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Crime Scene Management within Forensic science

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 Springer

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Initial Response at Crime Scenes and Prioritization of Efforts

1

Maha Ghanem

Abstract

Each crime or disaster necessitates, at a certain point, to reconstruct the events and retrieve the evidence that proves a certain hypothesis. Science and experience can fill in the spaces in each crime, allowing the investigator and the responsible team to correctly interpret the facts.

The investigator and the crime scene team have many obligations before, during, and even after being on the scene. At each crime scene, their mission is to know how the crime was committed, determine the assailant personnel, and eliminate the incorrect suspects.

Relevant evidence collected at the scene can help to diminish the list of suspects and help reconstruct the sequence of the crime's events. Different types of crimes can take place, indoors or outdoors, with evidence that can be easily distorted if precautions are not taken and proper methods for retrieving, packaging, and storage of evidence are not followed.

Several ethical and legal issues should be considered, such as consent for searching the victim's property, taken either from him/her or from their next of kin. Documentation and interpretations of the crime scene should be submitted to the jurisdiction system when completed.

Keywords

Reconstruct · Documentation · Investigation

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The crime scene is a one-shot chance, like a photo, as soon as things have been moved or changed, you can lose that little open door which can be the main lead, and this is gone forever.

This sentence sums up the significance of thorough scene examination and shows how fastidious we should be. A crime scene is where the crime takes place. It could be an initial (primary) scene or a secondary one.

Sometimes this scene extends to another place such as in cases where the body was dragged to another location as in case of foul play and this is called extended scene. A secondary scene is when we do not know where the crime originally took place (it is not where the actual crime took place) (LeMay 2011) as seen when a stabbed body is found in the water. The secondary scene can also be where a terrorist prepares his ammunition and plans his attack, or it can be a place where the criminal can get rid of his clothes or weapon. Another example, in cases of armed robbery, the stolen place is considered the primary scene, but the get-away vehicle is considered a secondary scene. Sometimes secondary scenes are a limited indoor area and sometimes it is outdoors with several meters or even kilometers needing to be secured.

Education and training of officers are essential in building experience and utilization of thinking aptitudes before going to the crime scene (Illes et al. 2019). This makes officers familiar with their duties and responsibilities, while senior officers monitoring their performance.

1.1 The Role and Prioritization of First Respondent Officer(s) at the Scene

1.1.1 Before Going to the Scene, the Responsible Officer has the Following Objectives

- On receiving the information memo, the responsible officer should carefully read the details, outline the factors that can disturb the scene according to its location (whether indoors or outdoors), and consider the effect of light and different environmental factors (UN International Drug Control Programme. Division for Operations and Analysis. Scientific Section 2009, p. 9).
- He should create a hypothesis about the events of the crime and according to the nature of the crime, he can properly assume the evidence that he expects to find.
- He should know the standard investigation techniques and the appropriate methods needed to secure the crime scene either by using appropriate tapes or police barricades prior to stepping on the scene.
- Remember the investigation star: what, where, when, who, why, and how (Gehl and Plecas 2016).

1.1.2 On the Scene, the First Responding Officer will be Responsible for Several Missions as

1.1.2.1 The Safety of the Living Persons

Officers and Investigators Whenever the first responding officer reaches the scene, he evaluates if there are any dangerous elements that may harm the team (UN International Drug Control Programme. Division for Operations and Analysis. Scientific Section 2009). The team may be exposed to hazardous materials; as chemical, biological, nuclear, or electrical substances. For example, if the victim had committed suicide by the carbon monoxide gas, the gas released can cause toxicity of the investigation team and even lead to an explosion if any spark is generated. He may even find an armed assailant inside the scene. Moreover, they may be exposed to unstable structures as falling rocks or bad environmental conditions as lightning strikes. So, the first mission, while on the scene, is to ensure the safety of the investigation team, e. g., wearing protective clothes, proper equipments, calling experts for timed bombs, etc. Always check first the source of a dangerous situation and deal with it (National Forensic Science Technology Center 2013, p. 12).

Rescuing Survivors After securing the crime scene, he should search for any living victims, call for medical assistance, and try to create a pathway for the medical personnel away from physical evidence (always use the designated safe route). He should also be aware of the changes that may occur in the scene due to the entry of medical personnel or their intervention with the victim by removing him from the original place or pushing the furniture to make way or performing CPR or any other medical intervention while making sure to document all that. It is of importance to record the fingerprints and shoe prints of the medical personnel for exclusion.

It is better to take photos or sketches of the scene before the medical intervention takes place. Also, if possible, secure their entry and make a rapid retrieval of the evidence from their entry path such as clothes which are extremely important from the scientific point of view. Clothes can differentiate between different types of crimes. They are examined for fibers, blood spatters, DNA, bullet entrance or exit which can be lost during medical intervention if the medical team is not instructed to avoid their destruction and their like.

Dead Victim In case of the presence of a dead victim, the officer should inform his superior officer of the death and the postmortem interval by looking at the postmortem changes as hypostasis and rigor mortis. After that, the body is transferred to the mortuary. It should be kept in the same position as that found on the scene so that the forensic medical examiner (coroner) can make an accurate medicolegal (autopsy) report. If it is difficult to transport the body in the same position as that found in the scene, a detailed report should be written and the changes that were done are documented.

Personal Protective Equipments According to the hazard which may be present at the scene (biosafety levels, e.g., COVID-19), Chemical warfare, Nuclear hazard, etc.

1.1.2.2 Cordon Off the Boundaries of the Crime Scene and Limit Access of Personnel for Security

Whenever the first responding officer and the team approach the scene, they should define the extent of the scene. It is easy when the crime occurs in a room of a house, but it is difficult when it is in a part of a forest. So, a decision is needed to secure and surround that area and determine if there are extensions to the primary scene. It is easy to decrease the boundaries than to expand them, so cordon it from the beginning beyond the field of the crime scene. Consider the entry and exit points of the criminal to be inside the secured area.

Large scenes may necessitate the help of police patrols to prevent vehicles and/or people from passing through.

The first responder officer should specify who should be inside the scene and prevent those who can distort it. As indicated by Locard's statement the assailant will carry something into the scene and leave with something from it, and therefore both can be utilized as evidence. By assigning tasks, this will lead to the avoidance of effort duplication and missing/misunderstanding evidence while investigating.

Regarding family, friends, and bystanders at the scene, they should be treated politely, but kept out of the scene with their movements controlled.

Underwater Scene It is challenging to apply the normal regulations in the underwater scenes, as regards the security, collection of data, and preservation of physical evidence and it needs well-trained divers.

1.1.2.3 Avoid Contamination

Contamination can be defined as the introduction of something new to a scene that was not originally there. This means that some substances are added to the scene after the crime is performed. The scene of the crime should be considered as a surgical theater, where it is preserved clean, with no contamination whatsoever. Usually, a police officer reaches the scene earlier than the forensic personnel, and sometimes, the investigator is the one who collects the evidence and sends it to the forensic lab.

Anticontamination Measurements Should be Considered as

- Wearing gauntlet and over-shoe covers,
- Utilizing a single entrance when passing through the scene,
- Avoiding the utilization of any services in the scene, e.g., latrine,
- Maintaining a strategy of not moving anything/anyone, except in need and this should be reported.

The first responding officer or any person (suspect, witness, etc.) should not eat, drink, smoke inside the scene. Moreover, any person or vehicle in the scene should be examined carefully, both on the scene or on leaving the scene.

So, the first responding officer should be meticulous with each detail of the scene, preserve each evidence, and avoid distortion of that evidence by any hazardous

approach such as stepping over the assailant's footprint or putting his hand over the fingerprints of the assailant.

1.1.2.4 Initiate Survey/Assessment

After defining the scene boundaries, an initial assessment of the scene is needed without moving any objects. A rapid search for the area is carried out, searching the floor for footwear and tire impressions, after which a detailed search takes place. Careful examination of the entry and exit points of the scene should be performed. Then inspection for broken glass, blood spatters, whether it belongs to the victim or the assailant, hairs, fibers, weapons, tool marks, fingerprints, and any other trace evidence which could be left by the suspect should be carried out. After the inspection of the points of entrance and exit, a careful search for the remainder of the scene can be carried out. It will help to verify the theory about the crime or change it.

The investigation team should collect the evidence and ask for assistance if needed. Environmental factors as light and wind that can distort or destroy the evidence should be considered. If the crime is outdoors and the first responding officer reaches the area at night, he has to choose between searching for the evidence in the dark, if any outside factors such as rain will destroy the evidence or postpone the process until daylight to see the evidence properly.

The first responding officer should determine if the boundaries that have been set for the crime are well-established or if they need a further extension.

1.1.2.5 Evaluate Physical Evidence

From the first responders to the last personnel, validated well-established protocols and quality control methods are followed in collecting and analyzing the physical evidence. Otherwise, something may be missed, distorted, contaminated, or adulterated. Assign the missions to the responsible personnel and document this in a formal sheet. The process of identifying physical evidence is difficult and needs an expert eye to locate. So, all possible methods should be used starting with the naked eye and magnifiers or by using specific equipment for the detection of prints or blood spatters.

After detection and packaging, the physical evidence will be stored and transferred to the forensic labs for analysis with results prepared and submitted to the legal system.

Distortion of evidence will misdirect the investigation and influence the case result ultimately. The location of evidence should be precisely documented.

If the sample evidence is large, subsamples will be created without oversampling as it may overload the labs and may lead to misrepresentation.

Once the collecting process is finished, the samples are stored in a cool, dry, and secure place until it is time to transport them to forensics. A second documentation process is needed for transportation, storage, and delivery to the labs. All steps of delivery (to the storage place and the labs) should be with a written receipt.

1.1.2.6 Personal Statements

If the victim is alive, his statement is the first thing to be collected, by asking questions about the crime collectively.

The reporting person should be interviewed and asked if anything changed or was moved since he/she had passed through the scene.

As soon as the scene is secured and the evidence is collected, the witnesses are all secured and questioned. It is important to isolate them separately. This will allow them to report their experience without flaws and influences. These processes should be carried out according to the laws and regulations in the officer's department, and according to the legal system. All statements and answers should be written and signed.

The suspect also needs to be interviewed and sometimes the medical team personnel to clarify certain situations especially if they arrived before the responsible officer. All the statements should be documented.

1.1.2.7 Legal and Ethical Considerations

Legal Issues

There are general standards identified with scene examinations and the forensic process, where these standards are ruled by local laws and guidelines. They identify issues, for instance, how to acquire permissions to the method of gaining authorization to launch the investigation, to lead the assessment, to manage physical evidence (for instance best technique required), and to submit that evidence to the forensic lab. They decide the acceptability of the evidence gathered at the scene as well.

Inability to cope with the existing laws, rules, and guidelines can bring about a circumstance where the proof cannot be utilized in court. This is of significance for the staff working at the scene, as they should be informed about it, and guarantee appropriate consistence with these laws and guidelines.

Ethical Concern

Ethically the first responding officer should take oral consent from the victim as in cases of robbery/burglary to search personal objects, or written consent from the next of kin if the victim is dead. Confidentiality of private information that may influence the reputation of a person should be considered and kept confidential if it does not influence the case investigation.

Ethical principles include respecting human dignity, confidentiality, and privacy of the victims while carrying out the examination and gathering physical evidence from dead bodies or the living such as using screens, curtains, and tents.

Professional codes of ethics govern the process of investigation and evidence collection. These codes consider acting with care, competence, impartiality, receptiveness, and fairness. If there is a contradiction between human life and the preservation of evidence, human life is always chosen.

1.1.2.8 Forensic Medical Examiners

The forensic examiners are assigned to investigate the circumstances of the crimes. Besides, they are concerned with the determination of the manner and cause of death

that fall under their jurisdiction. They may involve any natural death where the physician is unable or legally prohibited to do so. They carry out postmortem dissection, testing body fluids for toxicological evidence, perform a pathological examination of tissues, and examine different physical evidence. Identification of the victims is considered part of their responsibilities. It can be performed by matching the decedent to any formal documentation as ID or driver's license or in other situations identification methods can include the use of body X-rays, fingerprints, dental records, or DNA examination. Medicolegal assessment of infirmities along with the examination of various assaults can be also included.

1.1.3 Prepare a Narrative of the Scene

Documentation of the activities conducted at the crime scene must be carried out as soon as possible after the event to preserve data. Documentation targets creating a solid record of the scene, of the physical evidence, and any activities that had happened. Documentation at the scene is the beginning stage of the chain of custody.

1.1.4 Relinquish Control

The first responding officer summarizes the scene investigations, evidence collected, and interviews of the witnesses, victims, and suspects in the crime's location. This is then delivered to the responsible officer, the investigator, or the district attorney according to the legal system of the country. This is carried out to help in the next step of the crime investigation.

1.1.5 Communication with the Media

The officer in charge prepares a temporary location for releasing the information about the crime to the media and to coordinate crime scene investigation activities and team meetings there. If the reporters need to take photographs secure the scene and prevent distortion of the crime scene and evidence.

1.2 The First Responder Responsibilities in Electronic Scene

In the era of the digital age, we can be confronted with computer crimes. It may be used to cause threat to someone as in cases of child abuse, harassment, narcotics, and stalking or it may be used in illegal actions as gambling online or economic fraud, prostitution, and software piracy. Sometimes, it is more complicated and used by terrorists to violate the safety of countries and peoples.

An electronic scene is a crime scene that contains digital evidence that is stored on, received, or transferred by an electronic device. Like any other evidence,

electronic evidence could be easily lost. Just a button click is enough to permanently distort this valuable evidence.

Types of digital evidence are variable and include computers, accessories of the computers, laptops, minilabs, phones, etc.

Electronic Evidence

1. The computer system includes hardware, software, may be connected to an external hard drive, removable media, USB, and memory cards. You can find photos, email, database, chat, files, and different valuable information. All can be considered as all potential evidence.
2. Mobiles: modern android phones can be considered as potential evidence as it contains email, database, files, navigation systems, data storage, and individual information management.
3. Computer accessories are tools that can be connected to a computer to improve computer functions, capacity, and help user access.
4. Computer Networks are connected to computers to allow data exchange in between. The connection could be direct through cables or by wireless networks. A computer network often includes printers, accessories, and routers. So, whenever you are the first responder in an electronic scene do not try to extract any digital information unless you are experienced and trained to make such a move.

In Case of Presence of Digital Evidence, the First Responders Should

- Be sure of the presence of the memo of evidence collection.
- Be sure of the safety of the scene and the safety of the team.
- Secure the scene by following the regular procedure admitted by the department and secure all the digital devices.
- Apply personal protective equipment.
- Limit access to the scene's digital devices and prevent any assistance from nonexpert personnel.
- He/She should have appropriate collection tools for retrieval and preservation of digital evidence, such as boxes, gloves, cameras, tapes, paper bags, labels, antistatic bags, markers, isolation bags, and aluminum foil to wrap mobiles.
- Realize, collect, package, label, and preserve the digital evidence he finds.
- Be sure that all the scene's devices condition is not changed. For example, if the device is off (closed) leave it as it is, while if that device is opened (power on) check for its activity (sound of the drive spinning), check the screen to be sure that no order of destruction of the data has been carried out and document this steps.
- Ensure that external or internal powers of electronic devices are maintained to protect the stored data. The data of mobile or smartphone could be affected if the device remains closed. The software of mobile and smartphone could be manipulated remotely. The data might be turned off, erased, or hidden.
- Be sure that no one contacts that device from a remote device or through the cloud or there is any active communication with other devices.

- Document any activity in the digital evidence and determine the state of the camera.
- Transport the evidence safely, keep it away from any magnetic field (lights, radio, speakers), static electricity, heaters, hot or cold temperatures, humidity, and vibrations. All these hazards can destroy the evidence.
- Document the transportation event and preserve the integrity of the chain of custody.
- Respecting the department's policies in the management of evidence.
- Keep the document of the scene and the location of the evidence.
- Plan for the role and responsibilities of personnel involved in the investigation.
- All information about the users of the device, the Internet, accounts, passwords, etc., should be recorded.
- Documents including the scene location, condition, condition of the devices, passwords, suspected criminal activity should be sent to the forensics.
- Be able to contact a superior officer if a question of appropriate authority arises.

1.3 The Role and Prioritization of the Investigator at the Scene

1.3.1 Investigator Assessment

The role of the investigator in charge starts at that point, where he has specific responsibilities while on the scene. In addition to developing investigative plans in agreement with the laws and regulations of the country. Moreover, he has to revise all the steps taken by the initial respondent officer.

He communicates with the first responding officer regarding observations, documentation, and activities.

He should revise for:

- Safety of personnel either the team, the victim or other people related to the scene.
- Boundaries of the scene.
- Paperwork like the warrant of arrest or approval forms and consent.
- Defining authorized persons allowed to be in the scene.
- Confirmation for the presence of extensions to the primary scene or secondary scene and if so, define a responsible officer for that scene and be sure for an open-line communication.
- Establishment of a location for appliance staging (equipment needed for the search).
- Establishment of a secure area for the temporary storage of the evidence with consideration to the chain of custody rules.
- Asking for investigative resources as needed (according to the evidence present at the scene).
- Ensuring complete control of the scene as regards the documentation and photographs after the thorough search.
- Ensuring that the witnesses are identified and separated from each other.

1.3.2 Overview the Scene and Initial Documentation

There is a controlled process where the investigator searches all over the scene (it is controlled by avoiding disturbance of the crime scene evidence).

The Walk-Through Should be Conducted by the Investigator and Expert Personnel in Evidence Collection as Follows

- Specify a path for entry and exit to avoid contamination of the scene's evidence.
- Consider personal protective measurements to avoid contamination.
- Prepare documents and revise evidence collection and storage.
- Confirm the scene condition as regards the state of the scene, lights: turned on or off—day or night, doors, windows: opened or closed, odors: if there is specific odor as kerosene, curtains and shutters, time and date indicators inside the crime scene, electronic devices as answering machines, voice mail, signs of human activity (food preparation, housekeeping, etc.), furniture, weapons, carpets, environmental conditions and people involved.

1.3.3 Log Officer

He is the officer responsible for writing the activity of all personnel at the crime scene. He is assigned by the responsible officer to write down who enters the scene and who leaves it. (The detail is in Chap. 2).

1.3.4 Team Composition

Team composition is determined by the responsible investigator according to the type of crime and the multiplicity of the scene. Each member should be an expert in his/her field.

A qualified team is selected to perform specialized tasks as photography, latent prints, DNA extracts, bomb deactivator, etc.

Team members and assignments should be documented.

1.3.5 Procedure of Evidence Collection

The collection of physical evidence must be processed according to a protocol to prevent loss, annihilation, or defilement.

The investigation team should:

- Select a standard protocol for evidence collection.
- Select a movement strategy so that it would not compromise the further collection.
- Determine the order of collection of the evidence.

- Start with the vulnerable evidence that can be affected by environmental conditions.
- Assess the influence of heat, light, and other surrounding conditions on the physical evidence.
- Start from the simple evidence that does not necessitate processing to the difficult one which needs complicated methods.
- Define the role of each of the team members.
- Conduct a cautious and systematic assessment considering all conceivable outcomes of the physical evidence.
- Begin with effortlessly open regions and proceed to out-of-view areas.
- Start with the primary scene if there are multiple scenes then go search others.
- Recognize other strategies that could be used in the collection of evidence and report.

1.3.6 Contamination Control

It is an essential process that will guarantee the astuteness of evidence. It necessitates the following:

- Establishing an entry/departure path at the scene.
- Considering personal anticontamination measurements.
- Establishing a secure area (for equipment and sanitizing it before use and after collection of every evidence.
- Using disposable tools in evidence collection whenever possible.
- Handling the packaging and storage processes in a clean secure place until delivery to the lab.

1.3.7 The Final Assessment of the Crime Scene

The best start is composing a debriefing team including officers and investigators to be sure that all missions are completed. This should be carried out before releasing the scene.

Then a final survey to be sure that all steps which should have been carried out in the scene were accomplished and no equipment or evidence was left.

Case to Remember

I remember a case where a dead body of a 30-year-old man was found on a flat riverbank devoid of plants. He was lying on his back, beneath him there was only a pool of blood. The assailant said that there was a fight where both the victim and the assailant had knives. He pushed the victim from his back where the knife cut his throat accidentally. He then felt angry and stabbed the victim with the knife several times.

Externally, it was found that there was a cut in the shirt from the beginning of the sleeves of the left arm, some defensive wounds (multiple small incisions) in the upper arm and left forearm of the victim and there was an incised wound in the neck on the left side, eight stabs in the chest, as well as three stabs in the abdomen and a stab in the left arm, two under the left armpit, and one in the right hand, and there were several stab wounds in the back.

The autopsy showed the following

The Head We found that the scalp had no bruise, the skull bones were intact, the brain and meninges were free from any injury.

The Neck We found that the wound described in the neck by the naked eye had caused vital cutting of the muscles and the soft tissues in relation, including the major blood vessels on the sides of the neck (carotid artery and jugular veins), laryngeal cartilages, the upper trachea, and esophagus, with some blood trickled in the tracheal cavity—and the hyoid bone was intact.

The Chest It showed the penetration of the stab wounds described in the chest in the external examination across the rib distances and its internal pathways interfering, causing vital lungs lacerations, heart-piercing incisions, profuse blood bleeding around two liters and coagulated, and the chest ribs were unified and intact.

The Abdomen The stab wounds in the abdomen were penetrating the stomach enforcement. A stab from the right side of the back was also, penetrating the abdominal cavity, causing injury to the liver and mesentery tissue. Hemorrhage inside the peritoneal cavity was about 1/2 L. The stomach has semi-digested food and did not include any suspicious odor. The bladder has a small amount of urine.

The Extremities Limited contusions were seen against the lesions described by the limb by external examination. We found the major blood vessels of the limbs intact, including the arteries of the left forearm. All the bones of the corpse were found intact.

Samples were taken for pathology and toxicology labs.

The Forensic Report Included The scene of the crime did not show the presence of blood anywhere except under the victim in spite that the carotid was severed which is represented by showers of blood in the scene.

Accidental cutthroats are exceptionally rare. It occurs in accidents where the victim's head passes through glass.

The assailant said that the stab wound was accidental during the quarrel. We found that the lesion in the neck was transverse, deep, and its edges were regular. This description requires that the skin of the neck must be stretched, and neither the accused nor the simulation of the crime representation stated that the accused did this.

There is only one deep, slaughtered wound that occurs only if the deceased's head was well fixed and this happens when there are several people where a person fixes the head and the other performs the slaughtering process or if the victim is in deep sleep or under the effect of drug of abuse that causes heavy sedation. This was inconsistent with the investigations or the confession or the presence of defensive injuries to the upper arm and left forearm of the victim.

So, this victim must be killed in another scene and more than one assailant was there.

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Crime Scene Processing: Documentation and Evaluation

2

Maha Ghanem and Haidy M. Megahed

Abstract

Thorough and complete documentation of observations at the crime scene is crucial. Failure of complete documentation of evidence at the crime scene may result in challenges at court and unsuccessful prosecution and may affect the credibility and reputation of the first responders.

Any incident, whether criminal or noncriminal must be documented thoroughly. Even accidental injuries can be open to civil litigation such as those made by insurance companies or equipment manufacturers.

Crime scene documentation may include notes, photography, videos, sketches, measurements, or reports. None of which are a substitute for the other.

During documentation, it is vital to be aware that there may be many other people (attorney's, attorneys' investigators, crime lab analysts, etc.) who are involved in the case and were not able to visit and assess the scene of the crime by themselves and observe the placement of physical evidence within it. The aim of documentation is to deliver an enduring record of the scene and provide physical proof. It is the fundamental initial step of the chain-of-custody.

Keywords

Credibility · Noncriminal · Physical evidence

Crime scene documentation is carried out through a well-developed protocol by the responsible investigator. The documentation process is the responsibility of the first responder officer and the responsible investigator with the team of experts that are involved. It can be divided into; crime scene processing as photography, notes,

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sketches, video recording, and recording of the responsibilities of each expert in the team as well as the witness data. Bad documentation results in unaccepted evidence in the court or by the insurance company in accidents and guilty criminal release.

Proper handling of a crime scene includes numerous diverse individuals employing a wide assortment of media or strategies to record information, give a timeline of the examination, as well as how the wrongdoing scene was drawn closer and how proof was distinguished, checked, and collected for examination.

Documentation will be discussed by the court, attorney, and different parties involved. So, it should be completed as soon as possible to avoid missing any of the data.

Documentation should mention the point of entrance of the suspect, what items he might have moved in the scene as well as what was left undisturbed. It may give a hint about the *modus operandi* (MO) of the suspect. For example, in a housebreak, where the suspect stole money and bijou from the bedroom, documentation of undisturbed areas that contain valuables as sterling silver and entertainment devices is important.

Documentation begins from the moment the first person reaches the crime scene. First, record the time of arrival to the scene, the condition of the scene's doors, windows and if there is a characteristic odor and any observed or heard activity. Always review the assessment of the scene to decide the kind of documentation required. Documentation is done using appropriate methods such as photography, videos, sketches, notes, and measurements. Detailed documentation should be started prior to retrieval of any physical evidence. Each single recovered evidence is tagged. Any person entering or leaving the scene and any movement or removal of anything from the crime scene is also observed and recorded.

The objective of documentation is to deliver an enduring record of the scene and physical proof. It is the fundamental initial step of chain-of-custody. The documentation process requires highly organized and systematic personnel and it should be his/her only assignment as it consumes a lot of time and needs full commitment. According to the nature and type of the scene, the type of documentation needed is determined.

2.1 Photography

Crime scene photography seems to be a simple task to do but it necessitates the use of complicated techniques that should be carried out correctly and thoroughly to give the viewer of the photograph a clear visual record. Photography is the most widely accepted evidence and is considered a solid document by courts whatever the image quality may be.

Photo placard
Case number:
Date:
Location:
Photographer name and ID:
Roll #:

Fig. 2.2 Example of a photo placard

- The photographer's name should be recorded for the sake of the authenticity of the photos.
- Prior to entering the scene, acquire prior blueprints or maps if possible.
- Caution: some equipment and materials used in the photographic process are flammable, so use appropriate precautions when handling potentially flammable materials.
- Prepare lighting for the long-range (in front of the object) or for close-up photography (side lightning where the camera is in front of the object).

2.1.1 Types of Crime Scene Photography

2.1.1.1 Overall (Long-Range) Photography

Start the process with an overall picture of the scene. It functions to document the layout and condition of the scene as found. Usually, they are shot from all available corners of the crime scene. If the scene is a business or house, take a photograph of the *exterior crime scene* from the street and include the address and sign of the business to clearly identify the location.

Photographs should have a 360° coverage. Use aerial photography if possible (used to document crime scenes by taking photographs from considerable heights as from a helicopter). It is also advisable to take photographs facing away from the scene to reveal the surrounding area showing the presence or absence of vehicles, homes, streetlights, and parking lot security cameras.

When photographing *interior crime scenes*, use the four corners of the room as guides. Use a normal lens to photograph the interior crime scene in overlapping series. Wide-angle lens may be used to take overall photographs in such a way that allows the viewer to see a wide area in the scene at eye level.

When *photographing a structure*, such as a vehicle, it is advised to photograph it from various sides and angles. A vehicle is photographed from eight angles: front, rear, two sides, and four corners. Include the license plates in cases of vehicles (Fig. 2.3).



Fig. 2.3 A vehicle is photographed from eight angles: front, rear, two sides, and four corners. The license plates here are stolen

2.1.1.2 Midrange Photography

After completing the overall photographs, we can move on to the midrange photographs of the important regions within the crime scene (as points of entrance, physical evidence, opened safe, etc.).

It functions to correlate the photographed evidence with an easily recognizable marker or other items of evidence. It is not intended to show details. With close-up photographs, they go together. The aim of midrange photography is to establish the location of the item of interest within the crime scene and their spatial relationship with other items of evidence. Take the photographs before and after placing placards and scales.

For example, if there is a glass of wine on a table that is physical evidence, a midrange photograph would show the entire table showing where the glass was on the table and its relationship with other items on the table.

An overall photography was first taken to document the layout and condition of the scene (body) as found. It is ideal that photographs should not include any individuals and the scene should be properly secured. Then a midrange photograph is taken as in of the areas of interest within the crime scene with respect to other evidences.

When photographing a deceased, it should be done before the body is moved. Take photographs from all angles (facial view, position of the hand and feet, clothing) without altering the body. Close-up range is used to photograph wounds. After removal of the body, photograph the area where the body was moved.

2.1.1.3 Close-Up Photography

Close-up photographs are then taken for items of evidence or areas as near as possible portraying the details of the item of interest (footprint, fingerprint, tire tracks,

Fig. 2.4 On the right: Close-up photographs of an inlet of a firearm injury with 1 cm scale including an abrasion from distant firing of a M16 gun. On the left: an X-ray photo of the same victim. The arrow represents the track from the inlet to a point in the vertebral column where it was fractured (Dr. Mohamed Essam el-Sheikh. *Firearm injuries in forensic medicine*. Arabization center for the medical science—Arabic medical curricula series. first ed. 2012 p 92) (after permission of the author)



firearm injuries, etc.). They permit one to see all the apparent details of the physical evidence. Photographs ought to be near and fill the outline with the evidence item itself. Photographs are taken first without a scale and then with a scale in which the viewer can gauge the size of the item presented.

For example, after taking a midrange photography of the wine glass mentioned earlier, a close-up photograph of the glass is taken to detect details such as lipstick prints.

It is important to keep in mind the following: to utilize placards and remove the flash from the camera, to use suitable side lighting, to overcome the shadows with flash, and to include scales within the photos.

Figure 2.4 shows two close-up photos of an inlet of a firearm injury with 1 cm scale including abrasion from distant firing of a M16 gun.

These photographs were later matched with the X-ray findings (Fig. 2.4 on the left). The arrow represents the track from the inlet to a point in the vertebral column where it was fractured, and the bullet remnants were recovered later from the victim.

Figure 2.5 are close-up photographs of different distances of firing. The upper photograph is of 40 cm firing, the lower left photograph is of contact firing, and the lower right photograph is of a 20 cm firing range.

2.2 Videography

One of the commonly used method of documentation nowadays is videotaping and it is preferred due to its 3D filming of the scene. It is economical with high resolution and a distinguished capability to zoom and having the feature of a compact size. Although video recordings can be a great investigative aid, first responders may not