

**CAUSE, MECHANISM, AND
MANNER OF DEATH
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Of all of the functions of a medical examiner or coroner, none are more important than the determination of the cause, mechanism and manner of death.

Cause of Death

The cause of death is the underlying disease process or injury, which sets in motion a physiologic process (mechanism), that ultimately gives rise to death. As an example, a gunshot wound to the chest with perforation of the heart is a cause of death. The resulting cardiovascular collapse due to hypovolemic shock due to bleeding into the pericardial sac (hemopericardium), mediastinum (hemomediastinum) and pleural cavities (hemothorax) is the resulting physiologic process (mechanism) that ultimately gave rise to death. Another example, a vehicle strikes from behind a pedestrian; the autopsy shows a pontomedullary laceration (laceration or it you will tear of the brainstem) accompanied by crushing of his cervical cord at the level of C5 (5th cervical vertebra). The mechanism that gave rise to the death was the sudden hyperextension of his neck with laceration of his brainstem and crushing of his cervical cord due to being struck from behind by a vehicle. Another example is a patient who has a malignant tumor (cancer) of their kidney, which in this case, is a renal cell carcinoma. The tumor extended through the capsule of the kidney into the adjacent soft tissue. Renal cell carcinomas have a tendency to undergo spontaneous hemorrhage, which in this case caused bleeding (exsanguinating hemorrhage) into the surrounding soft tissue (retroperitoneal space) and the abdominal cavity. The cause of death is due to the renal cell carcinoma. The physiologic process it set in motion (mechanism) was the cardiovascular collapse due to hypovolemic shock due to spontaneous hemorrhage within the renal cell carcinoma. All of these examples are those in which there is a morphologic change (something that is visible either grossly or microscopically).

There are some physiologic processes that are not grossly or microscopically visible but are responsible for the person's death. As an example, a patient with a known history of

hypertension (high blood pressure) suddenly collapses and dies. The autopsy clearly demonstrates a heart weight in excess of what would be considered normal for a person of their body weight and height. In addition, examination of the heart showed a markedly thickened left ventricle and interventricular septum due to the fact that the heart had to work harder to overcome the resistance to ejection of blood from the heart. In response, the left ventricular muscle hypertrophies (enlarges), which in turn increases the heart's demand for oxygen over normal. When the heart's demand for oxygen exceeds that which is available, ischemia develops giving rise to an acute cardiac arrhythmia (abnormal beating of the heart) followed by a heart attack and death. The abnormal cardiac rhythm is not something you can see at the time of autopsy, i.e. you cannot see the mechanism that gave rise to the death, but you can see the morphologic changes in the heart (thickening of the left ventricular wall and interventricular septum due to muscle hypertrophy) that gave rise to the mechanism.

There are other changes, which are not grossly or microscopically visible, but can only be determined by analysis of body fluids (blood, urine, bile), stomach contents, tissue (liver, brain, etc.) or vitreous humor the results of which can indicate the underlying mechanism that gave rise to death. For example, a patient with no significant medical history suddenly collapses at a party and despite cardiopulmonary resuscitation dies. The autopsy fails to demonstrate any gross or microscopic pathologic changes, which can account for their death. However, toxicology analysis of their blood demonstrates the presence of cocaine. Cocaine is known to give rise to acute cardiac arrhythmias that cause sudden death.

Before continuing there is a not uncommon problem that medical examiner's and coroner's have to deal with and that is death certificates, which have been kicked back to us by the Bureau of Vital Statistics because the doctor has used the term "cardiorespiratory arrest" or "cardiac arrest" as the sole cause of death. What these terms mean is in the former the heart and lungs stopped and in the latter the heart stopped beating. It is true when we die our heart stops beating and we no longer breathe; this however is not a cause of death nor is it a description of the physiologic process leading to death. For example, a patient with hypertension suddenly develops an acute cardiac arrhythmia, which culminates in cessation of heart activity and consequent death of the

person. Instead of just putting down on the death certificate “cardiac arrest” it would be far more representative of how the patient died if acute cardiac arrhythmia due to hypertensive cardiovascular disease is used. What the Bureau of Vital Statistics wants to see is not only the underlying cause of death, which in this case is hypertensive cardiovascular disease, but the physiologic process the disease hypertension gave rise to (acute cardiac arrhythmia) that caused death.

Manner of Death

Simply stated, the manner of death is the underlying circumstance that placed in motion a physiologic process that culminated in the person’s death. If the person died solely as the result of a natural disease, such as hypertension, the manner of death would be ‘natural.’ If however, the physiologic process that is set in motion is due to circumstances that resulted in the infliction of an injury, than the manner of death is no longer natural, but either accident, homicide or suicide. For example, the above described pedestrian who was struck behind by a vehicle may have been the result of the driver trying to avoid a pot hole, which resulted in the vehicle entering the shoulder and striking the pedestrian who was walking in the shoulder of the roadway. Under this circumstance the manner of death would be ‘accident.’ If however, the driver of the vehicle, who just had a dispute with the pedestrian walking in the shoulder of the roadway, purposely strikes the pedestrian, the manner of death would be ‘homicide,’ i.e., the driver intended to cause harm to the pedestrian, in short, he used his car as a weapon.

Another example of how the cause of death remains the same, but depending on the circumstances, the manner could be ‘homicide,’ ‘suicide,’ or ‘accident,’ is the above example of a gunshot wound to the chest. If the deceased was shot by another person with the intent of causing harm, than the manner of death would be ‘homicide.’ If however, the person was depressed and saw no hope for relief of their psychological pain and thus shot themselves, the manner of death would be ‘suicide.’ Another scenario, is the deceased dropped the gun, which discharged with the missile striking him in the chest; in this set of circumstances the manner of death would be ‘accident.’ What is important to remember in the above examples is that in both the cause of death remained the same, however, the manner of death changed based on the circumstances giving rise to the physiologic process that ultimately caused death. In order for cause and manner of death

to be properly determined all aspects of a case must be taken into consideration including the results of the autopsy, both gross and microscopic, toxicology, and the circumstances leading up to the death.

Before continuing there is an issue which medical examiners and coroners deal with quite frequently and that is those deaths, which legally are classified as manslaughter (voluntary or involuntary). In the above example of the pedestrian struck by a vehicle, the driver is texting on their cell phone, which causes a moment of inattention, resulting in the driver striking the pedestrian. Although, he had not intended to harm or kill the pedestrian, his negligent actions resulted in their death. The prosecutor certainly would have a legal basis to pursue a manslaughter charge, however, the medical examiner or coroner would make a determination of manner of death as 'accident.' The foundation of the medical examiner or coroners position would be the driver although negligent, did not consciously intend to harm the pedestrian.

One of the unfortunate aspects of being a medical examiner or coroner is to deal with high profile cases in which for political and or publicity reasons the prosecutor will pressure the medical examiner or coroner to rule a case a 'homicide,' which if the death involved anyone else other than a high profile person (celebrity, politician, etc.) the death would be ruled an 'accident.' There is a fundamental point we must all remember and that is at the end of the day, the manner of death determined, must have its foundation in forensic science rather than political science.

There are occasions in which the circumstances leading up to a death is uncertain. In such a case the manner of death is ruled 'undetermined.' Although most medical examiners and coroners would prefer not to rule a case 'undetermined', unless you have the evidence to support another manner of death it is best you leave the manner of death as 'undetermined.' As an example, one of the very first cases I worked on was the skeletonized remains of a woman found in a field. She had been a patient in a psychiatric institution, who had wandered off from the institution during the winter months. Her remains were found the following summer. Although, there was no evidence of trauma to the remains, exactly how she died and the circumstances were unknown. In that case the cause of death and manner of death were ruled undetermined.

As another example, one of the not uncommon scenarios medical examiners and coroners are faced with is a person who has a history of alcohol abuse, leaves a bar, and is found hours later unconscious on the sidewalk with a laceration of his occipital scalp, fracture of the squamosal portion of the occipital calvarium, subdural and subarachnoid hemorrhage, contracoup lesions of the frontal and temporal poles and bruises and abrasions about the face and upper and lower extremities. Toxicology demonstrates the person is intoxicated. What is the manner of death? He could have been in an altercation during which he fell backward striking the back of his head, giving rise to the stated intracranial injuries, thus the manner of death would be 'homicide.' However, he also could have been involved in a minor altercation, from which he walked away, but due to his state of intoxication, falls several times giving rise to bruise (contusions) and abrasions. In his last fall, he does so backward, striking the back of his head, giving rise to the stated laceration of his scalp and intracranial injuries. Under this scenario the manner of death is 'accident.' Unless you are certain of the circumstances it is best the manner of death be ruled as 'undetermined'. Remember, in the final analysis, you must be always able to defend your determinations before a judge and jury.