# Examining the Role of Forensic Pathology in Determining the Cause and Manner of Death in Criminal Cases

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Abstract: Forensic pathology is an important area of criminal investigation, providing valuable information on the cause and manner of death, especially in cases of suspected foul play. Through the integration of medical knowledge with legal and investigative processes, forensic pathologists can differentiate between natural, accidental, and criminal deaths. They conduct autopsies, analyze medical evidence, and work with law enforcement to uncover the most important information necessary for solving crimes and serving justice to victims and their families. An investigation into the cause and manner of death involves a scrutiny of autopsy findings, toxicology reports, among other scientific information that is available. Forensic pathologists consider the presence of injuries, toxins, and even existing diseases to make a correct determination. They further go into the circumstances surrounding death by assessing the crime scene, among which the investigations could include the statements from the witnesses given that they would be needed in establishing whether it is a homicide, suicide, accident, or natural occurrence. Today, roles in forensic pathology have improved tremendously due to improved technology. By way of digital autopsies, advanced imaging, and DNA analysis, these cases can now be reexamined more accurately, hence solving otherwise impossible cold cases. This paper is assumed as of the very much-needed and imperative role that plays within criminal investigations in terms of obstacles it faces alongside developments it is being made and stresses upon its value toward the criminal justice system.

Keywords: Forensic pathology, cause of death, manner of death, criminal investigation, autopsy, toxicology, digital autopsy, technology in forensics, criminal justice.

# I. INTRODUCTION

Forensic pathology bridges the gap between medicine and law by developing an essential means of determining the cause and the manner in which a case may have ended with suspicion. The complexity that forensic pathologists and their expertise help unravel, with their medical as well as

scientific analysis, is over such unexplained deaths to be used in legal processes accordingly. Whether it is homicide or suicide, the exact cause and manner can be used as a guiding force in directing law enforcement inquiries, prosecution of criminals, and ensuring justice for those victims. Forensic pathologists carry out autopsies, examine medical evidence and collaborate with local law enforcement to reconstruct the scenario to determine the cause of death. Their findings decide whether death was due to natural causes, an accident, or criminal intent like murder or suicide. Based on this understanding of medical facts and combining it with circumstantial evidence, forensic pathologists can present a clearer picture of what happened and help solve even the most complicated cases.

The recent technological advancement has also led to further promotion of the forensic role in the criminal justice sector. The state of advanced imaging, digital autopsy, and DNA analysis are what have been embraced currently to add to the value of cause and manner of death determination. Innovation has not only made forensic investigation efficient but increased the possibility of reopening cases which had remained unsolved. Forensic pathology: a paper discussing its critical role in criminal investigations. This is done by pointing out the problems and the new technological tools that are molding the future of death investigations in the criminal justice system.

# II. FORENSIC PATHOLOGY

Forensic pathology is that area of pathology dealing with death, particularly those which are suspicious and/or unusual in nature. The practice plays a very crucial role in the criminal justice system because it can determine the cause and manner of death. Forensic pathologists can determine the cause and

manner of death in almost all homicide and suicide cases as well as many accidents and cases that remain undetermined. For these purposes, forensic pathologists apply both medical and scientific expertise to interpret physical, toxicological, and circumstantial evidence to determine conclusions for use in court.

# Primary Functions of a Forensic Pathologist

A forensic pathologist is mainly about doing an autopsy, that is to say, examining post-mortem the body and revealing the cause of death. During an autopsy, forensic pathologists look at the body externally and internally for signs of injury, diseases, among other things, that may have contributed to death. The findings from the autopsy are then combined with other evidence to make determinations about the death. The responsibilities of a forensic pathologist include:

Perform autopsies: The body is dissected to find and study the organs, tissues, and other parts of the body to determine any signs of trauma or diseases that resulted in death and any other factors that caused death. Injuries on the outside are documented as cuts, bruising, shot, or stab wounds, and a look is made for hemorrhage and organ damage on the inside.

Toxicology reports often have forensic pathologists working in conjunction with toxicologists as they examine blood, urine, or other fluids for drugs, alcohol, poisons, or other toxins possibly involving death. Such analyses are essential in overdose deaths, poisoning deaths, and death by intoxication.

The pathologist considers the medical history of the decedent and evaluates previous illness, operation, or genetic conditions that have possibly resulted in death. This is often used to decide whether the death was caused by a medical condition, such as heart disease, or was due to external causes.

Analyzing Circumstantial Evidence: Forensic pathologists are supposed to analyze circumstantial evidence around the death in most instances. These include circumstantial evidences around the place of death, evidences left behind by criminals at the scene, eye witness testimonies, and many others. Such factors will pave way to a background on which to analyze physical evidences for any conclusive statements over the manner in which the

person died, including homicide, suicide, or accident, among others.

# Cause and Manner of Death:

A very important role of forensic pathology is to determine the cause and manner of death. The terms cause and manner of death have specific meanings in the context of forensic investigation:

Cause of Death describes the underlying medical condition or any external event responsible for the death. The cause of death could either be blunt force trauma, the result of an attack, from a gunshot, cardiac arrest, drowning, or poisoning. He has to describe whether it's a cause by injury, disease, or otherwise in the case analysis of the forensic pathologist.

Manner of Death pertains to how the death happened, and this is primarily categorized into five types:

- ➤ Homicide refers to death by the intentional act of another person.
- Suicide is death caused by intentional selfharm.
- Accidental death occurs from an unintentional event, like a car crash or a fall.
- Natural death results from disease or medical conditions, including heart disease and cancer.
- Undetermined: When the evidence does not support a definitive determination of the cause or manner of death.

# Working with Other Experts:

Forensic pathologists do not work in isolation. They often collaborate with other professionals to effectively complete the investigation:

Law Enforcement: Forensic pathologists should be well consulted with the police investigators as they set a stage on the circumstances surrounding the death, including the crime scene and available evidence.

Toxicologists: Toxicologists examine biological samples to detect drugs, alcohol, poisons, among other substances which may have contributed to death. The forensic pathologist assists in correlating autopsy findings with physical evidence collected from the crime scene by working closely with crime

scene investigators who collect evidence from the crime scene.

Role of Forensic Pathology in Criminal Investigation

Forensic pathologists appear in criminal trials and often give testimony regarding their findings into the cause and manner of death before the courts. Their services are very integral to criminal investigation because they assist in distinguishing whether death is as a result of an accident or a natural condition and whether caused by criminal conduct. For instance, in homicide cases, the results of the forensic pathologist might give a chronology of the events, identify the nature of the injuries, and even pinpoint the weapon. In cases of suspected suicide or accidental death, forensic pathology may be used to either deny or confirm those findings.

# Challenges and Ethical Considerations

Forensic pathology is extremely valuable, but it also has its challenges. Sometimes the deaths are not classified due to either unavailability of evidence or unclear circumstances, leaving them undetermined causes or manners of death. In addition, pathologists may be influenced by law enforcement, families, or the media, and they are further obligated by strict ethical guidelines, which they must follow so that their findings are not biased and only based on scientific evidence.

Forensic pathology is a science that couples medical science with other investigative techniques aimed at unraveling the riddle of death. It forms an indispensable service in the criminal justice system, providing unbiased information regarding those outcomes and guiding the investigation into suspicious deaths.

# III. ROLE OF FORENSIC PATHOLOGY IN DETERMINING CAUSE OF DEATH

Forensic pathology is of utmost importance in the determination of cause of death, especially in unnatural or suspicious cases. Cause of death refers to the underlying medical condition or event that directly led to an individual's demise. It can be due to trauma, disease, toxins, or a combination of factors. Forensic pathologists are medical professionals trained to carry out detailed post-

mortem examination, appraisal of evidence, and assessment of the cause of death.

Process of Autopsy and Cause of Death:

The major arm of forensic pathologists in diagnosing the cause of death is an autopsy: a thorough, systematic examination of the body of the deceased. The autopsy will allow the pathologist to see visible injuries, internal damage, and signs of disease and also collect samples for further laboratory analysis. Several steps in the autopsy process contribute directly to establishing the cause of death:

External Examination: This would be to note and write down all of the exterior features that can be obtained from the body, any feasible external signs that could be indicators of trauma to the body itself (such as cuts, contusions, scalds or burns), the general appearance of the body with signs of rigor mortis, livor mortis, for example. Possible external signs might therefore immediately establish the cause of death. Perhaps a gunshot or a stabbing is a sign that trauma has resulted.

Then, the forensic pathologist further performs an in-depth internal examination to check all the organs of the human body for any potential injury or disease. Such would mark the possibilities of underlying health conditions that may have caused death, such as heart attacks, stroke, cancer, or organ failure for the person. Internal bleeding, tissue damage, and or failure of the organs must be considered as essential indicators, leading to the real cause of the death.

Identification of Trauma: In many criminal investigations, trauma-related causes of death are usually scrutinized. A forensic pathologist identifies and appraises the level of injuries inflicted on a corpse, such as fractures, contusions, lacerations, or stab wounds and assesses how severe they can be and can cause death. He also concludes whether the trauma was inflicted prior to death or postmortem, which separates violent crime from natural causes of death.

Toxicology Testing: Toxicology can be very pertinent in determining causes of death; it is therefore very important during suspected poisoning cases, drug overdoses, alcohol-related deaths among others. From the bodily fluid samples, toxicologists

collect through blood, urine, and eye fluid (vitreous), they are going to determine drug presence, alcohol, poisons or other toxins presences which, in turn will alter or supplement the cause of death. For example, high levels of carbon monoxide will indicate asphyxia, and the presence of lethal drugs will prove an overdose.

Disease and Medical Conditions: Certain death causes result from pre-existing medical conditions or diseases, such as heart disease and cancer or an aneurysm. In that regard, forensic pathologists examine organs for signs of such conditions, which may or may not have been apparent externally but could have caused or contributed to the death. An example would be a fatal heart attack or stroke in someone with a prior history of cardiovascular disease.

Common Causes of Death Determined by Forensic Pathologists:

A forensic pathologist is educated on various causes of death. There are a variety of common categories which these falls under:

Trauma: The principal cause of deaths in forensic analysis is from an external physical type. It encompasses blunt force such as car crashes and falls or sharp force with injuries due to stabbing, guns, and so forth. Again, this task involves a forensics specialist determining if there was a potential intentionality that caused the injuries versus accidental injury resulting from natural circumstances, for instance, falling those results from any medical condition.

Toxins and Drugs: The presence of poisoning or drug overdose is quite a challenge without laboratory procedures. Toxicology reports from forensic pathologists in most instances help to establish the existence of alcohol, prescribed drugs, illicit drugs, or poisons. In some cases, the amount or type of toxin established in the body directly points to the cause of death. For instance, the cause of death may be ascribed to asphyxiation after showing high levels of carbon monoxide gas in the blood.

Typically, natural causes deaths would be due to chronic or an acute medical disorder. Forensic pathologists evaluate the inner organs for signs of disease, whether cancer, cardiovascular disease, diabetes, or infectious disease. At times, depending on the body having no sign of other traumatic or violent circumstances, it would be possible to postulate that the death was secondary to an acute, sudden medical illness, such as a heart attack, aneurysm, or cerebral vascular accident.

Infections: Through forensic pathology, infectious diseases like sepsis, pneumonia, or meningitis can be identified. Infections are life-threatening and usually cause death; thus, a body is confirmed to be dead with the examination made by a forensic pathologist.

Asphyxia: The forensic pathologist may diagnose death from asphyxia based on different causes such as suffocation, choking, drowning, or strangulation. They would have a condition like fluid in the lungs for cases of drowning or neck and airway injuries in the case of strangulation. Forensic pathologists thus conclude death due to asphyxia using the circumstantial evidence found in addition to the signs described.

Sudden Infant Death Syndrome: For the deaths of SIDS, autopsy is not likely to provide an understandable cause for death. However, forensic pathologists would examine all potential alternative causes for example suffocation, infection or disease related deaths based on their findings in order to arrive at a conclusion. Forensic pathologists end up becoming essential parts of differential diagnosis of this SIDS by dismissing all other causes of death.

The establishment of a cause of death depends on forensic pathology if the circumstances of death are not known, suspicious, or criminal. Through autopsy, forensic pathologists determine the physical, toxicological, and medical evidence that could explain the cause of death. Their conclusions will lead the police to follow up in their investigations, and also serve as a foundation for the law court. Whether the cause results from trauma, disease, toxin exposure, or a combination, forensic pathology possesses the scientific base that will clarify the critical questions of how and why the person died.

# IV. ROLE OF FORENSIC PATHOLOGY IN DETERMINING MANNER OF DEATH

Determining the manner of death is an essential role of forensic pathology in criminal investigations.

While the cause of death refers to the specific medical reason behind a person's death (such as a gunshot wound, heart attack, or overdose), the manner of death explains the circumstances under which the death occurred. It provides a way for the death to be classified among the several potential categories: homicide, suicide, accident, natural, or undetermined. Forensic pathologists take into account. with their skill and expertise, circumstances, physical evidence, and findings at autopsy for the determination.

# Categories of Manner of Death

#### Homicide:

A homicide is defined as the death of a person due to the intentional action of another. Determination of a death as a homicide requires the presence of evident evidence that the death was caused by an external cause inflicted by another person. Forensic pathologists examine injury patterns, such as gunshot wounds, stab wounds, or blunt force trauma, and assess the nature and extent of injuries. They also look for defensive wounds that suggest the victim tried to protect themselves during the attack. Forensic pathologists further consider toxicology reports because drugs or poison, for example, can be agents of homicide. The role here is to have the forensic pathologist confirm the likelihood of this being an act of intent for the injuries and thus collaborate with the law enforcement by linking these findings towards possible suspects and motives.

# Self-inflicted death:

In this case, suicide is that death caused by one's own individual taking his or her life. A forensic pathologist scrutinizes the physical evidence and autopsy findings to ascertain if the death was selfinflicted. Major signs that suggest suicide include gunshot wounds that are self-inflicted, self-inflicted stab wounds, or drug overdoses. Sometimes, the pathologist has to take into account the victim's history, such as any mental health issues, previous suicide attempts, or even a suicide note. But a forensic pathologist must be extremely careful, since traces of homicide could sometimes appear more like suicide; especially if staged crime scenes and/or unusual injury patterns are observed, then circumstances should be probed and investigated extensively.

Accidental: Accidental death is death which occurs unintentionally. A common example includes accidents involving car and motorbikes, falling and drowning. And also deaths arising from an accidental overdose of some drugs. Forensic pathologists evaluate the crime scene and take into account all relevant circumstances that may suggest an accident. There is also careful observation of injury patterns to determine if they can support or deny the type of accident believed to have occurred, for example, blunt force trauma after a car accident or drowning-type injuries. When overdosing on drugs is the suspected cause, the pathologist looks for the presence of toxicity to possibly suggest an accidental poisoning or overdose. circumstantial evidence, such as witness testimony or evidence of negligence, is also necessary to determine that the death was indeed accidental.

#### Natural:

A natural death occurs when the person dies from an illness, disease, or other medical condition without any external force or trauma. The forensic pathologists are responsible for identifying underlying health conditions or diseases that may have caused the death, such as heart disease, cancer, stroke, or infections. This involves looking at body parts and fluids in the hopes of finding that there are illnesses not immediately present but the cause of the death. However, in a number of these instances, the cause of the natural death would be clear because a person knows he or she had a deadly illness and they die from it. However, in other cases, it might need a proper investigation to be done to eliminate the possibility of other causes or even to ascertain that no foul play was involved.

## Undetermined:

An undetermined manner of death is when the forensic pathologist cannot categorize the death into one of the other four categories because the evidence is too meager or the circumstances unclear. This may occur when there are conflicting findings or when the circumstances surrounding the death do not fit into any category. For instance, if the autopsy reveals no clear signs of trauma, disease, or natural causes, and the death scene offers no clarity, the pathologist may be unable to determine whether it was accidental, suicidal, or homicidal. In such scenarios, the cause of death is categorized as undetermined, and further investigation or

additional evidence may be required to make a final determination.

Forensic Pathology Contribution in Determining Manner of Death:

The role of forensic pathology in determining the manner of death is multi-faceted. This includes a critical review of autopsy findings, patterns of injury, toxicology reports, and circumstances surrounding the death scene. In most cases, a forensic pathologist collaborates with law enforcement officers, crime scene investigators, and other experts to interpret all the evidence and build up the scenario of events leading up to death. Some of the important factors that a forensic pathologist takes into account are:

- ➤ Injury Analysis: Nature of injuries is one of the most important evidence pieces in establishing the manner of death. Forensic pathologists analyze the pattern, type, and severity of injuries to determine whether they were consistent with accidental trauma, intentional harm, or self-infliction. For example, multiple stab wounds may suggest a homicide, while a single, clean cut on the wrist could suggest suicide.
- Toxicology Reports: Analysis of body fluids can reveal essential information on the manner of death. Presence of high concentrations of drugs or poisons could suggest an overdose (accidental or intentional), poisoning (homicidal), or self-inflicted poisoning (suicide). Toxicology can further eliminate the possibility of an accidental death or confirm the role of substances in causing death.
- Scene Analysis: Forensic pathologists look at crime scene photographs, police reports, and other evidence to determine if the death scene is consistent with a particular manner of death. For instance, a death in the home with a weapon present may suggest suicide, but if there are defensive wounds, it might be homicide.
- ➤ Medical History: The medical history of a person is often pivotal in determining the manner of death. The forensic pathologist may find an existing medical condition, such as heart disease or diabetes, that caused natural death. In cases of suspected suicide, information regarding mental health conditions or previous suicide attempts can be important.

Witness Statements: Sometimes, the witness statement will provide the background to give some sense to the manner of death. Witness may state hearing a gunshot, witnessing an argument, or witnessing dangerous behavior, which could imply suicide or homicide. The forensic pathologist may make an understanding of the death circumstance through the information gathered.

# Obstacles in Determining Manner of Death:

Determining the manner of death is not always straightforward. In some cases, forensic pathologists face challenges due to ambiguous or contradictory evidence. For example:

- Staged Death Scenes: A perpetrator may try to make a homicide look like an accident or suicide by staging the scene. Forensic pathologists must be able to identify inconsistencies in the evidence and look for signs that the scene was altered.
- ➤ Unclear Injury Patterns: Some injuries may not clearly indicate whether they were self-inflicted or inflicted by someone else. For instance, a gunshot wound might appear to be a suicide, but further analysis of the wound and surrounding evidence may indicate foul play.
- ➤ Lack of Conclusive Evidence: Sometimes, there is simply not enough evidence to definitively determine the manner of death, which may result in an undetermined classification.

Determination of the manner of death involves forensic pathology because it gives the scientific expertise that can classify a death into categories like homicide, suicide, accidental, natural, or undetermined. Forensic pathologists have a job beyond the autopsy. They need to carefully consider circumstantial evidence, injury patterns, medical history, and toxicology reports. That is how they are guaranteed to uncover the real circumstances pertaining to a death such that law enforcement and the judicial system can reach out to achieve justice with regards to the victim and his family.

# V. FORENSIC PATHOLOGY IN CRIMINAL INVESTIGATIONS

Forensic pathology is an integral part of criminal investigations. It plays a very important role in the pursuit of justice, helping law enforcement agencies and the judicial system determine the cause of suspicious, unexplained, or violent deaths. Their work helps differentiate between natural, accidental, and criminal causes of death and provides critical evidence that may either corroborate or refute other investigative findings. Forensic pathology can, therefore, be the determining factor of a criminal case's outcome-from the identification of perpetrators to the resolution of legal disputes-through its accuracy and reliability.

Identification of Victims and Determination of Time of Death:

Forensic pathology has highly played an even more critical role in identifying victims and estimating the time of death since criminal investigations have often been based on these two points. Some other techniques a forensic pathologist uses when a body is found and the person cannot be identified include:

- Dental Records: The dental feature comparison can identify any given dead person with the known records, especially in the instances of trauma or decomposition.
- ➤ DNA Analysis: DNA samples obtained from tissues, blood, or bone can be matched to missing persons databases or family members to identify the victim. This is especially important when traditional identification methods are not possible.

Additionally, ascertaining the time of death is very significant for investigators as it can allow them to identify a timeline or narrow down some suspects or potential witnesses. To estimate the post-mortem time, the forensic pathologist will use the following:

- ➤ Body Temperature: The cooling of the body known as algor mortis allows one to guess when the individual died.
- ➤ Rigor Mortis: The stiffness of the muscles after death would give a hint of how long the individual had been dead.
- Livor mortis: settling of blood in the body after death, which would give an insight into the positioning of the body at the time of death.

These approximations of the time of death can help police to identify essential windows for activity by suspects and witness statements.

Linking evidence to criminal activity:

Forensic pathology is beneficial in linking evidence to criminal activity and helping the investigators understand dynamics of a crime. Autopsy findings and the results of toxicology reports can provide essential clues that suggest foul play or eliminate certain theories. For instance, the existence of gunshot residue on a victim or signs of defensive wounds might indicate that the crime was a homicide committed by someone else. In the same way, toxicology reports that reveal the presence of drugs, alcohol, or poison might indicate whether the victim was incapacitated before the attack or if an overdose or poisoning caused death.

This would involve evaluation of the injury patterns that may provide a clue on the mechanism of injury and type of weapon used in committing a crime. For example, blunt force trauma injuries are common for physical attacks while gunshot wounds would suggest involvement of a firearm. By elaborating on the nature and location of injuries, forensic pathologists enable investigators to understand how a crime was committed, which might directly affect the direction of an investigation.

In cases with multiple victims or ones with complex crime scenes, forensic pathologists may connect the deaths through types of injuries or patterns that could identify a serial killer or pattern of criminal behavior.

# Assisting Legal Proceedings:

Forensic pathology also helps with legal procedures since it provides forensic pathologists who testify in court. Often, they have to testify to their findings of suspicious or violent deaths, mostly in criminal cases. Their expertise helps them clarify, through science, what was found and lead to the establishment of the cause and manner of death. Such testimony may prove to be important in establishing that the evidence confirms a given theory of the crime, or that such alternative explanations might be tenable.

Forensic pathology findings are of great importance for both the prosecutors and the defendants in criminal trials. The prosecution will find testimonies from the pathologist crucial in their argument to emphasize that the death is a result of criminal activity. Defence attorneys frequently use forensic pathology to question the evidence provided by the prosecution to prove that death was accidental or even self-inflicted. Forensic pathology's credibility and accuracy will play a critical role in delivering justice, preventing false accusations, and saving wrongfully accused persons.

### Solving Cold Cases:

Forensic pathology helps re-examine cold cases and solve crimes that may have occurred decades ago. Using technological advancement, particularly DNA analysis and digital autopsies, the forensic pathologists can reassess older cases to offer new evidence. These are cold cases where either the cause and manner of death at the first time of investigation were ambiguous or which lacked evidence. The forensic pathologists may help law enforcement agencies reopen investigations, solve unsolved crimes, and close the books for the victims' families by revisiting these cases and applying the modern techniques of forensic science.

Forensic pathology is an essential component of criminal investigations since it provides the scientific basis for determining the cause and manner of death in suspicious or violent deaths. Forensic pathologists offer crucial insights that help investigators understand how a crime occurred, identify victims, establish timelines, and link evidence to criminal activity. Their work, in return, supports the investigation process as well as judicial proceedings by bringing out objective medicinally sound conclusions drawn from their autopsy findings, and expert testimonies. In contrast, forensic pathology plays a very significant role in revisiting cold cases and propelling criminal justice through technological advancement. Forensic pathology is an indispensable field bridging medicine, law, and criminal justice. It is such a crucial field in support of bringing criminals to justice and keeping the law alive.

# VI. CONCLUSION

Forensic pathology is a mainstay of criminal investigations, giving critical insights into the cause and manner of death that are needed to solve crimes and deliver justice. Forensic pathologists thus play an instrumental role in distinguishing between natural, accidental, suicidal, or homicidal deaths by examining bodies in detail, including injuries and toxicology reports. Their work is not only about the verification of truth in the mysterious death of someone but also helps to prove the existence of

truth through evidence instead of conjecture. In criminal justice, identifying victims, estimating the time of death, and connecting pieces of evidence with the criminal act is highly inescapable.

As forensic science is growing to improve more extensively, particularly regarding DNA analysis, imaging technology, and digital autopsies, it continues to contribute an enormous impact upon forensic pathology when considering the conduct of criminal investigation. Indeed, applying such innovative techniques to solve previously cold case, unravel earlier undiagnosed crimes, and determine new diagnostic methods give further insights towards difficult-to-assess cases. Furthermore, forensic pathologists give critical expert testimony that the prosecution and defense may use in the court cases to ensure justice is pursued fairly and accurately.

Forensic pathology, therefore, unravels the mysteries of death and ensures criminal justice. Forensic pathologists, with their blending of medical expertise with processes of investigation, contribute significantly to truth and accountability in cases of unexplained and violent death. Their contribution is critical in solving crimes, protecting the innocent, and bringing closure to families affected by tragedy.

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