

How to Investigate Crime Scene Scientifically

Sharma DK¹, Jain Megha ^{2•}, Prajapati Sonali³ and Mia Rakesh⁴

¹Regional Forensic Science Laboratory, Bhopal, MP, India

²⁻³Department of Forensic Science, Parul University, Vadodara, India

⁴Applied Forensic Research Sciences, India.

Email:jainmegha510@gmail.com

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ABSTRACT

The criminal justice system depends solely on forensic science. Forensic scientists' study and understand evidence from crime scenes and other sites in order to create reliable outcomes that can help in the investigative process of criminals, or release an innocent person. Any physical scene, anyplace, that may provide possible evidence to an investigator is referred to as a crime scene. It can include a person's body, any form of structure, cars, open-air environments, or anything found there. The goal of a crime scene investigation is to figure out what happened (crime scene reconstruction) and find the person who is guilty. When it comes to solving and executing violent crimes, the ability to identify and carefully collect physical evidence is often important. Some crime scene investigators work in the field, collecting evidence and transporting it to a forensic science laboratory for inspection and reporting. This review's main goal is to provide proper way and guidelines to assist forensic and law enforcement experts in handling the crime scene evidence in order to prevent contamination, deterioration, loss of value & to investigate crime scene scientifically.

Keywords: crime scene, crime scene investigation, methods of investigation.

INTRODUCTION

The term forensic is derived from the Latin forensis, which means "of or before the forum." The term's origins can be traced back to Roman times, whenever a criminal charge It meant presenting the argument in front of a forum full of public people. Both the accused and the accuser would make remarks based on their respective perspectives of the incident. The case would be judged in favour of the person who made the best argument and delivered it the most effectively. The two modern uses of the word forensic—as a type of legal evidence and as a subcategory of public presentation—come from this origin.

In present usage, using the term forensics instead of forensic science is inappropriate, because forensic is practically a synonym for legal or court-related. However, the phrase has become so intimately associated with the scientific field that it now has its own definition in several dictionaries.

A crime scene is any location that may be linked to a crime. Physical evidence relevant to a criminal inquiry can be found at crime scenes. This evidence is collected by crime scene investigators (CSIs) and law enforcement. A crime scene might be the actual scene of the nor any location where evidence from the crime can be found. Scenes are not limited to a specific location; they might include any person, place, or object connected to the criminal activity. Outdoor, indoor, and conveyance crime scenes are examples of different categories of crime scenes. The most challenging crime scenes to investigate are those that occur outside. The elements, such as rain, wind, or heat, as well as animal activity, contaminate the crime scene and cause evidence to be destroyed (Moorthy, 2019). Because of the absence of exposure, there is a far lesser risk of contamination at indoor crime scenes. The human aspect is frequently the source of contamination here. If a crime was committed both outside and inside, the outdoor crime scene takes priority. Crimes involving transportation, such as robbery, larceny, car theft, forcible touching, and homicide, are known as conveyance crime scenes. Each sort of crime scene, as well as the nature of the crime (robbery, homicide, rape, and so on), has its own set of protocols. When investigating a crime scene involving a conveyance, it's critical to examine beyond the vehicle itself. Footprints or shoe impressions of someone leaving a place, for example, could leave evidence that the suspect picked up at the scene, such as soil, gravel, sand, or other materials.

PRACTICALLY/THEORTICSLLY BASED ON CRIME SCENE:

Forensic Science is an application of sciences includes physics, chemistry, biology and many more to aid legal procedures. The role of the forensic scientist is examining various types of evidences such as blood patterns, drugs, traces materials, etc. and determine the identity of an unknown suspect, each crime scene is unique and each case is different and has its own perspectives and challenging.

WHO IS AN INVESTIGATOR?

An investigator who collects the evidences document it, evaluate and provides information about it. The whole process complete through investigation. He/She is the first person who visits the crime scene. The term Crime derived from Latin word "crimen" which means offence and also wrong-deor. It is an intentional act which is done against the law. Crime scene is basically a scene or a site where the crime committed. It is always inconsistent. Physical evidence recognition, documentation, correct collection, packaging, preservation and eventually, scene reconstruction are the essential crime scene techniques. Usually there are several types of crime scenes occurred on the basis of size, location, and so on. Crime scene is of three types- Indoor, Outdoor, Conveyance.

Outdoor crime scene- Basically it happens outside the area. It is most vulnerable crime scene for loss if evidence in which the chance of contamination of evidence is high. Outdoor crime scene has undefined boundaries which makes investigators to consider the area for search. It has higher chance for contamination might be by humans, animals and weather conditions. Change in weather would totally destroy the evidence. As if there was rain after crime. Indoor crime scene- The crime commit inside a closed or partially closed environment is known as indoor crime scene. Here the chance of loss of evidence is comparatively less than outdoor crime scene (Moorthy and Murty, 2019D]. Less of contamination of evidences. Easy to secure and protect crime scene, Search area is definite or defined. The evidence can withstand the weather conditions, the quality of sample collected would be good enough for analysis, it would be easy to the investigating officer (IO) to manage logistics, media, manpower and information. Conveyance crime scene- The crime scene in which the crime occurred in a vehicle is known conventional or conveyance crime scene. Types of evidences found are based on nature of crime and i.e., the investigating officers get idea of scene. This includes vehicle burglary, grand theft, carjacking, sexual battery and homicide.

Crimes are divided into two categories on the basis of offences are- Cognizable offence: The crimes in which the investigating officer can investigate without warrant known as cognizable offence. The investigating officer

would not require FIR and arrest warrant to arrest the culprit. Non- cognizable offence: The crimes in which investigating officer cannot investigate without permission is known as non- cognizable offence. The investigating officer would require FIR and arrest warrant arresting the culprit.

Crimes are classified on the basis of nature (causes)-
Accidental: The crimes are occurred without any motive and it could be unintentional is known as accidental crimes. Accidental crimes include murder, rape, burglary, arson and theft. Suicidal: Basically, suicide is, a person commits to destroy his own life intentionally or unintentionally. If the attempt is unsuccessful than comes under crime and the person punished for that crime. Suicidal comes under section 309 of IPC which states that "whoever attempts to commit suicide and does any act towards the commission of such offence, shall be punished with simple imprisonment for a term which may extent to one year or with fine or with both". There are some offences which comes under suicide crimes are- human trafficking, drug trafficking and murder. Homicidal: Homicide crime is intentional or unintentional in which a person has motive to kill someone may result from accident, reckless or negligent acts. Involvement of two person, a person kills another person. Homicidal is most common cause in today's world. It includes crimes like murder, manslaughter, justifiable homicide, assassination, killing in war, etc.

SECURING & ISOLATING CRIME SCENE:

The nature of the offence is determined by the first officer on the site. He or she has a basic responsibility to obtain medical help for anyone who has been hurt and, if possible, make an arrest. The scene must also be protected from unauthorized people who might add new evidence or change it. Suspects and witnesses must also be detained. The witness provides crucial information to the crime scene investigators, which will be utilized later to recreate the sequence of events, the modus operandi, and the reason for the crime. Investigators must carefully and precisely treat the crime scene, taking great care to observe and collect every evidence that will be needed for scientific study and legal application. The lead investigator's initial inspection of the crime scene is referred to as the walk-through. The following are the five steps of a preliminary investigation:

Examine the crime site for any injured people and, if necessary, contact for medical assistance.

1. Determine if or not a crime has occurred.
2. Protect the crime scene and all evidence.
3. Witnesses should be interviewed and witness reports should be gathered.
4. Make a complete report out of all of the facts you've acquired.
5. The goal of the walk through is to make a small map of how the scene will be studied and to note the place of any potential evidence. The tour begins as close as feasible to the place of entrance. The ground on which the investigators are about to walk should be the first thing they look at. If any evidence is found, a marker should be placed at the site to warn others not to walk on the item of interest.

The following steps will be taken to preserve evidence: Only shift items if they are absolutely necessary. Avoid contaminating evidence as much as possible.

Preservation of Physical Evidence: note making, sketching, photograph & video record the scene, along with individual physical evidences, before moving anything. Preserve forensic evidence against the elements. Keep track of and identify any evidence that is discovered or relocated (i.e. what, where, by whom and when).

Note making - It's critical that responding officers take note of the scene's current state when they arrive. Throughout the investigation, note taking should be updated on a regular basis. **Sketching** -Victim and Witness Statements may be included in the investigator's notes. Investigators note includes: the lighting situation, open the windows and doors, Aromas, Indicators of date and time, e.g., Newspapers and the mail, General descriptions of the scene (Green et al., 2000) and its circumstances. Types of sketching: - overview sketching- This is the most popular style of sketch, and it comprises of horizontal objects. Elevation sketching - exhibits a vertical plane instead of a horizontal one. Bloodstain patterns on vertical surfaces such as walls or furniture, as well as bullet holes in windows, are examples. Cross-projection sketching- It is a mixture of the first two sketches. It's similar to a floor plan, only the walls are flat and the things on them are displayed in their relative locations. Its labeling often includes the following

information: report number, scene address, sketcher's identity, and time/date of creation. 5-Scale and direction notations: if something isn't to scale, include 'not to scale.' Orient the sketch as needed, but don't forget to include the compass direction.

Photography: Photography is important for determining an object's position and position, as well as its relationship to other items, which is difficult or impossible to explain completely. In many situations, photographs of the crime scene were able to provide the necessary explanation. At crime scenes, a variety of evidences is typically found. Every piece of evidence must be photographed to show its position and appearance. Fingerprints on an item that will be gathered as evidence, for example, could be photographed at the scene before packing or in the laboratory later [Moorthy TN et al., 2020]. In this case, there are several aspects to consider. In this case, there are several aspects to consider. If there is a danger that the fingerprint will be damaged during transport to the laboratory, it may be safer to picture the fingerprint at the scene, or it may be more efficient to photograph the fingerprints in the research lab due to the specialised illumination provided on a copy stand. It will be up to the crime scene photographer to decide which line of action is best for each situation. Every photograph taken at a crime scene can be used as tangible evidence in court; as a result, the crime scene photographer must have a thorough understanding of mechanics and technical abilities in order to properly document evidence.

Videography: It gives a detailed record of what a crime scene looked like; videography is a valuable weapon in a crime scene investigator's toolbox. Videography is more versatile than photography by nature, and the ability to move about allows investigators to capture the action in context [Gardner et al 2009]. Videography is crucial in the investigation of a criminal case since it allows for a thorough recording of the crime scene. Videos create visual records of events that can be easily comprehended by police who were not present at the time.

Collection of Physical Evidences: To avoid contamination and compromise, evidence in a criminal inquiry must be carefully collected. It's bagged, labelled, and processed after it's been collected. Keep evidence in your possession until it can be given over to the authorities or properly stored using the Contraband/Unauthorized Item Seizure Tag (CSC/SCC 0482). To avoid cross-contamination, keep each item of evidence distinct from other pieces of evidence, put blood-stained things in a paper. If a computer is present at an incident scene and there appears to be an attempt to tamper with computer evidence (e.g., a rapidly blinking hard drive access light), turn it off as soon as feasible and safeguard it from contamination. If a cell phone or other mobile device is present at an incident scene, take steps to protect the information on the device by turning it off as soon as possible, removing the SIM card (if applicable), and alerting the Assistant Deputy Commissioner, Institutional Operations.

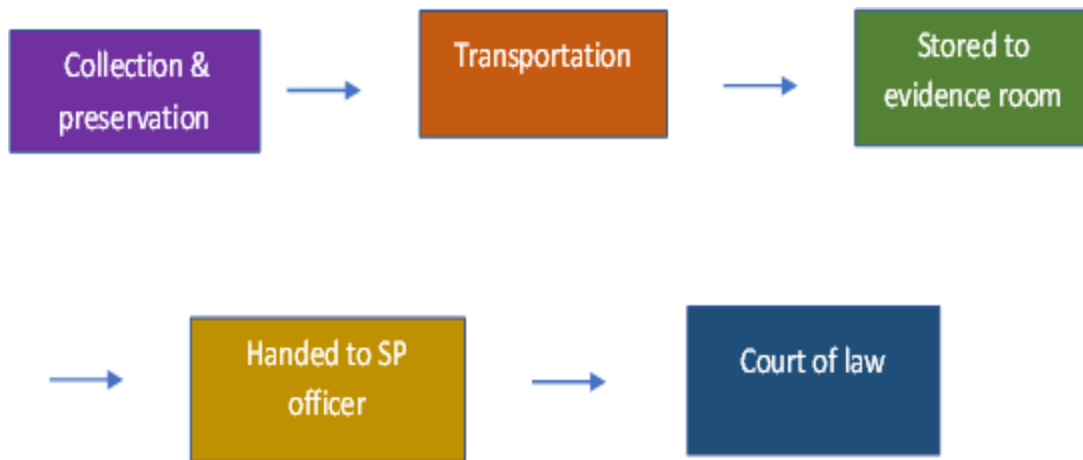


Figure 01: Process of chain of evidence

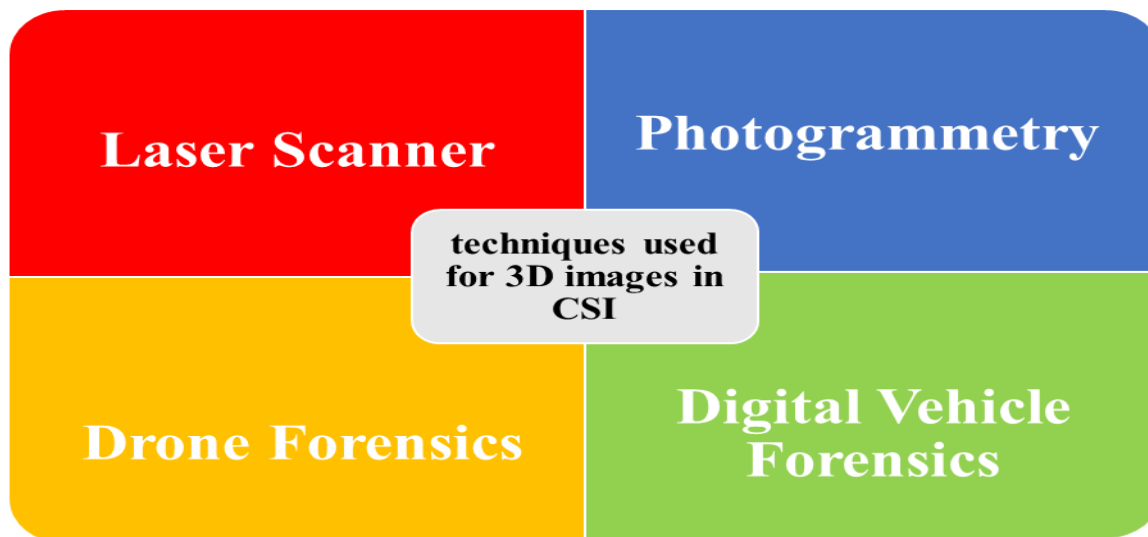


Figure 02: Techniques of instrument used in 21st century

Transportation: Segregate witnesses from one another and from other people, and record their testimonies on the Statement/Observation Report (CSC/SCC 0875) (for instructions, see Instructions (CSC/SCC 0875-01)). When a computer is involved in an incident scene, do not disrupt it and promptly notify the Chief, IT Client Services, and the Manager, Information Technology Security. Main Communication Control and secure range cassettes After a suicide or any other incident that is likely to result in a national investigation, post recordings [Nantana et al., 2010]. The officer who collects evidence in the field brings it to the station to be documented, after which it might be taken to the evidence room for storage or to be analysed in a lab. The information must have a clear chain of custody at all times; for example, when someone takes it out of the evidence room to inspect it, this must be recorded, and whoever possesses the evidence is responsible for keeping it secure. We'll now send it to the storage facility- A secure room or location where evidence connected to criminal prosecutions or investigations is stored is known as an evidence room. An evidence room, also known as a property room, is frequently found in a police station. Large police agencies may also use offsite warehouses to store old evidence, allowing more recent and current evidence to be stored in their evidence rooms. The evidence room is an important aspect of a police station because evidence management is so important in criminal investigations.

CSI techniques used in 21 century : In the twenty-first century, crime scene investigation is carried out utilising a variety of instrumentation techniques, and forensic scene documentation has become more efficient. To obtain 3D photos of crime scenes, forensic experts have begun to use laser scanners, drones, digital vehicle forensics and photogrammetry (Fisher et al., 2012). Drones are primarily employed in unintentional crime scenes on highways. The time it takes to photograph a crime scene is approximately 10–20 minutes. The main benefit is that it can be done without shutting down traffic. The disadvantage is that the results are not accurate (in cm) for measuring in court, but they are easier to digitally retain in the long run. Much of forensic science's future in the twenty-first century is up for debate [Mann et al., 1990].

CONCLUSION

We researched crime, crime scenes, and theoretically based on crime scene in these review paper. There are many other types of crime scenes, but we've only addressed three: indoor, outdoor, and convention crime scenes. We also witnessed crime scenes based on scale, such as Macroscopic and Microscopic crime scenes, in addition to these three. Accidental, suicidal, and homicidal are the three most common causes (natures) of crime. These papers also discuss protecting and isolating a crime scene, including the presence of first responders, the

safeguarding of the crime scene from contamination, and the entire chain of custody process. In addition to preserving the murder scene (note making, sketching, photography, videography). Physical evidence will be collected and transported to an evidence room by us. The case is then handed over to a police officer for further investigation before being brought to a court of law. In addition, several new instrumentation techniques have been utilised in the twenty-first century to scientifically investigate crime scenes.

Conflicts of interest: The authors stated that no conflicts of interest.

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