagnose health problems, mobilize community partnerships, enforce laws and regulations, assure a competent workforce, and research for new insights.<sup>12</sup> The work or participation of forensic pathologists, medical examiners, and coroners fits well into many aspects of these essential public health services.

When hundreds of people were dying of cholera in 1854 London, anesthesiologist John Snow traced the possible source to contaminated water being supplied by the Broad Street Pump in London's Soho District.<sup>13</sup> Snow studied where the victims lived and where they went, determined that use of the pump was feature common to many of the victims, and was so strongly convinced of the cause that he removed the handle from the pump. His work is an example of public health research and also was truly forensic and investigatory in nature. Medical examiners and coroners play a similar role in everyday life by collecting evidence to identify common threads between a victim and his or her environment, to identify etiologic agents and make diagnoses, and to find a common cause when groups of related deaths occur. Much work of medical examiners and coroners is, simply put, public health principles put into daily practice.

New York City Medical Examiner Charles Hirsch<sup>14</sup> discussed the valuable public health role to be played by forensic pathologists (many of whom are medical examiners or coroners) in his 1997 Maude Abbott Lecture titled "Forensic Pathology and Public Health." In that lecture, he states that public health "is a given as an important governmental responsibility." Of course, medical examiner and coroner offices are part of government. Further, in the broadest sense, *forensic* means "public" and physician medical examiners and coroners can view the jurisdictions they serve as their patients. The NAME recognized this as



early as 1987 when its Board of Directors approved a motion to pursue cooperative agreements with the CDC to be more formally involved in matters of public health (source: NAME Board of Directors Minutes, 1987).

Also in his lecture, Dr. Hirsch pointed out the important public health role played by medical examiners and coroners by virtue of investigating a quarter to a third of deaths in many jurisdictions, and that virtually 100% of medical examiner/coroner cases are relevant to public health simply through completion of the death certificate and contributions to autopsy-based vital statistics. He cited the value of information provided through mandatory and voluntary reporting of certain types of deaths to various agencies, such as those involving unsafe products, and the value of doing routine human immunodeficiency virus testing on deceased individuals for both epidemiologic and practical purposes, such as enabling notification of sexual contacts or following up on exposures of health care workers and law enforcement personnel to the decedent. The more traditional role of identifying infectious diseases, including tuberculosis, Hantavirus infection, legionnaires disease, and West Nile virus were also emphasized, pointing out that until forensic pathologists helped lead to the recognition of West Nile virus outbreak in New York City in 1999, it had never been identified an infectious agent among humans in the United States. Other critical and practical public health functions of medical examiners and coroners cited by Dr. Hirsch include evaluation of hazards of medical procedures, meningitis in school children, violence, substance abuse, natural disaster fatalities, occupational hazards, recreational accidents, unexplained infant deaths, and child abuse. In short, whether death involves disease, violence, or public health issues, the forensic pathologist, medical examiner, or coroner plays a vital public health role by serving as the "family physician to the bereaved."<sup>15</sup> The public health relevance to death investigation is manifest in the fact that some forensic pathologists have also obtained a Masters Degree in Public Health (source: NAME membership database, Atlanta, Ga).

Stephen B. Thacker,<sup>16</sup> one of the original "founders" of CDC's MECISP program in 1985 and long-time CDC employee, in *Principles and Practice of Public Health Surveillance*, provides a brief history of public health surveillance. This history is relevant because medical examiners and coroners, through their investigations, routinely collect and report information that may be used for surveillance. Thacker reminds us that the idea of observing, recording, collecting facts, analyzing them, and considering courses of action (all things that medical examiners and coroners do) originated with Hippocrates. He perceives the first important public health surveillance action to have occurred in Venice during the bubonic plague when symptomatic sailors were prevented from disembarking. The idea of a formal classification of disease originated with Sydenham in the 1600s. It was in the 17th and 18th centuries that more comprehensive public health surveillance developed in Europe with the establishment of health councils and mortality statistics. In the United States, the Shattuck Report of 1850 served as the impetus for national disease monitoring activities. The Shattuck Report related certain causes of death and disease types to living conditions and recommended a decennial census, standard nomenclature of causes of death and disease, and the collection of data that would include demographic, socioeconomic, and geo-

graphical elements. In 1878, the precursor of the Public Health Service was authorized by Congress to collect morbidity data for quarantine purposes. Following the polio epidemic of 1916 and the influenza pandemic of 1918, all states began national reporting of morbidity. In 1948, the National Office of Vital Statistics was responsible for morbidity reporting, and weekly statistics were published in *Public Health Reports*. In 1949, Alexander Langmuir, trained at the first school of public health at Johns Hopkins, moved to the CDC in Atlanta to organize the Epidemiologic Intelligence Service. Mortality data were added to *Public Health Reports* in 1952 in the publication that later became known as the *Morbidity and Mortality Weekly Report*, with the CDC taking over publication duties in 1961. The remainder of CDC's history has been detailed earlier in this article.

## EVIDENCE OF EMERGING COOPERATION

Several medical examiner offices such as those in Virginia (Richmond), New Mexico (Albuquerque), and Fulton County (Atlanta), Georgia, now have part-time or full-time epidemiologists working physically within the office. For the most part, such personnel have been provided through CDC grants to state health departments that are participating in the National Violent Death Reporting System (NVDRS), Electronic Death Registration (EDR), Unexplained Deaths Possibly Involving Infectious Causes (UDPIC, UNEX, or MED-X), or bioterrorism surveillance and preparedness programs.<sup>11,17,18</sup> Hopefully, these offices will experience improved participation in public health programs and research and will serve as a model that can be replicated in many more coroner and medical examiner offices.

## A GRAND VISION

As it stands now, it appears that the CDC's vision of public health information of the future revolves around the concept of a National Electronic Disease Surveillance System (NEDSS).<sup>19</sup> NEDSS is a CDC initiative that "promotes the use of data and information system standards to advance the development of efficient, integrated, and interoperable surveillance systems at federal, state, and local levels. A primary goal of NEDSS is the ongoing, automatic capture and analysis of data that are already available electronically."<sup>19</sup> The NEDSS system is based on several principles that include the use of industry standards, reliance on off-the-shelf software, Internet-based secure data transmission, a common "look and feel" of systems, common reporting requirements, and no requirement to use specific software. It appears that all related systems, such as the Electronic Injury Surveillance System, will be required to be NEDSS compatible. Also, data used in these systems will have to meet specific criteria and standards to be used in the system. For example, at the time of this writing, standards were being developed for the *death message*, which would be an electronic summary of information related to the cause and circumstances of death. The overarching goal seems to be the development of a system that could obtain all health (and death) information into a single national system that would be used for public health purposes. Of course, medical examiners and coroners would be expected to be tied into this system to provide death investigation information. It appears to me that the NVDRS could be the initial phase of such a move. A key to the success of such a program will be the need to

obtain medical examiner and coroner data without imposing undue burdens on the office in terms of data collection, processing, and management and the ability to appropriately maintain confidentiality and privacy in accordance with various state and federal laws.

### **SPECIFIC INVOLVEMENT OF MEDICAL EXAMINERS AND CORONERS IN PUBLIC HEALTH**

In brief, the ways in which medical examiners and coroners participate in, or contribute to, public health are as follows:

- **Death Certification** (completion of the death certificate). Medical examiners and coroners certify approximately 20% of the deaths in the United States and, therefore, are a major contributor to national mortality statistics, especially in regard to nonnatural deaths and sudden, unexpected natural deaths.<sup>3</sup>

- **Performance of autopsies.** In the hospital setting, the autopsy rate nationally has fallen to less than 8%.<sup>20</sup> Most of the autopsies being conducted in the United States are now being performed in the medicolegal death investigation system. Thus, medical examiners and coroners provide the lion's share of autopsy-based disease and cause-of-death information.

- **Routine collection of specimens** that may be used in subsequent public health studies. Sections of lung routinely taken from infants at autopsy have been used, for example, in studies related to acute pulmonary hemorrhage in infancy and the genetics of the *Pneumocystis* organism.

- **Reporting of notifiable conditions** to appropriate health departments. A previously unknown case of tuberculosis, first detected at autopsy, would be reported to the health department, for example.

- **Investigating deaths**, in conjunction with health department laboratories and/or the CDC, that are unexpected and unexplained and that may involve causes with an imminent risk to the public health. Classic cases have involved deaths because of legionella, product tampering involving cyanide, and hantavirus pulmonary syndrome. More recent cases have involved anthrax.<sup>21,22</sup>

- **Routine collection of death-related information** that is more extensive than that obtainable from the death certificate and that may relate to public health interests in disease or injury prevention or control. Medical examiners and coroners often collect information about possible motives and precipitating factors in cases of suicide, for example, but this information seldom is reported on the death certificate.

- **Participating in, or providing data for, research studies** conducted by public health researchers. A sample of such CDC-based articles is shown in the Table.

- **Participating in formal and ongoing programs** developed by the CDC or state or local health departments. The National Violent Death Reporting System or EDR are examples of ongoing programs that rely on medical examiner and coroner data or participation.

- **Regularly reporting data or sentinel events** to surveillance systems, agencies, or organizations with specific interests and death registry programs for specific types of death. The NAME's Pediatric Toxicology Registry is an example.

- **Publication of formal descriptive studies and case reports** with public health import.

- **Involvement in environmental pathology**, such as participation in studies of pollution-related asthma.

### **TRADITIONAL SURVEILLANCE PROGRAMS**

There are a number of ongoing programs that have existed for years and that have a public health or safety focus of relevance to medical examiners and coroners.<sup>3,5</sup> A brief description of each is provided in the following:

- **Drug Abuse Warning Network.** The Substance Abuse and Mental Health Services Administration administers this surveillance system for collecting information on emergency room visits and deaths related to nonmedical use of drugs and substances that may result from homicide, suicide, accidental ingestion, adverse reaction, over-medication, other accidental causes such as use for psychic effect or dependency, and cases in which the circumstances could not be determined. Substances monitored include illegal drugs of abuse, prescription and over-the counter drugs, dietary supplements, nonpharmaceutical inhalants, alcohol in combination with drugs, and alcohol alone in persons younger than 21 years. Annual reports are prepared that allow comparison of fatal and nonfatal events in the same population base. The "NewDAWN" has now incorporated reporting areas that are rural in addition to the traditional urban areas. Data are reported for entire states from 6 states and from 122 additional medical examiner/coroner jurisdictions in 35 metropolitan areas of approximately 30 other states. Data are collected periodically from medical examiners and coroners using a hard-copy, paper reporting system. For more information, see the NewDAWN Web site ([www.dawninfo.samhsa.gov](http://www.dawninfo.samhsa.gov)).

- **Medical Examiners and Coroners Alert Project.** The Consumer Product Safety Commission administers this program to promptly collect information on deaths that are thought to be due to consumer products or that involve potentially unsafe products. After follow-up on reports, unsafe products can be recalled or standards may be developed to improve the safety of products. Cases may be reported online. The Consumer Product Safety Commission does *not* collect information on deaths involving automobiles, infant/child car seats, foods, medicines, cosmetics, or medical devices. A variety of standard reports are available online. For further information, see the Medical Examiners and Coroners Alert Project reporting site (<https://www.cpsc.gov/mecap.html>) or the Consumer Product Safety Commission site ([www.cpsc.gov](http://www.cpsc.gov)).

- **Food and Drug Administration Medical Products Program** (Food and Drug Administration MedWatch). The Food and Drug Administration administers this program to collect reports of serious adverse events involving drugs, problems with medical products including medical devices, and medication errors. Reporting by medical examiners is voluntary, whereas reporting is mandatory for manufacturers, distributors, and packers. MedWatch does *not* collect information on problems with vaccines or veterinary products. Separate Vaccine Adverse Event Reporting System and veterinary medicine product event reporting systems exist for such incidents (<http://vaers.hhs.gov/>) and (<http://www.fda.gov/cvm/default.html>), respectively. Medical examiners and coroners may submit voluntary MedWatch reports online. See the MedWatch Web site for further details ([www.fda.gov/medwatch](http://www.fda.gov/medwatch)).

- **Department of Transportation Fatality Analysis Re-**

porting System. The US Department of Transportation's National Highway Traffic Safety Administration created the Fatality Analysis Reporting System in 1975 to identify traffic safety problems and evaluate motor vehicle safety standards and highway safety initiatives. To be included in the system, a crash must involve a motor vehicle traveling on a traffic way usually open to the public and result in 1 or more deaths within 30 days of the crash. Medical examiners and coroners do not actively report directly to this system, but Fatality Analysis Reporting System analysts rely on death certificates and medical examiner and coroner reports to collect data for the system. For further information, see the Fatality Analysis Reporting System Web site (<http://www-nrd.nhtsa.dot.gov/departments/nrd-01/summaries/FARS.98.html>).

- Occupational Injury/Death Data. Data systems also exist that are based partially on death certificate information from death certificates usually completed by medical examiners and coroners. The Bureau of Labor Statistics Census of Fatal Occupation Injuries (<http://www.bls.gov/iif/oshcfoi1.htm>) and the National Institute of Occupational Safety and Health (part of the CDC) collect such information on traumatic occupational fatalities (<http://www.cdc.gov/niosh/injury/#data>).

### EMERGING SURVEILLANCE PROGRAMS

In the past few years, some newer surveillance programs and projects have emerged in which medical examiners and coroners may play a pivotal role:

- National Violent Death Reporting System (NVDRS). The CDC's National Center for Injury Prevention and Control has now funded 17 state health departments to participate in the NVDRS program. The goals of this state-based program are to inform decision makers about the characteristics of violent deaths and to evaluate and improve state-based violence prevention. Major objectives are to link records from violent deaths that occur in the same incident, to identify risk factors of multiple homicides or homicide-suicide events, to improve timeliness of data availability, to describe in detail the circumstances that contribute to violent deaths, and to better characterize perpetrators and relationships to victims. Medical examiner and coroner records are crucial to the NVDRS project, because much of the NVDRS data are derived from such records in conjunction with police and crime laboratory records. The NAME is participating by assisting in feasibility studies regarding medical examiner and coroner participation. Further information is available on the NVDRS Web site ([www.cdc.gov/ncipc/profiles/nvdrs](http://www.cdc.gov/ncipc/profiles/nvdrs)).

- Surveillance for emerging infectious disease and terrorist agents. Following a 1992 Institute of Medicine report that highlighted the need to more effectively detect emerging infectious diseases, the CDC in 1995 initiated population-based surveillance for critical illnesses and unexplained deaths because of possible infectious causes.<sup>18</sup> Initially the program was referred to as UDPIC but has become known as UNEX, an acronym for Unexplained Deaths and Critical Illness Project. The concept revolves around the idea that surveillance of unexplained deaths can be used as a public health approach to recognize emerging pathogens.<sup>23</sup> A UNEX case was originally defined as the hospitalization or death of a person with life-threatening illness having hallmarks of infectious disease for which no cause was identified through routine testing.

An extensive laboratory investigative protocol was established in an attempt to establish etiologic-specific diagnoses. In the mid-1990s, the New Mexico office of Medical Investigators developed an approach to the detection of emerging infectious agents from the standpoint of the forensic pathologist in a death investigation system.<sup>24</sup> This evolved to a syndromic surveillance system to recognize bioterrorism mortality and fatal infections with public health import, now conducted under the name of "Med-X." The Med-X approach serves as a model that may be implemented in other states. At the time of this writing, guidelines were being prepared by the CDC for the implementation of such surveillance in states or other jurisdictions who have the capacity to conduct such surveillance. Although the death investigation laws of some states specifically authorize medical examiners or coroners to investigate deaths with public health ramifications, the laws in other states are less clear or silent.<sup>6-8</sup> Such issues will need to be addressed in various jurisdictions to ensure that investigations are conducted in accordance with law. Following the September 11 World Trade Center terrorist attack and deaths resulting from mail contaminated with anthrax spores,<sup>21,22</sup> the importance of surveillance for biologic terrorist agents has gained recognition and support. As a result, the CDC has published guidelines for the medical examiner and coroner communities regarding surveillance and case management of possible bioterrorism agents.<sup>25</sup> It seems likely that surveillance for not only biologic but also chemical agents will become more widespread and formal in the coming years.

- Electronic Death Registration (EDR). A "Partnership Committee" exists to guide the development of the EDR and consists of members from the Social Security Administration, the National Association of Public Health Statistics and Information Systems, the American Medical Association, the NAME, the National Center for Health Statistics, the American Hospital Association, and the National Funeral Director's Association.<sup>11</sup> Extensive work has been done to develop standards for systems to be used by states to allow the certification and registration of deaths to be done electronically via the Internet. At present, 4 states (Minnesota, Montana, New Hampshire, and South Dakota) have implemented systems, and about 13 other states or jurisdictions (including Washington, DC and New York City) are in various stages of planning, testing, or implementation. EDR is a somewhat daunting task to design and implement because states wish to remain in control of their own death registration data (which means that different EDR systems will probably emerge in the various states), and systems must allow for data entries and access by physicians, hospitals, other medical institutions such as nursing homes, funeral directors, medical examiners and coroners, and state and/or local vital statistics personnel. The large number of "players" makes difficult the practical and universal implementation of such systems. At present, much of the funding for EDR systems is being provided by the Social Security Administration, which has recognized that rapid knowledge of specific deaths can save considerable money long term by more rapidly terminating Social Security Administration benefit payments, when appropriate.

### OTHER PUBLIC HEALTH ASPECTS OF MEDICAL EXAMINER/CORONER ACTIVITIES

R. "Gib" Parrish (a key person in the MECISP program in the 1980s and 1990s) and I have authored 2 previous



**Sample Morbidity and Mortality Weekly Report Articles From 1997 Through 2005 Based on Medical Examiner or Coroner Case Information or Participation**

Homicide and Suicide Rates—National Violent Death Reporting System, Six States, 2003  
Vol 54(15):377 04/22/2005

Increase in Poisoning Deaths Caused by Non-Illicit Drugs—Utah, 1991–2003  
Vol 54(2):33 01/21/2005

Fatal Rat-Bite Fever—Florida and Washington, 2003  
Vol 53(51):1198 01/07/2005

New Year's Eve Injuries Caused by Celebratory Gunfire—Puerto Rico, 2003  
Vol 53(50):1174 12/24/2004

Preliminary Medical Examiner Reports of Mortality Associated with Hurricane Charley—Florida, 2004  
Vol 53(36):835 09/17/2004

Medical Examiners, Coroners, and Biologic Terrorism: A Guidebook for Surveillance and Case Management  
Vol 53(RR-8):1 06/11/2004

Nonfatal and Fatal Drownings in Recreational Water Settings—United States, 2001–2002  
Vol 53(21):447 06/04/2004

Malaria Surveillance—United States, 2002  
Vol 53(SS-1):21 04/30/2004

Occupational Fatalities During Trenching and Excavation Work—United States, 1992–2001  
Vol 53(15):311 04/23/2004

Unintentional and Undetermined Poisoning Deaths—11 States, 1990–2001  
Vol 53(11):233 03/26/2004

Acute Idiopathic Pulmonary Hemorrhage Among Infants: Recommendations from the Working Group for Investigation and Surveillance  
Vol 53(RR-2):1 03/12/2004

Disparities in Premature Deaths from Heart Disease—50 States and the District of Columbia, 2001  
Vol 53(06):121 02/20/2004

Update: Influenza-Associated Deaths Reported Among Children Aged 18 Years—United States, 2003–2004 Influenza Season  
Vol 52(53):1286 01/09/2004

Invasive *Streptococcus pyogenes* After Allograft Implantation—Colorado, 2003  
Vol 52(48):1173 2/05/2003

Severe Morbidity and Mortality Associated With Influenza in Children and Young Adults—Michigan, 2003  
Vol 52(35):837 09/05/2003

Contribution of Selected Metabolic Diseases to Early Childhood Deaths—Virginia, 1996–2001  
Vol 52(29):677 07/25/2003

Heat-Related Deaths—Chicago, Illinois, 1996–2001, and United States, 1979–1999  
Vol 52(26):610 07/04/2003

Hypothermia-Related Deaths—Philadelphia, 2001, and United States, 1999  
Vol 52(5):86 02/07/2003

Deaths Among Drivers of Off-Road Vehicles After Collisions with Trail Gates—New Hampshire, 1997–2002  
Vol 52(3):45 01/24/2003

Surveillance for Traumatic Brain Injury Deaths—United States, 1989–1998  
Vol 51(SS-10):1 12/06/2002

Deaths in World Trade Center Terrorist Attacks—New York City, 2001  
Vol 51(special issue):16 09/11/2002

Heat-Related Deaths—Four States, July–August 2001, and United States, 1979–1999  
Vol 51(26):567 07/05/2002

Variation in Homicide Risk During Infancy—United States, 1989–1998  
Vol 51(9):187 03/08/2002

State-Specific Mortality From Sudden Cardiac Death—United States, 1999  
Vol 51(6):123 02/15/2002

Hypothermia-Related Deaths—Utah, 2000, and United States, 1979–1998  
Vol 51(4):76 02/01/2002

Emergency Medical System Responses to Suicide-Related Calls—Maine, November 1999–October 2000  
Vol 51(3):56 01/25/2002

Surveillance for Homicide Among Intimate Partners—United States, 1981–1998  
Vol 50(SS-3):1 10/12/2001

Heat-Related Deaths—Los Angeles County, California, 1999–2000, and United States, 1979–1998  
Vol 50(29):623 07/27/2001

Fatal Pediatric Lead Poisoning—New Hampshire, 2000  
Vol 50(22):457 06/08/2001

Drowning—Louisiana, 1998  
Vol 50(20):413 05/25/2001

Fatal Occupational Injuries—United States, 1980–1997  
Vol 50(16):317 04/27/2001

Surveillance for Fatal and Nonfatal Firearm-Related Injuries—United States, 1993–1998  
Vol 50(SS-2):1 04/13/2001

Using Tandem Mass Spectrometry for Metabolic Disease Screening Among Newborns  
Vol 50(RR-3):1 04/13/2001

Mortality From Coronary Heart Disease and Acute Myocardial Infarction—United States, 1998  
Vol 50(6):90 02/16/2001

Hypothermia-Related Deaths—Suffolk County, New York, January 1999–March 2000, and United States, 1979–1998  
Vol 50(4):53 02/02/2001

Houseboat-Associated Carbon Monoxide Poisonings on Lake Powell—Arizona and Utah, 2000  
Vol 49(49):1105 12/15/2000

Unpowered Scooter-Related Injuries—United States, 1998–2000  
Vol 49(49):1108 12/15/2000

**Continued**

- Heroin Overdose Deaths—Multnomah County, Oregon, 1993–1999  
Vol 49(28):633 07/21/2000
- Unintentional Opiate Overdose Deaths—King County, Washington, 1990–1999  
Vol 49(28):636 07/21/2000
- Heat-Related Illnesses, Deaths, and Risk Factors—Cincinnati and Dayton, Ohio, 1999, and United States, 1979–1997  
Vol 49(21):470 06/02/2000
- Morbidity and Mortality Associated With Hurricane Floyd—North Carolina, September–October 1999  
Vol 49(17):369 05/05/2000
- Baler and Compactor-Related Deaths in the Workplace—United States, 1992–2000  
Vol 50(16):309 04/27/2000
- Storm-Related Mortality—Central Texas, October 17–31, 1998  
Vol 49(7):133 02/25/2000
- Age-Specific Excess Deaths Associated With Stroke Among Racial/Ethnic Minority Populations—United States, 1997  
Vol 49(5):94 02/11/2000
- Hypothermia-Related Deaths—Alaska, October 1998–April 1999, and Trends in the United States, 1979–1996  
Vol 49(1):11 01/14/2000
- Surveillance for Injuries and Violence Among Older Adults  
Vol 48(SS-8):27 12/17/1999
- Reptile-Associated Salmonellosis—Selected States, 1996–1998  
Vol 48(44):1009 11/12/1999
- Pedestrian Fatalities—Cobb, DeKalb, Fulton, and Gwinnett Counties, Georgia, 1994–1998  
Vol 48(28):601 07/23/1999
- Deaths Among Children Aged Less Than or Equal to 5 Years From Farm Machinery Runovers—Iowa, Kentucky, and Wisconsin, 1995–1998, and United States, 1990–1995  
Vol 48(28):605 07/23/1999
- Injuries Among Railroad Trespassers—Georgia, 1990–1996  
Vol 48(25):537 07/02/1999
- Firearm-Associated Deaths and Hospitalizations—California, 1995–1996  
Vol 48(23):485 06/18/1999
- State-Specific Maternal Mortality Among Black and White Women—United States, 1987–1996  
Vol 48(23):492 06/18/1999
- Heat-Related Illnesses and Deaths—Missouri, 1998, and United States, 1979–1996  
Vol 48(22):469 06/11/1999
- All-Terrain Vehicle-Related Deaths—West Virginia, 1985–1997  
Vol 48(1):001 01/15/1999
- Hypothermia-Related Deaths—Georgia, January 1996–December 1997, and US 1979–1995  
Vol 47(48):103 12/11/1998
- Fatal Car Trunk Entrapment Involving Children—United States, 1987–1998  
Vol 47(47):101 12/04/1998
- Coronary Heart Disease Mortality Trends Among Whites and Blacks Appalachia and US, 1980–1993  
Vol 47(46):101 11/27/1998
- Trends in Ischemic Heart Disease Death Rates for Blacks and Whites—United States, 1981–1995  
Vol 47(44):945 11/13/1998
- Deaths Associated With Hurricane Georges—Puerto Rico, September 1998  
Vol 47(42):897 10/30/1998
- Postneonatal Mortality Surveillance—United States, 1980–1994  
Vol 47(SS-2):15 07/03/1998
- Heat-Related Mortality—United States, 1997  
Vol 47(23):473 06/19/1998
- Lightning-Associated Deaths—United States, 1980–1995  
Vol 47(19):391 05/22/1998
- Fatal Occupational Injuries—United States, 1980–1994  
Vol 47(15):297 04/24/1998
- Toy-Related Injuries Among Children and Teenagers—United States, 1996  
Vol 46(50):118 12/19/1997
- Hypothermia-Related Deaths—Virginia, November 1996–April 1997  
Vol 46(49):115 12/12/1997
- Tornado Disaster—Texas, May 1997  
Vol 46(45):106 11/14/1997
- Childhood Pedestrian Deaths During Halloween—United States, 1975–1996  
Vol 46(42):987 10/24/1997
- Heat-Related Deaths—Dallas, Wichita, and Cooke Counties, Texas, and United States, 1996  
Vol 46(23):528 06/13/1997
- Suicide—Washington, 1980–1995  
Vol 46(22):502 06/06/1997
- Tornado-Associated Fatalities—Arkansas, 1997  
Vol 46(19):412 05/16/1997
- Gamma Hydroxy Butyrate Use—New York and Texas, 1995–1996  
Vol 46(13):281 04/04/1997
- Update: Pulmonary Hemorrhage/Hemosiderosis Among Infants—Cleveland, Ohio, 1993–1996  
Vol 46(2):33 01/17/1997
- Injuries and Deaths Associated with Use of Snowmobiles—Maine, 1991–1996  
Vol 46(1):1 01/10/1997
- Traumatic Brain Injury—Colorado, Missouri, Oklahoma, and Utah, 1990–1993  
Vol 46(1):8 01/10/1997



summary articles concerning epidemiologic aspects of forensic pathology and the role of medical examiners and coroners in public health.<sup>3,5</sup> For additional discussion and references, the reader is referred to those articles.

### PITFALLS

Recognizing the positive things that medical examiners, coroners, and public health professionals can accomplish by working together, there are some obstacles and characteristics of which we need to be aware:

- Public health agencies are often not well-funded and staffed. The same holds true for medical examiner and coroner offices. These conditions can make it difficult to plan and finish projects because of lacking money, time, and personnel.
- Public health agencies often operate within a bureaucracy with significant layers of administration, policy, and procedure. To conduct certain projects or publish certain material, clearance may need to be obtained from multiple departments or agencies, which can delay projects significantly. Further, turnover in key administrative personnel or project managers is not uncommon. This situation can cause projects to get "lost" or result in loss of institutional memory about certain projects and issues. For further information on drawbacks, obstacles, and risks, please see references 3 and 5.

### CLOSING THOUGHTS

Traditionally, the emphasis of work done by medical examiners, coroners, and the death investigation community has been viewed as serving the criminal justice system. Death investigations have been viewed as being performed mainly to detect criminal activity or to collect evidence and develop opinions for use in criminal law proceedings such as homicide trials. During the years, a role in public safety has also emerged in that the findings of medical examiners and coroners are often used in a variety of settings to improve product or environmental safety. It has also been customary for medical examiner and coroner reports to serve the profession of medicine through their use in quality assurance reviews or in settings such as trauma audits in which surgical or medical treatment of injuries are evaluated. This "triangle" of service focus involving criminal justice, public safety, and medicine has now evolved to a "quadrangle," which includes public health as one of the beneficiaries of death investigation and the valuable information collected by medical examiners and coroners. It is foreseeable that the public health role of medical examiners and coroners may continue to grow and that perhaps in the not-too-distant future, public health impact will surpass criminal justice

as the major focus of medicolegal death investigation in the United States.

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