



Opportunity or threat? A comparative study on the perception of artificial intelligence in dentistry among practitioners and patients

Szanse czy zagrożenia? Badanie porównawcze postrzegania sztucznej inteligencji w stomatologii wśród lekarzy i pacjentów

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ABSTRACT

INTRODUCTION: Artificial intelligence (AI) is increasingly being applied in dentistry – from radiological diagnostics and orthodontics to prosthesis design and practice management. AI's precision, speed, and potential for automating routine tasks position it as a promising tool to support clinicians, although it simultaneously raises doubts regarding acceptance and trust among both dentists and patients.

MATERIAL AND METHODS: In May 2025, a cross-sectional online survey was conducted via Google Forms with 101 respondents: 25 dentists (24.75%) and 76 patients (75.25%). The questionnaire was comprised of both closed-ended and multiple-selection questions addressing AI awareness, trust levels in AI-supported diagnoses and treatment plans (rated on a 1–5 scale), therapeutic preferences, perceived benefits, and concerns regarding AI in dentistry.

RESULTS: The dental practitioners demonstrated higher trust in AI-supported diagnoses than patients, with mean trust scores of 2.92 versus 2.42, respectively. Trust levels increased significantly along with self-reported knowledge of AI, reaching mean values of 3.20 for “high” and 4.00 for “very high” familiarity. In a hypothetical scenario with equal error rates, 79.21% of respondents would favor a dentist supported by AI, 18.81% preferred human-only care, and only 1.98% would trust AI alone.

CONCLUSIONS: AI in dentistry offers tangible diagnostic and organizational advantages; however, the principal barriers to its implementation are insufficient trust and limited user knowledge. One of the greatest challenges in modern public health is educating both patients and professionals about the capabilities and limitations of AI, a prerequisite for increasing acceptance and fully harnessing AI's potential in clinical practice.

KEYWORDS

artificial intelligence, dentistry, trust, education, public health

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STRESZCZENIE

WSTĘP: Sztuczna inteligencja (*artificial intelligence* – AI) jest coraz częściej stosowana w stomatologii – od diagnostyki radiologicznej i ortodoncji po projektowanie protetyczne i zarządzanie praktyką. Wysoka precyzja, szybkość i potencjał w zakresie automatyzacji rutynowych zadań sprawiają, że jest to obiecujące narzędzie wspierające klinicystów, choć jego powszechne wdrożenie napotyka na bariery związane z akceptacją i zaufaniem zarówno wśród dentystów, jak i pacjentów.

MATERIAŁ I METODY: W maju 2025 r. przeprowadzono przekrojowe badanie ankietowe online za pomocą Formularzy Google z udziałem 101 respondentów: 25 lekarzy dentystów (24,75%) i 76 pacjentów (75,25%). Kwestionariusz składał się z pytań zamkniętych i wielokrotnego wyboru, dotyczących wiedzy na temat AI, poziomu zaufania do diagnoz i planów leczenia wspomaganych przez AI (ocenianych w skali 1–5), preferencji terapeutycznych oraz postrzeganych korzyści i obaw, związanych ze stosowaniem AI w stomatologii.

WYNIKI: Lekarze dentyści mieli większe zaufanie do diagnoz wspieranych przez AI niż pacjenci, ze średnimi ocenami zaufania odpowiednio 2,92 i 2,42. Zaufanie znacząco rosło wraz z deklarowaną wiedzą na temat AI, osiągając średnie wartości 3,20 dla „wysokiej” i 4,00 dla „bardzo wysokiej” wiedzy. W przypadku gdy odsetek błędów byłby taki sam, 79,21% respondentów preferowałoby lekarza dentystę wspieranego przez AI, 18,81% opiekę świadczoną wyłącznie przez człowieka, a tylko 1,98% zaufałoby samej AI.

WNIOSKI: AI w stomatologii oferuje wymierne korzyści diagnostyczne i organizacyjne, jednak głównymi barierami w jej wdrażaniu są niedostateczne zaufanie i ograniczona wiedza użytkowników. Kluczowym wyzwaniem jest edukacja zarówno pacjentów, jak i specjalistów na temat możliwości i ograniczeń AI, co jest warunkiem wstępnym do zwiększenia akceptacji i pełnego wykorzystania potencjału AI w praktyce klinicznej.

SŁOWA KLUCZOWE

sztuczna inteligencja, stomatologia, zaufanie, edukacja, zdrowie publiczne

INTRODUCTION

Artificial intelligence (AI) is becoming an integral component of modern dental practice [1,2,3,4]. It is increasingly being applied in various areas of dentistry, including diagnostics, dental radiology, orthodontics, and treatment planning [5]. Specifically, AI algorithms now assist clinicians by automating the analysis of radiographic images to identify subtle signs of caries or periodontal disease [6,7], planning orthodontic treatments by predicting tooth movement [8], and optimizing the design of prostheses such as crowns and bridges within CAD/CAM systems to ensure a precise fit [9].

There is a growing body of evidence indicating that AI enhances the safety, efficiency, and precision of dental practice. For instance, deep learning models, a core branch of AI, have demonstrated high accuracy in radiographically detecting caries, sometimes exceeding that of human experts [6]. These systems can improve diagnostic consistency across different practitioners and support earlier intervention. However, the use of AI in healthcare also raises numerous questions and concerns, primarily centered around trust, accountability, and the future of the doctor–patient relationship [10]. This study compares the perception of AI in dentistry between two key stakeholder groups – dental practitioners and patients – to understand whether AI is viewed as a valuable assistant or a potential threat.

MATERIAL AND METHODS

Study design and participants

The study was designed as a cross-sectional survey conducted online in May 2025. The research tool was a questionnaire created using Google Forms. A total of 101 individuals participated in the study. The respondents were divided into two main groups: dental professionals ($n = 25$; 24.75%) and patients ($n = 76$; 75.25%). Convenience and snowball sampling methods were used to recruit participants.

Survey Instrument

The questionnaire consisted of closed-ended, single-selection, and multiple-selection questions, as well as questions utilizing a 5-point Likert scale. The original survey was conducted in Polish and was translated into English for the purpose of this manuscript. The survey was structured into five main domains:

1. Demographics and awareness of AI
2. Trust in diagnoses
3. Treatment preferences
4. Perceived benefits of AI
5. Concerns about AI in dentistry

Data collection and ethical considerations

The survey was distributed electronically and was fully anonymous and voluntary. Implied informed



consent was obtained from all participants. The study adhered to the principles of the Declaration of Helsinki.

Statistical analysis

The data collected in the survey was exported and analyzed. Descriptive statistics were used to summarize the characteristics of the study groups. To compare mean trust levels between the two groups, the independent samples t-test was used. To compare mean trust levels across more than two groups, one-way analysis of variance (ANOVA) was employed. Relationships between categorical variables were analyzed using the chi-squared (χ^2) test of

independence. A p-value of < 0.05 was considered statistically significant.

RESULTS

Participant characteristics

The study sample consisted of 101 respondents, of whom 75.25% ($n = 76$) were patients and 24.75% ($n = 25$) were dental practitioners. The detailed demographic and professional characteristics of the study participants are presented in Table I. The demographic profile of the participants, including age, gender, education, and place of residence, was collected for further analysis.

Table I. Demographic and professional characteristics of the study participants ($N = 101$)

Characteristic	Category	n (%)
Profession	Patient	76 (75.3%)
	Dentist	25 (24.8%)
Gender	Female	68 (67.3%)
	Male	33 (32.7%)
Age	21–30 years	52 (51.5%)
	31–40 years	22 (21.8%)
	41–50 years	14 (13.9%)
	51–60 years	8 (7.9%)
	Above 60 years	5 (5.0%)
Education	Secondary	15 (14.9%)
	Higher, current student	46 (45.5%)
	Higher	40 (39.6%)
Place of residence	Rural area	18 (17.8%)
	Town with $< 10,000$ inhabitants	11 (10.9%)
	Town with 10,000–50,000 inhabitants	15 (14.9%)
	City with 50,000–200,000 inhabitants	21 (20.8%)
	City with $> 200,000$ inhabitants	36 (35.6%)

Trust in AI-based diagnosis: A comparison between dentists and patients

A central objective was to assess the level of trust in a diagnosis formulated solely by an AI system. The analysis revealed a statistically significant difference between the two cohorts. The mean trust

score, on a 5-point Likert scale, was higher among the dentists ($M = 2.92$) than the patients ($M = 2.42$). An independent samples t-test confirmed this difference to be statistically significant ($p = 0.046$), suggesting that dental professionals are more inclined to trust AI-driven diagnostics than patients. This core finding is illustrated in Figure 1.

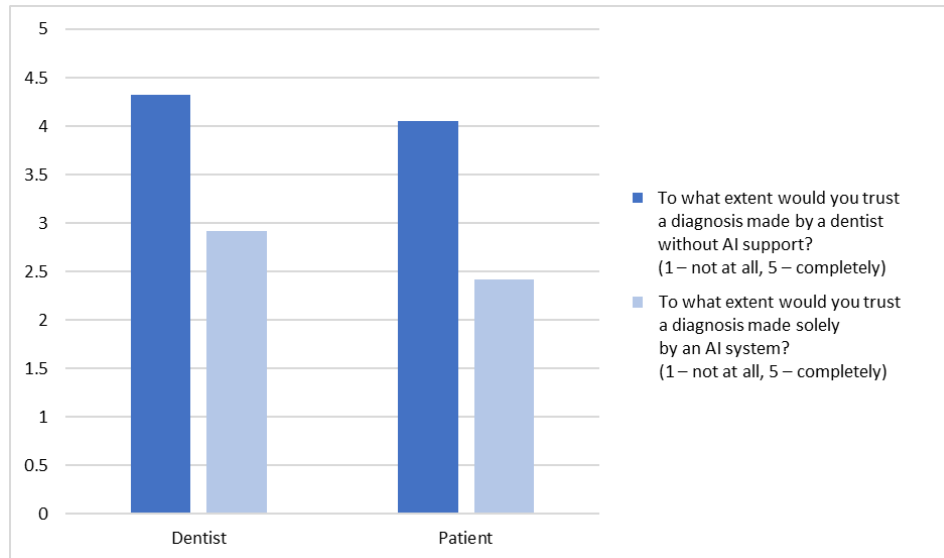


Fig. 1. Comparison of mean trust scores for an AI-only diagnosis, between dentists and patients

The impact of self-assessed AI knowledge on trust

The one-way ANOVA revealed a highly significant effect of self-assessed AI knowledge on the level of trust in AI diagnostics ($p < 0.001$). A clear trend was observed: trust levels were consistently low and stable among participants reporting “none” ($M = 2.41$),

“low” ($M = 2.40$), or “average” ($M = 2.47$) self-assessed knowledge. However, markedly higher trust was recorded for participants with “high” ($M = 3.20$) or “very high” ($M = 4.00$) knowledge. This demonstrates a strong positive correlation between familiarity with AI and willingness to trust it in a clinical setting (Figure 2).

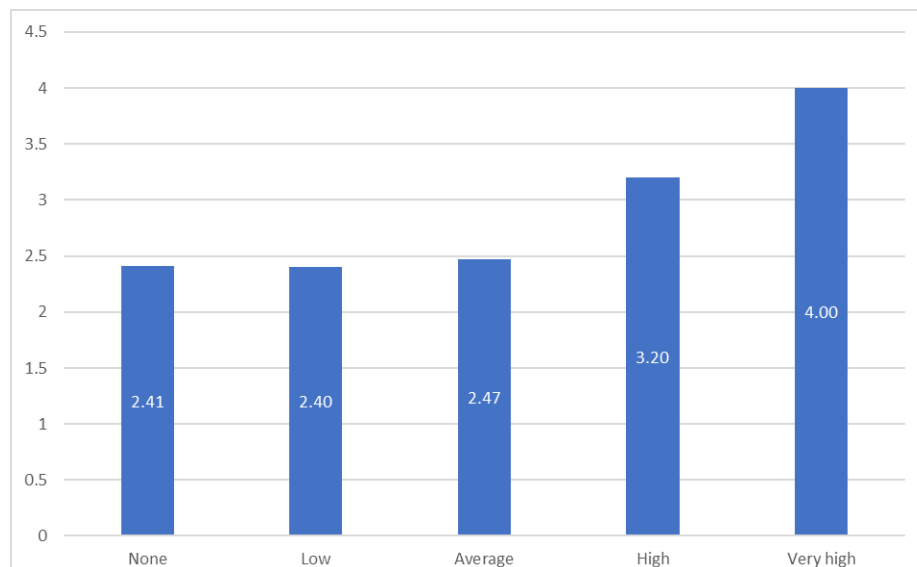


Fig. 2. Mean trust scores for an AI-only diagnosis based on self-assessed knowledge of AI

The influence of demographic factors on trust in AI

Further ANOVA testing was conducted to evaluate the influence of other demographic variables. A statistically significant relationship was identified

between the age of the respondents and their level of trust ($p = 0.027$), with younger cohorts generally demonstrating higher trust scores than older cohorts. In contrast, no statistically significant differences in trust levels were found based on the respondents' level of education ($p = 0.116$) or their place of residence



($p = 0.655$), suggesting that these factors were less influential in shaping perceptions within our study sample.

Preferences for AI-involved treatment models

The participants were presented with a hypothetical scenario to gauge their preference for different treatment models. The results show that the vast majority of respondents (79.21%) favored a “hybrid” model, where a dentist is supported by AI. A smaller group (18.81%) preferred a human-only approach, while a negligible fraction (1.98%) declared that they would trust an AI-only model. A chi-squared test for independence was performed to examine the relationship between the respondents’ role (dentist vs. patient) and their preferred treatment model. The analysis indicated no significant correlation between these variables ($p = 0.284$), suggesting a broad consensus across both groups on the desirability of a human-in-the-loop approach to the implementation of AI in dentistry.

DISCUSSION

The findings of this study provide a nuanced snapshot of the current perceptions of AI in Polish dentistry, highlighting a significant gap between its technological potential and its acceptance by key stakeholders. Our analysis confirms that the primary barriers to AI adoption are not technical, but deeply rooted in user trust, professional experience, and digital literacy [1].

Our first key finding is the statistically significant “trust gap” between dental professionals and patients. Our results are consistent with recent international studies, which found that while patients are generally optimistic about AI, they harbor significant concerns regarding the potential loss of the human element in care [10]. These perceptions within dentistry mirror the broader public sentiment towards AI, where a similar dichotomy of perceived opportunity and risk has been observed [5]. Indeed, the challenge of fostering patient trust while preserving the physician’s role is a central theme in the wider discourse on AI in medicine, extending to fields such as radiology and oncology [5].

Perhaps the most critical finding is the strong, positive correlation between AI knowledge and trust ($p < 0.001$). This underscores that trust is a dynamic variable that can be cultivated through education. This result strongly corroborates findings which demonstrate that less knowledge of AI is directly associated with higher perceived risk [10]. The need for this education is further emphasized by studies showing high patient interest in AI, provided that they feel informed and secure [10].

Furthermore, our analysis revealed a significant negative correlation between age and trust in AI ($p = 0.027$), with younger cohorts demonstrating higher levels of acceptance. This finding has crucial practical implications for the implementation of AI-driven tools in clinical settings. It suggests that a “one-size-fits-all” approach to patient education and communication may be ineffective. To ensure equitable adoption and to mitigate disparities, healthcare providers and policymakers should consider developing tailored strategies. For younger, digitally native patients, communication might focus on the technological capabilities and efficiency gains of AI. For older patients, the focus should instead be on building trust, emphasizing the role of AI as a supportive tool that remains under the full control of the human clinician, and using more traditional, interpersonal communication channels to address their specific concerns [1].

It is noteworthy that despite the varying levels of trust, a strong consensus emerged that a “human-in-the-loop” approach is preferred. This indicates a shared desire to leverage AI’s analytical power – proven to be effective in tasks such as detecting caries [6] – without sacrificing human oversight, a preference also noted in other studies on patient acceptance [10].

CONCLUSIONS

The successful integration of AI in dentistry hinges on a dual strategy: fostering trust through targeted educational initiatives for both the public and professionals and developing transparent, clinician-supervised AI systems that enhance, rather than replace, human expertise. Our research demonstrates that the primary challenge is not the capability of artificial intelligence itself, but rather the human response to it. Therefore, addressing the deficit in trust and knowledge is paramount to unlocking the full potential of AI to improve dental care outcomes.

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Conflict of interest

The authors declare no conflict of interest.



Appendix A: Survey Questionnaire

Title: The Impact of Artificial Intelligence on Dental Practice: The Perspective of Patients and Dentists

Introduction: The aim of this study is to analyze the attitudes, expectations, and concerns related to the use of artificial intelligence (AI) in dentistry. The survey is addressed to both dentists and patients. Participation in the study is anonymous, and its results will be used for scientific purposes only.

Part I: Respondent profile

Q1. Please specify which group you represent:*

- Patient
- Dentist

Q2. Gender:*

- Woman
- Man
- Other / Prefer not to say

Q3. Age:*

- 20 years or less
- 21–30 years
- 31–40 years
- 41–50 years
- 51–60 years
- Over 60 years

Q4. Place of residence (size of locality):*

- Rural area
- Town with < 10,000 inhabitants
- Town with 10,000–50,000 inhabitants
- City with 50,000–200,000 inhabitants
- City with > 200,000 inhabitants

Q5. Level of education:*

- Primary
- Secondary
- Higher, current student
- Higher

Part II: Awareness of and experience with AI

Q6. Have you encountered the use of artificial intelligence in your work?

- Yes
- No

Q7. Have you heard about the use of artificial intelligence in dentistry?*

- Yes
- No

Q8. Did you know that AI can analyze X-ray images or plan treatment?*

- Yes
- No

Q9. Have you ever been treated using AI-based technology?*

- Yes
- No

Q10. How do you rate your knowledge of AI in dentistry?*

- Very good
- Good
- Average
- Poor
- None



Part III: Perceptions, trust, and concerns

Q11. To what extent would you trust a treatment plan developed by AI under the supervision of a dentist?*

- Fully
- Partially
- I would not trust it

Q12. To what extent would you trust a diagnosis made solely by an AI system? (1 – would not trust at all, 5 – would trust very much)?*

- 1
- 2
- 3
- 4
- 5

Q13. To what extent would you trust a diagnosis made by a dentist without AI support? (1 – would not trust at all, 5 – would trust very much)?*

- 1
- 2
- 3
- 4
- 5

Q14. What would be the biggest benefit for you from the use of AI in a dentist's office?* (Multiple selections are possible.)

- Lower treatment costs
- Shorter visit time
- More accurate diagnosis
- Better communication
- None of the above
- Other: _____

Q15. In which areas can AI best support a dentist's work?* (Multiple selections are possible.)

- Analysis of X-ray images
- Treatment planning
- Medical documentation
- Time and appointment management
- Patient education
- Other: _____

Q16. What is your biggest concern related to AI in a dental office?* (Multiple selections are possible.)

- Algorithm errors
- Lack of human contact
- Not knowing who makes the decisions
- Job loss for dentists
- Lack of transparency / Knowledge of how it works
- Nothing concerns me, AI should be everywhere
- Other: _____

Q17. Do you believe that the use of AI can increase/decrease treatment costs?

- Increase
- Decrease
- No impact
- I don't know

Q18. Do you fear that AI might one day replace dentists?*

- Yes
- No



Part IV: Hypothetical scenarios

Q19. Imagine that you have to choose one treatment option. Which do you choose?*

- Treatment by a dentist assisted by AI
- Treatment by a very experienced dentist without AI
- Treatment by AI alone, if it were cheaper and faster
- Other: _____

Q20. AI makes half as many errors as a human. Whom would you trust with your treatment?*

- AI only
- A doctor supported by AI
- A human only
- Other: _____

Q21. AI will make dentists more...* (Multiple selections are possible.)

- Empathetic
- Lazy
- Precise
- Focused on the patient relationship
- Redundant
- Other: _____

(Note: Questions marked with an asterisk were mandatory in the original survey.)

Authors' contribution

Study design – M. Krysiak, K. Drobny

Data collection – K. Drobny

Data interpretation – M. Krysiak

Statistical analysis – M. Krysiak

Manuscript preparation – M. Krysiak, K. Drobny

Literature research – K. Drobny

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