

ORIGINAL ARTICLE

UNLOCKING FORENSIC INSIGHTS THROUGH DENTAL RECORDS: A SURVEY OF DENTAL RECORD KEEPING AMONG PRACTITIONERS IN TAMIL NADU, INDIA

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ABSTRACT

Introduction: Forensic dentistry plays a major role in the identification of individuals who cannot be identified visually by other means. Dental records are crucial in the identification of victims in mass disasters. Many previous studies indicate that people are often unaware of how to maintain dental records. Hence, the present study was intended to explore the forensic relevance of dental records in Tamil Nadu, India.

Methods: A cross-sectional study was conducted among 250 randomly selected general dental practitioners from Tamil Nadu. Data were collected through a structured questionnaire via a Google form. The questionnaire addressed information on dental documentation, data keeping, and forensic awareness. Based on the responses, data was collected, and the percentages were computed for the conclusion.

Results: Out of 225 respondents, the majority were male, aged 28-45 years, with 3-20 years of work experience. While most maintain dental records and use digital radiographs, only a few maintain them digitally and obtain written consent from the patients for their treatment. Prosthetic documentation is limited, with less than half of them recording implant serial numbers and using denture markings. Forensic awareness was low, with only a minimal number having formal forensic training, and many reporting inadequate undergraduate education in the field.

Conclusions: Most practising dentists remain under-digitalised in dental record maintenance, highlighting the need for standardised protocols to enhance patient care, data management, and forensic readiness. These improvements can be achieved through focused education and training, empowering dental professionals to contribute more effectively as forensic experts.

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INTRODUCTION

Forensic odontology is the practice of applying the knowledge of dentistry in criminal investigations and legal proceedings¹. Forensic odontologists do casework for human identification, age estimation, sex determination, and crime investigation using the principles of forensic science and forensic odontology².

Person identification is important for initiating criminal investigations and confirming the identity of deceased individuals. It ensures the proper conduct of legal and social procedures, including burial and the settlement of related matters. Accurate identification is a great relief to the family members and an act of justice to the persons who have been missing for a very long time.

A dental record is a patient's dental health report that is kept by the dentist, containing all subjective and objective information. This file comprises the patient's chief complaint, the history of illness and associated systemic illnesses, clinical examination, dental charts, diagnosis, investigations, treatment plan, the treatment done, and notes on subsequent follow-up(s)³.

It is legal to maintain dental records in many developed nations, but in developing countries like India, it is not a standard protocol in practice. In addition to this, many dentists in the country are unaware, and many do not maintain it, and most often, the ones that have been maintained are substandard.

Various disasters like earthquakes, tsunamis, air crashes, train accidents, terrorism, homicides, and suicide bombings across the world take away thousands of lives, leaving a large number of unidentified victims.

Forensic odontology plays a vital role in the identification of victims, and the dental records serve as important antemortem records. This method of identification has high accuracy, as teeth are unique and can withstand many types of physical and chemical reactions⁴.

In this regard, the need of the hour is to know the present status of dental record maintenance among general dental practitioners (GDPs). Hence, this study was conducted to evaluate the status of the practice of dental record-keeping at GDPs of Tamil Nadu, India.

OBJECTIVES

This study aimed to evaluate the status of dental record-keeping practices among GDPs in Tamil Nadu, emphasising their forensic and medicolegal relevance.

METHODS

A cross-sectional survey was done among dentists practising in the private sector in Tamil Nadu to gauge their awareness, knowledge, and attitudes on the state of dental records and their maintenance patterns. This study was conducted over a period of 6 months from November 2024 to April 2025. A list of registered dentists from the Indian Dental Association's Tamil Nadu chapter was acquired to randomly select the study sample. In each district, eight to ten dentists were chosen by random sampling. For the study, a total of 250 dentists were included. GDPs with either a Bachelor of Dental Surgery (BDS) or Master of Dental Surgery (MDS) degree with a valid Tamil Nadu Dental Council Registration and a minimum of 3 years of dental practice in their own setup were included in the study.

A web-based electronic survey was done using Google Forms, distributed through WhatsApp and email. Ethical clearance was obtained from the Institutional Human Ethics Committee of Sree Mookambika Institute of Dental Sciences, Kulasekharam, Kanniyakumari District, Tamil Nadu, India (SMIDS/IHEC No. 05, Protocol No. 40/2024).

The questionnaire was a 40-item structured questionnaire consisting of 3 sections, in accordance with the AAPD (American Academy of Paediatric Dentistry) guidelines^{5,1,4,6}. To validate the questionnaire, a pilot study was done on 10% of the study sample (25 dentists). Section A consisted of questions on demographic details of GDPs, and Section B on dental documentation and data keeping, including the method of obtaining dental data from patients. Section C consisted of questions on the forensic awareness of the practising dentist. It also tested the knowledge and attitudes towards dental records in forensic odontology.

The collected data were entered into MS Excel. Descriptive statistical analysis was used to summarise the findings in the study. Each response's percentage was computed, and conclusions were derived from the data. The results were then tabulated and interpreted to draw relevant conclusions.

RESULTS

A response rate of over 90% was observed, with a total of 225 dentists participating in the study.

General information about study participants

The majority of respondents (65.5%) were males in the 28–45-year age group, with 3–20 years of work experience.

Private dental colleges accounted for 72.4% of all practising dentists, followed by deemed universities (17.2%) and government dental colleges (10.3%). While 62.1% of dentists possessed a BDS degree, the remaining 37.9% had pursued an MDS.

Information on general documentation

Among GDPs, 96.6% start a dental file for all new patients, whereas 3.4% of them do not maintain any dental records. Out of all the dental practitioners who maintain dental records, 65.5% of them record them manually in preprinted forms, with the remaining dentists recording them manually on blank paper and digitally using computer software, in decreasing frequency (Fig. 1).

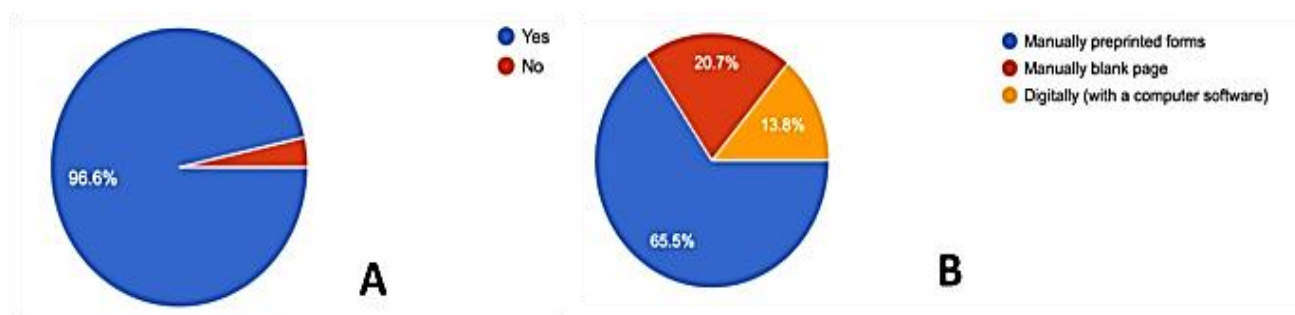


Figure 1: Responses to the question "Do you start a dental file for all new patients?" (A) and "How do you record the case history?" (B)

Among GDPs who maintain dental records, 96.6% collect demographic information, such as name and address, during every new patient registration. Among these, 93.1% of the GDPs collect contact information like phone numbers and email addresses. Medical history is collected by 75.9% of GDPs through a structured process involving patient interviews, a review of existing medical records, and the use of questionnaires. Additionally, 89.7% of GDPs document a "medical alert" in the patient's record, while 10.3% do not. Regarding extraoral examination, 72.4% of GDPs record any asymmetric features observed on the face.

Information on oral health status and treatment records:

Most dentists maintain thorough clinical records. They typically document whether teeth are present or missing and commonly use the Fédération Dentaire Internationale (FDI) system for identifying teeth. Records of restorative procedures, such as fillings, are usually included. Many dentists also note each patient's periodontal condition, as well as their molar relationship and malocclusion status (Fig. 2).

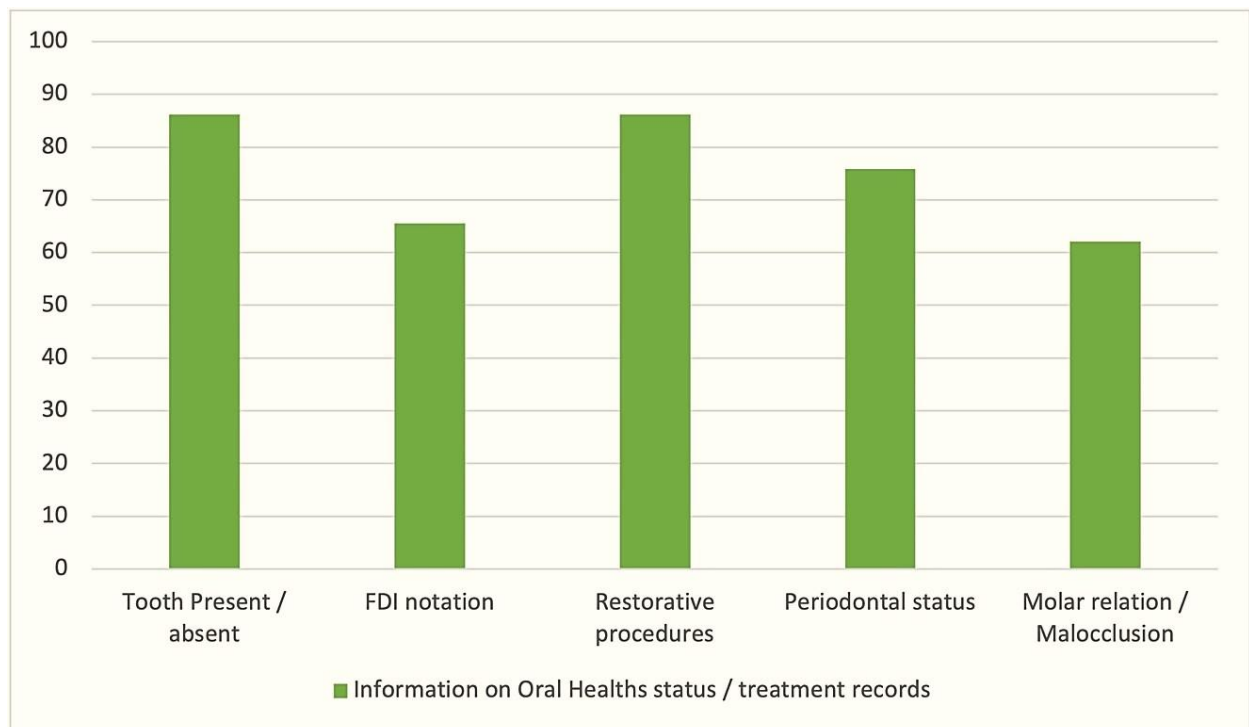


Figure 2: Information on oral health status and treatment records

Dental prosthetic record

Dentists document all details of prosthetic work, such as crowns, veneers, Fixed Partial Dentures (FPD), Removable Partial Dentures (RPD), Complete Dentures (CD), and implants, in 89.7% of cases, whereas 10.3% do not mention this

information. Before treatment, 72.4% of dentists make study casts or take photographs, while 27.6% do not. Only 51.7% of dentists mention the serial number of the implant used, and 20.7% of dentists use personalised denture markings in their prosthetic work (Table 1).

Table 1: Dental prosthetic record

Question	Option	Percentage
Do you write all the details of the prosthetic work (crowns, veneers, FPD, RPD, CD, implants) done in the oral cavity?	Yes	89.7
	No	10.3
Do you take study casts/photographs before treatment?	Yes	72.4
	No	27.6
Do you mention the serial number of implants used?	Yes	51.7
	No	48.3
Do you mention the personalised denture markings used in your prosthetic work?	Yes	20.7
	No	79.3

Radiographic record

For routine dental examinations, 86.2% of dentists use digital Radiovisiographs (RVG), while 13.8% rely on conventional X-rays. Only 17.2% of dentists do Orthopantomograms (OPG) for all patients, and only 13.8% of dentists think OPGs are needed for all patients seeking treatment.

The findings of the radiographs are mentioned in the case history form by 79.3% of all dentists. Regarding record keeping of patients' radiographs, 69.5% of dentists retain the radiograph as a soft copy, 13.8% retain the radiograph as a hard copy, and 17.2% hand over the radiographs to the patients (Fig. 3).

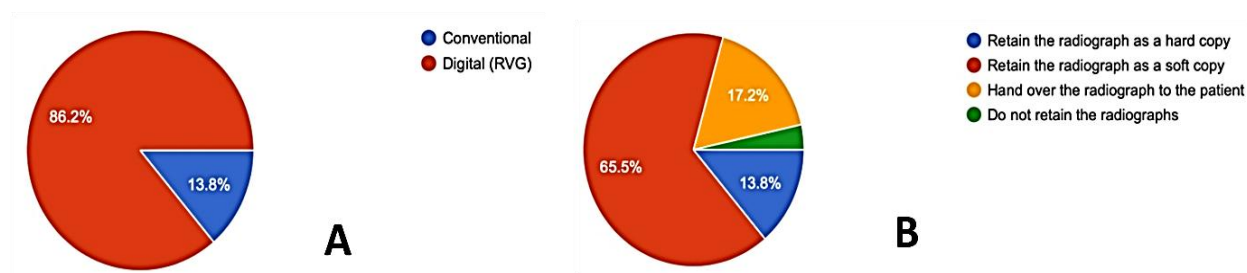


Figure 3: Responses to the question “What type of radiograph do you take?” (A) and “What do you do with the patients’ radiographs after the treatment?” (B)

Consent and preservation of dental records

The proposed treatment plan is mentioned in the dental record by 96% of dentists. Only 69% get the signature for the financial agreement. Written consent for dental procedures is obtained by 69% of dentists, and 31% don't get written consent. The prescribed medication is recorded in the patient file by 75.9% of dentists, while 82.8% document detailed information about the treatment performed in the patient record.

Regarding dental record storage, 72.4% of dentists use paper files, 13.8% use electronic health records, and 13.8% use secure online storage. The patient records are stored for >5 years by 51.7% of dentists, 3 to 5 years by 27.6%, for 1-3 years by 13.8%, and for 1 year by 6.9%. Only 79.3% of dentists update patient details on subsequent dental visits. Only 6.9% of dentists share patient details with external parties like insurance companies or researchers (Fig. 4).

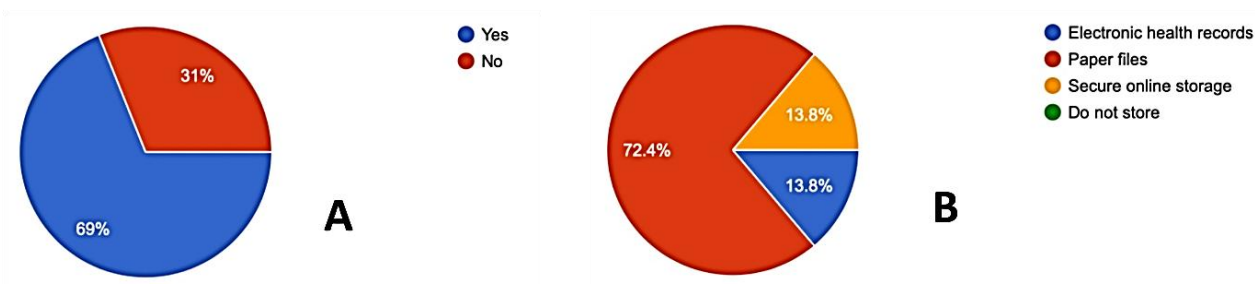


Figure 4: Responses to the question (A)-“Is written consent, signed by the patient, a standard part of your practice protocol?” and (B)-“Where are dental records typically stored?”

Forensic awareness

The last section was the questions on the forensic awareness of the practising dentist, testing their knowledge and attitude towards dental records in forensic odontology. The responses are shown in Table 2.

Table 2: Percentage distribution of various components in forensic awareness

Question	Option	Percentage
Do you think a tooth/teeth can be used to estimate the age of an individual?	Yes	93.1
	No	6.9
Can DNA be extracted from the teeth?	Yes	79.3
	No	20.7
Do you regularly note and record dental anomalies?	Yes	86.2
	No	13.8
Are you aware of denture markings, such as electronic bar codes or QR codes, being incorporated in RPD/CD?	Yes	51.7
	No	48.3
Your knowledge level/awareness about forensic dentistry is	Adequate	27.6
	Inadequate	13.8
	Average	58.6
Do you think there is adequate teaching about forensic odontology at the undergraduate level?	Yes	37.9
	No	62.1
Have you undergone any formal training in the field of forensic dentistry?	Yes	10.3
	No	89.7
Have you handled any forensic dentistry-related cases before?	Yes	10.3
	No	89.7
Are you aware that you can be an expert witness in court to present forensic dental evidence?	Yes	62.1
	No	37.9
Are you aware of the "Interpol antemortem" form of dental records?	Yes	69.0
	No	31.0

DISCUSSION

Dental records serve as an antemortem tool in forensic identification. Being important, several dentists and legal professionals are still unaware of such dental records, which may help in the identification of unknown persons³.

In our study, 96.6% of GDPs maintained a dental record for every new patient, which aligns with the study by Wadhvani S, with 87% of GDPs maintaining dental records and only 31% of them filling in all the details in the dental record⁷.

Even though the rate of maintenance is high, the method of documentation varies significantly. The majority of the dentists (65.5%) used manually preprinted forms, followed by blank papers and digital aids. This finding is consistent with the study by Sarode et al., where the majority of the GDPs use manually preprinted forms, followed by blank paper and digital software for record keeping.³ This high dependence on manual methods raises concern about long-term storage of data, their retrieval,

and accessibility. This issue can be better addressed with the implementation of Electronic Health Records (EHR).

Oral health status and treatment documentation showed a mixed trend. 86.2% recorded the teeth present, followed by 62.1% recording the molar relation or malocclusion. Periodontal status was noted by only 75.9% of respondents. This trend suggests a gap in detailed oral health evaluation, which may be due to a lack of time in busy practice, focusing only on patient needs.

In our study, prosthetic treatment records were maintained by 89.7% of GDPs, whereas only 72.4% take study casts or photographs before treatment. Only 20.7% of GDPs used personalised denture markings, and just 51.7% documented implant series. These findings are in line with the study by Asteka et al., where most of the GDPs maintain a record of their prosthetic work and document implant serial number⁶. It is concerning that these prosthetic records and photographs taken during treatment may be crucial for future reference, legal documentation, and personal identification.

In radiographic records, 86.2% of dentists use digital radiographs, which is a promising trend facilitating better image quality, storage, and sharing. However, only 17.2% refer patients for OPG routinely, and just 13.8% believe OPGs are necessary for all patients. This reflects the selective use of OPG imaging, which may miss out on many hidden diagnoses. While 69.5% of dentists prefer to store radiographs as soft copies, 79.3% record the findings in the case history, which is a good indicator of integrated diagnostics. These findings are in common with Kaur et al., where 70% of GDPs use digital radiographs, and they (52.5%) retain them as soft copies, mentioning all the radiographic findings (81.9%) in the case sheet⁸.

Informed written consent from a patient indicates that the patient has been provided with clear and understandable information about the dental procedures, allowing the patient to make a voluntary decision. Although 96% record a treatment plan, only 69% obtain a financial agreement signature and formal written consent. In light of this significant legal and ethical gap, it

highlights the need to raise awareness about obtaining proper informed consent to protect both patients and practitioners.

Record storage practices among GDPs remain highly manual, with 72.4% using paper files and only 13.8% using a secure online system. This indicates a minimal transition towards the modern digital world. The use of electronic health records is an advancement of information and communication technology worldwide. It is widely used among dental professionals in developed countries, but in developing countries like India, the awareness and its use are minimal⁹. According to a study from Australia, electronic health records were observed to provide more complete information than manual dental records¹⁰. In developing countries, there are many challenges to implementing these electronic dental records, as most dental clinics are small, and they don't want to invest a lot of money in their setup. They may also face ethical issues such as privacy breaches when proper security measures are not applied¹¹.

According to the Revised Dentists (Code of Ethics) Regulation – 2014, a “dental record must be maintained for a minimum period of three years by the dentist from the date of onset of the treatment”¹². This retention of dental records varied in our study, with just half (51.7%) of the GDPs maintaining them for 3–5 years.

The one important factor to consider lies in the forensic awareness. 93.1% of the respondents were aware that teeth can be used to estimate age, and 79.3% acknowledged the possibility of DNA extraction from the tooth. This high level of awareness appears to be theoretical. Despite the known importance of dental anomalies in personal identification, not all respondents regularly document dental anomalies in their dental records. This detailed documentation of dental anomalies is essential for antemortem and postmortem comparison. Any setback may compromise forensic identification in the case of unidentified remains.

The knowledge of forensic odontology seems to be average in 58.6% of the respondents, with the majority of the GDPs lacking confidence in forensic applications. This low self-confidence

may lead to under-detecting potential forensic implications or an unwillingness to participate in legal investigations when called upon. A striking 62.1% of GDPs reported in the survey that forensic odontology was inadequately taught during the BDS degree course, and only a few (10.3%) had received any formal training. This indicates a massive failure in the undergraduate teaching curriculum. This branch of dentistry is often treated as an elective topic in dental education, although there lies an importance in victim identification, medicolegal cases, mass disasters, etc. This lack of teaching may limit general dental practitioners in fulfilling their role as forensic experts.

The findings of our study were supported by a study conducted by Ishee et al., which demonstrated a lack of knowledge, awareness, and practice of forensic dentistry amongst dentists of Punjab. This can only be improved by taking necessary steps to incorporate forensic odontology training into the undergraduate curriculum and creating more exposure from a varied practical point of view¹³.

Dental hard tissues are a unique tool in the forensic process whenever visual identification is not practical. While 96.6% of GDPs maintain dental records, most of them depend on manual documentation with limited use of either digital tools or EHRs. There is a reasonable awareness of forensic concepts among GDPs, but practical training and confidence in forensic odontology remain low. The gap must be improved with digital adoption, standardised record keeping among GDPs, and integration of forensic training into the dental curriculum¹⁴.

LIMITATIONS

As the data were self-reported via an online survey, responses may be subject to social desirability bias. The study is limited to Tamil Nadu and may not reflect practices across India.

CONCLUSIONS

Dental records play a vital role in forensic identification and legal proceedings. Although it is important to maintain dental records, there exists a considerable variability in consistency,

accuracy, and duration of retention of dental records. Having a good record-keeping practice is essential for quality patient care and may aid in forensic cases of unidentified bodies, mass disasters, or medico-legal issues. To bridge this gap, there is a need for continuing dental education programmes, forensic workshops, implementation of record-keeping systems etc. By following this, GDPs can contribute to public health and law enforcement by unlocking the power of dental records in forensic science.

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None

CONFLICTS OF INTEREST

The authors declared no conflicts of interest.

ETHICAL ISSUES

Ethical approval has been obtained from the Institutional Human Ethics Committee of Sree Mookambika Institute of Dental Sciences, Kulasekharam, Kanniyakumari District, Tamil Nadu, India (SMIDS/IHEC No. 05, Protocol No. 40/2024).

SOURCES OF SUPPORT

None

AUTHOR CONTRIBUTIONS

RF: Conception and design of the work; revising the draft critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. **MPR:** Conception and design of the work; revising the draft critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. **BG:** Analysis and interpretation of data for the work; drafting the work; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are

appropriately investigated and resolved. **DA:** Analysis and interpretation of data for the work; drafting the work; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. **SJM:** Analysis and interpretation of data for the work; drafting the work; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. **NP:** Conception and design of the work; drafting the work; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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