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TECHNO-BYTES

Forensic Dentists at the Frontline: Scene Examination & Mock Drill Training in DVI

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Abstract

Disaster Victim Identification (DVI) is a structured forensic process essential for recognizing individuals affected by mass fatality incidents. Among its phases, Phase 1: Scene Examination and Body Recovery is critical, as it involves preserving forensic evidence, assessing environmental factors, and establishing the context of the event. Forensic odontologists play a pivotal role in this phase by ensuring proper documentation of dental evidence, preventing contamination, and facilitating accurate retrieval of postmortem dental records.

Remains found at disaster sites may vary from fragmentary, scorched, to decayed, presenting significant challenges for forensic teams. Difficulties arise in cases where remnants get mixed up, making it difficult to document and analyze the calamity site. Forensic pathologists, odontologists, and other forensic experts work collectively to overcome these obstacles and ensure accurate victim identification. However, due to the considerable mutilation and modification in dentition during disasters, there is a vital need for active planning and preparedness, as recommended by the International Organization for Forensic Odonto-Stomatology (IOFOS).

This paper explores the specific responsibilities of forensic dentists in Phase 1, emphasizing interdisciplinary collaboration and evidence integrity. Additionally, it highlights the necessity of mock drill training sessions for forensic odontologists, which enhance preparedness, improve response times, and ensure systematic management of dental evidence in real-world disaster scenarios. Integrating structured DVI training into forensic odontology curricula can significantly enhance identification procedures, contributing to a more streamlined and effective disaster response system.

Keywords: Disaster Victim Identification (DVI), Forensic Dentistry, Scene Examination, Evidence Recovery, Mock Drills, Emergency Preparedness.

Introduction

Mass fatality incidents, whether caused by natural disasters, accidents, terrorist attacks, or pandemics, require an efficient forensic response to identify victims and provide closure to families. Disaster Victim Identification (DVI) follows an internationally recognized protocol consisting of five distinct phases, as established by Interpol 2018). Among these, Phase 1 – Scene Examination and Body Recovery is foundational to a systematic approach in forensic identification, with forensic odontologists playing a crucial role in preserving and documenting dental evidence Fig 1). Their expertise ensures that dental remains are handled systematically, allowing for accurate identification in later DVI stages.

The nature of remains found at disaster sites varies, with some being fragmentary, severely burned, or decomposed. In some cases, remnants become mixed, making forensic documentation more difficult. Forensic pathologists, odontologists, and other forensic specialists must collaborate to systematically recover, document, and analyze the remains. Given the mutilation and alteration of dentition in such disasters, the IOFOS guidelines emphasize the necessity for proactive planning and training in forensic odontology to improve disaster response efficiency Fig 2).

This techno-byte focuses on:

- The role of forensic dentists in Phase 1 of DVI, particularly in evidence preservation and scene documentation.
- Best practices for handling and recovering dental evidence to prevent contamination.
- The significance of mock drill training in preparing forensic odontologists for disaster response.

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Figure 1 : Forensic dentists examining human remains in the Disaster Victim Identification (DVI) process.

By analyzing forensic case studies and international DVI protocols, this study underscores the critical need for early forensic dental intervention in disaster response (Figure 1).

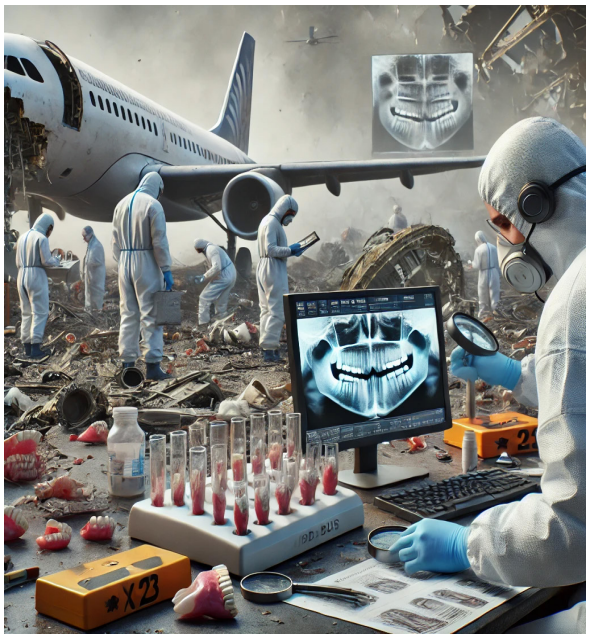

Figure 2: Forensic Odontology Laboratory Analysis in DVI. The process of post-mortem dental examination and comparison with ante-mortem records (radiographs) is essential for positive victim identification at a temporary laboratory set up near the disaster scene

Role of Dentists in Scene Examination and Body Recovery

Evidence Preservation and Contamination Prevention

Forensic odontologists collaborate with forensic pathologists, anthropologists, and crime scene investigators to document and preserve dental remains meticulously (Figure 2).[1] Their responsibilities include:

- Assessing Environmental Factors – Evaluating fire damage, water submersion, or trauma effects on dental structures.
- Locating and Recovering Dental Evidence – Identifying teeth, jaw fragments, dental prosthetics, and restorations as key forensic markers.
- Preventing Contamination – Using sterile handling techniques and forensic protocols to maintain evidence integrity.
- Documenting and Labeling Findings – Capturing photographs, GPS coordinates, and detailed reports for further forensic analysis.[2]

Systematic Body Recovery and Documentation

Dental structures, particularly teeth and jawbones, are among the most durable human tissues, often surviving fire, explosions, and prolonged decomposition [3]. Forensic dentists contribute by:

- Ensuring Intact Recovery – Assisting in the systematic removal of remains while preserving dental structures.
- Recording Dental Characteristics – Noting existing dental work, anomalies, and anatomical variations that assist in later identification.
- Establishing the Event Context – Using forensic knowledge to infer trauma patterns, force impact, and heat exposure for reconstructing the incident [4].

Interdisciplinary Collaboration in DVI

Effective DVI operations require seamless collaboration between multiple forensic disciplines. Forensic dentists work alongside:

- Forensic Anthropologists – Conducting skeletal assessments for age estimation and biological profiling.
- Radiologists – Assisting in imaging-based dental comparisons for ante-mortem and post-mortem reconciliation.
- Law Enforcement & First Responders – Coordinating logistical and security aspects of body recovery and evidence handling [5].

Without efficient coordination, misidentification risks increase, delaying the forensic reconciliation process.

The Importance of Mock Drill Training Sessions for Dentists

Enhancing Preparedness and Efficiency

Mock drills are simulated forensic exercises that prepare forensic teams for real-world disaster scenarios (Figures 3 and 4). They allow forensic dentists to:

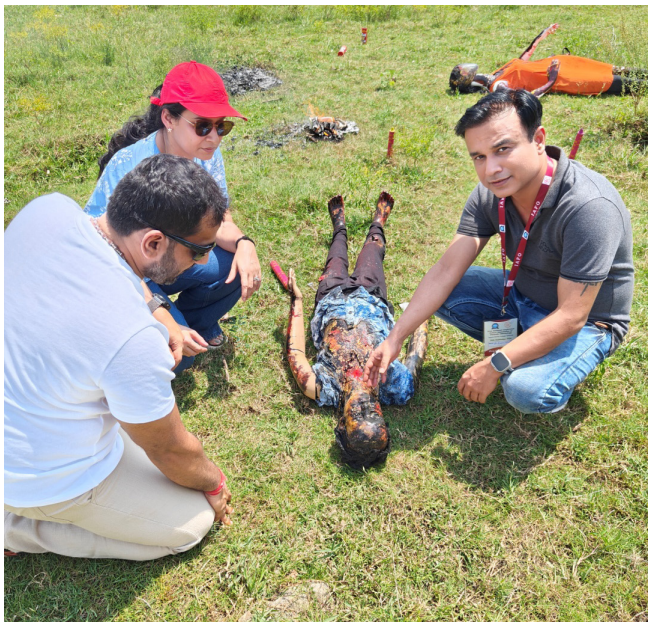

Figure 3: Hands-on Training in DVI Phase 1. Forensic odontologists and DVI team members receiving practical instruction on scene assessment and body recovery techniques during a mock drill

- Practice Scene Examination – Enhancing real-time forensic decision-making and adaptability [6].
- Improve Interdisciplinary Coordination – Enhancing collaboration with pathologists, law enforcement, and forensic scientists.
- Assess Equipment and Protocols – Ensuring that forensic odontological tools are optimized for field use.

Figure 4: Interdisciplinary Coordination in DVI Mock Drill. Forensic personnel in protective gear (PPE) preparing for or performing systematic body recovery and evidence processing during a simulated disaster exercise

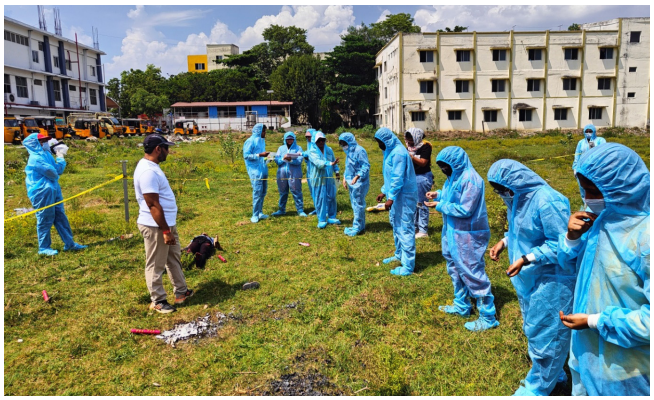

Figure 5: Structured DVI Training Session. An instructor supervising forensic odontologists and trainees practicing scene documentation and evidence retrieval during a simulated mass fatality incident

Strengthening Evidence Handling and Chain of Custody (Figure 4)

- Training through mock drills reinforces standardized forensic protocols, reducing errors in handling, documentation, and labeling of evidence [7]. Key benefits include:
- Ensuring Adherence to Chain of Custody – Preventing forensic inconsistencies and legal challenges.
- Minimizing Data Loss in Mass Fatalities – Reducing risk of misplaced or mislabeled dental remains during recovery.
- Accelerating Identification Timelines – Enhancing the efficiency of forensic teams during high-casualty incidents [8].

Integration into Forensic Odontology Curriculum

Including mock drills in forensic dentistry training programs ensures that future forensic odontologists are well-equipped for real-world applications.[9]

Such mock drill sessions have been conducted by us for several years to ensure preparedness, notably at Jamia Millia Islamia University from the Faculty of Dentistry, which was a part of a certificate course that enabled forensic personnel to be prepared for disasters. These training programs provided hands-on experience in forensic procedures, allowing participants to engage in simulated disaster scenarios, enhancing their ability to respond to real-life situations effectively.

Many such training programs have been conducted by us at various national and international platforms for the benefit of society to ensure preparedness (Figure 5). Our initiatives have spanned across major academic institutions, professional associations, and government organizations. To name a few, we have organized training programs at:

Indian Dental Association (IDA)

Conducted at both national and state-level conferences, these programs have educated numerous dental professionals about forensic odontology's crucial role in DVI.

Airforce Institute of Dental Sciences

Training sessions tailored to military personnel, equipping them with necessary forensic identification skills crucial in conflict zones and disaster-hit regions.

Other International and National Conferences

Our participation in multiple global forums has enabled knowledge sharing with experts worldwide, helping to standardize forensic odontology practices across different countries and disciplines.

By conducting such extensive mock drills and workshops, we aim to foster a workforce of well-trained forensic dentists ready to contribute to disaster victim identification and humanitarian efforts globally.

Conclusion

Forensic odontologists play a crucial role in DVI, particularly in Phase 1, where scene examination, body recovery, and evidence preservation lay the groundwork for successful victim identification. Their expertise in handling dental remains, preventing contamination, and collaborating with other forensic professionals is indispensable in mass fatality investigations.

To enhance forensic efficiency, structured mock drill training sessions should become a mandatory component of forensic odontology curricula, as recommended by IOFOS guidelines. Such training improves preparedness, response times, and interdisciplinary coordination, ensuring a systematic and legally sound forensic identification process in real-world disaster scenarios.

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