# AI-Powered Dental Treatment Planning Tool

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## ABSTRACT

This project developed an educational dental treatment planning application integrating AI-powered radiographic analysis with automated appointment scheduling.
The system combines OpenAI's GPT-4o vision API, digital dental charting, CDT-based procedure coding, and urgency-based scheduling. Structured prompt engineering ensures clinically relevant, image-specific AI responses, exposing dental students to emerging healthcare technologies within an appropriate educational context.

## INTRODUCTION

Artificial intelligence (AI) is transforming dental radiology by enabling enhanced diagnostic precision through deep learning models such as convolutional neural networks (CNNs) [1]. Studies show that 68% of dental specialists agree AI is useful for evaluating radiographic details missed by practitioners, and 64% believe AI will help students make radiological diagnoses [2]. AI-assisted platforms can improve students' ability to detect caries (89.4%) and enhance radiographic interpretation skills (92.4%) [3].

However, there remains a significant research gap in developing educational tools that integrate AI analysis with clinical workflow training [4]. This project developed an educational dental treatment planning application combining AI-powered radiographic analysis with automated appointment scheduling to demonstrate modern clinical workflow integration and expose students to emerging healthcare technologies.

## RESULTS

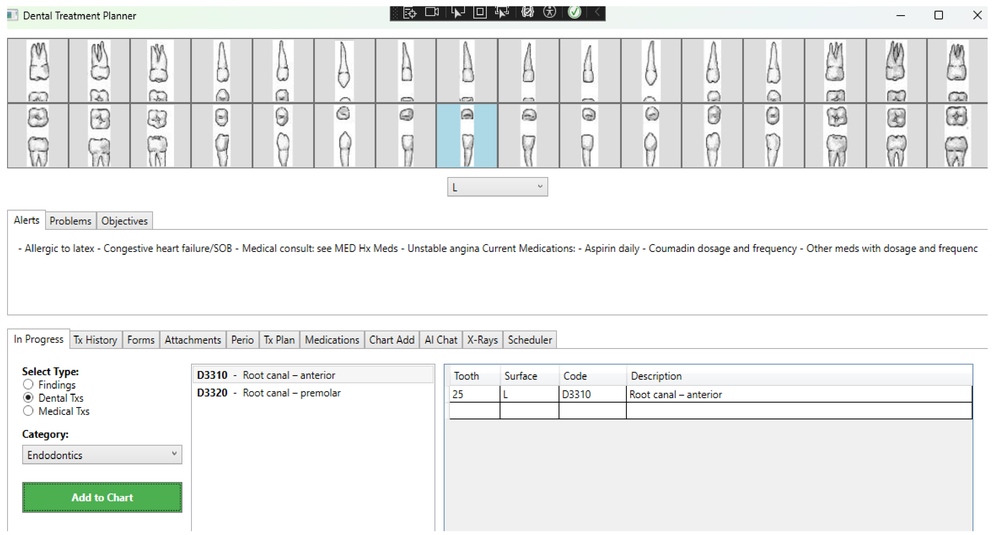


*Figure 1: showing the selected plan on the AI- Moderated application with the CDT code planned.*

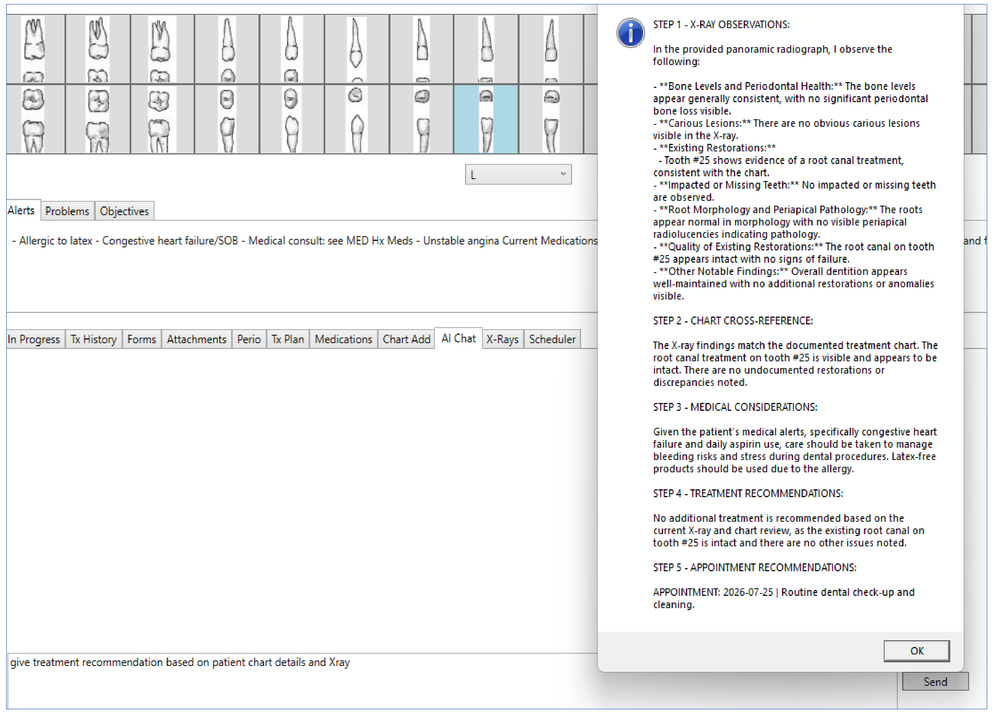


*Figure 2: showing the treatment options that populated after all the date were entered including the radiographs.*

## MATERIALS & METHODS

A desktop application was developed using C# integrating OpenAI's GPT-4o vision API for radiographic analysis [1].
**Key components include:**
• Digital dental charting (FDI numbering system)
• Multi-format X-ray upload module (JPEG, PNG)
• CDT-based procedure catalog for standardized coding
• Automated appointment scheduler
**AI prompts require five sequential steps**:
(1) radiographic observations,
(2) chart cross-reference
(3) medical considerations
(4)treatment recommendations in Tooth|Surface|Code|Description format,
(5) urgency-based scheduling (emergency: 1-3 days, routine: 3-6 months).
Patient-specific data including medical alerts (latex allergy, cardiovascular conditions, anticoagulants) and existing treatment history were integrated to generate contextualized recommendations [2].

## DISCUSSION

The application successfully demonstrates integrated AI-assisted clinical workflow simulation. Key findings include:
**1. AI Radiographic Analysis** The system demonstrates AI's ability to analyze radiographic images, providing students with observations about radiograph types, visible restorations, and areas requiring further evaluation [1].
**2. Chart Cross-Reference** Cross-referencing between X-ray findings and existing chart entries identifies treatment discrepancies and undocumented restorations.
**3. Automated Scheduling** Appointments are calculated based on clinical urgency:
• Emergency: 1-3 days
• Routine preventive: 3-6 months
• Post-operative follow-up: 1-2 weeks

## REFERENCES

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