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Article

Artificial Intelligence in Clinical Documentation: A Comparative Analysis in Complete Denture Treatment Planning

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Abstract

Background: The aim of this study is to answer this question (What are the applications of artificial intelligence dentistry and how well does it perform in dentistry?), especially in the scope of diagnosis and examination of edentulous patients. ***Materials and methods***: Ten patients with complete edentulousness were selected for this study and these patients were questioned, diagnosed and examined using our clinic's regular case sheet and using the case sheet extracted by artificial intelligence. Then, the answers of these ten patients were compared and the results were prepared, collected, tabulated and statistically analyzed. ***Result***: The results of the graphic analysis showed a difference between the two case sheets in the answers, as well as a difference between the two-case sheet in diagnosis and examination. The results for the case sheets that was chosen for diagnosis using artificial intelligence showed an accurate examination of the patients' condition. ***Conclusion***: Artificial intelligence has a strong and wide relationship with diagnosis and examination developing the best treatment plan, as this topic has a great impact due to its frequent use these days.

Keywords: Artificial intelligence, Prosthodontic, Edentulous patient, Case sheet, Complete denture.

1. Introduction

Artificial intelligence (AI) is playing an increasingly important role in digital dentistry. AI-based algorithms are being used to analyze health data, research findings, and treatment techniques to offer diagnostic and therapeutic recommendations for individual patients. AI-based algorithms can be used to analyze health data, research findings, and treatment techniques to offer diagnostic and therapeutic recommendations for individual patients [1].

Artificial intelligence is being used to create virtual patients in dentistry. Virtual patients can provide an excellent method for learning and honing patient interviewing skills, medical history taking, recordkeeping, and patient treatment planning [2, 3].

Artificial Intelligence (AI) is gaining popularity worldwide owing to its significant impact in science and innovation. The role of AI in prosthodontics has increased significantly in recent years. AI is used for diagnosis, decision-making, prognosis, treatment planning and prediction of outcomes. Integration of AI into prosthodontics can enhance the accuracy and precision of dental practice [4,5]. However, limited datasets

are a major constraint in its practical applications. In the realm of dentistry, the specialty of prosthodontics is distinguished by its pioneering advancements, consistently extending the limits of innovation to improve both functional and aesthetic outcomes for comprehensive oral rehabilitation [6].

1.1 Aims of the Review

1. The aim of this project is to explore the use of artificial intelligence (AI) in prosthodontics and its potential role in diagnosis and examination for the completely edentulous patient (extraoral and intraoral):
2. Improving diagnostic accuracy.
3. Creating more accurate restorations.
4. Analyzing health data.
5. Analyzing research findings.
6. Explore treatment techniques to offer diagnostic and therapeutic recommendations for individual patients.

2. Materials and Methods

This study was conducted to compare the conventional method of patient examination and documentation for complete denture cases with an AI-generated case sheet designed to enhance clinical workflow and data completeness.

2.1 Study Design

A cross-sectional observational study was performed using two different formats of case documentation:

- Conventional case sheet.
- AI-Generated case sheet

2.2 Sample Selection

A total of ten edentulous patients requiring complete denture prostheses were selected.

2.2.1 Inclusion criteria

- Completely edentulous patients.
- Patients requiring maxillary and/or mandibular complete dentures.
- Patients able to provide informed consent [7]. As shown in Fig. 1.

Figure 1. Sample of selected edentulous patient for complete denture treatment.

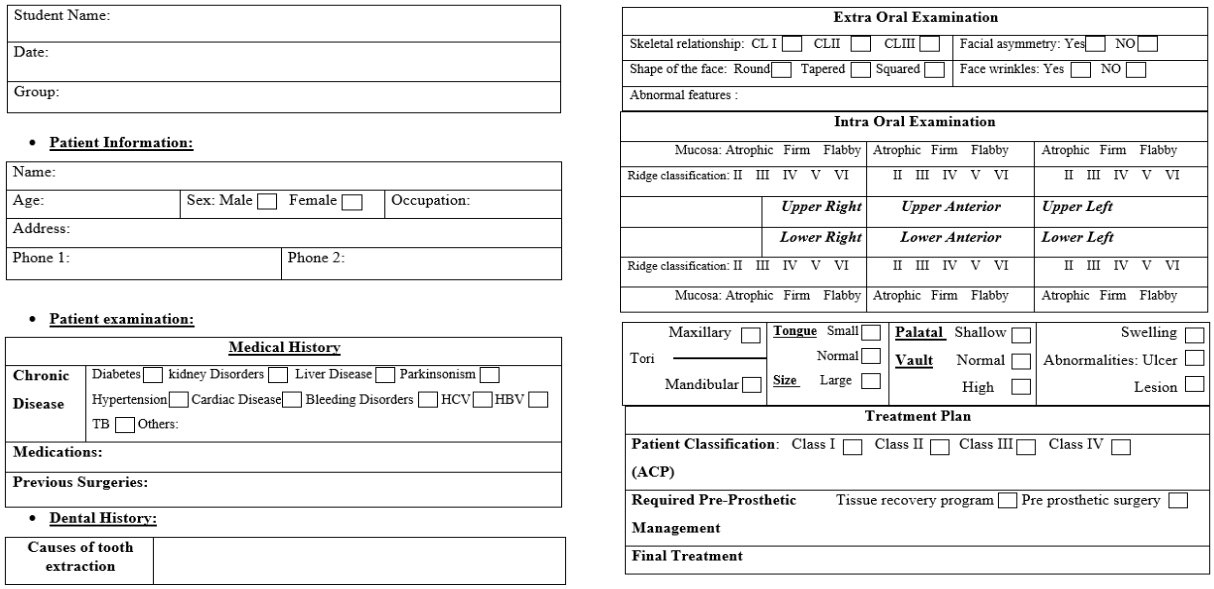
2.2.2 Exclusion criteria

- Medically compromised patients contraindicated for prosthodontic procedures.
- Partially edentulous patients [8].

2.3 Examination Tools

2.3.1 Conventional Case Sheet

- Includes patient demographics, medical and dental history, extraoral and intraoral examinations.
- Manual input of parameters such as ridge classification, mucosal condition, tongue size, and skeletal relationships.
- Treatment planning based on clinical judgment. As shown in Fig. 2.



Student Name:
Date:
Group:

- **Patient Information:**

Name:		
Age:	Sex: Male ☐ Female ☐	Occupation:
Address:		
Phone 1:	Phone 2:	

- **Patient examination:**

Medical History	
Chronic Disease	Diabetes ☐ kidney Disorders ☐ Liver Disease ☐ Parkinsonism ☐ Hypertension ☐ Cardiac Disease ☐ Bleeding Disorders ☐ HCV ☐ HBV ☐ TB ☐ Others:
Medications:	
Previous Surgeries:	

- **Dental History:**

Causes of tooth extraction	

Extra Oral Examination		
Skeletal relationship: CL I ☐ CLII ☐ CLIII ☐		Facial asymmetry: Yes ☐ NO ☐
Shape of the face: Round ☐ Tapered ☐ Squared ☐		Face wrinkles: Yes ☐ NO ☐
Abnormal features :		

Intra Oral Examination		
Mucosa: Atrophic Firm Flabby	Atrophic Firm Flabby	Atrophic Firm Flabby
Ridge classification: II III IV V VI	II III IV V VI	II III IV V VI
	Upper Right	***Upper Anterior***	***Upper Left***
	Lower Right	***Lower Anterior***	***Lower Left***
Ridge classification: II III IV V VI	II III IV V VI	II III IV V VI
Mucosa: Atrophic Firm Flabby	Atrophic Firm Flabby	Atrophic Firm Flabby

Maxillary ☐	**Tongue** Small ☐	**Palatal** Shallow ☐	Swelling ☐
Tori ———	Normal ☐	**Vault** Normal ☐	Abnormalities: Ulcer ☐
Mandibular ☐	**Size** Large ☐	High ☐	Lesion ☐

Treatment Plan
Patient Classification (ACP): Class I ☐ Class II ☐ Class III ☐ Class IV ☐
Required Pre-Prosthetic Management Tissue recovery program ☐ Pre prosthetic surgery ☐
Final Treatment

Figure 2. The conventional case sheet.

2.3.2 AI-Generated case sheet

1. Digitally structured to include a broader and more comprehensive range of parameters such as:
   - Functional assessment (speech, mastication, esthetics).
   - Salivary function and consistency.
   - Psychosocial and psychological readiness.
   - Radiographic evaluations (panoramic, periapical, CBCT if applicable).
2. Designed using artificial intelligence to auto-suggest sections and ensure completeness.
3. Includes prompts for implant considerations, grafting needs, and follow-up schedule. As shown in Fig. 3.

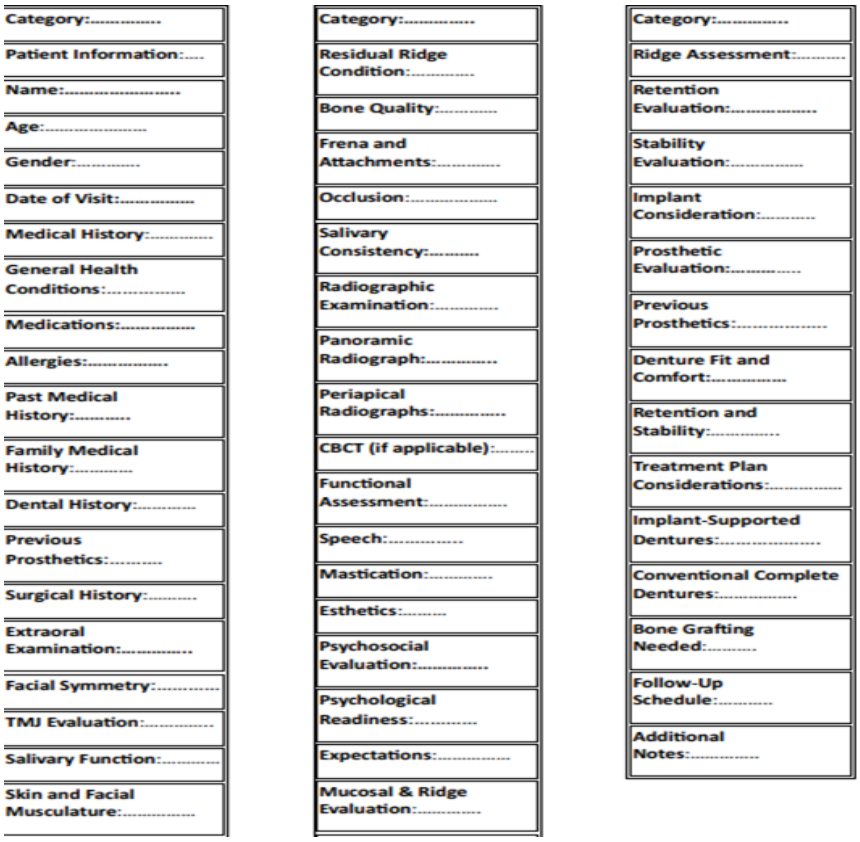


Figure 3. The AI case sheet.

2.4 Procedure

Ten selected patient was examined by the clinician using both formats sequentially:

- First, the patient data was recorded using the conventional case sheet, as routinely used in dental clinics.
- On a separate visit or immediately after, the AI-generated case sheet was used to document the same patient's findings.
- Clinical findings were compared between the two formats in terms of data completeness, time efficiency, and comprehensiveness.

2.5 Data Analysis

Data from both sheets were compared for:

- Completeness of recorded parameters
- Identification of treatment considerations (e.g., pre-prosthetic surgery, grafting, implant suitability)
- Time taken for documentation
- Clinician feedback (qualitative) on usability

3. Results and Discussion

A total of ten edentulous patients were examined using both the conventional and AI-generated case sheet formats. The findings of the study revealed notable differences in data completeness, diagnostic depth, and efficiency between the two documentation methods.

3.1 Data Completeness

1. The AI-generated case sheet captured a significantly higher number of clinical parameters, including:
   - Functional assessments (speech, mastication, esthetics)
   - Psychological readiness and patient expectations
   - Detailed radiographic evaluation (including prompts for CBCT and panoramic views)
   - Implant consideration and bone grafting assessment
2. The conventional case sheet focused mainly on basic intraoral and extraoral examination, ridge classification, and treatment planning without in-depth prompts.

Table1. The difference between the result using conventional case sheet and AI- generated case sheet.

Parameter	Conventional Case Sheet	AI-Generated Case Sheet
Medical/Dental History	✔	✔
Ridge & Mucosa Evaluation	✔	✔
Radiographic Evaluation	✗	✔
Functional Evaluation (Speech, Esthetics)	✗	✔
Psychosocial & Psychological Factors	✗	✔
Implant/Pre-Prosthetic Considerations	✗	✔

3.2 Time Efficiency

- The average time required to complete the conventional case sheet was seven minutes, while the AI-generated case sheet took 10 minutes due to its more detailed structure.
- Despite taking slightly longer, the AI case sheet reduced the risk of omitting key diagnostic information.

3.3 Clinician Feedback

1. Most clinicians reported that the AI case sheet was:
   - More structured and comprehensive
   - Helpful in guiding treatment planning, especially for complex cases
   - Beneficial for early identification of implant or surgical needs
2. However, a few clinicians noted that the AI-generated format was initially time-consuming and required adaptation

.

3.4 Treatment Planning Impact

- In most of cases, the AI-generated case sheet led to modifications or additions in the treatment plan (e.g., suggestion of implant-supported dentures or bone grafting).
- The conventional case sheet failed to highlight some advanced considerations due to limited prompts.

The integration of artificial intelligence (AI) in dental documentation significantly enhances the diagnostic and planning process for complete denture patients.

3.5 Final Evaluation

This study demonstrated that AI-generated case sheets offer superior data completeness, more detailed functional and psychological assessments, and improved treatment planning compared to conventional formats. These findings are consistent with previous literature emphasizing the growing role of AI in enhancing clinical decision-making and documentation accuracy in dentistry [8,10-12,14].

Moreover, the adoption of digital technologies such as CAD/CAM and AI not only streamlines the prosthetic workflow but also aligns with modern trends toward efficiency and sustainability in prosthodontic practice [9,13,15]. As dental medicine continues to evolve, incorporating intelligent, explainable systems becomes essential for optimizing outcomes while maintaining clinical transparency and patient trust [8,14].

Given these advantages, AI-based systems hold promise for becoming an integral part of routine prosthodontic care, particularly in the management of edentulous patients requiring complete dentures [10-12,16].

4. Conclusions

The comparison between the conventional case sheet used in industrial clinics and the AI-generated case sheet highlights the unique strengths and limitations of each approach. The traditional case sheet relies on the expertise of medical staff and established standards, ensuring reliability and consistency in practice. On the other hand, the AI-based case sheet offers greater flexibility and accuracy in data analysis, with the ability to customize information to the patient's specific condition. This enhances both diagnostic and therapeutic efficiency.

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