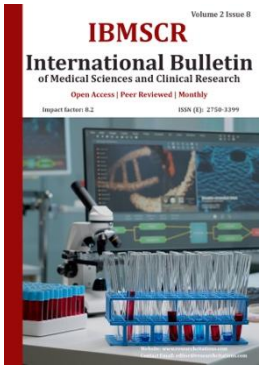

ARTIFICIAL INTELLIGENCE AS A MARKETING TOOL IN DENTISTRY

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Abstract

The rapid development of artificial intelligence (AI) technologies is opening up new opportunities for dental marketing. This literature review analyzes relevant publications on the use of AI in the promotion of dental clinics and services. Key areas of application are examined: personalization of the patient experience, chatbots and automated communication, online reputation management, and targeted advertising based on machine learning algorithms. The review covers publications from 2015–2025. It has been established that integrating AI into dental clinic marketing strategies can significantly increase patient retention, improve patient engagement, and optimize operational costs for promotion. However, a number of unresolved issues are identified: ethical issues of data processing, insufficient digital literacy among medical personnel, and a limited evidence base in the dental context.

Keywords: *artificial intelligence, dental marketing, digital marketing, machine learning, personalization, chatbots, patient experience.*

Introduction

In an increasingly competitive dental services market, effective marketing has acquired strategic importance. Traditional methods of patient acquisition — advertising in local media, word of mouth, leaflets — are gradually giving way to digital technologies. Artificial intelligence, until recently perceived exclusively as a clinical tool for radiograph diagnosis or treatment planning support, is today actively penetrating the field of patient relationship management and the marketing strategies of medical organizations [11].

Dentistry is not immune to this trend: clinics are making ever greater use of machine learning algorithms for patient base segmentation, churn prediction, automated appointment reminders, and the personalization of commercial offers. This trend is expected to continue, underscoring the need for ongoing development and adaptation to industry trends in order to ensure a steady inflow of target patients. The introduction of innovative medical services at a clinic entails navigating a competitive environment, which requires these offerings to possess certain characteristics — affordability, procedural guarantees, novelty, and durability [1].

Despite growing interest in this topic, systematic reviews specifically devoted to AI marketing applications in dentistry are virtually absent. Most publications focus on clinical uses

— caries diagnosis, cone-beam computed tomography analysis, detection of periapical changes — leaving the managerial and marketing dimensions of AI in the shade.

Materials and Methods

Sources were searched in the PubMed, Scopus, Web of Science, and Google Scholar databases, as well as in dental management journals, covering the period from 2015 to 2025.

Inclusion criteria: publications in Russian and English devoted to the use of AI technologies in marketing, patient communication, or dental practice management; the presence of empirical data or case descriptions. Exclusion criteria: publications devoted exclusively to the clinical application of AI without a marketing component; conference abstracts without full text; publications prior to 2015 owing to the rapid obsolescence of technological data.

Results and discussion

Personalization of the Patient Experience

Personalization is one of the most thoroughly studied areas of AI application in healthcare marketing. Machine learning algorithms make it possible to analyze patients' visit histories, demographic characteristics, preferences, and behavioral patterns in order to develop individualized communication strategies [5].

The use of customer relationship management (CRM) systems with a built-in AI module enables dental clinics to filter their patient base by churn risk. Patients who have not visited the clinic for more than 12 months are automatically identified by the algorithm and receive personalized messages containing reminders and special offers. In a pilot study conducted across a UK clinic network, the implementation of an AI-driven CRM succeeded in re-engaging 22% of 'lost' patients within three months [13].

At the same time, excessive personalization can cause patients to feel that their privacy has been violated. According to a survey of 1,200 users of healthcare services in the United States, 41% of respondents expressed concern about the use of their personal data for marketing purposes, even when the communication was perceived as useful. This highlights the need for transparent patient communication regarding how their data are used [15].

Chatbots and Communication Automation

Natural language processing (NLP)-based chatbots represent the most widely deployed AI marketing tool in dentistry. They provide round-the-clock handling of enquiries from prospective and existing patients, appointment booking, answers to frequently asked questions, and the collection of essential preliminary information [12].

A meta-analysis of 18 studies conducted by Hussein & Al-Rawabdeh found that the implementation of chatbots in dental clinics reduces the workload on administrative staff by an average of 37% and lowers the patient no-show rate by 19% [7]. Automated appointment reminders generated by AI in accordance with the patient's preferred communication channel (SMS, messenger, email) demonstrate significantly higher effectiveness compared with standard reminders.

It should be noted, however, that this tool has limitations. In clinically complex situations requiring specialized medical communication, chatbots exhibit significant shortcomings and frequently cause user frustration [3]. The optimal model is considered to be a hybrid approach in which AI handles routine enquiries while escalating complex cases to a live member of staff.

Online Reputation Management Using AI

Online reputation is a key factor in the choice of a dental clinic: according to BrightLocal, 87% of consumers read online reviews before their first visit to a doctor, and 79% trust them as much as personal recommendations [4]. In this context, reputation monitoring and management have become critically important marketing tasks.

AI-powered sentiment analysis tools make it possible to monitor thousands of reviews across various platforms and social networks in real time, classifying them by topic and emotional tone. This enables the clinic to respond promptly to negative reviews and to identify systemic issues that undermine patient satisfaction [6].

Beyond monitoring, AI is used to automate responses to standardized positive reviews, generate templates for personalized replies to negative comments, and identify 'brand advocates' — loyal patients whose reviews have the greatest influence on the audience.

Targeted Advertising and Content Marketing

For a clinic to achieve market success and stand out from its competitors, it must develop a unique selling proposition (USP) and employ unconventional marketing strategies. In today's world, where most people search for information about services of interest to them online, advertising plays a pivotal role in promoting private dental practice [2].

AI algorithms underpin contemporary advertising platforms — Google Ads and Meta — which are actively used by dental clinics. Lookalike audience technology allows the algorithm to identify potential patients whose queries and characteristics match the profile of the existing patient base, which significantly increases targeting precision and reduces the cost per patient acquisition [8].

Ethical Issues and Limitations

The use of AI in dental services marketing is associated with a number of ethical challenges; disregarding these can cause serious reputational damage to a clinic. Central among them is the issue of personal data protection: the use of medical information for commercial purposes is governed by stringent regulatory frameworks — national personal data legislation in most countries [10].

To ensure patient safety, uphold professional ethics, and maintain public trust, dental clinics and dental researchers are obliged to obtain informed consent from patients, strictly protect the confidentiality of their data, and place safety first. It is important to note that digital intelligence based on artificial intelligence — in particular, business intelligence — interacts closely with human intelligence, which encompasses emotional, social, and cognitive dimensions [14].

A fundamental requirement for the use of AI in medical marketing is transparency: the patient must know that they are interacting with an automated system and must have the option to opt out of personalized communications. Several authors also point to the risk of manipulative use of predictive systems — the pushing of unnecessary services onto patients identified by the algorithm as financially capable and ready to accept a treatment plan [9].

Conclusion

The literature review demonstrates that artificial intelligence has already secured a significant place in the marketing toolkit of dental clinics, and its role will continue to grow. The key areas of AI application in this field are personalization of the patient experience, communication automation via chatbots, online reputation management, and targeted advertising.

Nevertheless, the evidence base in this area remains relatively modest: most studies have been conducted in a general medical rather than a dental context, many are based on small samples or limited to a single country. Large-scale randomized studies specifically aimed at evaluating the effectiveness of AI marketing in dental practice are needed.

The successful integration of AI into the marketing strategy of a dental clinic requires not only technological investment, but also improvements in staff digital literacy, the development of clear ethical data governance protocols, and the cultivation of a culture of evidence-based marketing decision-making.

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