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### RESEARCH PAPER

# Uniform and inclusive autopsy performa in India: a cross-sectional study and recommendations thereof

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**Background and aims:** Autopsy is an exhaustive practice and has serious medical, social and legal consequences. One should be cautious in medico-legal practice, keeping in mind that the genesis of this work is doubt, litigation, review and re-examination at various stages until conclusion by the court. One of the crucial and deciding factors in an investigation process is autopsy. Leave aside the conduction of autopsy by different categories of doctors; there is enormous variation in autopsy performa of different states/regions of India. Moreover, there is no mention of dental autopsy findings in this performa. Therefore, the study proposes a uniform and inclusive postmortem examination form in India for better documentation. **Materials and methods:** After conducting the research into five stages: a collection of 30 Postmortem forms; conducting interviews and questionnaire surveys among 250 forensic doctors; framing a uniform and digitalized Postmortem form including a performa for dental profiling and foetal autopsy; reviewing the form with 24 forensic doctors and finalizing after suggestions given by the experts. **Results:** It was found that over 80% of the Forensic doctors were unsatisfied with their current Autopsy performa in different sections. Coming to their practice in dental profiling, only 15.7% had a section of dental profiling included in their primary form. In contrast, only 19.7% of them recorded the dental findings in all the cases and the majority of them, i.e., 74.8%, recorded only in unknown/unidentified cases. **Conclusion:** An attempt to draft a uniform, relevant, informative, detailed, scientific, diagrammatic and digitalized form is made. In recommended performa, all the crucial attributes of an autopsy examination have been included to assist in the proper report preparation and sound judgments and conclusions.

**Keywords:** Forensic examination; medico-legal autopsy; dental profiling; PM form.

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## INTRODUCTION

Forensic Medicine is a branch of Medicine involving the study and application of scientific and medical knowledge for the administration of law.<sup>1</sup> Forensic investigation of human remains has two motives. The first is to recover and examine the remains for criminal investigations, including establishing the cause and manner of death. The second is to identify the remains and return them to the family of the deceased.<sup>2</sup> One of the crucial and deciding factors in an investigation process is Autopsy or Postmortem examination. An autopsy is derived from the Greek word “Autopsia”, meaning “the act of seeing for oneself.” It involves examination and dissection of a dead body to determine the cause and time of death and help identify the person.<sup>3</sup> Section 174 and 176 of Code of Criminal Procedure (Cr.P.C.) mentions the concept of a medico-legal autopsy during investigations of a sudden, suspicious, unnatural death.<sup>4</sup> A complete autopsy involves opening all the body cavities and examining all organs of the head, neck, chest and abdomen.<sup>1,5</sup> Autopsy/Postmortem examination is an exhaustive exercise and has serious medical, social and legal repercussions. The most outstanding care should be taken to avoid injustice to anyone as its result can affect people’s life, limb, and liberty. One should be cautious in medico-legal practice that the genesis of this work is doubt, litigation, review and re-examination at various stages until conclusion by the court.<sup>6</sup>

In India, all states have different formats for medico-legal postmortem examination. Various autopsy guidelines are being followed in different ways in each state, except administrative orders for panel formation for autopsy in dowry-related and custodial deaths.<sup>7</sup> Postmortem reports are usually handwritten, but due to court requirements, electronic advancement, and clarity, computerized reports are being issued by many states like Punjab and Haryana.<sup>7</sup> Sometimes, because of the absence of specific essential columns in the postmortem form, even unnecessary complications have arisen, leading to allegations of manipulations.<sup>8</sup> There are more than 500 medical colleges in India, and their training standards are different from college to college. These varied standards have created a massive

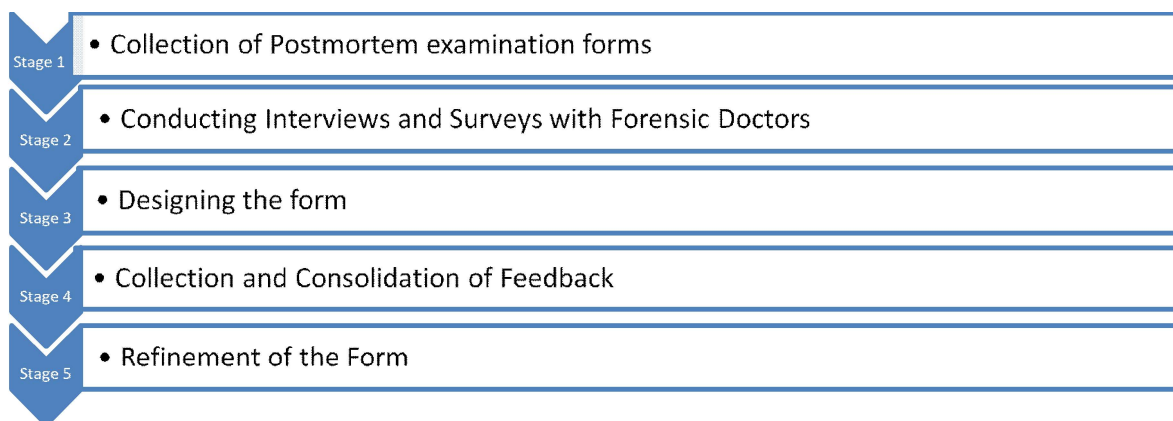
gap in forensic knowledge and practice since its MBBS doctor is responsible for conducting the autopsy most of the time. The reasons are conflicting resource material, teaching methodology, improper training of faculty, insufficient subject coverage, the pattern of assessment of trainees, inadequate human resources, poorly equipped working stations and lack of infrastructure, to name a few. At times, many criminals are let off due to improper reporting of findings and flawed workout of cases at their first contact, i.e., crime scene, in the hospitals and autopsy centres.<sup>7,9,10</sup>

Coming to the scenario of Dental autopsy, some data and awareness studies have been conducted to stress the importance of odontology in postmortem examination. There aren’t any studies in the literature that involved fieldwork in checking a dental profiling format among medical colleges and other postmortem centres performing autopsies.<sup>11</sup> To see if such an idea would add reality, a study was planned. The forensic doctors were asked to evaluate the potency of a recently developed dental profiling format with guidelines to assist them in examining and coming back to a conclusion supporting the findings.

After gathering data regarding the issues found within the autopsy in India, an attempt has been made to formulate a uniform, relevant, informative, detailed, scientific, diagrammatic and digitalized performa with the information obtained from the primary data we collected through interviews and surveys and secondary data from the literature within which all the crucial attributes of examination are present to assist in the proper report preparation and therefore adequate conclusions. This paper aimed to propose a uniform and inclusive Postmortem Examination Form in India.

## MATERIAL AND METHODS

30 Postmortem forms of various medical colleges across India at each level-central, state and district were collected (**Flow-Chart 1**). The collection mode was two ways-personally visiting the college and obtaining via emails (Collection was made after getting permission from the authorized medical in charge of the particular college). In Stage 2, a semi-structured



**Flow-chart 1** The stages of the study

interview consisting of open-ended questions was conducted through face-to-face sessions and telephonic conversations where audio recordings were done through mobile phones after obtaining informed consent from 50 forensic doctors of all grades across different countries. In the next step of Stage 2, a cross-sectional study was conducted. A close-ended questionnaire was circulated among 200 forensic doctors all over the country after taking written consent. The section included 15 questions to understand doctors' practice, experience, and opinion about their current autopsy form. The results were tabulated and analyzed separately in a Microsoft Excel spreadsheet and interpreted on a pie chart.

Collective data analysis and understanding of the postmortem forms, interviews, questionnaires and guidelines of various institutes, literature, academic knowledge, and approaches from standardized books were considered, and a postmortem form was framed. The form was divided into sections: Brief description, General observation, External examination, External injury, Dental Autopsy findings, Internal Examination, Specimen collection, opinion, and body sketches.

**Table 1** Number of Postmortem forms and Feedbacks collected.

ZONES	NO. OF FORMS COLLECTED	NO. OF FEEDBACKS OBTAINED
East	6	4
West	6	4
North	7	6
South	7	6
Central	4	4
Total	30	24

The newly designed Autopsy form was further circulated to 24 Forensic doctors all over India to obtain feedback on it (written consent was taken) (**Table 1**). The feedback performance had provisions for writing or typing comments separately for each section of the Autopsy form. The feedbacks received were critically analyzed and evaluated. If a comment seemed repetitive, a summative idea of suggestions was noted down. If feedback was found helpful, significant, or critical, they were too included in the final consolidated feedback. Further, a refined Autopsy form was developed keeping in mind the tight feedbacks which was more technical, practical and accurate.

## RESULTS

Based on the collection of PM forms from all over the country,

it was broadly interpreted that 60% of the total forms were digitalized, and the rest were handwritten. Surprisingly, only 10% had a section documenting dental features in it.

In the interview session, it was noted that 80% of the Forensic doctors would prefer a digital format to prevent discrepancy, having more transparency and for better record management. More than 50% of the forensic doctors felt that they lacked space to write all the findings. The form should be more detailed and elaborate, with more sub-headings, especially in the Internal Examination section. Moreover, 45% suggested the presence of body sketches to describe any peculiar finding which would make their work easier, whereas 40% felt that their form lacked a well-defined column for documenting Postmortem changes/time since death and a separate column to describe AM/PM injuries in which each injury should be described separately in detail with a detailed description of it. Around 30% preferred the form should include dental profiling and favouring proper hospital detail column and specimen collection information with appropriate histopathological examination. A separate form for foetal autopsy was suggested.

## SURVEY THROUGH ELECTRONIC MEDIA

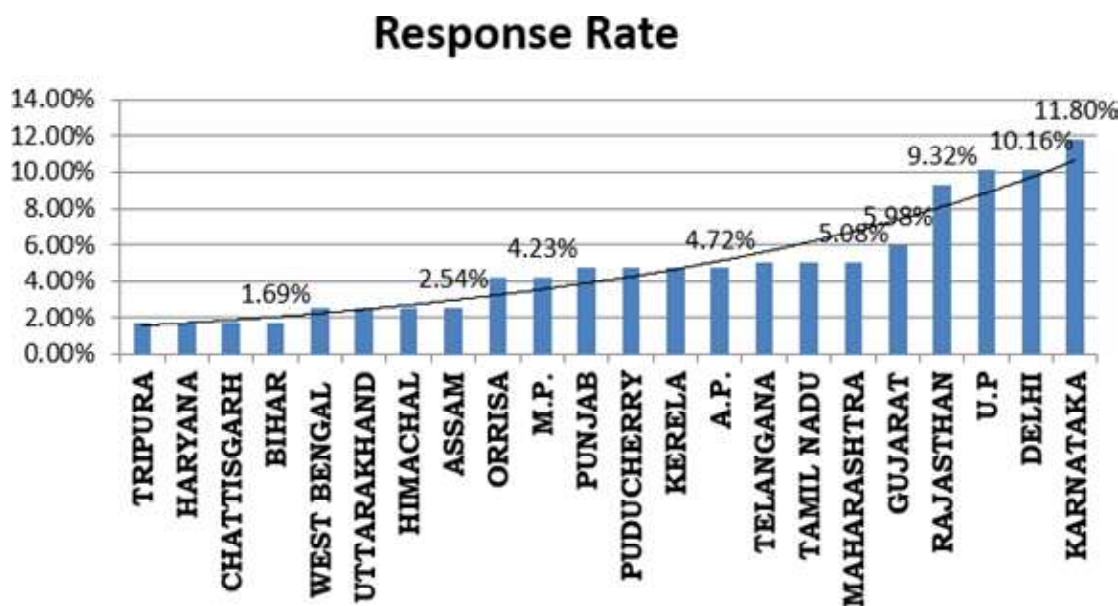
**Table 2** Participants according to Gender, Type of Institution and Work Experience of the Forensic doctors.

GENDER	
Female	8.50%
Male	91.50%
TYPE OF INSTITUTION	
Central Govt.	18.30
State Govt.	50.80%
Deemed	11.70%
Private	19.20%
WORK EXPERIENCE	
>20 Years	11.70%
16-20 Years	16.70%
10-15 Years	11.70%
5-10 Years	24.20%
<5 Years	35.80%

Out of 200 forensic doctors who participated in the study, a slight majority were males (**Table 2**). The majority of the respondents were from the state government, followed by the central government, private medical colleges and least from deemed universities (**Table 2**). Coming to the work experience, 12.6% of doctors had the experience of more

than 20 years, 28.3% were experienced between 10-20 years, and the rest had the experience of fewer than ten years (**Table 2**). Moreover, maximum participation was

seen from the state of Karnataka and least from the states of Tripura, Haryana, Chhattisgarh and Bihar, respectively (**Figure 1**).

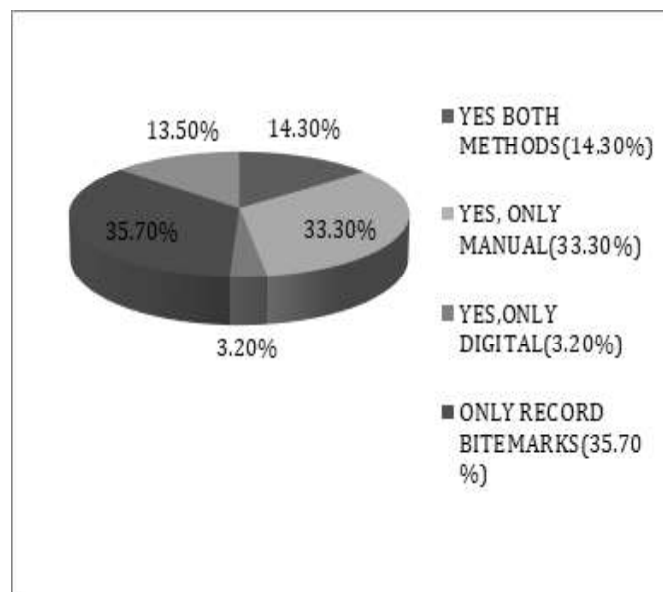


**Figure 1** Illustrates the frequency of state-wise distribution of responses

In the questionnaire section, when asked about the format of the Postmortem form used in their institute and their practice, 30.7% answered that they have been using their current form for more than 20 years. In contrast, only 26.8% of institutes have updated their form in 5 years. Nearly 78% of the forms were government adopted while their institute prepared the rest. Only 37.8% of institutes had a separate form for Foetal Autopsy, whereas others did not have. When asked about the improvements made and their preferred type of Autopsy form, 69.3% preferred a digitalized one; 73% chose an elaborate form over a concise one, whereas 62.2% preferred a personal form. Moreover, 87.4% agreed that there is a need for body sketches/pictorial representation to describe injuries or any peculiar characteristic for better understanding in some instances.

Coming to their practice in dental profiling, only 15.7% had a section of dental profiling included in their primary form. In contrast, only 19.7% of them recorded the dental findings in all the cases and the majority of them, i.e. 74.8%, recorded only in unknown/unidentified cases. When asked about recording and analyzing Bitemarks, only 35.7% recorded them, 14.3% analyzed them using manual and digital methods, 33% used manual processes, only 3.2% used digital techniques to record. In contrast, the rest, 13.5%, did not record them at all (**Figure 2**). Moreover, 67.7% of doctors practised dental age estimation methods for estimating the age of an unidentified/unknown body in which most of them relied on the eruption status (30%)

and Gustafson's method (21.25%), some of them referred to Demirjian's method (6.25%) while the remaining consulted an Odontologist (2.5%) (**Figure 3**). In dental radiography/photography practice, nearly 59.8% have never used it, whereas 18.1% have used both methods, and 11% have used at least one of them. In almost 95.5%

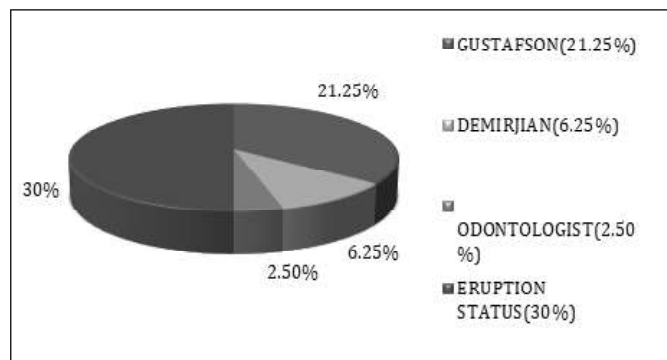


**Figure 2** Illustrates the frequency distribution of practice of recording and analyzing Bite mark cases

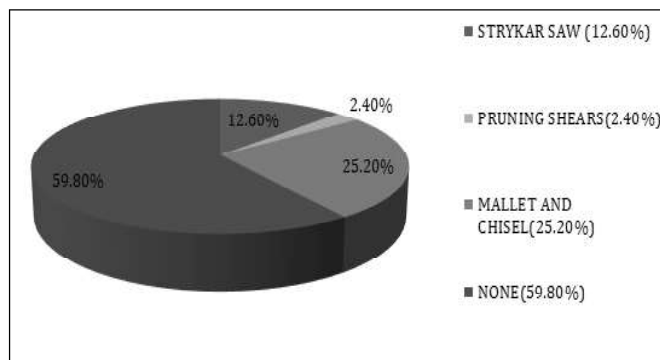


of the cases, doctors have checked for intraoral injuries (gingival, mucosal, palatal) in some instances, whereas 59.8% had not performed it in the practice of verbal autopsy. In contrast, others had performed using Pruning shears (2.4%), Stryker Autopsy saw (12.6%), Mallet and Chisel (25.3%) methods, respectively (**Figure 4**). Coming

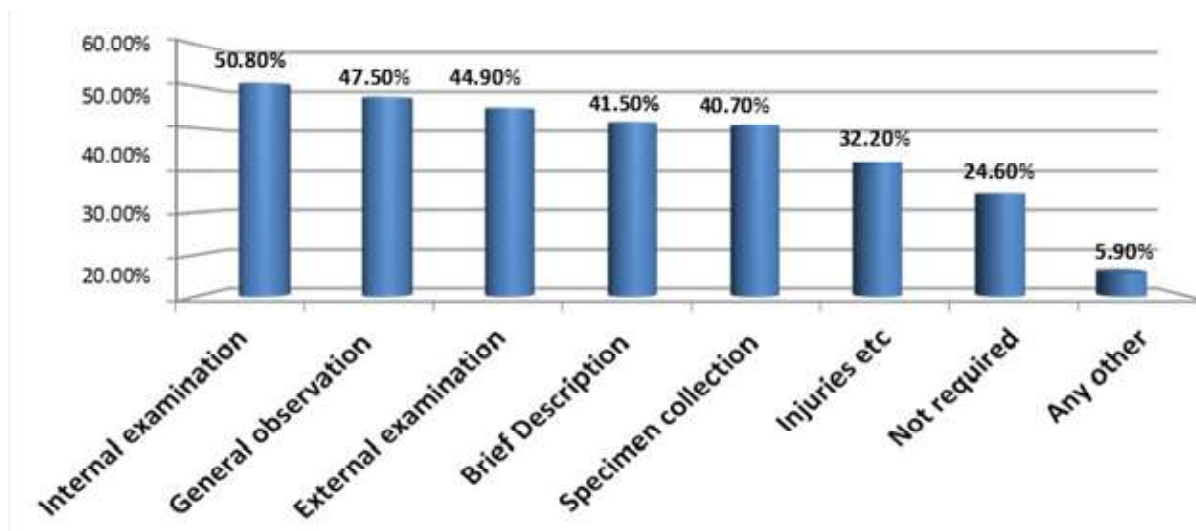
to the more significant and the most critical question of whether they are satisfied with their current Autopsy form, more than 81.40% of them responded that they are not completely satisfied and there is a scope for improvement and betterment form about various sections (**Figure 5**).



**Figure 3** Frequency distribution of age estimation methods practised in a deceased



**Figure 4** Frequency distribution of practice of performing Oral Autopsy and the type of method used.



**Figure 5** Illustration of the need for improvement about different sections of a PM form

After a cumulative analysis of the PM forms, interviews, and surveys, a draft Postmortem Examination Form was framed descriptively and elaborately, including Dental Profiling and Foetal Autopsy as annexure to it. After its completion, feedback was collected where a review regarding the performa was taken from the doctors, and other compilation and consolidation were done. A refined performa that was more accurate, better structured, had a more practical approach, and apt scientific terms were signed. Final compiled proforma of PM Form, Dental Profiling and Foetal Autopsy are attached as annexures.

## DISCUSSION

According to previous studies by Jan Valentini et al. conducted on postgraduate trainees in Germany, 66% perceived their knowledge regarding the procedure of the external postmortem examination to be inadequate or mediocre, and only 3% felt 'adequately' confident to determine the cause of death.<sup>9</sup> In another study by Andrew R Bamber et al. in the UK suggested the decline in the use of autopsy for teaching is at least in part, a consequence of the decreasing autopsy rate in the UK and elsewhere, and of a lack of clarity over which cases are

appropriate for medical student teaching in the UK.<sup>10</sup> Another study by Sai Wai Yan Myint Thu et al. in Myanmar generalized positive perceptions among decision-makers towards electronic dental records, and 86% of dentists indicated that they were willing to use them. Financial concerns were identified as the most critical barrier to implementing electronic dental records among dentists who were not ready to use the proposed system. For the long term, they recommended providing education and training in health informatics to healthcare professionals to facilitate the efficient use of electronic dental record.<sup>11</sup>

Our study's main objective was to incorporate uniformity, the notion of "One Nation One Proforma", and the three vital D's-Digitalization, Detailing and Dental profiling in it. Talking about digitalization, the practice of record maintenance after the examination procedure has become digitally available for the past few years. This keeps the records well stored in the software that are available. Though such systems offer many benefits, some institutes still prefer the conventional method of paper-based examination form. The form prepared supports paper-based examination as well.

About the structure of the format, the form was framed with the intention of not failing to include even the slightest meaningful information that could be used as a resourceful forensic aid. It was prepared after gaining sufficient knowledge from the doctors through interviews, questionnaires and literature. The formulated form was then forwarded to experienced forensic doctors all over India as they would offer an ideal source of genuine and well-grounded feedback. The feedback played a pivotal role in qualifying the efficiency of the format as it decided the fate and direction of the framework and its possible role as a potential universal format.

Moving on to the comments, the doctors appreciated the overall layout of the format and an organized way of representing data in the form of tables. They enjoyed the idea of including Postmortem changes in detail, tabulating external injuries, clothes, specimen collection in separate rows and columns and mentioning every relevant organ in the internal examination. There were some recommendations/suggestions by them which have been incorporated. As suggested by most doctors, a section for foetal autopsy has been included as they felt it plays a crucial role, but as an annexure and not in the main form.

The study has also established that postmortem dental examination is not considered a vital component in India, despite its inevitable role in medico-legal interests. But still, we took a big step of incorporating dental analysis in the format, which got mixed responses. The doctors were not routinely examining the oral cavity as per the cumulative results of the interviews and survey. Still, some of them liked the idea of incorporating coding of the teeth in dental charting, giving it a more straightforward and less time-consuming examination procedure. Coming to the Bite marks, they

considered it crucial in assault cases and applauded the vision to incorporate it in detail with each relevant finding and advised proper training before examining it.<sup>12</sup> Most of them were sceptical about incorporating dental profiling in the main form. They suggested keeping it as an annexure, using it whenever required, especially in unknown and unidentified bodies, alleged assaults and sexual assaults, especially where bite marks are present.

## CONCLUSION

One must always remember that it is on the basis of proper documentation of the postmortem examination, forensic expert gives evidence in the court of law and stands the rigors of cross-examination, as the law says that whatever is not documented has not been done. The observations are also essential for the issue of medico-legal certificates. In this study, we have attempted to frame/structure a Postmortem Examination format that can be universally accepted, keeping in mind the practice, opinions and recommendations of forensic doctors throughout the country. As we know, in the court proceedings, there are high chances to dissect a case; hence each section of the form has to be formulated in detail considering that all the relevant findings are documented, safeguarding the doctor.

Though the study has its limited merits, it can be further enhanced by increasing the sample size shortly for more precision and accuracy of results and a more extended period for covering more autopsy setups. As India is a developing country, there is a lack of resources and infrastructure, thus limiting the practicality of the format, hampering the radiological examination, digitalization of the form and autopsy techniques.

On the flipside, this research leaves many avenues for those interested in carrying this idea forward, with more forensic doctors, a longer time frame, and more locations. Framing a universal form for Age estimation, the skeletal examination would also contribute to attaining uniformity and filling the cavities between judiciary and Medicine. The root cause of inconsistency in the format is the disparity of the guidelines followed across the country and the training. Therefore, the amendment of uniform guidelines will eliminate the root cause of the difference in the formats. Moreover, software-based computers to store the documented form will solve discrepancies, enabling quick access and making it more coordinated. It preserves the privacy and security of the data even after years which are the fundamental requirement in a medico-legal case about the court of law as space storage counts.

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**Ethical corrections:** All data of the cases were treated with confidentiality, following the declaration of Helsinki.

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