



QUALITY IN SPORT

eISSN 2450-3118 · Open Access · Peer-reviewed

apcz.umk.pl/QS

Nicolaus

Copernicus

University in Toruń



NOWAKOWSKA, Michalina, PACHCIŃSKA, Monika, JANCZAK, Oliwia, BIEDEREK, Wiktoria, LITWIN, Bartosz, KOZAK, Adrianna, LUBIŃSKA, Alicja, DADOUSH, Hana, JUNCIEWICZ, Julian, and CIAŻKOWSKA, Karolina. The Role of Artificial Intelligence in Dental Injuries – A Narrative Review. *Quality in Sport*. 2026;74:75035. <https://doi.org/10.12775/QS.2026.74.75035>

ARTICLE TIMELINE

Received: 05.08.2026. Revised: 25.08.2026. Accepted: 07.09.2026. Published: 18.09.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).

Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

OPEN ACCESS · CC BY-NC-SA 4.0 This article is published with open access under the License Open Journal Systems of Nicolaus Copernicus University in Toruń, Poland, and is distributed under the terms of the Creative Commons Attribution Non-commercial Share Alike License (<http://creativecommons.org/licenses/by-nc-sa/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the work is properly cited. The authors declare no conflict of interest regarding the publication of this paper.

The Role of Artificial Intelligence in Dental Injuries – A Narrative Review

Michalina Nowakowska¹

ORCID: <https://orcid.org/0009-0001-9753-3692>

E-mail: michalina1n@gmail.com

¹ Private practice, Poznan, Poland

Monika Pachcińska²

ORCID: <https://orcid.org/0009-0009-3656-109X>

E-mail: pachcinskam@gmail.com

² Poznan University of Medical Sciences, Poznan, Poland

Oliwia Janczak³

ORCID: <https://orcid.org/0009-0000-0611-5261>

E-mail: janczak.oliwia@gmail.com

³ Private practices, Lodz, Poland

Wiktoria Biederek ⁴

ORCID: <https://orcid.org/0009-0008-4504-7116>

E-mail: wiktoria.biederek@umed.lodz.pl

⁴ Department of Angiology, Medical University of Lodz, Lodz, Poland

Bartosz Litwin ⁵

ORCID: <https://orcid.org/0009-0009-7727-0029>

E-mail: bartek.litwin99@gmail.com

⁵ Medical University of Lodz, Lodz, Poland

Adrianna Kozak ⁶

ORCID: <https://orcid.org/0009-0002-7664-4112>

E-mail: adrianna.kozak@stud.umed.lodz.pl

⁶ Medical University of Lodz, Lodz, Poland

Alicja Lubińska ⁷

ORCID: <http://orcid.org/0009-0001-2593-5908>

E-mail: lubinska.alicja26@gmail.com

⁷ Private practice, Szczecin, Poland

Hana Dadoush ⁸

ORCID: <https://orcid.org/0009-0004-4578-5320>

E-mail: dadoush.hania@gmail.com

⁸ Medical University of Lodz, Lodz, Poland

Julian Juncewicz ⁹

ORCID: <https://orcid.org/0009-0004-2579-8298>

E-mail: j.m.juncewicz@gmail.com

⁹ Medical University of Lodz, Lodz, Poland

Karolina Ciążkowska ¹⁰

ORCID: <https://orcid.org/0009-0006-4823-4350>

E-mail: kciazkowska@outlook.com

¹⁰ Medical University of Lodz Department of Orthodontics, Lodz, Poland

Corresponding Author

Michalina Nowakowska, e-mail: michalina1n@gmail.com

Abstract

Background. Dental injuries are estimated to be the second most frequent oral condition and the fifth most prevalent health condition worldwide. Dental traumas are regarded as a public health issue due to their high prevalence and complexity of consequences. The popularity of AI tools in the health-care field has increased rapidly, enabling to improve clinical effectiveness, patient satisfaction and reduce health-care cost. Early diagnosis and proper treatment management through the use of artificial intelligence can minimize the risk of complications, not only in the clinical area, but also in social, psychological and economical fields.

Aim. The aim of this literature review is to evaluate the potential of AI-based systems application in supporting diagnostic and treatment management of dental injuries.

Material and methods. A review of literature available in the PubMed and Google Scholar databases was conducted. The literature used in the article comes from the years 2014-2026.

Results. Artificial intelligence plays an important role in the diagnosis and treatment management of patients with dental injuries. AI-based tools may assist with a differential diagnosis and radiological reports, recommending the appropriate clinical course of action and raising awareness among non-medical persons on how to manage first-aid dental help. Artificial intelligence also grows in popularity among the students, supporting the education process. On the other hand, AI in dental injuries cases faces limitations such as significant language dependence, inability to cite the sources, whereas inaccurate recommendations can be responsible for poor clinical decisions.

Conclusion. Artificial intelligence can be effective as a supportive tool in diagnostic and treatment management of dental injuries. Even though AI-based systems are expanding quickly in health care, further research is necessary to improve their reliability and clinical applicability in dentistry.

Keywords: AI in dental trauma, artificial intelligence in dental trauma, AI in dental injuries, artificial intelligence in dental injuries, artificial intelligence in dentistry

1. Introduction

Dental injuries consist not only of the damages of the teeth, but also of the supporting tissues (periodontal ligament, alveolar bone), soft tissues, the temporomandibular joint, and muscles [1]. It is estimated that up to one-third of all injury cases involve the facial skeleton, accounting for about 15% of emergency room visits worldwide [2]. Among children under 6 years old, oral injuries rank second in frequency, only after hand and arm injuries. It has been noted that oral injuries make up 5% of all body injuries, but in preschool-aged children this percentage rises to 17%, indicating that this is a significant public health issue [3]. They usually result from falls, sports activities, high-risk interpersonal interactions, or accidents [1].

Contact sports often pose a higher risk of dental trauma due to the physical nature of the activities. Among dental injuries, sports accidents are one of the most common, with a frequency varying largely across the literature from 7,1-71,5% [4]. Sports are divided into high-risk and medium-risk categories. The first one includes: American football, hockey, ice hockey, lacrosse, martial sports, rugby and skating, the second one - basketball, team handball, diving, squash, gymnastics, parachuting and water polo. Cycling was reported to be responsible for around 19.3% of dental injuries, especially in preschool-aged children [3].

Teenage boys are most affected by dental trauma. It has been reported that the most common teeth to be injured are the maxillary incisors [4].

The effects of dental injuries are more serious when they involve permanent teeth. The literature most often mentions: complications related to the periodontium, such as external root resorption, including ankylosis, complications involving the pulp, mainly including necrosis, inflammation of periapical tissues, tooth discoloration, aesthetic changes in structure, and emotional and psychological consequences [1,5].

Several factors significantly affect the prognosis of the teeth after an injury: accuracy of the initial assessment, correct classification of the injury and proper management according to current guidelines developed by the International Association of Dental Traumatology (IADT). Teeth injuries can present in a wide range of clinical scenarios, so practitioners often face difficulties in making the right diagnosis and choosing the proper treatment protocol. Many parents don't report dental injuries among children, especially when there are no obvious symptoms. Delaying urgent dental visits may happen due to lack of nearby clinics, low health awareness, or concerns about high cost of the treatment [6].

The term artificial intelligence (AI) is defined as "a field of science and engineering concerned with the computational understanding of what is commonly called intelligent behavior, and with the creation of artifacts that exhibit such behaviour". It was used for the first time in the 1950s [7]. Over the past two decades there has been a dynamic development of AI-based systems in dentistry. This technology is becoming an integral part of modern clinical practice and is being implemented in many areas, such as diagnostics, dental radiology, orthodontics, prosthetics, and treatment planning [8]. The use of intelligent algorithms to support the process of data and image analysis is both a challenge and an area of growing interest in modern medicine. This comes with the need to introduce regulations related to responsibility for AI-based diagnoses, therefore the patient's health, which requires adjustments in medical regulations [9].

The aim of this literature review is to evaluate the potential of AI-based systems application in supporting diagnostic and treatment management of dental injuries.

2. Materials and methods

A review of literature available in the PubMed and Google Scholar databases was conducted. The literature used in the article comes from the years 2014-2026. The following keywords were used: AI in dental trauma, artificial intelligence in dental trauma, AI in dental injuries, artificial intelligence in dental injuries, artificial intelligence in dentistry.

3. Results

3.1. Theoretical basis

Nowadays, mobile health approaches have gained increasing popularity among patients and health care professionals. The term "mobile health" applies to the field of health care that is based on mobile technologies, such as apps, social media platforms and artificial intelligence (AI) to prevent, educate and treat diseases by supporting clinical decision making processes. In the area of dental injuries, several mobile apps have been developed, 3 of them are based on the IADT guidelines - ToothSoS, AcciDent, and Injured tooth. Moreover, the progress of AI induced development of large language models (LLMs), such as Generative Pre-trained Transformer (GPT), Google Gemini, Claude, Copilot [10].

3.2 Artificial intelligence in the diagnosis of dental injuries

Proper clinical diagnosis of dental injuries plays a crucial role in their management. It should include a thorough medical interview, clinical and radiographic examinations. Accurate identification of the type of dental injury is a key to select the appropriate treatment protocol, increasing the rate of success and minimizing the risk of complications.

Frenandes et.al. showed that AI-based systems can provide accurate diagnoses and effective treatments recommendations, with scores above 90% in most categories that were evaluated. The highest accuracy (100%) in diagnostics to quality of treatment recommendations were observed in acute dental pain management. Unfortunately, areas such as dental dislocations and gingival bleeding were identified for improvement. Additionally, it was evaluated that all systems provided quick and adequate responses and maintained a positive dimension of interest and motivation among users. It was suggested that AI systems are particularly effective at handling dental emergencies, providing rapid and accurate responses. These findings can be crucial in diagnostics, treatment, and patient care [11]. Another research suggests that contemporary LLMs (Chat GPT, Gemini, Claude) can serve as clinical decision support tools in dental trauma management with appropriate oversight, but with differential language effects [12].

Radiographic imaging plays a crucial role in the diagnosis of dental injuries. It supports clinicians with assessment of the condition of both the tooth root and the alveolar bone. Many injuries, such as root fractures, may be clinically asymptomatic and detected only on X-ray images. Depending on the type and extent of the injury, periapical radiographs, panoramic radiographs or CBCT may be implemented. Analysis should focus on the stage of root development, the nature of the damage, the presence of periapical inflammation, and the monitoring of the healing process. In another article AI-enhanced Cone Beam Computed Tomography (CBCT) has shown promise for improving diagnostic precision with reduction of radiation dose. The diagnostic quality for fine structures such as the lamina dura and periodontal ligament was maintained while reducing radiation dose by up to 50% compared with conventional reconstruction protocols. A study evaluating the diagnostic efficacy of an AI platform for interpreting CBCT images showed that clinicians sensitivity increased from 76.7% (without AI support) to 85.4% (with AI support) in detecting pathological lesions, while specificity rose slightly from 96.2% to 96.7 [13]. A promise in detecting facial fractures on X-rays or CT (computed tomography) scans using AI algorithms was shown. Different studies

demonstrated that LMMs models can be trained to identify maxillary or orbital fractures on CT scans, with diagnostic accuracy comparable to experienced specialists [2].

AI-based tools open doors in a pain assessment in children, particularly those with limited verbal communication or neurodevelopmental disorders. The pain is detected by facial micro-expressions and analysed properly [13]. It could play a key role in breaking down barriers, improving diagnostics, and implementing proper treatment for patients with special needs.

3.3 Artificial intelligence as support in treatment management

Artificial intelligence is taking off as a support in dental trauma management. The most popular systems mentioned in the publications were: ChatGPT, SOS Dental Trauma, Dental Trauma Evo.

Bubna et.al. exhibited that Dental Trauma Evo app achieved 100% accuracy in recommending the appropriate clinical course of action, except recommendations for replantation of avulsed teeth with open apices, that showed only 93% success rate. However, some initial responses failed to include all treatment options for a few types of dental trauma, especially enamel and dentine fractures or pulp-exposed fractures in primary teeth. After the code change, a second round of testing showed significant improvement up to 100% [14].

In another study ChatGPT-4o showed a high level of accuracy in providing the guidance. Permanent dentition increased the chance of achieving the maximum score in the categories: diagnosis, contraindications and immediate actions, whereas the time duration of the tooth outside the oral cavity lowered the score for immediate actions. The stage of root development did not impact the results. Communication clarity was rated above 93%. It was suggested that ChatGPT-4o can provide repetitive triage for tooth avulsion cases and implements the “time-critical safety” composite as criterion for emergency chatbots. These results showed that while ChatGPT can be used by clinicians for quick and accurate advice, some shortcomings may provide incomplete or inadequate management of emergency situations [15].

Luiz et.al. showed that the SOS Dental Trauma chatbot presents high accuracy and complete answers in simulated scenarios, with evidence-based guidance for dental injury in both dentitions. The possibility of wide-spreading the recommendation through Whatsapp supports patients and their guardians and gives a promise in supporting dental clinicians and health education [1].

A different study focused on ChatGPT reliability in three dental types of injury - avulsion,

general dental trauma and intrusion. The highest rating was assigned to avulsion, whereas intrusion showed no significant differences. The responses of ChatGPT were assessed positively overall, with avulsion to be the most reliable topic [16].

On the other hand, Nahir demonstrated the need for ChatGPT to be improved, especially with fluentness and efficiency. In the study, a total of 60 questions were asked to ChatGPT for each topic (including dental trauma, oral health, tooth eruption, fluoride), composed of pediatric patient or parent questions and academic questions. An average score was revealed for pediatric patient or parent questions, the lowest - for academic questions regarding dental trauma. Nevertheless, no significant differences were noted in similarity and readability for different question groups and topics [17].

Another study evaluated the bibliographic reliability of AI-based systems in generating scientific references for standardized dental trauma scenarios. Those chatbots showed noticeable variability in the accuracy of citations for dental injury management. Inaccurate or incorrect references may contribute to the treatment failure, so AI-generated responses need to be properly verified and used only as a supportive tool. It was emphasised that those findings do not extend to clinical-decision making accuracy [18].

The high overall performance of all models of AI-systems (Chat-GPT, Claude, Google Gemini) shown in the study, suggest that with a proper oversight current LLMs can assist as supportive tools in clinical practice [12].

The proper incorporation of LLMs and AI can advance in clinical practice by improving the ability to properly respond to critical situations, consequently increasing the chance of treatment success [11].

3.4 Artificial intelligence as a tool to raise awareness

AI-based applications and systems can serve as tools to raise awareness about proper management of dental injuries among pediatricians and non-medical persons, including family members and friends.

The AI app - SOS Dental Trauma was developed based on IADT recommendations to provide immediate guidance on how to proceed in situations of dental injuries prior to professional care. WhatsApp was chosen to be the access platform, so the instructions can be presented quickly, easily, and integrated into patients' daily lives. The entire conversation is limited to dental trauma in both primary and permanent teeth. It was proven to support patients and

caregivers in the management of dental trauma emergencies and showed potential as a tool in health education [1].

Wang et.al. showed that ToothSOS mobile app garnered 91.7% willingness among pediatricians for TDI guidance, but awareness was low. AI tools such as ChatGPT showed promise in patient education (76.7% accuracy for TDI queries) [19].

On the other hand, a study conducted by Sari et.al. presented that none of the pediatrician's participants knew about the ToothSOS application, 91.7% of them preferred using this tool in future practices. It was stated that the unawareness of ToothSOS mobile application was an important result of the study and highlighted the need for updating pediatricians on dental traumatology [20].

3.5 Artificial intelligence in education about dental injuries

AI-based applications and systems have the potential to modernize dental education. They can support teaching methods and elevate the learning process.

Haupt et al. showed that ChatGPT significantly improved student accuracy in dental trauma assessment, especially in answering multiple-choice questions about the management of injured primary teeth, compared with a control group. It was mentioned that medical and dental students are more eager to use digital tools, preferring them to traditional textbooks, when in need of immediate support in particular. More and more students prefer AI-based technologies to traditional textbooks, on account of efficiency, speed and ease of access [10].

In another study it was indicated that AI-based systems can maintain a high level of interest and motivation among the students and professionals in learning new techniques, where consistency is crucial. Due to a high level of accuracy and specificity of AI, students explore these systems to progress in clinical case management and refine their practical skills [11].

Another study suggested that thoughtful integration of AI-based apps, like ToothSOS, with dental study programs may enhance academic development and increase the level of student's preparedness for emergencies in an everyday practice, such as dental injury management. Additionally, it was demonstrated that even the patient-directed section of the ToothSOS app can improve accuracy of proper management of dental trauma [21].

Haupt et.al. in their study showed that all evaluated support tools (ChatGPT-40, AcciDent app, digital textbook) improved student's scores in answering questions about dental injuries. Both

ChatGPT-4o and AcciDent app demonstrated high accuracy with faster responses compared to digital textbook [10].

3.6 Comparison of AI tools

Kuru et.al. in their study compared correctness and consistency of five LLMs models in dental trauma questions: ChatGPT-3.5, ChatGPT-4, Copilot Pro, Copilot Free, Google Gemini. Provided responses to identical questions showed a high degree of consistency. Even though no statistical differences in the accuracy were noticed, ChatGPT-3.5, ChatGPT-4.0 and Google Gemini showed higher percentage of correct answers for multiple-choice and fill-in-the-blank questions compared to dichotomous ones. Copilot models achieved no significant question-type differences. Noticeably, Copilot's and Gemini's answers were often imprecise, whereas Copilot's sources citations were of low evidentiary value [22].

Another study evaluated the accuracy of different information sources (ChatGPT-4o, AcciDent app, textbook, no support tool) in clinically relevant educational content in dental trauma management. Correctness for dichotomous questions varied vividly, depending on the type of chatbot. ChatGPT-4o showed a mean accuracy of 86,4% [10].

Another research draws attention to the role of language in performance of LLMs. Even though ChatGPT reached the highest absolute score, Claude may provide more reliable information regarding dental trauma regardless of the used language. ChatGPT was reported to show the most significant language influence, with better results in English. Google Gemini was described to be moderate language dependent, whereas Claude was language independent. This result implies that language can significantly influence the accuracy of AI generated responses [12].

Manav et.al. evaluated a bibliographic reliability of AI-based chatbots in responding to different dental trauma scenarios. Statistically important differences were found between ChatGPT and other systems (particularly Gemini and DeepSeek), no significant differences were noticed between Perplexity AI, Gemini and DeepSeek. ChatGPT and Perplexity AI were suggested to have stronger grounding in databases compared to Gemini and DeepSeek [18].

Another study reported that ChatGPT-4o showed better results in management of complicated crown fractures, whereas Gemini Advanced in avulsions. Gemini Advanced was more consistent in handling uncomplicated fractures, luxations and intrusions, compared to ChatGPT-4o [1].

3.7 Limitations

There are several limitations of AI-based apps and chatbots mentioned in this review of literature.

First, the effectiveness of LLMs use depends on precision and a level of detail of formulated instructions (known as prompts), which influences the clarity and relevance of generated responses. This skill is emphasized as a key to LLMs proficiency. Luckily, this competence can be taught and measured [10].

As mentioned before, language may influence the outcome of generated protocols by AI tools. ChatGPT was reported to show the most significant language influence, with better results in English. Google Gemini was described to be moderate language dependent, whereas Claude was language independent. This result implies that language can significantly influence the accuracy of AI generated responses, a fact that clinicians must be aware of, especially when English is not their first language [12].

Another significant limitation of LLMs is the inability to cite the sources, which may generate unverified and potentially unreliable responses. This issue may be crucial in the clinical decision-making process while managing dental trauma, especially when response time plays a crucial role in the treatment [16]. With the critical importance of evidence-based guidelines for dental injuries, inaccurate or unverifiable citations can impede data verification processes. Inaccurate or fabricated citations can be responsible for poor clinical decisions [18].

In maxillofacial surgery it was noticed that AI struggles to detect very subtle or complex fractures. It was reported that AI performance drops when algorithms are based on data from different hospitals [2].

4. Conclusion

The popularity of AI tools in the health-care field has increased rapidly, assisting with a differential diagnosis and radiological reports and enabling to improve clinical effectiveness, patient satisfaction and reduce health-care cost. In this review it has been shown that the accuracy of suggestions by AI tools is generally highly rated, it depends on the input's precision, correctness, and reasoning. Several prompting strategies have been assessed to enhance the performance of LLMs. Artificial intelligence is regarded as a fast and accessible source of information for managing dental trauma emergencies, where time, proper diagnosis and treatment play a crucial role and affect the prognosis of the teeth. Therefore it is important for clinicians to understand the language of AI to communicate with chats effectively to

achieve the best possible decision-making performance. Potential influence of errors and inaccurate recommendations provided by AI may result in disastrous consequences. Therefore AI-based systems are generally described as a supplemental tool rather than a sole source of information. Even though AI-based apps are expanding quickly in health care, further research is necessary to improve their reliability and clinical applicability in dentistry.

Disclosure

Author's Contribution Statement:

Conceptualization: Michalina Nowakowska

Methodology: Michalina Nowakowska, Monika Pachcińska, Oliwia Janczak, Wiktoria Biederek

Resources: Michalina Nowakowska, Bartosz Litwin, Adrianna Kozak, Alicja Lubińska

Writing-rough preparation: Michalina Nowakowska, Hana Dadoush, Julian Junciewicz, Karolina Ciążkowska

Writing-review and editing: Michalina Nowakowska, Karolina Ciążkowska, Adrianna Kozak, Alicja Lubińska

Supervision: Michalina Nowakowska

Funding: No external funding was received.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

All authors have read and agreed with the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

Declaration of the use of generative AI and AI-assisted technologies in the writing process:

In preparing this work, the authors used Google Gemini for the purpose of checking grammar, punctuation and improving the readability of the article. After using this tool, the authors have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

References

- [1] Luiz, L.B.D.P., Bubna, D.P., Almeida, S.B., Baratto-Filho, F., Mattos, N.H.R., Sousa-Neto, M.D., Kuchler, E.C., Roskamp, L., de Araujo, C.M. & Araujo, B.M.M. (2026). SOS Dental Trauma - An Artificial Intelligence Chatbot via WhatsApp for Guiding Patients After Dental Trauma. *DentTraumatol.*, 42(4): 523–528. <https://doi.org/10.1111/edt.70045>
- [2] Yousief, S., Baeisa, M.E., Alghamdi, K.A., Aljadani, A.A., Alotaibi, T.N., Alim, N. & Halabi, O. (2026). Recent Advances in the Management of Oral and Maxillofacial Trauma: An Update with an AI-Systematic Review. *EC Dental Science*, 25.1: 01-28.
- [3] Zaleckiene, V., Peciuliene, V., Brukiene, V. & Drukteinis, S. (2014). Traumatic dental injuries: etiology, prevalence and possible outcomes. *Stomatologija*, 16(1):7-14. PMID: 24824054.
- [4] Mills, S. & Fine, P. (2026). Sports dental trauma for children and adolescents: unique considerations. *Research in Sports Medicine*, 34(1), 27–38. <https://doi.org/10.1080/15438627.2025.2564350>
- [5] Kallel, I., Douki, N., Amaidi, S. & Amor, B.F. (2020). The Incidence of Complications of Dental Trauma and Associated Factors: A Retrospective Study. *Intl Jrnl of Dentistry.*, 2968174. <https://doi.org/10.1155/2020/2968174>
- [6] O'Connell, A.C. (2025). Contemporary Approach for Traumatic Dental Injuries in the Primary Dentition. *Dent Traumatol.*, 41: 17-26. <https://doi.org/10.1111/edt.13011>
- [7] Khanna, S. & Dhaimade, P. (2017). Artificial Intelligence: Transforming Dentistry Today. *IJBARM.*, 6(3): 161-167.
- [8] Krysiak, M. & Drobny, K. (2025). Szanse czy zagrożenia? Badanie porównawcze postrzegania sztucznej inteligencji w stomatologii wśród lekarzy i pacjentów. *Ann.Acad.Med.Siles.*, 1(1): 51-58. <https://doi.org/10.18794/aams/209526>
- [9] Kwiatek, J., Leśna, M., Piskórz, W. & Kaczewiak, J. (2025). Comparison of the Diagnostic Accuracy of an AI-Based System for Dental Caries Detection and Clinical Evaluation Conducted by Dentists. *J Clin Med.*, 14(5), 1566. <https://doi.org/10.3390/jcm14051566>

- [10] Haupt, F., Rödiger, T. & Liersch, P. (2025). Evaluating ChatGPT-4o as an Educational Support Tool for the Emergency Management of Dental Trauma: Randomized Controlled Study Among Students. *JMIR Med Educ.*, 11:e80576. <https://doi.org/10.2196/80576>
- [11] Fernández Carrillo, A.M., Sierralta Soto, M.P., Diaz Correa, C.A., & Núñez Apumayta, C. A. (2025). Language Models and generative Artificial Intelligence for teaching resolutions in traumatic dental emergency situations. *E-Revista Multidisciplinaria Del Saber*, 3, e-RMS14022025. <https://doi.org/10.61286/e-rms.v3i.173>
- [12] Öz, H. & Dundar, M. (2026). Impact of Query Language on Large Language Model Performance in Dental Trauma Management: A Comparative Evaluation of ChatGPT, Gemini, and Claude. *BMC Oral Health*, 10.1186/s12903-026-09191-9. <https://doi.org/10.1186/s12903-026-09191-9>
- [13] Assiry, A.A., Alrehaili, R.S., Mahnashi, A., Alkam, H., Mahdi, R., Hakami, R., Alshammakhy, R., Almallahi, W., Alhawsah, Y. & Khalil, A.S. (2025). How Is Artificial Intelligence Transforming the Intersection of Pediatric and Special Care Dentistry? A Scoping Review of Current Applications and Ethical Considerations. *Prosthesis*, 7(5), 119. <https://doi.org/10.3390/prosthesis7050119>
- [14] Bubna, D.P, Felipe de Jesus Freitas, P., Ferraz, A.X., Abuabara, A., Baratto-Filho, F., Marques de Mattos de Araujo, B., Kuchler, E.C., Roskamp, L., Deliga Schroder, A.G. & Miranda de Araujo, C. (2025). Dental Trauma Evo – Development of an Artificial Intelligence-powered Chatbot to Support Professional Management of Dental Trauma. *Journal of Endodontics*, 51(9): 1229-1234. <https://doi.org/10.1016/j.joen.2025.05.012>
- [15] Grinberg, N., Arbel, S., Boyadjiev, Y.Y., Ianculovici, C., Kleinman, S. & Peleg, O. (2026). The Performance of Artificial Intelligence in Providing Real-Time Aid in Emergency Dental Trauma: A Clinical Validation Study. *Dent Traumatol.*, 42(3): 356–362. <https://doi.org/10.1111/edt.70022>
- [16] Bordin, R., Bartnack, C., Westphalen V., Gasparello G., Bark M., Gava T. & Tanaka O., (2024). Evaluating generative pretraining transformer reliability in addressing dental trauma: A cross-sectional observational study on avulsion and intrusion. *Saudi Endodontic Journal.*, 15(1), 45–52. https://doi.org/10.4103/sej.sej_107_24

- [17] Bayraktar Nahir, C. (2025). Can ChatGPT be guide in pediatric dentistry? *BMC Oral Health*, 25(1),9. <https://doi.org/10.1186/s12903-024-05393-1>
- [18] Manav, Y. & Ozdemir, M. (2026). Accuracy of Artificial Intelligence-generated References in Dental Trauma Management. *Lokman Hekim Health Sciences*. 6(2): 221-227. <https://dx.doi.org/10.14744/lhhs.2026.84647>
- [19] Wang, Y., Wang, X., Zhao, Y., Qiao, L., Ye, L., Zhou, L. & Zhao, J. (2025). Dental trauma in children: monitoring, management, and challenges-a narrative review. *Transl Pediatr.*, 14(7):1637-1651. <https://doi.org/10.21037/tp-2025-243>
- [20] Sari, M.B.D., Sari, E., Bal, C. & Aksoy, M. (2024). Evaluation of the knowledge level of pediatricians on dental trauma and their awareness of the ToothSOS mobile application: A cross sectional study. *Dent Traumatol.*, 40(2):195-203. <https://doi.org/10.1111/edt.12895>
- [21] Ozdemir, M., Comert, H. & Ataç, A.S. (2026). Effect of the ToothSOS Mobile Application on Dental Students' Knowledge of Emergency Management of Traumatic Dental Injuries: A Comparative Study. *Dent Traumatol.*, 42(2): 202-211. <https://doi.org/10.1111/edt.70007>
- [22] Kuru, H.E., Aşık, A. & Demir, D.M. (2025). Can Artificial Intelligence Language Models Effectively Address Dental Trauma Questions?. *Dent Traumatol.*, 41(5): 567-580. <https://doi.org/10.1111/edt.13063>