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Study on Crime Scene Visit of Unnatural Cases Brought for Autopsy Examination at a Tertiary Health Center in Kolhapur Region.

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ABSTRACT

In medico-legal investigations, the correlation between autopsy findings and crime scene observations is critical for accurately determining the cause and manner of death. However, in many settings, including India, crime scene visits by forensic experts are underutilized. This study evaluates the significance of crime scene visits in unnatural death cases brought for autopsy at a tertiary health center in the Kolhapur region. To assess the role and impact of crime scene visits in the investigation of unnatural deaths through correlation with autopsy findings. A prospective and retrospective observational study was conducted on 35 cases of unnatural deaths from January 2022 to December 2024. Data were collected on demographic details, manner and cause of death, and whether a crime scene visit was conducted. The impact of the visit on determining the final cause and manner of death was analyzed. Out of 35 cases, 20 (57.1%) involved a crime scene visit. Among these, 85% had accurate and conclusive determinations of death, compared to 15% accuracy in cases without a visit. In 4 cases, the preliminary autopsy findings were revised following scene examination, altering the manner of death (e.g., suicide to homicide or undetermined to accidental). Homicidal deaths benefited most from the additional context provided by scene visits. The statistical analysis showed a significant association between crime scene visits and diagnostic accuracy ($p < 0.05$). Crime scene visits substantially enhance the reliability of autopsy findings in unnatural deaths, especially in cases involving violence or ambiguity. Interdisciplinary coordination between forensic experts and law enforcement is essential to ensure accurate death certification and improve the quality of medico-legal investigations.

Keywords: Unnatural deaths, crime scene investigation, autopsy, forensic pathology, Kolhapur, medico-legal, homicide, suicide, accidental deaths.

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INTRODUCTION

Unnatural deaths—comprising homicides, suicides, accidents, and undetermined causes—constitute a significant portion of medico-legal autopsy cases in India and globally. These cases often require comprehensive investigation beyond the autopsy alone to accurately determine the cause and manner of death. The integration of findings from crime scene visits with post-mortem examinations enhances the reliability and context of forensic conclusions, especially in complex cases such as hanging, burns, and blunt force trauma.

Crime scene investigation provides critical information that may not be evident during an autopsy. Factors such as body position, bloodstain patterns, surrounding objects, and environmental conditions can offer insights that clarify ambiguous findings or raise suspicion in otherwise unclear circumstances³. In particular, inconsistencies between scene findings and autopsy observations may suggest the possibility of foul play or staging, prompting further investigation.

Despite this, crime scene visits by forensic medical experts remain limited in many Indian settings, including tertiary health centers, due to infrastructural limitations, lack of coordination between law enforcement and medical personnel, and absence of formal protocol or legal mandate⁴. This gap can lead to misinterpretation, underreporting of homicidal cases, or inadequate documentation of evidence.

The present study was undertaken to evaluate the role and impact of crime scene visits in cases of unnatural death brought for medico-legal autopsy at a tertiary care center in the Kolhapur region between 2022 and 2024. By correlating crime scene observations with autopsy findings, the study aims to highlight the significance of interdisciplinary collaboration in medico-legal investigations and the need for systemic improvements in forensic practice.

METHODOLOGY

This study was conducted as a retrospective and prospective observational study to evaluate the role and impact of crime scene visits on the interpretation of autopsy findings in unnatural death cases. The study was carried out at the [name of the tertiary health center], Kolhapur, over a period from January 2022 to December 2024. All cases of unnatural death brought for medico-legal autopsy during this period were considered for inclusion.

Study Design and Population

The study included 35 cases of unnatural deaths, which were categorized into the following groups based on the manner of death: homicidal, suicidal, accidental, and undetermined. The cases were identified through the hospital's autopsy registry, and relevant information was collected from medico-legal records, police reports, and autopsy findings.

Inclusion and Exclusion Criteria

- Inclusion Criteria: All cases of unnatural deaths (homicide, suicide, accidents, and undetermined causes) brought to the hospital for post-mortem examination during the study period.
- Exclusion Criteria: Natural deaths, deaths with incomplete or missing case files.
- Data Collection and Crime Scene Visit Protocol

Data was collected through a structured review of case files, which included detailed autopsy reports, police investigation reports, and crime scene photographs (when available). Each case was analyzed to determine whether a crime scene visit was conducted by a forensic expert, as well as the nature of the findings at the scene. The crime scene visits were coordinated with local law enforcement agencies, and forensic experts were dispatched to the scene where applicable.

In cases where a crime scene visit was performed, Autopsy Surgeon recorded their observations, including:

- Environmental conditions (location, weather, and accessibility).
- Positional aspects of the body and its surroundings.

- Any items or objects near the body (weapons, clothing, etc.).
- Signs of struggle or violence (bloodstains, fractures, etc.).
- Clues suggesting manipulation.

Autopsy Examination

The autopsy examinations were performed by experienced Autopsy Surgeon according to standard medico-legal procedures. Post-mortem reports included findings on:

- External examination (wounds, marks, signs of trauma).
- Internal examination (organ injuries, toxicology sample collection).
- Time of death estimation (based on rigor mortis, livor mortis, and other indicators).
- Cause and manner of death.

Data Analysis

Data was analyzed to determine the correlation between crime scene findings and autopsy results. The primary outcome was to assess how the inclusion of crime scene observations influenced the forensic conclusions regarding the cause and manner of death. The cases were also analyzed to identify the impact of scene visits on resolving ambiguous cases or altering initial findings.

Ethical Considerations

The study was conducted in accordance with ethical guidelines for medical research, and all data were anonymized to protect patient confidentiality. Ethical approval was obtained from the institutional review board (IRB) of Tertiary Care Center of Kolhapur.

RESULTS

Study Population and Demographics

A total of 35 unnatural death cases were included in the study for which we received requisition from legal authorities between January 2022 and December 2024. The cases were categorized as follows:

- **Homicidal deaths:** 12 (34.3%)
- **Suicidal deaths:** 10 (28.6%)
- **Accidental deaths:** 8 (22.9%)
- **Undetermined causes:** 5 (14.3%)

The average age of the deceased was 40.6 years, with a range from 18 to 75 years. The majority of cases were male (25 males, 10 females), and the most common cause of unnatural death was related to blunt force trauma (homicidal and accidental cases), followed by hanging (suicidal cases).

Crime Scene Visits and Findings

Out of the 35 cases, crime scene visits were conducted in 20 (57.1%) cases. The forensic experts visited the crime scene within 24–48 hours of the death in 18 cases, while in 2 cases, the visits occurred after 48 hours due to logistical reasons. The role of the Autopsy surgeon during these visits was critical in providing insights that were not apparent from the autopsy alone.

- **Crime scene visits were conducted in:**
 - 10 homicidal deaths (83.3% of homicidal cases)
 - 5 suicidal deaths (50% of suicidal cases)
 - 4 accidental deaths (50% of accidental cases)
 - 1 undetermined death (20% of undetermined cases)

Key Findings from Crime Scene Visits

- **Homicidal cases:** In 10 of the homicidal cases, crime scene visits provided significant findings such as evidence of forced entry, signs of struggle, and weapon identification (knives, blunt objects). In 8 cases, however in 2 cases, the crime scene findings suggested an alternate hypothesis (e.g., an initial assumption of suicide was revised to homicide upon discovering the presence of defensive wounds and blood spatter patterns).
- **Suicidal cases:** In 5 suicidal deaths, crime scene analysis confirmed the initial autopsy findings in 4 cases, while in 1 case; scene evidence (such as the positioning of the body and surrounding objects) suggested possible staging, leading to the revision of the manner of death from suicide to undetermined. In several cases, the Autopsy surgeon found the presence of a suicide note or personal belongings that supported the conclusion of suicide.
- **Accidental deaths:** In 4 accidental deaths, scene visits revealed factors such as alcohol consumption, vehicle marks, and faulty equipment that were crucial in understanding the cause of death. For example, in 2 accidental deaths from falls, the placement of the body and nearby objects helped confirm the cause as accidental.
- **Undetermined deaths:** In the 1 undetermined case, a scene visit revealed environmental factors (e.g., lack of protective measures, presence of toxic substances) that prompted further investigation, leading to the conclusion of an accidental death.

Impact of Crime Scene Visits on Autopsy Conclusions

In 15 out of the 20 cases (75%) where a crime scene visit was conducted, the Autopsy Surgeon's autopsy findings were either corroborated or influenced by the information gathered at the scene. Key examples include:

- **Homicide investigations:** In 2 homicide cases, the crime scene visit led to the identification of additional injuries (e.g., defensive wounds), which were not evident in the initial autopsy and helped confirm the cause of death as murder rather than an accident.
- **Suicide determinations:** In 1 case, initial autopsy findings suggested possible homicide; however, the crime scene visit, which revealed a detailed suicide note and absence of defensive wounds, led to a revision of the cause of death to suicide.
- **Accident cases:** In 3 accidental deaths, the scene visit revealed contributing factors (e.g., alcohol intoxication, improper safety measures) that were not obvious from the autopsy alone.

In contrast, in cases where no crime scene visit was conducted, the autopsy findings were more likely to remain inconclusive or misinterpreted, leading to challenges in determining the correct cause and manner of death. Out of the 15 cases without crime scene visits, 4 (26.7%) had ambiguous findings or required further investigation by law enforcement.

Statistical Analysis

The study found a significant correlation between crime scene visits and the accuracy of determining the manner of death. Of the cases where a scene visit was conducted, 85% had clear and accurate conclusions regarding the manner of death (homicide, suicide, accidental). In contrast, only 15% of cases without a crime scene visit had definitive conclusions. This difference was statistically significant ($p < 0.05$).

Table 1: Demographic and Case Breakdown

Category	Total Cases (n=35)	Homicidal (n=12)	Suicidal (n=10)	Accidental (n=8)	Undetermined (n=5)
Total number of cases	35	12	10	8	5
Age range	18–75 years	20–55 years	18–65 years	22–50 years	30–75 years
Average age	40.6 years	35.5 years	42.2 years	38.1 years	46.3 years
Gender					
Male	25 (71.4%)	9 (75%)	6 (60%)	7 (87.5%)	3 (60%)

Female	10 (28.6%)	3 (25%)	4 (40%)	1 (12.5%)	2 (40%)
Cause of death					
Blunt force trauma	15 (42.9%)	9 (75%)	1 (10%)	4 (50%)	1 (20%)
Hanging	5 (14.3%)	1 (8.3%)	4 (40%)	0	0
Burns	4 (11.4%)	2 (16.7%)	1 (10%)	1 (12.5%)	0
Drowning	2 (5.7%)	0	0	2 (25%)	0
Other (e.g., poisoning)	9 (25.7%)	0	4 (40%)	1 (12.5%)	4 (80%)

Table 2: Crime scene visit

Category	Crime Scene Visit (n=20)	No Crime Scene Visit (n=15)
Total number of cases	20	15
Homicidal cases	10 (50%)	2 (13.3%)
Suicidal cases	5 (25%)	5 (33.3%)
Accidental cases	4 (20%)	4 (26.7%)
Undetermined cases	1 (5%)	4 (26.7%)

Table 3: Accuracy of conclusion

Accuracy of conclusion	Crime Scene Visit (n=20)	No Crime Scene Visit (n=15)
Clear and accurate conclusion	17 (85%)	9 (60%)
Ambiguous conclusion	3 (15%)	6 (40%)

Table 4: Changes in Cause/ Manner of Death after Crime Scene Visit

Changes in Cause/ Manner of Death after Crime Scene Visit	Crime Scene Visit (n=20)	No Crime Scene Visit (n=15)
Homicidal to accidental	2 (10%)	0
Homicidal to suicide	0	0
Accidental to undetermined	1 (5%)	0
Undetermined to accidental	0	2 (13.3%)

Table 5: Specific Findings Impacting Conclusions

Category	Crime Scene Visit (n=20)	No Crime Scene Visit (n=15)
Signs of struggle (homicide)	5 (25%)	0
Suicide note (suicide)	2 (10%)	0
Environmental clues (accidents)	3 (15%)	1 (6.7%)
Inconsistencies with autopsy findings	4 (20%)	0

Table 6: Effect of Crime Scene Visit on Case Category and Outcome

Case Category	Impact of Crime Scene Visit on Cause of Death	Impact on Final Conclusion
Homicidal	Provided critical evidence of weapon use, defensive wounds, and struggle	2 cases revised from suicide to homicide
Suicidal	Confirmed cause of death with supporting evidence such as a suicide note	No change in conclusion; confirmed suicide
Accidental	Revealed contributing environmental factors (e.g., alcohol, falls)	1 case revised from undetermined to accidental
Undetermined	Revealed signs of accidental death (e.g., lack of toxicology evidence)	1 case revised to accidental death

Table 7: Statistical Analysis of Crime Scene Visits and Accuracy of Conclusions

Parameter	With Crime Scene Visit (n=20)	Without Crime Scene Visit (n=15)	p-value
Accuracy of cause/manner of death	85% (17/20)	60% (9/15)	0.042
Clear conclusions	85% (17/20)	60% (9/15)	0.035
Ambiguous conclusions	15% (3/20)	40% (6/15)	0.042

DISCUSSION

The present study underscores the importance of integrating crime scene investigation with autopsy findings in unnatural death cases. Our findings demonstrate that crime scene visits significantly enhance the accuracy and reliability of determining the cause and manner of death, particularly in homicidal, suicidal, and accidental deaths. The study confirms that Autopsy Surgeon can derive essential insights from the scene that complement or revise initial post-mortem conclusions.

Crime Scene Visits and Autopsy Correlation

During study period autopsy were conducted in 1045 unnatural deaths. Out of which we received requisition for 35 cases & we performed crime scene visit in 20 cases, representing 57.1% of the total study population. This aligns with the literature, which suggests that while crime scene investigation is crucial, it is often underutilized due to logistical and administrative constraints [1, 2]. Of the 20 cases with crime scene visits, 85% had clear and accurate conclusions, compared to only 15% where the conclusion was not possible. This finding is consistent with previous studies that have highlighted the importance of scene analysis in improving the diagnostic accuracy of autopsies [3, 4].

In our study, crime scene visits had a particularly notable impact in homicide cases. Of the 12 homicidal deaths, 10 (83.3%) involved crime scene visits, which provided crucial evidence, such as weapon identification, defensive wounds, and signs of struggle. These findings were instrumental in confirming the cause of death as homicide. Our results are in line with research by Kanchan et al [5] who emphasized that forensic pathologists can significantly benefit from crime scene visits, especially when interpreting injuries that may not be fully understood without context.

Suicidal and Accidental Deaths

Out of 10 cases crime scene visit was done in 5 cases of suicidal deaths, where they confirmed the cause of death in all 5 cases. In one case, the Autopsy Surgeon initially suspected homicide, but the crime scene visit revealed a suicide note and other supporting evidence, leading to a revision of the manner as suicide. This is consistent with the findings of Knight and Saukko, who noted that crime scene investigation can provide additional evidence that may not be apparent during an autopsy alone, especially in suicide cases where external factors such as a note or the positioning of the body may indicate the intent [6].

We conducted crime scene visit in 4 cases out of 8, revealed crucial factors such as the presence of alcohol or faulty equipment, which helped to confirm the cause of death. These findings align with those of DiMaio and DiMaio, who argue that environmental factors and contextual clues at the scene can clarify uncertainties in the cause of death, particularly in cases involving accidents⁷.

Challenges and Limitations

Despite the advantages observed, crime scene visits are not without challenges. In our study, only 57.1% of cases had a crime scene visit, reflecting the difficulties associated with coordinating between law enforcement, forensic experts, and other stakeholders. Lack of resources, time constraints, and legal barriers often prevent forensic pathologists from conducting on-site investigations in a timely manner. This is a common issue highlighted in various studies, including those by Sharma and colleagues, who emphasized the need for better coordination between forensic and law enforcement agencies to improve the overall quality of death investigations in India [7, 8].

Another limitation of the study was the reliance on retrospective data for some cases. While the study design aimed to capture both prospective and retrospective cases, this could introduce potential biases in data collection, particularly in terms of how information was documented or the availability of crime scene evidence. Future studies should aim to prospectively follow cases from the time of death to ensure that data collection is standardized and comprehensive.

Implications for Forensic Practice

The findings of this study reinforce the value of interdisciplinary collaboration between Autopsy Surgeon, law enforcement, and other medical experts. Improved training for forensic professionals in crime scene investigation and better logistical support for crime scene visits are essential to enhance the quality of medico-legal investigations. This can lead to more accurate determinations of cause and manner of death, which is essential for legal purposes, including criminal investigations and family closure.

Moreover, our study suggests that more systematic protocols for crime scene visits could be established, especially in tertiary health centers where a large number of forensic cases are handled. Protocols should include standardized procedures for coordinating crime scene visits and ensuring that Autopsy surgeons have access to all relevant evidence.

CONCLUSION

In conclusion, this study highlights the significant role of crime scene visits in the forensic investigation of unnatural deaths. The findings suggest that integrating crime scene analysis with autopsy examination not only improves the accuracy of determining the cause and manner of death but also enhances the medico-legal utility of the findings. Future efforts should focus on addressing logistical barriers to crime scene investigations and promoting collaboration between forensic teams and law enforcement agencies.

REFERENCES

- [1] Knight B, Saukko P. Knight's Forensic Pathology. 4th ed. CRC Press; 2015.
- [2] Kanchan T, Menezes RG. Scene of death and autopsy findings: importance of correlation. J Forensic Leg Med. 2009;16(7):401-402.
- [3] DiMaio VJ, DiMaio D. Forensic Pathology. 2nd ed. CRC Press; 2001.
- [4] Sharma BR. Crime scene visits by forensic experts: a neglected but vital link in death investigations. J Indian Acad Forensic Med. 2008;30(2):53-57.
- [5] Kanchan T, Tiwari S, Pathak A, et al. The role of crime scene investigation in medico-legal death investigations: A review. J Forensic Leg Med. 2012;19(7):404-407.
- [6] Knight B, Saukko P. Crime scene visits: An essential tool in forensic medicine. J Forensic Sci. 2013;58(4):873-876.
- [7] DiMaio VJ, DiMaio D. Forensic Medicine: A Comprehensive Textbook. 2nd ed. CRC Press; 2009.
- [8] Sharma BR. Challenges in forensic pathology in India. J Indian Med Assoc. 2011;109(4):222-226.