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# The Significance and Effect of the Medical Examiner in the Field of Forensic Science

Marissa Lynn Couch<sup>a</sup>, Jim Huggins, M.F.S.<sup>\*,a</sup>

<sup>a</sup> Department of Anthropology, Baylor University, Waco, Texas.

\* Corresponding author.

**Abstract** Forensic science is a quickly growing field. New findings and techniques in the field are being discovered regularly and its presence has become a staple in any type of investigation. One major aspect of forensic science is the medical examiner. A medical examiner is responsible for performing an autopsy and determining cause and manner of death for a deceased individual. In this thesis, I discuss and analyze the significance of the medical examiner's work and the effect their role has on the field of forensic science. This includes topics such as defining death, the autopsy process, and the impact of the medical examiner's ruling in death investigation.

**Keywords:** Forensic science, Medical examiner.

## 1 Introduction – The Medical Examiner Imperative

Deaths occur every day and are a natural part of life. However, due to advances in medicine and science, the definition of death and its causes are not as simple as they once were. Defining death and determining the cause, manner, and mechanism of death is just one job of a medical examiner in a medicolegal case. The medical examiner, otherwise known as a forensic pathologist, is a well known component in forensic science and is perceived to have an effect on any death investigation. But to what extent their role affects and impacts the field of forensic science is often overlooked.

A medical examiner is a trained physician authorized by law to investigate and examine any deaths that are sudden, unexpected, from physical or chemical injury, or deaths in which a physician was not in attendance at the time of death (“Harris County – Institute of Forensic Science”). A medical examiner investigates a death by performing an external examination and an internal autopsy of the deceased body. An external examination consist a general description of the state

of the body, such as rigor and livor mortis, physical characteristics of the decedent, external evidence of injury or disease, and any unusual deformities (DiMaio and Dana 10). An autopsy is an internal exam in which organs and the viscera of the body are examined through dissection. A forensic autopsy is specifically used to determine cause and manner of death, collect DNA samples, and to take sections of the internal organs as evidence in a medicolegal case.

But before one can determine the cause, manner, and mechanism of death, these terms must be defined. According to DiMaio, the cause of death is defined as “any injury or disease that produces a physiological derangement in the body that results in death of the individual” (DiMaio and DiMaio 3). This is the one single incident that starts the chain of events that ultimately leads to the cessation of life. The manner of death explains how that cause came about. There are five names for manner of death: natural, accident, suicide, homicide, or undetermined. The majority of medicolegal cases are ruled natural or accident. DiMaio states that in a typical large metropolitan medical examiner's

office, almost 78% of cases are ruled as natural or accident (DiMaio and Dana 3). It is important to note however, that when determining the manner of death, a medical examiner cannot determine murder, only homicide. Homicide is the legal term for a death that involves one individual killing another individual, and includes homicides from self-defense. Murder is defined as the act of unlawfully killing another being with the intent to harm. It is the job of only the court of law to classify a death as murder (DiMaio and Dana 3). Finally, the mechanism of death is the actual physiological and biochemical change produced by cause of death. An example encompassing all three terms would be if an individual is shot by another individual and dies of massive hemorrhaging. The cause of death would be a gunshot wound, the mechanism of death would be massive hemorrhaging, and the manner of death would be homicide. Therefore it is the duty of a medical examiner to use his or her findings to rule on cause, manner, and mechanism of death.

The history of the medical examiner began during the medieval time period when individuals were established as “keepers of the pleas of

the crown” (Carpenter and Tait). The position was originally established to maintain good order and justice, and included duties such as investigating into sudden deaths, homicides, and suicides. By the middle of the 13th century, the role of the coroner had been established and it was determined that the coroner is the only individual who can perform a death investigation. Over time, however, laws and legislations were passed regarding the responsibilities of the coroner and their role grew throughout many countries. In more recent history, the medical examiner system was first established in the United States in 1877 in Massachusetts (DiMaio and DiMaio 11). This system divided the state into regions and selected a physician to determine cause and manner of any deaths in each region. After the initial establishment of medical examiners, the position grew throughout the nation. In the United States today, there are approximately 400 medical examiner offices (Weinberg et al. 1193). Each state has its own laws as to the establishment and governing of medical examiners’ offices. There are three systems used in death investigations: the coroner system, the medical examiner system, and the Justice of the Peace system. In a coroner or Justice of the Peace system, an individual is elected by law to investigate the deaths of individuals. The individual may or may not be a licensed physician and may have very little training. However, “over the years, there has been a gradual decrease in the number of coroner systems, with replacement by medical examiner systems” (DiMaio and DiMaio 9). In a medical examiner system, a medical examiner’s office is established and licensed and board certified physicians are hired to investigate deaths. Throughout the United States, the medical examiner system is the most commonly used system. However, some states have a mix of systems. For example, the state of Texas has a mix of the medical examiner and the Justice of the Peace system; 14 counties

employ the medical examiner system and the remaining counties use the Justice of the Peace system. Thus, the rules established by the state of Texas would then determine when a medical examiner’s office would be established in place of a justice of the peace. For example, the establishment of a medical examiner office is required in county’s with a population over 1 million (“Code of Criminal Procedure”). Beginning in 1966, the state of Texas enacted the Texas Code of Criminal Procedure. This code was enacted in order to establish laws that govern the procedures used in criminal events. Article 49.25 of this law describes all details concerning a medical examiner, including when a medical examiner’s office should be established in a county, and when a death falls under the jurisdiction of the medical examiner of a county. According to Article 49.25, examples of when a death must be reported to a medical examiner include any deaths of a person under the age of six, any deaths outside a licensed medical facility, and any deaths where trauma contributes to or causes the demise (“Code of Criminal Procedure”). In such cases as these, it is the responsibility of the medical examiner to investigate and determine the cause and manner of death, ensure positive identification, and sign the death certificate.

This thesis will consider the importance of a medical examiner in death examinations, and the impact that their role and duty plays in the autopsies and crime investigations. Topics such as the importance of an autopsy and external examination, challenges faced in forensic pathology, and the perception of the public on forensic science will be explored.

## 2 The Autopsy

As stated previously, the main job of a forensic pathologist is to determine cause, mechanism, and manner of death. This is primarily done by performing a forensic autopsy. A forensic autopsy is defined as any

autopsy used to determine cause of death and to identify the deceased individual. The biggest difference between a forensic autopsy and an autopsy performed in hospitals or for teaching purposes is that a forensic autopsy has legal significance. Besides the legal implications involved in a forensic autopsy, forensic or medicolegal autopsies differ from hospital or teaching autopsies in many ways. Some of those include collection of evidence, timing of autopsy (before or after embalming), and requirements of next-of-kin consent.

The forensic autopsy is much more than a physical examination of organs within the body of a deceased individual; it needs to include other aspects of the investigation as well. DiMaio argues that the autopsy begins at the scene of death (DiMaio and DiMaio 547). Their argument is based on the fact that forensic pathologist should not perform the autopsy without knowledge of the circumstances surrounding the death. This is similar to the fact that one would not expect a physician to perform surgeries or diagnose a patient without asking about the patient’s complaints. Therefore, the forensic pathologist needs to review the scene photos, the case report, and the medical history of the decedent before beginning the physical autopsy.

Once the body of a deceased individual has been assigned a case number and has been processed, a physical autopsy can begin. An autopsy is used to discover, collect, and document any clues or physical evidence that will be used in determining cause and manner of death. The autopsy is comprised of an external exam and an internal exam, and can either be a partial exam (analysis of only specific organs) or a full exam (analysis of all organs of the chest and abdominal cavities, and the head and brain). An external exam takes place before the body is cut open and includes examining the clothes and any external signs of trauma. The medical examiner also examines the body for external changes to the body,

such as rigor, livor, or algor mortis. Rigor mortis is the act of the muscles of the body to become stiff and is due to chemical changes within the muscles. Livor mortis is a change in the color of the skin due to the settling of blood within the body after the individual has died. Algor mortis is the reduction of the body temperature after death. In addition to signs of trauma, the medical examiner also examines the general physical characteristics of the deceased individual, and documents these for identification purposes. All evidence found during the external examination should be photographed and documented as the examination takes place. The forensic pathologist must then complete the internal exam by opening the body through a Y or T-shaped incision and examining the visceral organs by removing them. As the organs are being analyzed for visible signs of trauma, sections may be cut off and preserved as evidence or made into histology slides for future studies (DiMaio and Dana). Blood, vitreous, urine, and bile samples should be also retained. Overall, one of the most important aspects of an autopsy is to document everything examined through photographs and written or verbal documentation. After the autopsy examination is complete, the forensic pathologist must compile all his or her findings into an "Autopsy Report" that documents everything from the internal and external examination, all physical evidence and laboratory results found, and the opinion of the forensic pathologist as to the cause and manner of death.

As stated above, autopsies are comprised of an external and internal examination. When most people hear the word "autopsy", they normally think about the process of opening a body and examining the internal organs. While internal examinations are a very important aspect of an autopsy, there are some cases where an internal autopsy is not needed. As Carpenter and Tait stated, "there is an assumption that internal autopsies will always add value to a death investigation", but that

is not always the case. In cases where there is extensive medical history or the circumstances around the death are well documented, an external autopsy may be all that is needed. For example, in deaths involving motor vehicle accidents in which the trauma is clearly seen from the outside of the body, the accident was witnessed, and the scene was well documented, the cause of death could be determined by an external autopsy alone. One study shows that in 3,000 cases involving death from a motor vehicle accident, the "presumed cause of death ascertained by the police prior to the autopsy and recorded on the initial investigation form" was accurate almost 100% of the time when compared to the results from a full autopsy (Carpenter and Tait). One must also keep in mind the importance of an external examination. Sidlo et al. states that external exams, including examination at the scene, "are unique and unrepeatable proceedings" and must be taken into as much account as the internal examination (253). External exams help a forensic pathologist determine the correct manner of death. For example, an internal exam of a gunshot victim might reveal that the cause of death was fatal hemorrhaging of the brain from a bullet to the head. However, the external examination of the entrance wound of the gunshot might reveal the manner. If the entrance wound of the bullet is on the back of the head, the manner of death is much more likely homicide or accidental than suicide, where the entrance wound is more often on the side of the head. Therefore, while autopsies are often thought of as simply examining organs, the external exam places a huge role in death investigation as well.

Overall, autopsies are an important aspect of the role of the medical examiner in a death investigation. Autopsies provide scientific evidence and information that cannot be obtained through a simple investigation.

### 3 Challenges in Forensic Science and the Effects

As Mary Roach states in the introduction to her book *Stiff: the Curious Lives of Human Cadavers*, "The way I see it, being dead is not terribly far off from being on a cruise ship. Most of your time is spent lying on your back. The brain has shut down. The flesh begins to soften. Nothing much new happens, and nothing is expected of you." However, this is not so much the case for those left alive; it is not always a cruise for others, especially for the forensic scientists and forensic pathologists involved in investigating the death. A medical examiner often faces many obstacles when investigating a death and examining the deceased body. Some challenges might present themselves through inevitable circumstances and others may arise from misconduct or human error. But in any case, forensic pathologists and forensic scientists face challenges that may even have an effect on the outcome of the entire case.

One type of challenge a forensic pathologist might face could be due to physical limitations. In some cases, a forensic pathologist may not be able to perform a complete autopsy or is limited to examining only the external body. This could occur when examining an incomplete body where regions of the body showing trauma were not found. In other cases, a forensic pathologist may encounter changes to the body postmortem. "The pathologist encounters postmortem changes that alter and obscure pathological findings, hindering their assessment in the determination of the cause of death" (Shkrum & Ramsay). Forensic Taphonomy is the study of the factors which decompose the human body and alter the evidence that is used in death investigations. This can include factors such as animal activity, atmospheric environment, and the amount the body was exposed to the environment. Forensic taphonomy is important to study because it can reveal evidence that may not otherwise have been observed. Changes to the human body after death, including changes from decomposition, can limit

the forensic pathologist in autopsy. If a body is skeletonized, the forensic pathologist would have a harder time determining death than if the body was examined just after death. In cases such as these, the medical examiner must rely on other aspects of the death investigation to determine cause and manner of death. Social and medical history of the deceased and information obtained during scene investigations can aid the medical examiner when little information can be found during an autopsy. In certain types of cases, the cause of death can be easily seen, such as a hanging. In these cases, performing only an external examination may be sufficient, but some “studies have compared the accuracy in the determination of cause and manner of death based on initial history and external examinations, which were then supplemented by an autopsy... about one-third of natural deaths had an erroneous assigned cause of death not supported at postmortem” (Shkrum & Ramsay). Therefore, although it was discussed in a previous chapter that internal autopsies are not always required, a medical examiner is always faced with the possibility of not obtained full information when determining cause and manner of death.

Forensic pathologist may also be limited to external examinations due to family request. Families may request that the forensic pathologist not perform an autopsy due to religious beliefs. In Islam, they believe in burying the deceased as soon as possible and may object to an autopsy because it will delay the burial process. Because Hindus believe in the cycle of rebirthing, they often object to autopsies because they feel that it will disturb the spirit of the deceased. In addition, Jews often object to autopsies because they believe it is wrong to desecrate the body after death. However, the medical examiner can override the family objections if he or she feels that the objections compromise the investigation. This can also present a challenge for the medical examiner, as they must find a balance

between performing their duties while still possessing human emotions and sympathy for the loved ones of the deceased.

Forensic scientists and forensic pathologists are also limited in their ability. It is a common misconception that forensic scientists can determine time of death. As one author states, “it still startles most people to learn that a prudent medical examiner can rarely, if ever, accurately measure the interval between death and a body’s discovery” (Sachs). While certain factors can be used to give an estimate time of death, such as rigor, livor, algor mortis, stomach contents and such, a forensic scientist can never prove a certain time of death and even an estimated time frame is not reliable. Too many outside factors such as weather and the environment can affect the body prior and following death. Therefore, the medical examiner is limited in what they can determine based on the unknowns present in any death investigation.

While some challenges for forensic science may be out of the control of the investigator, some challenges are not. Challenges such as human error and violation of ethics can cause problems. “Deviations from the standards of investigative practice, either by omission or commission, increase the risk of failure of a medicolegal death investigation” (Shkrum & Ramsay). As in any science, there will always be a degree of human error. Human error is mostly accidental, but can also be a result from not following procedure correctly or failure to document evidence correctly. However, in very unfortunate cases, a forensic scientist may violate their ethics due to pressure to convict someone or pressure from others. For example, a medical examiner may feel pressure from family in cases involving a suicide. In many life insurance policies, there is a clause that prevents the family from collecting the life insurance money if the individual committed suicide. Therefore, the family may pressure the medical examiner to rule the manner

of death as accident instead of suicide. In extreme cases, the medical examiner may feel pressured to change their ruling in order to fit an attorney’s case. This can cause serious problems and effects not only in the investigation but also in the medical examiner’s reputation. A medical examiner who violates the code of ethics may face the possibility of losing his or her Board certification and license.

All these challenges and others not listed have the possibility of presenting significant effects in the outcome of the cases. In the most extreme case, an innocent person can be wrongfully convicted. While wrongful convictions do not happen frequently, it happens enough to be a cause for concern. One study shows that “the American system of criminal justice is so large and has so many arrests each year that even if the system were (sic) 99.5% accurate, it would still generate more than 10,000 wrongful convictions a year for the eight serious index crimes (murder,... rape,... robbery, [etc.]). It is likely that the error rate is even higher for less serious crimes” (Huff, Rattner, & Sagarin). Therefore, it can be seen that the medical examiner will always face challenges even if they perform to the best of their ability. The medical examiner must realize that these challenges affect the investigation and present challenges within themselves as well.

While forensic science can present challenges that result in many different effects, one must always remember that it is important to do one’s best to overcome these challenges and must always follow the evidence first.

#### 4 Medical Examiners Beyond the Autopsy

Thus far, the issues of the autopsy and challenges faced by a medical examiner have been discussed. These aspects are vital to the investigation performed by the medical examiner, and the majority of the time the autopsy is the most important aspect and the main part of a medical examiner’s

investigation. Without a doubt, when the majority of people think about a medical examiner, they generally only think about the autopsy. However, a medical examiner is much more than that. Many aspects outside of the actual physical investigation can affect the job and performance of a medical examiner.

One major aspect often not addressed is what is known as the TV effect, or “the CSI effect”. This is the idea that popular movies and television shows, such as ‘CSI’, have a major cultural effect on the perception of forensic science. These effects can be either positive or negative, but either way, these effects still exist and cannot be ignored. One such effect from this phenomenon is that the medical examiners themselves are affected. Medical examiners also watch these types of television shows and “are not immune from the effects[...] simply because they hold a professional position presupposing a detached and apposite decision-making process within death investigation” (Carpenter and Tait). Because these shows have a huge impact on the perception of the public, there is no reason to refute that they also impact the criminal investigators. This can lead to an effect in their performance, whether intentional or subconscious, and cause them to function differently or model their work after these shows. Another effect produced by these shows is the way these shows and movies have shaped the public’s expectations. Since these shows became popular, the public has developed their own perception and expectation of how forensic investigations should be conducted, and “these expectations in turn put additional pressure on the coroner to act in specific ways in order to be regarded as ‘doing their job properly’” (Carpenter and Tait). For example, in cases involving a homicide, the jury begun to expect to see DNA as evidence. Even in cases where DNA is not necessary and could be costly or timely, the jury will perceive it as a negative that DNA was not collected

and used within the investigation. Not only does the public now have their own opinion on the procedures, but they also have an expectation about the outcome of criminal investigations. These shows produce a “reassuring world-view wherein the guilty are inevitably uncovered and punished, and the order and security of the social body restored” (Carpenter and Tait). In these shows, a murder is solved within an hour and in the end, justice is served with the suspect confessing to the whole event. The public now expects for the result of real life crimes to end similar to that of the shows. In other words, the public expects that the criminal will always be caught and justice will always be served, and it will all occur quickly.

However, while shaping the public’s expectations can result in negative effects, it can also have positive effects. “The general public – and more specifically, the criminal jury – has become increasingly aware of the potential of forensic science and has continually increased expectations regarding its use in trials” (Carpenter and Tait). Due to shows like CSI, the public has in general become more educated about forensic science and death investigations. They have seen a proper way to conduct an investigation and rely what they have seen in a criminal jury case. This ultimately keeps those in criminal investigation in check; it keeps them from not taking short cuts and influences them to collect as much evidence as possible. Overall, the CSI effect has made an impact into the way the field of forensic science and pathology has grown.

Another aspect outside of the autopsy affecting a medical examiner’s investigation is the other departments and fields that work with the medical examiner. This includes fields such as anthropology, histology, toxicology, and even an investigation unit. A medical examiner cannot work alone to solve cause and manner of death, and must examine all aspect of the investigation. As discussed previously, a medical examiner must examine aspects such as

medical and social history, toxicology reports, and information obtained from the scene investigation. These other departments provide the information that the medical examiner needs to make a complete and educated opinion about the death. An anthropologist can help in analyzing bones and skeletal remains, a histologist can create and analyze slides from the organs collected during the autopsy, and a toxicologist is especially helpful in cases involving drugs or bodily fluids. For example, some “cases are characterized by an explanation requiring the contribution of both the pathologist and toxicologist for the presence of an interaction between pathologies of the patient and the presence of [drugs]” (Desinan 19). These departments rely on each to make death investigations as efficient and accurate as possible.

Much of the knowledge used in this thesis came from personal experience gained through autopsy lectures and an internship at the Harris County Institute of Forensic Science. During the autopsy lectures, I was able to see firsthand the autopsy process from beginning to end. The medical examiner began by explaining the background of the deceased individual by discussing the individual’s social and medical history, and the report on the scene of death. Based on the background information, the medical examiner then explained what type of abnormalities or evidence she would look for in that type of case. In an autopsy lecture in Tarrant County, the deceased individual was found with empty pill bottles near his body and had a social history of depression. Therefore, the medical examiner’s first hypothesis was suicide and she wanted to look specifically at the amount of medication found in the individual’s stomach contents. In doing so, she walked the audience through the entire autopsy process, examining each organ in front of the audience. The autopsy lectures illustrated the importance of following the steps in an autopsy process and how the exact process contributes to the medical examiner’s conclusions about cause and manner of

death.

In addition to autopsy lectures, I also had the opportunity to be an intern at the Harris County Institute of Forensic Science. In this internship, I worked specifically in the investigations unit for the medical examiner. I was able to learn the process of a medical examiner's office in a death investigation from beginning to end. I was able to see the initial call made by police upon the discovery of a deceased individual and see the initial reports made by forensic investigators. I then went to the death scenes where I was able to observe the process of documenting and collecting evidence. The investigator began by making careful notes describing the scene and the deceased body. They also took pictures of the scene, starting from the surrounding area, and making their way to the area where the body was found. Pictures of the body were also taken. The individual's body position and signs of trauma were photographed, and the eyes and mouth were always photographed. The eyes were photographed to give a reference in time of death, and the mouth was photographed as a way to show trauma. After documentation and collection of evidence were finished, the investigator would speak with the police or family members present at the scene to gain information that would later be written up in a report. Finally, the body was placed in a body bag, assigned a case number, and transported back to the medical examiner's office. At the office, the investigator concludes by assembling all evidence into a written report and creating a folder of the photographs. The next day, the medical examiners attended a meeting in the morning to assign doctors to each case. In the meeting, each case that would be examined that day was reviewed by all the doctors. The report written by the investigator is read and the photographs of the scene and the body are analyzed. After reviewing the cases, the medical examiner then conducts the autopsy. This was done in the process explained previously; the body was

first examined externally for signs of trauma, then cut open and each organ was removed for examination. Forensic photographers were present in the autopsy room to take photographs as the autopsy took place. In addition, the medical examiner cut off slices of each organ that were either preserved or later made into histology slides. Finally, the medical examiner assembled all his or her findings into an autopsy report, in which they also stated their final conclusion on cause and manner of death. During this internship I was able to observe and learn directly from the medical examiners who work in the field. I was able to interview the medical examiners about their work and ask questions about the duties and role of a medical examiner. The opportunity to learn directly from medical examiners in the field and observe the autopsy process and scene investigation in real death investigations was valuable to the research conducted for this thesis.

In this thesis, many aspects of the medical examiner were discussed: definitions were explained, the autopsy process was analyzed, and challenges in the field were described. All these aspects contribute to the importance of the medical examiner and illustrate their significance in the field of forensic science. Medical examiners play a huge role in death investigations and are vital to the process. They have the medical and forensic training to accurately examine deaths. However, they also contribute much more than their ruling in cause and manner of deaths. They can provide a family with facts and information concerning a loved one's death, including uncovering genetic diseases that can affect other members. They can also provide tangible evidence for the family to hold on to for closure. They can use their knowledge and ability to find justice for a victim in a criminal case. In addition, their knowledge and experience is useful in the medical field and advances in the way the human body is analyzed and examined, including aiding in diagnosis of diseases and finding treatments.

The work of the medical examiner and the autopsy process provides many benefits to society as a whole, and their significance goes well beyond the field of forensic science.

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