

ORIGINAL ARTICLE

# Forensic odontology as a victim identification tool in mass disasters: A feasibility study in the Indian scenario

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## Abstract

**Aim:** The aim of this study was to evaluate the awareness of practicing dentists about the subject of forensic odontology and to assess their willingness to maintain and share patient records. **Materials and Methods:** A blind questionnaire survey was carried out among 100 randomly selected practicing dentists in district Ghaziabad, Uttar Pradesh. **Results:** Most of the dentists interviewed were familiar with the subject of forensic odontology and its relation to dentistry, despite forensic dentistry having been newly introduced since 2007 into the undergraduate dental curriculum in India. However, dental records are maintained by only a few dentists, and only a very small percentage of them reported to have shared records, which may have helped in the identification of victims in a mass disaster. **Conclusion:** The result of our survey concluded that more awareness needs to be developed among practicing dentists regarding maintaining and sharing patient records for forensic odontology to succeed as a victim identification tool.

**Key words:** dental records, forensic odontology, mass disaster

## Introduction


Millions of lives are lost every year by natural (earthquake, drought, and tsunami) or man-made disasters (terrorism/homicides/suicide bombing). Traumatic experiences such as these can result in a large number of unidentified victims; this is when the tools available to forensic science come into play to identify such victims. Most common practices are physical identification of bodies/corpses, fingerprinting, dental comparison, and Deoxyribonucleic acid analysis.<sup>[1]</sup>

When physical identification and fingerprints cannot

be used, dental identification remains one of the most reliable and frequently applied methods of identification, predominantly by comparisons of ante-mortem and post-mortem records. The science of dealing with evidence from dental and oral structures – Forensic Odontology, is a specialty unto itself.<sup>[2]</sup>

Forensic odontology has established itself as an important and often indispensable science in medico-legal matters, and in particular, in identification of the dead. Much of its expertise is drawn from clinical experience, basic research, and advances in knowledge in dentistry in general. In the last half-century, forensic odontology has made great strides and has developed as a separate specialty. It relies on the sound knowledge of the teeth and jaws possessed by dentists, and incorporate dental anatomy, histology, radiography, pathology, dental materials, and developmental anomalies.<sup>[3]</sup>

This study has been conducted to verify whether forensic odontology can be used as a victim identification tool in mass disasters in India based on existing dental records

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available with a victim's dentist. We attempted to find out whether detailed dental records are maintained by dentists in India, and to analyze whether there is willingness about sharing dental records, since such record-keeping and sharing would be the first step to make forensic odontology successful as a tool for identification of victims of mass disasters in India.

## Materials and Methods

A survey questionnaire [Table 1] was prepared and a blind survey was carried out on one hundred practicing dentists of District Ghaziabad, Uttar Pradesh. Dentists were randomly selected and were requested to complete the questionnaire. A blind survey is a survey that hides the sponsor or product of interest; withholding this information is intended to reduce bias in responses.

## Results

A summary of the results is given in Table 2. From given sample 86% of respondents were maintaining records in physical or digital form. Such records are a good source of information for forensic dentistry. This study attempts to create awareness of maintaining records and dissemination of same to government agencies. Less than 15% were not keeping record, but were keen on maintaining it in future.

Majority of dentists are maintaining records on paper, which questions its longevity and free accessibility for any research. However, trend is catching up on digital domain, and close to 29% respondents are using technology and maintaining digital archives, which are easier to share. Though dentists are following holistic approach in their records 80% of dentists are keeping pre- and post-treatment photographs, X-rays during treatment and models in various stages of progress.

However, it is observed records are maintained consistently for shorter periods such as for 2 years but if we are looking for trends then availability of data is abysmally low. Only 8% of dentists have records available for period of more than 5 years. There is a paucity of data for exhibiting trend, which limits the scope of any study and research. Also respondents are not updating data on regular basis. More than 56% dentists are irregular in storing information, which makes it less reliable for any concrete outcome. Furthermore, they are not keen on sharing their records with public at large or with government agency. More than 64% are not comfortable in sharing it.

They consider it more for internal reference and citing. Though record maintenance is practiced as a privy of dentist, but on counseling them they are keen on sharing it with other dentists and institution. It is been observed that

**Table 1: Questionnaire**

S. no.	Questions	Answer options
1	Do you maintain records of your patients?	On paper/digitally
2	If you answered yes to question 1, jump to question 3. If you answered no, do you propose to start maintaining records of your patients?	Yes/no
3	If you answered yes to question 2, continue to question 3. If you answered no, please do not answer the rest of the questionnaire	
4	In what form do you maintain them?	On paper/digitally
5	Do you keep and maintain records of patient's photos, X-rays and models?	Yes/no
6	If yes, for what period are records maintained?	1 year/>1 year/>3 years/>3 years/>5 years/>5 years
7	Do you give your patients any record number/document to access his records?	Yes/no
8	Can you search and quickly access records of a patient based on inadequate data such as just a name, a phone number or address?	Yes/no
9	If you answered yes to question 8, jump to question 11. If you answered no, will you freely share records of your patients with another dentist, if asked to do so by the patient or his direct relatives?	Yes/no
10	Do you fear competition if/when you share your patient's records with other dentists?	Yes/no
11	Do you fear having allegations of malpractice leveled against you if/when you share your patient's records with other dentists?	Yes/no
12	Are you familiar with the subject of Forensic odontology and its relation to dentistry?	Yes/no
13	Have you ever contributed to identification of victims in mass disasters?	Yes/no
14	If called upon to do so, would you share your patient's dental records with a government agency to help identify victims of mass disasters?	Yes/no
15	If your answer to question 14 was yes, do you think there may be chances of these records being misused?	Yes/no
16	If your answer to question 15 was no, please give your reasons in a few words	Yes/no
17	Do you have any idea about the UIN system to be introduced in India?	Yes/no
18	Do you approve of such a system in India?	Yes/no
19	Do you feel that the UIN is an invasion to your privacy?	Yes/no

UIN: Unique identification number

**Table 2: Results of the questionnaire attempted by various dentists**

Question number	Question	Response			
		Yes		No	
1.	Do you maintain records of your patients?	86		14	
2.	If you answered no, do you propose to start maintaining records of your patients?	08		06	
3.	In what form are the patient's records maintained?	Hard copy		Soft copy	
		57		29	
4.	Do you keep and maintain records of your patient's photos, X-rays, models?	80		06	
5.	Period of maintenance of records	<1 year	1-3 years	3-5 years	>5 years
		34	30	14	8
6.	Do you give your patients any record number/document to access his record?	47		39	
7.	Can you search and quickly access records of a patient based on inadequate data such as just a name, a phone number or an address?	51		36	
8.	Do you update your patient's records at specific intervals, such as phone numbers or address which may have changed?	30		56	
9.	Do you share/have you shared your patient's records with another dentist/another institution?	22		64	
10.	Will you freely share records of your patients with another dentist, if asked to do so by the patient or his direct relatives?	52		12	
11.	Do you fear competition if/when you share your patient's records with other dentists?	09		77	
12.	Do you fear having allegations of malpractice leveled against you if/when you share your patient's records with other dentists?	16		70	
13.	Are you familiar with the subject of forensic odontology and its relation to dentistry?	83		06	
14.	Have you ever contributed to identification of victims in mass disaster	03		83	
15.	If called for identification of victims in mass disasters, would you share your patient's dental records with a government agency to help identify victims of mass disasters?	79		07	
16.	Scared of misuse of records when called for identification of victims in mass disasters?	36		43	
17.	Why not share your patient records with government agency?	No reply		No reply	
18.	Do you have any idea about the UIN system to be introduced in India?	45		41	
19.	Do you approve of UIN system in India?	79		07	
20.	Do you feel that the UIN is an invasion to your privacy? yes/no	78		08	

UIN: Unique identification number

reason for not sharing are not grave as most of them agreed that it is not because of fear of competition/malpractices that is keeping them away from disseminating it, but the lack of awareness about its importance for study.

An insignificant number of respondents (only 3%) have contributed in identification of victims in mass disasters. It is quiet evident that the Indian dentist community is not aware of the invaluable contribution which forensic dentistry makes in identifying victims. Even government agencies have failed in approaching them. There is an urgent need to create awareness about it and to introduce it as a separate branch in graduation/post-graduation. Fear of misuse of records is keeping them away from sharing data. Government and other institutions have to reinforce it in doctors have to conduct workshops, print and publish media can help to create awareness.

## Discussion

Forensic dentistry or forensic odontology involves dentists' participation and assistance in legal and criminal matters. It

refers to the proper handling, examination and evaluation of dental evidence, which is then presented in the interest of justice.<sup>[4]</sup> The evidence that may be derived from teeth is the age (in children) and identification of the person the teeth belong to. This is carried out using dental records or ante-mortem (prior to death) photographs.<sup>[5]</sup> Besides, a forensic odontology report sets out the finding of a comparison between antemortem and postmortem evidence and indicates the odontologist's opinion on the identification. This opinion needs to be defensible in a court of law.<sup>[5]</sup>

The establishment of forensic odontology as a unique discipline [Table 3] has been attributed to Dr. Oscar Amoeda (Father of Forensic Odontology), who identified the victims of a fire accident in Paris, France in 1898.<sup>[6]</sup>

Today forensic odontology is considered to be a specialized and reliable method of identification of the deceased, particularly in multiple fatality incidents. Although this reputation has been gained from the application of forensic odontology in both individual identification as well as

**Table 3: History of forensic odontology**

Year	Milestone
1453	First reported case of dental identification: Earl of Shrewsbury who fell in the battle of Castillon
1775	Dr. Paul Revere: The first forensic odontologist, who identified the remains of a victim based on the retrieval of a prosthesis constructed by him
1831	Leuchs discovered amylase in saliva
1849	The first conviction based on dental evidence of crowns from charred remains of the victim
1898	First treatise on forensic odontology was written by Dr. Oscar Amoeda the father of forensic odontology
1921	Mueller suggested that detection of amylase can be a presumptive test for salivary stains
1929	Ki performed the first comprehensive investigation in identification of isoantibodies in saliva
1932	Locard recommended the use of lip prints in identification
1937	Murder trial conviction based on bite mark evidence first time in history
1946	Welty and Glasgow devised a computerized program to sort 500 dental records
1985	Jeffreys "discovered" DNA fingerprints

DNA: Deoxyribonucleic acid

disaster situations over a number of years, the professional nature of the discipline and its practices have evolved only recently.

Therefore, success of forensic dentistry can be achieved totally only if the dental specialist and the dental institutions maintain ante-mortem records of their own patients with information like name, age, sex, number of teeth present, filled teeth, dentures and other restorations, morphological variations of teeth and mucosa with photographs and radiographs etc., This antemortem record will help to identify deceased persons and criminals by comparing with the postmortem records prepared by examining deceased persons during investigations, in homicide and mass disasters.<sup>[7]</sup>

Forensic dental identification depends largely on the availability of ante mortem records. Hence, it is the social responsibility of each dentist to maintain dental records of their patients for the noble social cause of identification in the event of any disaster.

In recent times, forensic odontology has evolved as a new ray of hope in assisting forensic medicine. This is relatively a young science of dentistry and still in its infancy state

in India where as in other developed countries it has acquired a recognized branch of dentistry in medical forensicology.<sup>[8]</sup>

Hence, identification of an individual is a prerequisite for certification of death and for personal, social and legal reasons. Human identification is a mainstay of civilization, whether in living or dead, and the identification of unknown individual has always been of paramount importance to our society.<sup>[9]</sup> Hence, one of the main focuses of forensic odontology is identification of an individual. Dental identification can be used as the sole method of identifying a deceased person. Dental identification is based on the comparison of ante-mortem and postmortem records. The records collected to identify a decedent should be accurate and totally inclusive of objective finding.<sup>[10]</sup>

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