



## Knowledge and Practice Of Orthodontic Record Keeping - A Clinical Audit

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### Abstract

**Background:** Record keeping is an essential process and its importance cannot be ignored when it comes to Orthodontics. Even diagnosis is dependent on accurate and reliable Orthodontic records. Apart from diagnosis and treatment planning, these records are also important for medico-legal issues, publications, self -appraisals, patient education. The Basic record keeping armamentarium in Orthodontics includes: Case history, consent forms plaster models, a panoramic radiograph, Lateral cephalogram, intra and extra oral pictures. The objective of this study was to determine the knowledge and Practice trend of Orthodontic record keeping amongst the dental practitioners. **Material & Methods:** This cross-sectional study was conducted across various dental clinics in Bangalore city. The sample selection for Dental clinics was made by the lottery method, and total of 40 clinics were selected from the list of registered dental clinics. Questionnaires were designed in such a way so as to determine the knowledge, awareness and practice trends about the Orthodontic records keeping among dental practitioners. Questionnaires were collected back by hand and analysed. The data was tabulated in excel sheet and statistical analysis was performed on the data. **Results:** Chi-square/ Fisher Exact test has been used to find the significance of study parameters on a categorical scale between two or more groups. Student t-test has been used to find the significance of study parameters on a continuous scale between two groups (Intergroup analysis) on metric parameters. 65% practitioners didn't attend any CDE program on maintaining health records program whereas 35% had attended such program's. Majority of general practitioners had knowledge and awareness about Orthodontic record keeping while as practice of Orthodontic record keeping was not completely as per norms. **Conclusion:** The present study found the good knowledge and awareness about orthodontic record keeping, but record keeping practice was found to be average due to lack of adequate infrastructure at clinics and non-usage of digital technology in most of the clinics. This study suggests that more awareness programs stressing the importance of Orthodontic record taking and workshops for incorporating digital technology related to the storage & preservation of Orthodontic record should be conducted.

**Keywords:-** Record keeping, CDE-continuous dental education Programs.



## INTRODUCTION

Maintaining of Health records is an integral part of effective patient care. The first step in Orthodontic practice is maintaining a standardised Orthodontic record. The primary intention of making documentation is to identify the accurate diagnosis and patients concerns, formulate the proper treatment for the diagnosed person.<sup>[1-3]</sup> Orthodontic record consists of regular updating of dental charts which include the examination of the comprehensive oral and perioral hard and soft tissue transformation made in the particular period of treatment. This Documentation comprises of communication emerges between orthodontist and patient and these records are highly useful in safeguarding against the legal interest of all the parties. A study on record taking concluded that radiographs, photographs and then casts form an integral part of the patient record taking.<sup>[4]</sup>

Technological transformation created a huge impact on different sectors. This, in turn, influenced Orthodontic practices as well. Hence integrated technology solution eliminated the concerns associated with Orthodontic practices and make the team highly comfortable while maintaining the records of the patients.<sup>[5]</sup> Technology plays a key role in influencing the impact of every aspect of Orthodontic practices. Many studies assessed the Orthodontic practices, application of computer technology in various tools like digital photographs and then cone-beam computed tomography followed by virtual study models, communication, virtual reality software and network-attached storage devices.<sup>[6,7,8]</sup>

Orthodontic treatment has the highest clinical risk of malpractices and litigation due to long period of treatment. The overriding message for the clinician is to practice the Orthodontics with the philosophy of prevention and avoidance.<sup>[9,10]</sup> The practice of having dental record is not only for forensic application but also for legal regulations for claiming insurance and consumerism.<sup>[11]</sup>

One of the valuable tools in maintaining diagnostic record using 3 Dimensional technology is that it assists the person to reproduce the patient dataset which is available in a secondary environment. The practitioner has the ability in creating and manipulating the records using 3D virtual patient. 3dMD system gives the stereophotogrammetry images which produces a full-face image using active stereo approach. A study found that the practitioner recommended digitalisation because of cost and speed of acquiring and reproducing images replace the current manual methods of record keeping in Ortho sector.<sup>[12]</sup>

It is mandatory for an Orthodontist to follow this art and practice of records taking which is indispensable for medico-legal issues, publications, self-appraisals, treatment progress and patient education as well. Keeping in view the above points and literature, the present study was carried to determine the knowledge, awareness and practice trend of Orthodontic record keeping by dental practitioners in their clinics in Bangalore city.

## MATERIAL AND METHODS

The necessary permissions for the study were obtained and protocol for the study was also approved.



The sampling technique adopted for the study was non-probability sampling in which convenience sampling was chosen and a total of 40 Dental clinics were selected among the list of registered clinics. Each Dentist running the clinic was given a questionnaire to assess the knowledge, awareness and record keeping practice of Orthodontic records in their dental clinics. The questionnaire was designed and validated by three senior Orthodontists of Professor Cadre. 10 minutes was the designated time to fill the questionnaire. All the questionnaires were collected in hand. Consent was taken from the dental specialists for participating in the study and were informed that the name of dental specialist and clinic will be kept anonymous. The entries were tabulated in the excel sheet and the data was analyzed and various statistical tests were performed.

**Inclusion criteria included:** Registered clinic, Clinics with more than 30 ongoing Orthodontic cases, Clinic running for five and above years, Dental practitioner with recognized Dental degree recognized by Govt. of India.

**Exclusion criteria included:** clinics where Orthodontic patients are not treated, Clinics having non Orthodontic specialist, clinics promoting DIY (do it yourself) Orthodontic appliances.

The Statistical software, namely SPSS 22.0, and R environment ver.3.2.2 was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc. Descriptive and inferential statistical

analysis has been carried out in the present study. Results on continuous measurements are presented on Mean  $\pm$  SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on a categorical scale between two or more groups. Student t-test (two-tailed, independent) has been used to find the significance of study parameters on a continuous scale between two groups (Intergroup analysis) on metric parameters.

## RESULTS

From [Table 1], it is quite clear that 100% of respondents stated that patient details are important and that was always documented from the patients whenever they visited the clinic. About informed consent form, 5% of patients stated never, 35% of stated sometimes and 60% of stated always because the consent is considered it to be an agreement between the patients and clinic for granting permission to do services for the patients. Considering medical history, 30% of respondents stated it as necessary and 70% stated always. Oral health status was primarily necessary for 100 %. Orthodontic charting in skeletal form was considered necessary by 25% as sometimes whereas 75% stated it always. 85% required chart in the form of malocclusion classification, 10% stated for sometimes and 5% said no need of Orthodontic charting. Documenting of overjet and overbite: 45% of required it always, 50% sometimes and 5% didn't require. Considering degree of crowding in Orthodontic



charts: 55% considered it important while as 40% said sometimes and 5% never wanted it. Radiographs of lateral cephalogram were considered for record keeping by 45% as always and 55% as sometimes only. With regard to OPG: 55% said always, 40% for sometimes and 5% for never and for IOPAR: 25% to be required for always, 40% needed it for sometimes and 35% of no need for record keeping it.

Pre treatment photographs: 85% said always, 10% for sometimes and 5% for never whereas photographs during mid treatment were 45% for always, 30% for sometimes and 25% stated as never. Concerning the requirement of Post treatment photographs 75% response for always, 20% for sometimes and 5% stated as never.

About models needed for before treatment was stated to be essential by 80%, Sometimes to be 20% and 0% for never. Consequently, during treatment at regular intervals to be 25% as always, 55% as sometimes and 20% as never. Lab models essential for after treatment to be 75% as always, 20% as sometimes and 5% stated as never.

However, the responses for documentation and record keeping: 95% said always and 5% as sometimes Considering payment receipts, 90% required it always, 5% sometimes and 5% no need of it to be recorded and stored.

[Table 2], infers the practices about the storage and maintenance of records being followed by the general dental practitioners at their dental clinic. 100% stated that Orthodontic clinic keeps the records of the patients while visiting the clinic for availing treatment. 95% of respondents stated that maintenance of records is legally bound whereas 5% don't so. 20% maintain the records in the form of handwritten

while 10% in electronic form and 70% of keeping the records in the form of combination of handwritten and electronic records.

Records stored as per date were 10% while 20% of based on alphabetical order, 70% to be customised serial number to the file and none stated others. Considering the information on storage of Orthodontic records, 45% to preserve it for less than a year, whereas 55% for more than a year. However, information about non-reporting patients stored it for 75% for less than a year and 25% of for more than a year. Storing patient files and other records of medicolegal cases: 5% were not preserving the information, 10% for less than a year and 85% maintaining it for more than a year. About the disposing of records after the retention period, 55% of the records were given to the patient itself, 20% transfer it to the external agency and 25% incinerated the records.

From [Table 3], it is clear that 65% didn't attend any CDE program on maintaining health records program whereas 35% had attended such program's. Hence, it is clear that highest number of respondents did not attend any such program's for maintaining health records.

From [Table 4], it is clear that responses less than median were more (60%) as compared to responses more than median (40%) which infers that majority of dental practitioners practicing the protocol of Orthodontic record keeping are below the median score.

[Table 5] infers the association between knowledge and awareness of orthodontic record keeping with the practice of record keeping followed in the clinics.

It is observed from the table 6 that for a means score of 49.60 and S.D for 4.04; P-value is 1 stating the record maintenance of patients in Orthodontic clinic. P-value of 0.217 stating it is

moderately significant about legally bound to maintain the records in Orthodontic clinic. Considering maintenance of records got p-value as 0.564 stated symbolic significance because they are maintaining records in handwritten form as well as electronic form. About records storage at the Orthodontic clinic, p-value is 0.311 stated moderately significant. For Orthodontic records of ongoing completed patients p-value is 0.351 which represents moderately significant because they maintain

the records for more than a year – maintaining records about inactive patients adjusted p-value as 0.822 which represents symbolic significance – considering patients files and other records of medicolegal cases secured p-value as 0.913 which stated symbolic significance and disposal of records acquired p-value as 0.090 which represents strongly significant with respect to the study.

**Table 1:** Basic Knowledge about the Orthodontic record keeping

Part 2 of the questionnaire	Never	Sometimes	Always	Min	Max	Mean	SD
Patient details	0%	(0%)	(100%)	3.00	3.00	3.00	0.00
Informed consent form	5%	(35%)	(60%)	1.00	3.00	2.55	0.60
Medical History	0%	(30%)	(70%)	2.00	3.00	2.70	0.47
Oral Health Status	0%	(0%)	(100%)	3.00	3.00	3.00	0.00
<b>Orthodontic Charting</b>							
a. skeletal pattern	0(0%)	5(25%)	15(75%)	2.00	3.00	2.75	0.44
b. malocclusion classification	1(5%)	2(10%)	17(85%)	1.00	3.00	2.80	0.52
c. Over-jet & Overbite	1(5%)	10(50%)	9(45%)	1.00	3.00	2.40	0.60
d. Degree of crowding	1(5%)	8(40%)	11(55%)	1.00	3.00	2.50	0.61
<b>Radiographs</b>							
a. Lateral Cephalogram	0(0%)	11(55%)	9(45%)	2.00	3.00	2.45	0.51
b. OPG	1(5%)	8(40%)	11(55%)	1.00	3.00	2.50	0.61
c. IOPAR	7(35%)	8(40%)	5(25%)	1.00	3.00	1.90	0.79
<b>Photographs</b>							
a. Before treatment	1(5%)	2(10%)	17(85%)	1.00	3.00	2.80	0.52
b. During treatment (regular intervals)	5(25%)	6(30%)	9(45%)	1.00	3.00	2.20	0.83
c. After treatment	1(5%)	4(20%)	15(75%)	1.00	3.00	2.70	0.57
<b>Lab models</b>							
a. Before treatment	0(0%)	4(20%)	16(80%)	2.00	3.00	2.80	0.41
b. During treatment (regular intervals)	4(20%)	11(55%)	5(25%)	1.00	3.00	2.05	0.69
c. After treatment	1(5%)	4(20%)	15(75%)	1.00	3.00	2.70	0.57
Treatment Plan	0(0%)	1(5%)	19(95%)	2.00	3.00	2.95	0.22
Payment receipts	1(5%)	1(5%)	18(90%)	1.00	3.00	2.85	0.49



**Table 2:** Practices about storage and maintenance of Patient records followed

Part 3 of the questionnaire	A	B	C
Q1	20(100%)	0(0%)	0(0%)
Q2	19(95%)	1(5%)	0(0%)
Q3	4(20%)	14(70%)	2(10%)
Q4	2(10%)	4(20%)	14(70%)
Q5	0(0%)	9(45%)	11(55%)
Q6	0(0%)	15(75%)	5(25%)
Q7	1(5%)	2(10%)	17(85%)
Q8	11(55%)	5(25%)	4(20%)

Question number =Q

**Table 3:** CDE (continuous dental education) program's attended on maintaining health records

CDE program's attended on maintaining health records	No. of dental practioners %
No	65.0
Yes	35.0
Total	100

**Table 4:** Comparison of total score with the median for the practice of record keeping in dental practice

Total Score of Protocol of practice	Number of responses by Orthodontist in comparison to median %
Less than median	60.0
More than Median	40.0
Total	100.0

**Table 5:** Association of Knowledge of record keeping (Part 2) with the practice of record keeping followed in the clinics (Part 3)

Part 3	Total Score of Protocol of practice -part 3		Total (n=40)	P-value
	Less than Median score of part 2	More than Median score of part 2		
Q1				
A	100%	100%	100%	1.000
B	0%	0%	0%	
C	0%	0%	0%	
Q2				
A	100%	87.5%	95%	0.400
B	0%	12.5%	5%	
C	0%	0%	0%	
Q3				
A	25%	12.5%	20%	0.367
B	75%	62.5%	70%	
C	0%	25%	10%	



Q4				
A	0%	25%	10%	0.367
B	25%	12.5%	20%	
C	75%	62.5%	70%	
Q5				
A	0%	0%	0%	0.197
B	58.3%	25%	45%	
C	41.7%	75%	55%	
Q6				
A	0%	0%	0%	1.000
B	75%	75%	75%	
C	25%	25%	25%	
Q7				
A	0%	12.5%	5%	0.302
B	16.7%	0%	10%	
C	83.3%	87.5%	85%	
Q8				
A	66.7%	37.5%	55%	0.151
B	8.3%	50%	25%	
C	25%	12.5%	20%	

**Table 6:** Comparison of the responses given in part 3 (Protocol of record keeping followed in dental clinics) by general practitioners with the correct answers

	Mean score	SD score	P-value
Part 3 Q1			
Correct answer	49.60	4.04	1.000
Wrong answer	-	-	
Part 3 Q2			
Correct answer	49.32	4.33	0.217
Wrong answer	55.00	-	
Part 3 Q3			
Correct answer	49.21	4.07	0.564
Wrong answer	50.50	5.59	
Part 3 Q4			
Correct answer	48.92	3.95	0.311
Wrong answer	51.17	5.38	
Part 3 Q5			
Correct answer	50.45	4.50	0.351
Wrong answer	48.65	4.30	
Part 3 Q6			
Correct answer	49.20	4.92	0.822



Wrong answer	49.73	4.39	
Part 3 Q7			
Correct answer	49.64	4.47	0.913
Wrong answer	49.33	4.92	
Part 3 Q8			
Correct answer	48.09	3.43	0.090+
Wrong answer	51.44	4.92	

**Figure 1**  
**Questionnaire**

**Part 1**

1. Name (optional):
2. Age:
3. Gender: Male / Female
4. Have you attended any CDE program/ Workshop on maintaining Health records? Yes / no

**Part 2**

**Kindly Tick the column you think is most significant in patient Orthodontic record keeping process:**

	Question	Never	Sometimes	Always
01.	Patient Details Name, address postcode, date of birth and parent/guardian telephone number.			
02.	Informed Consent from patient/Parent/Guardian			
03.	Medical History			
04.	Oral Health Status			
05.	Orthodontic Charting			
	a. skeletal pattern			
	b. malocclusion classification			
	c. Over-jet & Overbite			
	d. Degree of crowding			
06.	Radiographs			
	a. Lateral Cephalogram			
	b. OPG			
	c. IOPAR			
07.	Photographs			
	a. Before treatment			
	b. During treatment (regular intervals)			
	c. After treatment			



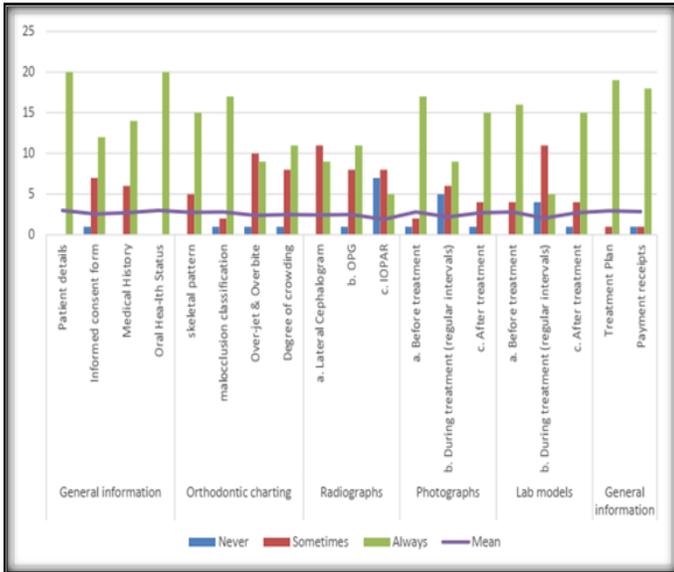
08.	Lab models			
	a. Before treatment			
	b. During treatment (regular intervals)			
	c. After treatment			
09.	Treatment Plan			
10.	Payment receipts			

### Part 3

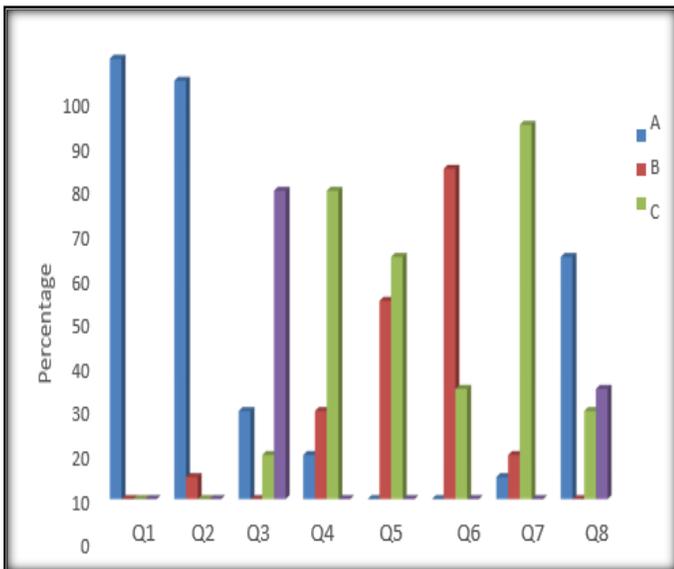
#### Practice of Storage and Maintenance of Patient records

1. Do you keep records of the patients visiting your clinic for Orthodontic treatment?
  - a. Yes
  - b. No
  - c. Sometimes
2. Do you think you are legally bound to maintain the records in your clinic?
  - a. Yes
  - b. No
  - c. Don't know
3. How do you maintain the records in your dental office/clinic?
  - a. Hand written
  - b. Printed forms
  - c. Digital records
4. How are the records stored?
  - a. By date
  - b. Alphabetical order
  - c. Customized serial number to the file
5. For how long do you store the Orthodontic records of ongoing/ Active/completed patients?
  - a. Don't preserve
  - b. less than 1 years
  - c. More than 1 year
6. For how long do you store the Orthodontic records of non-reporting/inactive patients (not reporting for 24 months) ?
  - a. Don't preserve
  - b. less than 1 years
  - c. More than 1 year
7. How long do you store the patient files & other records of medicolegal cases?
  - a. Don't preserve
  - b. Less than 1 years
  - c. More than 1 year
8. How do you dispose the records after the retention period?
  - a. Give them back to the patients

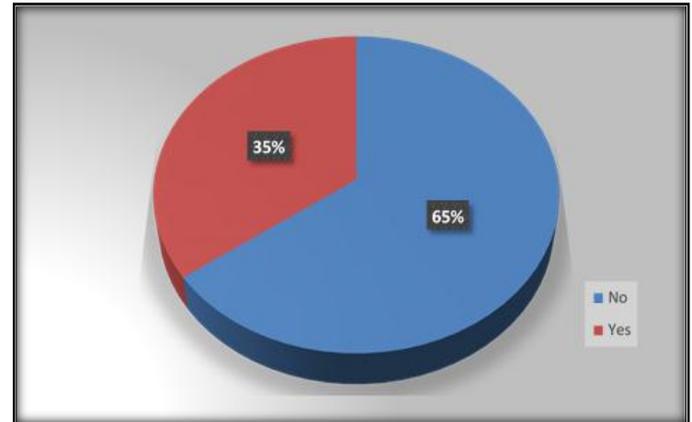
- b. Incineration/Shredding
- c. Transform to external agency that can destroy the records
- d. None of the



**Graph 1:** Part 2- Protocol of record keeping followed in dental clinics



**Graph 1:** Part 3 – Practice about storage and maintenance of Patient records



**Figure 2:** CDE program attended on maintaining health records

### DISCUSSION

It is vital for the health worker to safeguard the patient's information as per medico-legal, commercial and legal regulations (consumer act) as framed by the government.<sup>[13]</sup> Patients records for Orthodontic treatment are recorded as pre-treatment, mid treatment and post treatment. The initial diagnostic records should include a minimum of patient history (medical, dental), clinical findings, TMJ examination, intra and extra oral photographs, panorex, cephalometric analysis and study models. Progress records include all events including treatment rendered, financial activity, correspondence, and appointment history, including missed or cancelled appointments this may include models, photos, panorex (check the roots) and TMJ examination. It is a clinician's nightmare to complete a case and find out after the treatment is finished but the case could have been fine-tuned.



The present survey conducted to reveal the knowledge and practice of maintaining the Orthodontic records at the dental clinics in Bangalore. The study further assessed the knowledge of practicing the record-keeping and observed the outcome that the maximum number of dental practitioners have knowledge and are aware of Orthodontic record-keeping in their dental clinic but only average frequency actually follow the practice of record keeping.

Only 35% practitioners had attended the Continuous dental education program and kept the record in a proper way. Patient record maintenance is important for the practitioner to keep up the record as per ADA. Besides<sup>[14,15]</sup> A study found that dentist's cited almost 90% of the patient information and the practitioner found it easy to decide about the treatment plan because of the availability of diagnosis along with the personal information of the patients.<sup>[15]</sup>

In the present study, it was observed that 100% of respondents were maintaining the patients details and 60% of them took informed consent from the patients. Osbourne et al.<sup>[16]</sup> exhibited in the study that Minnesota Dentists perception stated that 85% of dentists are having adequate record documentation related to the Orthodontic patients as per American Dental Association Criteria. A study concluded that 71% of the dentists acquired informed consent from the patients.<sup>[17]</sup> Dental practitioners in Chennai maintaining complete records are said to be around 12% only.<sup>[18]</sup>

Dental practitioners are considered to be the legal owner of the dental records.<sup>[19]</sup> In this study, Dental practitioners recorded the information for less than a year for non-active patients whereas more than a year for active

patients. A good practitioner keeps the record for 10 years.<sup>[20]</sup> Indian Council of Medical Research states that all records should be maintained carefully for 3 years.<sup>[21]</sup> Astekar stated in his study it is mandatory for the dentists to store the records for 5 years.<sup>[17]</sup> The present study identified that practitioners maintain the record for maximum one year which depicted that the record storage and preservation is average and these results of present study agree with the others studies.<sup>[22,23,24,25]</sup> To avoid litigation extra time should be given in preparing high quality records, in discussing informed consent, in documenting proper treatment records and in talking to patients.<sup>26</sup> A review stated that Orthodontists have 47% lawsuits for poor interaction with patients, 40% as a result of other Orthodontists criticism 3% due to poor treatment results.<sup>27</sup> The drawback of this study was the less sample size. Further studies can be carried out with more sample size.

## CONCLUSIONS

The present study found good knowledge and awareness about orthodontic record keeping among the dental practitioners, but record keeping practice was found to be average due to lack of adequate infrastructure at clinics and non-usage of digital technology in most of the clinics .

More CDE (Continuous dental education) programmes and workshops on importance of record taking in Orthodontics and use of digital technology should be conducted. Moreover, having an excellent clinical infrastructure, a proper record room is essential to store and preserve the Orthodontic records for an extended period which was lacking in most of



the clinics. This study recommends that all the records should be taken and stored properly. Auditing of the records should be done at timely intervals. Use of digital technology should be incorporated in clinics to make record storage process paperless which can help in easily reviewing the progress of Orthodontic patients and reduce the burden of storing so much hardware in a clinic which otherwise is time consuming and requires lot of infrastructure.

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