Students and Patients' Compliance towards Dental Software Used In Private Dental College in Chennai - A Prospective Trial

Kalaivani Venkadessan[1], Meignana Arumugham Indiran[2], Lalitha Rani Chellappa[3]

[1] *Postgraduate student, Department of Public Health Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India. Email: kalai11venki@gmail.com*
[2] *Professor, Department of Public Health Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India. Email: drmei.sdc@saveetha.com*
[3] *Senior Lecturer, Department of Public Health Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India. Email: lalitharanibds28@gmail.com*

KEYWORDS
Dental software, DIAS, compliance, student satisfaction, patient satisfaction, dental informatics, electronic dental records (EDR).

ABSTRACT
Objective: This study aimed to assess the compliance and satisfaction of third-year undergraduate dental students and patients using the Dental Information Archiving System (DIAS) in a private dental college in Chennai, focusing on ease of use, time efficiency, and overall experience.
Methods: A prospective trial was conducted at Saveetha Dental College, involving 100 dental students and 100 patients. Compliance and user satisfaction were measured using a questionnaire administered at two-time points: at the initial clinical appointment and after four weeks of using DIAS. The questionnaire included multiple-choice and Likert-scale questions addressing key aspects such as ease of use, perceived value, and efficiency of the system.
Results: Patients: Awareness of DIAS increased significantly from 78% to 96% between the first and second visits. Patient satisfaction with the software's time efficiency and perceived security improved drastically, with 93% finding the time spent reasonable by the second visit ($p = 0.000$). Confidence in data security rose from 4% to 85% ($p = 0.000$). Students: Familiarity with DIAS improved from 7% to 61% ($p = 0.000$), and preference for DIAS over traditional methods increased from 28% to 67% ($p = 0.000$). The time required for DIAS usage decreased, while the application of clinical knowledge increased from 67% to 74% ($p = 0.008$).
Conclusion: The study demonstrated that both students and patients showed significant improvements in compliance and satisfaction with the dental software over time. Increased exposure led to better understanding and trust in the system, highlighting the potential of DIAS to enhance clinical education and patient care. However, challenges related to data security, interoperability, and the need for ongoing training remain critical for wider implementation.

1. Introduction

Dental advancements are heavily reliant on information technology advancements (1). The term "dental informatics" emphasises the applications of computer and information sciences in dentistry to enhance clinical practice, management, research, and teaching (2, 3). The evolution of computerised health information systems (HISs) in dentistry has been the subject of additional research. The data required to plan and carry out care is gathered, stored, processed, and transmitted via health information systems (4, 5).

The electronic dental record (EDR), which is used by practitioners to record patients' medical and dental histories as well as specifics about consultations, is one well-known HIS component. Due to the clear advantages of EDRs, particularly for large clinical institutions, the US's total adoption rate of EDRs rose from 52% in 2012 (6) to 77% in 2017 (7). In countries like the United Kingdom, New Zealand, and Germany the EHR adoption rate is more than 95% even by physicians in private practice (8). In India, overall adoption rates were only around 30-40% of hospitals in urban areas of India, rural hospitals and clinics are yet to adopt EHR systems (9).

EDRs are more than just a straightforward conversion of paper records. They enable control over data acquisition, ease data storage and access, assist administrative and management procedures, and direct public health policy. Ideally, they are interoperable with other HIS components. They can be applied to education and research as well (10,11). Scalable, shareable, and dentistry-specific standardised clinical coding systems (SCCSs) are required to fully benefit from EDRs, especially in terms of data transfer, aggregation, and reuse (12). These technologies provide computerised comparisons of the results of various treatments for the same diagnosis and facilitate machine-readable documentation. (13).

Only 5-10% of Dental clinics and colleges implemented EHR in some form. A number of dental colleges are connected to general medical institutions that may already have a digital infrastructure, making them crucial centres for clinical training. To improve patient management and student education, dental colleges with larger hospital setups, particularly private ones and those in urban areas have begun implementing EHR. Dental software enhances patient experiences while also being beneficial to students (14). It guarantees that patients receive prompt and consistent care by offering a streamlined platform for communication and treatment and that their data are safely maintained and readily available for follow-up. Dental software has grown in significance as a result of these benefits, especially in educational settings where a high volume of patients and students interact regularly (15).

However, patient and student participation and compliance are critical to the effectiveness of these software programs. The degree to which users, in this case, students and patients adhere to suggested protocols for utilising the software is known as compliance. This includes how students handle patients with the program. A prospective trial of dental software compliance can offer insightful information about the acceptability, difficulties, and potential enhancements required to increase its usage. User compliance and technology adoption are strongly related in any healthcare environment (16). No matter how sophisticated, technology cannot provide its promised benefits if end users both patients and healthcare providers do not comply to a sufficient degree. Students' adherence to dental software is essential in the context of dentistry education for a number of reasons. It first makes sure they are knowledgeable about the program and have no trouble using it to manage scheduling, diagnostics, and patient records. This knowledge is essential when students enter the workforce, as these programs are frequently essential to day-to-day operations. Second, compliance makes it easier to provide standardized care, which lowers errors and enhances the interaction between patients, teachers, and students (17).

The new software created by a private dental college to record all the dental findings and treatment planning helps in a greater way than conventional methods of recording the findings. The students' compliance towards the software is expected to increase as they work on it. The patients' understanding of the software and the time taken to fill their findings relies on their knowledge and understanding as the software was designed to treat the patient in a comprehensive manner after the complete recording of their oral health status with respect to all departments. The aim of this study is to assess the compliance of Students and patients with dental software used in private colleges in Chennai.

2. Methodology

Study Design

This is a prospective trial study to assess patient and student compliance of a dental Software System implemented in Saveetha dental college Chennai.

Study Setting

The study was conducted at Saveetha Dental College in Chennai. Here, patient management, student training, and treatment planning were maintained with the help of the Dental software DIAS (Dental Information Archiving System).

Study Population

This study will include two distinct groups of participants. Third Year Undergraduate Students in the dental program and Patients visiting the dental college for comprehensive treatment during the study period

Inclusion Criteria

Third-year undergraduate dental students who have just entered clinical postings. Patients above 18 years of age were included. Individuals who have consented to participate have undergone at least one treatment session.

Exclusion Criteria

Students and Patients who were not willing to take up this study were excluded.

Sample Size

For the study, 100 students and 100 patients would be selected for six months. This size of sample was chosen with the anticipated outflow of patients and a consideration for the number of students currently on the software.

This will be undertaken using a stratified sampling approach so that there is a broad representation of undergraduates and postgraduate students, patients across various age groups/backgrounds etc. (18)

Study Duration

To ensure thorough data on compliance and challenges faced by both students and patients collected, the study was performed over 3 months period starting from February 2023 to April 2023.

Ethical Considerations

Written consents were taken from all participants including students and also patients before entering into this study.

Questionnaire Development and Data Collection

A questionnaire was created that aimed to monitor patients' and students' adherence to the software functioned independently for every cohort. The survey was conducted to assess ease of use, user satisfaction, efficiency, and perceived value of DIAS in terms students felt as medical students and patients anticipated. The survey involved a mix of multiple-choice and Likert-scale questions to gather responses. The questionnaire had an extremely basic and clear structure so that people from all walks of life could read the questions and answer them conveniently. The content validation was carried out by three experts in the field of Public Health Dentistry, dental informatics and software usability.

We studied the face validity of a 20-item questionnaire in a pilot study among 40 respondents (20 students and 20 patients). Respondents were required to fill in the questionnaire and comment on how clear and well understandable the questions were. Based on this feedback, the wording of a couple of items was clarified as needed. Furthermore, the 30-item questionnaire was re-administered to a sample of 15 students and 15 patients at a two-week interval to evaluate test-retest reliability. Similar analyses for the students and their patients resulted in an intraclass-correlation coefficient (ICC) of 0.87 (students), 0.85 (patients), demonstrating acceptable stability across time points. Questionnaires was handed out to students at the start of their course and after 4 weeks into clinical postings. Patients were asked to complete questionnaires in the first clinical appointment and the subsequent follow-up visit.

3. Results

A total of 100 patients participated in the study. 46% of the population were male and 46% were males (Figure 1). 14% of the population was between the ages of 18 and 30; 14% was between the ages of 31 and 40; 28% was between the ages of 41 and 50; 30% was between the ages of 51 and 60; and 14% was over the age of 60. In terms of education, 13% of patients held an undergraduate degree, 6% held a postgraduate degree, 18% did not complete primary school, 23% completed primary school, 19% completed secondary school, 15% completed high school, and 6% had no formal education at all. Among students 38.96% were males and 61.04% were females.

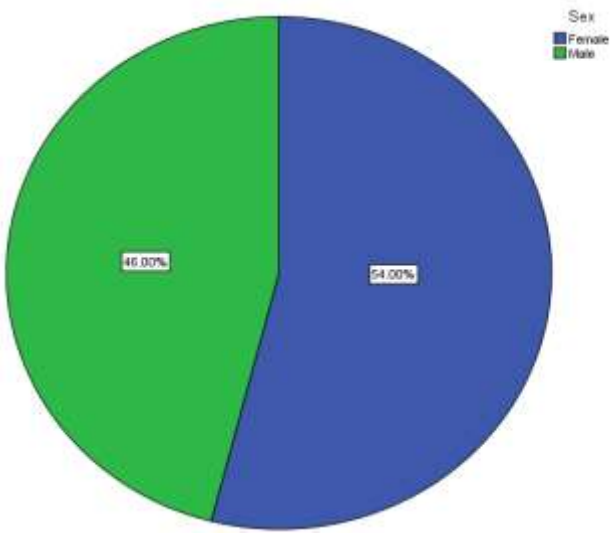

Figure 1: Gender distribution among Patients'

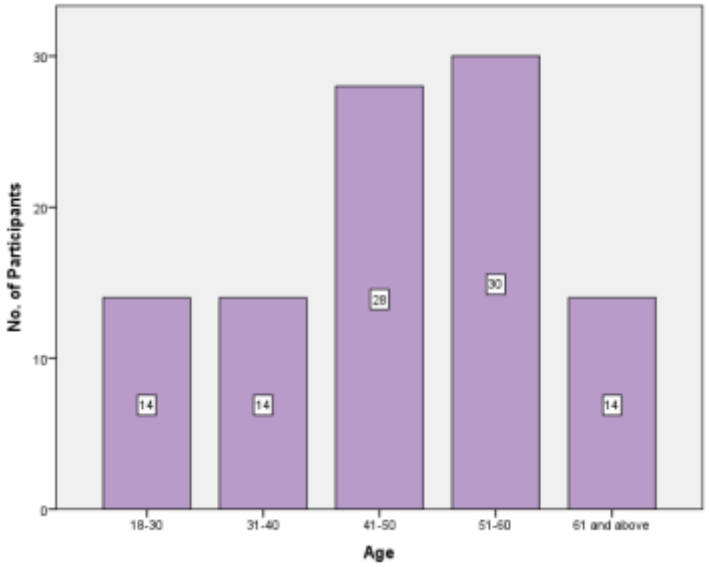

Figure 2: Age distribution among the study population (Patients).

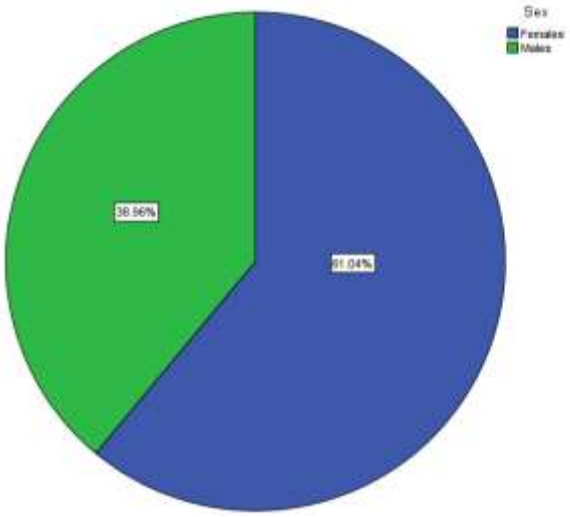

Figure 3: Gender distribution among students.

Table 1: Patient's response to questionnaire (Wilcoxon Singed rank test):

Questions	Visit	Yes	No	May be	Z value	P value
Do you know Dentist use a specialised dental software that is unique to this college to store all details?	1st visit	78	22	0	-4.243	0.000
	2nd visit	96	4	0		
Do you feel secure to share your information in DIAS	1st visit	4	36	60	-8.173	0.000
	2nd visit	85	10	5		
Do you feel unnecessary giving pose for pictures?	1st visit	43	26	31	-3.921	0.000
	2nd visit		73	27		
Do you feel all your chief complaint is addressed?	1st visit	5	88	7	-6.601	0.000
	2nd visit	75	11	14		
Do you think time taken to fill DIAS is too much?	1st visit	90	3	7	-8.188	0.000
	2nd visit	2	93	5		
Do you think time taken to fill DIAS is worth?	1st visit	2	80	18	-7.79	0.000
	2nd visit	91	0	9		
Do you think your money spent here for this innovation is worth it?	1st visit	100	0	0	0	1
	2nd visit	100	0	0		
Do you think the time waited to get into the clinic is high?	1st visit	74	26	0	-8.35	0.000
	2nd visit	0	95	5		

Do you think students are qualified enough to treat you?	1st visit	53	6	41	-6.28	0.000
	2nd visit	95	2	3		

Table 2: Student's response to questionnaire (Wilcoxon Singed rank test):

Questions	Visit	Yes	No	May be	Z value	P value
Is it easier to get familiar with DIAS?	1st visit	7	55	15	5.565	0.000
	2nd visit	61	3	13		
How long you took to get familiar with DIAS?	1st visit	0	13	64	3	0.003
	2nd visit	0	4	73		
Will you prefer DIAS over the conventional method of recording case history?	1st visit	28	36	13	5.059	0.000
	2nd visit	67	3	7		
Can you apply all the clinical/theory knowledge while filling the DIAS?	1st visit	67	0	10	2.646	0.008
	2nd visit	74	0	3		
Is your patient satisfied with your treatment after seeing pre- and post- OP pictures?	1st visit	77	0	0	0	1
	2nd visit	77	0	0		
Does DIAS react to user input quickly?	1st visit	47	6	24	4.208	0.000
	2nd visit	68	0	9		
Do you find DIAS user friendly?	1st visit	55	13	9	3.349	0.001
	2nd visit	72	2	2		
Has your Photographic skills improved?	1st visit	77	0	0	0	1
	2nd visit	77	0	0		
Do you think time spent on filling DIAS is useful during Diagnosis?	1st visit	49	7	21	3.796	0.000
	2nd visit	67	0	10		
Do you think time spent filling DIAS is useful during the Treatment plan?	1st visit	43	7	27	4.477	0.000
	2nd visit	67	0	10		
How long do you take to fill the DIAS?	1st visit	0	6	71	7.55	0.000
	2nd visit	2	59	16		
Do you think DIAS is innovative?	1st visit	63	0	14	0	1
	2nd visit	63	0	14		
How accurate do you think DIAS is?	1st visit	0	0	77	7.73	0.000
	2nd visit	54	16	7		
How simulated is the software items with the real tooth condition?	1st visit	0	51	26	4.522	0.000
	2nd visit	16	54	7		

Table 3: Correlation between overall scores of patients with students:

Correlation between overall scores of patients with students		Patient score	Student score
Student Score	Pearson correlation	0.942	1
	P value	0.000	-
Patient score	Pearson correlation	1	0.0942
	P value	-	0.000

Patients' Responses to Questionnaire

Awareness about DIAS increased to 96% at the second visit from 78% at the first (p = 0.000). By the second visit, feelings of security had improved from 4% to 85% (p = 0.000). Photographic poses: From 43% to 73% (p = 0.000), more people accepted the poses. 75% of respondents were satisfied, up from 5% (p = 0.000) in addressing the chief complaint. Time Taken to Fill DIAS: On the first visit, 90% of respondents thought the time was excessive; during the second visit, however, 93% thought it was fair (p = 0.000). Worth of Time Spent: By the second visit, it had increased from 2% to 91% (p = 0.000). All 100% felt the money paid was worth it on both occasions. Wait Time to Clinic, decreased from 74% who thought the wait was excessive to 95% who thought it was fair (p = 0.000). Perception of Students' Qualifications had increased from 53% to 95% (p = 0.000) by the second visit.

Students' Responses to Questionnaire

The DIAS was easier to become familiar with, increasing from 7% to 61% (p = 0.000). Time required to get familiar with DIAS, 64% required more than a week at the first visit, and 73% required more than a week at the follow-up (p = 0.003). DIAS preference rose from 28% to 67% (p = 0.000). Clinical Knowledge Application

increased from 67% to 74% (p = 0.008). DIAS response time increased from 47% to 68% (p = 0.000).

User-friendliness of DIAS increased from 55% to 72% (p = 0.001). There was a statistically significant increase in the usefulness of DIAS from 49% to 67% for diagnosis and from 43% to 67% for treatment planning. The Time required to Fill DIAS, required longer than 15 minutes at first for nearly 71% of students, but that number dropped to 59% after 4 weeks (p = 0.000). The perception of accuracy increased from 0% to 54% (p = 0.000). A significant positive correlation was found between the overall scores of students and patients regarding DIAS compliance, with a Pearson correlation coefficient of 0.942 (p = 0.000).

4. Discussion

The purpose of this study was to assess the adherence of students and patients for using the Dental Information Achieving System (DIAS) in a private dental college located at Chennai. Overall, student and patient perspectives of DIAS were enhanced after 2 visits. The findings indicate that digital systems which function similarly to DIAS could promote a successful portfolio-based education initiative in dental settings despite existing hurdles (19).

Ensuring data security and protecting patient privacy have become critical concerns, as safeguarding sensitive information is paramount to maintaining trust and compliance. Alongside this, interoperability challenges present a significant hurdle, as the ability to seamlessly exchange data between different systems and stakeholders remains difficult, hindering efficiency and collaboration within the dental field (20).

Additionally, the rapid pace of technological advancements necessitates continuous education and training for dental professionals. To effectively utilize emerging technologies and stay current with evolving practices, ongoing skill development is essential to maintain high standards of care (21).

Patients' Experience with DIAS

At the initial visit, only 78% of patients were aware of the use of specialized dental software, which increased to 96% by the second visit. This increase demonstrates the value of repeated exposure and education regarding the system's role in their treatment. Additionally, security concerns were a major issue initially, with only 4% of patients feeling secure about sharing their information on DIAS. However, by the second visit, 85% of patients felt more comfortable, indicating that familiarity with the system increases trust. This improvement is significant as patient confidence in data security is critical for the adoption of any healthcare technology.

Patients also showed significant changes in their attitudes toward providing photographic poses, initially seen as unnecessary by 43%, which improved to 73% acceptance. This reflects how patients may need time and explanations to understand the role of photographic documentation in their care. Furthermore, patients' satisfaction with the time taken to fill DIAS improved drastically, from 90% initially finding it excessive to 93% viewing it as reasonable by the second visit. This may indicate that as patients understand the value of the information being collected, they become more willing to spend time on it (22).

Students' Experience with DIAS

Students showed a sharp increase in their ease of familiarization with DIAS, improving from 7% on the first visit to 61% by the second visit. This reflects the adaptability of students to new technology when they have sufficient exposure. Interestingly, while most students took more than a week to become familiar with DIAS, they eventually found the system preferable to conventional case history recording methods, with preference rising from 28% to 67% across the two visits (23).

The ability to apply clinical knowledge while using DIAS also improved from 67% to 74%, showing that students felt more confident in integrating their theoretical knowledge into digital documentation over time. Additionally, their perception of the system's user-friendliness increased from 55% to 72%, indicating that familiarity with the software improved their overall experience. The improvement in reaction speed of the system from 47% to 68% suggests that technical functionality plays a critical role in user satisfaction.

Software similar to DIAS has been discussed by Glenn Wynsor et al, CloudPlus – a new dental practice management system by Wysdom Dental Technologies also works in treatment planning, case history recording and streamlined patient check-in/out processes. These efficiencies can lead to increased productivity for dental practices. CloudPlus addresses data security concerns by storing data both locally and in the cloud, ensuring near-guaranteed uptime and protection against attacks. This hybrid approach combines the accessibility of cloud

software with the security benefits of local storage.

Challenges faced by dental practices using legacy systems, which are often outdated and difficult to maintain, while the industry is moving towards cloud-based systems, offering benefits like remote access and centralized updates (24).

5. Limitations

This study only included learners from one dental school, likely introducing institutional bias concerning the particular execution of DIAS. Moreover, this study considered change for only two visits; further long-term assessments would be able to inform better on sustained compliance and satisfaction.

Furthermore, although both students and patients demonstrated increasing compliances, in the study, detailed qualitative feedback was not taken into account—for instance, specific barriers to initial acceptance or the factors contributing to improved perceptions over time. Finally, it was not compared to other digital or paper-based systems, which can help put into context its relative effectiveness.

6. Future Scope

Technical aspects of DIAS could also be improved based on user feedback, especially the speed of the system and simplification of the user interface. Due to increasing familiarity of students and patients with digital tools, there is an emerging opportunity to develop more integrated systems that could combine diagnosis and treatment planning, and patient management into a single platform.

Finally, the establishment of training programs for students and patients would increase their comfort in using DIAS. This might involve brief orientations for patients regarding its functions, and for students, more hands-on training at the outset might speed up familiarization and decrease the time normally taken to begin to feel comfortable with the software.

7. Conclusion

The noticeable improvements in attitudes and cooperation from students and patients demonstrate their willingness to embrace resources after becoming familiar, with them. Nevertheless, it is essential to address worries regarding security, time efficiency and user-friendliness to encourage acceptance of these technologies. With enhancements and exploration DIAS and similar systems have the potential to significantly influence the landscape of dental education and practice administration.

References

[1] Gracco A, De Stefani A, Bruno G. Influence of New Technology in Dental Care: A Public Health Perspective. *Int J Environ Res Public Health*. 2023;20(7):5364. Published 2023 Apr 3.

[2] Benoit B, Frédéric B, Jean-Charles D. Current state of dental informatics in the field of health information systems: a scoping review. *BMC Oral Health*. 2022;22(1):131.

[3] Islam MM, Poly TN, Li YJ. Recent Advancement of Clinical Information Systems: Opportunities and Challenges. *Yearb Med Inform*. 2018;27(1):83-90.

[4] Swami S, Srivastava T. Role of Culture, Values, and Politics in the Implementation of Health Technology Assessment in India: A Commentary. *Value Health*. 2020;23(1):39-42.

[5] Nguyen Q, Wybrow M, Burstein F, Taylor D, Enticott J. Understanding the impacts of health information systems on patient flow management: A systematic review across several decades of research. *PLoS One*. 2022;17(9): e0274493.

[6] Acharya A, Schroeder D, Schwei K, Chyou PH. Update on electronic dental record and clinical computing adoption among dental practices in the United States. *Clin Med Res.* 2017;**15**(3–4):59–74.

[7] Chauhan Z, Samarah M, Unertl KM, Jones MW. Adoption of electronic dental records: examining the influence of practice characteristics on adoption in one state. *Appl Clin Inform.* 2018;**9**(3):635–645.

[8] Ammenwerth E, Duftschmid G, Al-Hamdan Z, et al. International Comparison of Six Basic eHealth Indicators Across 14 Countries: An eHealth Benchmarking Study. *Methods Inf Med*. 2020;59(S 02):e46-e63.

[9] Ghia C, Rambhad G. Implementation of equity and access in Indian healthcare: current scenario and way forward. *J*

Mark Access Health Policy. 2023;11(1):2194507.

[10] Upadhyay S, Hu H. A Qualitative Analysis of the Impact of Electronic Health Records (EHR) on Healthcare Quality and Safety: Clinicians' Lived Experiences. *Health Services Insights*. 2022;15.

[11] Adeniyi, Adekunle & Arowoogun, Jeremiah & Chidi, Rawlings & Okolo, Chioma & Babawarun, Oloruntoba. The impact of electronic health records on patient care and outcomes: A comprehensive review. World Journal of Advanced Research and Reviews. 21. 2024. 1446-1455.

[12] Ramoni, Rachel & Etolue, Jini & Tokede. Adoption of dental innovations: The case of a standardized dental diagnostic terminology. Journal of the American Dental Association 2017; 148.

[13] Yuan SP, Ma WJ, Kanthawala S, Peng W. Keep Using My Health Apps: Discover Users' Perception of Health and Fitness Apps with the UTAUT2 Model. Telemed E-Health. 2015;21(9):735–41.

[14] Ahadzadeh AS, Pahlevan Sharif S, Ong FS, Khong KW. Integrating health belief model and technology acceptance model: an investigation of health-related internet use. J Med Internet Res. 2015;17(2):e45.

[15] Lemire M, Pare G, Sicotte C, Harvey C. Determinants of Internet use as a preferred source of information on personal health. International Journal of Medical Informatics 2008; 77(11):723-734.

[16] Jung M-L, Loria K. Acceptance of Swedish e-health services. Journal of multidisciplinary healthcare 2010; 3:55-63.

[17] Kern LM, Edwards A, Kaushal R, Investigators H. The Meaningful Use of Electronic Health Records and Health Care Utilization. American Journal of Medical Quality 2016; 31(4):301-307.

[18] Hammonds T, Rickert K, Goldstein C, Gathright E, Gilmore S, Derflinger B, et al. Adherence to antidepressant medications: a randomized controlled trial of medication reminding in college students. *J Am Coll Health.* 2015;63(3):204–208.

[19] Forrest JL, Miller ED, Overman PR, et al. Informatics in dentistry: A scoping review. J Dent Educ.2018;82(9):943-953.

[20] Duke NN, Friedewald VE, Garvey T, et al. The impact of health information exchange on dentalpractice: A scoping review. J Am Dent Assoc. 2018;149(3):196-204.

[21] Jayathissa, Prabath & Hewapathirana, Roshan. A REVIEW OF DENTAL INFORMATICS: CURRENT TRENDS AND FUTURE DIRECTIONS. International Journal of Dental Research. 2023;5. 1-4.

[22] Gauri S. Bhange and Swapnaja R. Hiray. Dental patient records maintenance on cloud computing using data protection model. In Proceedings of the CUBE International Information Technology Conference (CUBE '12). Association for Computing Machinery, New York, NY, USA,2012; 526–531.

[23] Wright JT. Transforming dentistry with technology. *J Am Dent Assoc*. 2022;153(1):1-2.

[24] The future of dental practice management systems. *Br Dent J* 2023; **235**, 64.