Visual communication in dentistry: The role of dental photography in patient education

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Abstract

Introduction: Dental photography is an important component of contemporary dental practice. In addition to its diagnostic and documentary value, it may support patient education, shared decision-making and clinical communication.

Purpose: To analyse the current state of knowledge on the role of dental photography in patient education and to assess its significance in improving dentist-patient communication.

Materials and methods: A narrative review of scientific literature published between 2016 and 2026 was conducted using the PubMed and ScienceDirect databases. The search used combinations of the following terms: "dental photography", "intraoral photography", "clinical photography", "patient education", "oral health education" and "patient communication". After screening 114 unique records against predefined eligibility criteria, 11 publications on the application of dental photography in patient education and clinical communication were included in the analysis.

Results: The reviewed studies indicate that dental photography improves patients' understanding of their oral health status, facilitates the presentation of diagnoses and treatment plans, and may increase engagement with therapeutic recommendations. Visualisation of the patient's oral condition was associated with improved motivation for oral hygiene and favourable changes in selected periodontal parameters. Relevance was also identified in paediatric dentistry, where visual materials may support communication with children and parents.

Conclusions: Dental photography is an effective adjunct to patient-centred dental care. Its clinical use may enhance communication, improve patient motivation and support documentation and follow-up. Wider implementation requires attention to staff training, workflow organisation, equipment costs, data protection and informed consent.

Keywords: Intraoral photography, dental photography, patient, education, oral hygiene motivation, patient communication

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INTRODUCTION

Dental photography constitutes an indispensable component of modern clinical practice, serving as a precise instrument for documenting and analyzing the oral health status of patients. It provides a visual representation of teeth, gingiva, and other oral structures, supporting diagnostic processes, treatment planning, and the longitudinal monitoring of treatment outcomes [1]. Dental photography is a branch of general photography and an integral part of contemporary dentistry — its rapid technological advancement has rendered its application in everyday clinical practice increasingly accessible and widespread [2]. Its applications extend well beyond documentation alone, encompassing communication between the clinician, the patient, and the dental technician; self-assessment of treatment outcomes; illustration of scientific publications and educational lectures; dental practice marketing; and the facilitation of teledentistry consultations [1]. Key areas of application also include medicolegal documentation and diagnostics across such disciplines as aesthetic dentistry, implantology, orthodontics, and periodontology [3].

The widespread adoption of digital cameras, and smartphones in particular, has meant that high-quality clinical photography is no longer the exclusive domain of academic centres or highly specialised clinics [1]. Technological progress has given rise to simple, cost-effective photographic systems for dentistry — such as portable lighting systems of the Smile Lite MDP type — that enable the acquisition of professional-grade images using widely available mobile devices [4]. Concurrently, a broad range of courses and training programmes in clinical photography has emerged, reflecting the growing demand within the dental community. Survey-based studies conducted among dental students and clinicians in various countries confirm that digital photography is widely used in daily practice and that increased access to equipment is accompanied by growing awareness of the need for further education in this field [2,5].

Among the numerous functions that dental photography fulfils in the contemporary dental setting, its role in patient education and the fostering of patient engagement in the treatment process deserves particular attention. Patient education is recognised by the dental community as a primary objective of clinical photography [2]. The visualisation of oral health status, which is often inaccessible to patients during routine examinations, is an effective clinical communication tool, enabling the translation of actual health problems into language comprehensible to patients. Effective dentist–patient communication, supported by visual aids such as photographs, models, or printed materials, significantly enhances patients' understanding of health-related information, improves adherence to therapeutic recommendations, and reduces dental treatment-related anxiety [6]. These observations are corroborated by findings from clinical studies, in which the use of visual aids during the communication of diagnostic findings significantly improved patients' comprehension of their diagnosis and proposed treatment plan compared with groups receiving verbal explanations alone [7].

A broader conceptual framework for these observations is provided by the contemporary paradigm of patient-centred care (PCC), defined as a mode of practice that considers the individual preferences, needs, and values of the patient, with those values guiding all clinical decisions [8]. This approach, widely adopted in general medicine and endorsed by international health organisations, encompasses — alongside emotional support and continuity of care — the active participation of patients in therapeutic decision-making, realised through shared decision-making [8,9]. Evidence indicates that implementing PCC leads to improved clinical outcomes, greater patient satisfaction, and fewer medicolegal disputes [8]. A prerequisite for effective patient engagement, however, is an adequate level of health awareness — oral health literacy, understood as the capacity to obtain, comprehend, and practically apply information pertaining to oral health, constitutes the foundation of a collaborative clinician–patient relationship [10]. Higher levels of oral health literacy are associated with more active patient participation in therapeutic decision-making [10]; yet studies indicate that, despite dentists' declared recognition of the importance of effective communication, few of the recommended educational techniques are applied in daily practice, with insufficient time devoted to patient education and a lack of appropriate visual tools identified as key barriers [11].

Despite the growing body of literature on the application of dental photography in clinical practice, relatively few studies have focused on its role in patient education and in shaping patient engagement in the treatment process. An understanding of the potential of clinical photography as a tool to support communication and patients' health awareness may be of significant importance in improving the quality of dental care.

AIM OF THE STUDY

The aim of this article is to analyse the current state of knowledge on the role of dental photography in patient education and to assess its significance in improving dentist–patient communication.

MATERIAL AND METHODS

This work is a narrative review of scientific literature on the role of dental photography in patient education. A literature search was conducted in the PubMed and ScienceDirect databases using appropriate combinations of keywords ("dental photography", "intraoral photography", "clinical photography", "patient education", "oral health education", and "patient communication"). This was supplemented by a manual search of literature, including an analysis of the reference lists of selected articles and publications meeting the inclusion criteria, to identify additional studies that may not have been retrieved through the database search. The database search was restricted to publications from the preceding ten years (2016–2026), available in full text, published in English, and comprising both original research articles and review papers. Appropriate database filters were applied to narrow the search results. At this stage, publications failing to meet the above criteria were excluded, including materials that did not constitute scientific articles, works unavailable in full-text format, and publications in languages other than English.

Selection was performed based on titles and abstracts, using broad eligibility criteria. Publications pertaining to dental photography, patient communication, or patient education were included for further analysis, even where they did not simultaneously address all these aspects. This approach was intended to capture potentially relevant studies and to minimise the risk of overlooking valuable data. In the subsequent stage, full-text articles were assessed applying more detailed eligibility criteria. Only publications pertaining to the use of dental photography in patient education and/or patient communication, referring to a population of dental patients, and presenting the findings of original research or review studies were included in the analysis. Publications were excluded if they focused exclusively on dental photography without addressing its role in patient education or patient communication; on patient communication without the use of photography; or solely on patient education without the use of photography (Fig. 1).

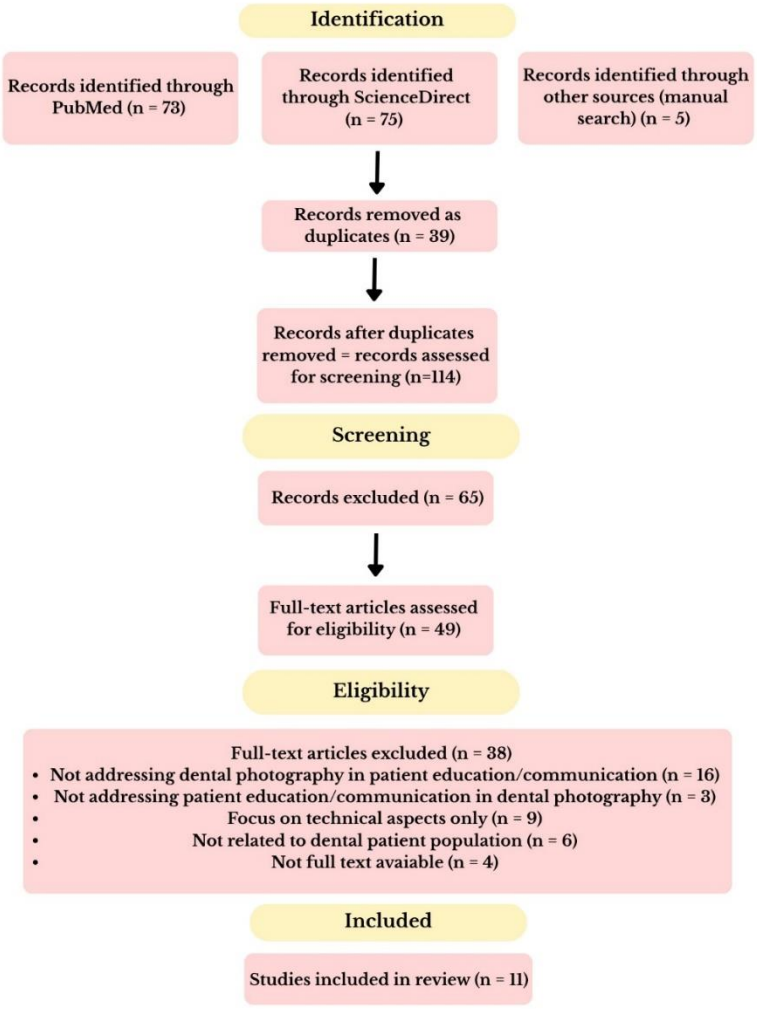


Figure 1. Flow diagram of the study selection process

RESULTS

The literature review included 11 publications, which were grouped into several main thematic areas. The largest group consisted of studies on the role of photography in dentist–patient communication (4 studies), followed by studies on the use of photography in pediatric dentistry (3 studies), as well as studies on patient education and motivation in oral hygiene, including the assessment of clinical outcomes (2 studies). Additionally, there were single studies addressing knowledge of dental photography among students and dentists (1 study), the use of intraoral cameras (1 study), and the impact of photography in social media on the choice of dentist and type of treatment (1 study) - Table 1.

Table 1. Characteristics of studies included in the review of intraoral photography

No.	Title	Research question	Methodology (brief)	Main findings
1	Intraoral Photo-graphy Reco--mmendations for Remote Risk Assessment and Monitoring of Oral Mucosal Lesions [12]	What recommendations should guide the acquisition of intraoral photographs for remote risk assessment and monitoring of oral mucosal lesions?	Narrative review and development of practical guidelines. Discussion of lighting techniques, camera angle, mirror and retractor use, applicable to smart-phone and compact cameras.	High-quality intraoral photo-graphs are essential for timely risk assessment of mucosal lesions in teledentistry settings. The developed guidelines are implementable using widely available devices and may serve as the basis for future teledentistry platforms.
2	Mobile dental photography: a simple technique for documenta-tion and commu-nication [4]	What are the possibilities and clinical applications of mobile dental photography (Smile Lite MDP) in clinical documentation and commu-nication with patients and dental technicians?	Review article presen-ting the technical capabilities of smart-phones and the Smile Lite Mobile Dental Photography (MDP) technique. Presentation of clinical cases and applications.	Mobile dental photography enables the acquisition of high-quality clinical images using a smartphone. It is an effective tool for document-tation and communication with patients and dental laboratories, with applic-ations extending beyond the clinical setting.
3	Strategies for Effective Denti st-Patient Com-munication: A Literature Re-view [6]	What dentist-patient com-munication strategies pro-mote effective, high-quality dental care?	Literature review. Ana-lysis of the literature on dentist-patient com-munication, encompa-ssing active listening, patient-centred appro-ach, use of visual materials, and inform-ation technology.	Effective dental commu-nication should be clear, accurate, concise, complete, and cohesive. The use of visual materials and infor-mation technology signifi-cantly improves patients' understanding of health information, reduces dental anxiety, and improves adherence to therapeutic recommendations.
4	Improving the Communication of Dental Findi-ngs in Pediatric Dentistry by Using Intraoral Scans as a Visual Aid: A Rando-mized Clinical Trial [7]	Does the use of intraoral scans (IOS) as a visual aid improve the communication of dental findings and enhance parents'/caregivers' understanding of children's treatment plans?	Randomized clinical trial (RCT). 60 children (mean age 10.1 years) were allocated to a control group (verbal explanation only, n=30) and a study group (verbal explanation + IOS Trios 4 scans, n=30). Comprehension assessed by question-naire.	The use of intraoral scans as a visual aid significantly improved parents'/caregivers' comprehension of dental findings and treatment plans compared with verbal explanation alone. IOS constitutes an effective tool for supporting communi-cation in paediatric dentistry.

No.	Title	Research question	Methodology (brief)	Main findings
5	Using patients' oral photographs for oral hygiene motivation promotes periodontal health: a prospective randomized controlled trial [13]	Does personalised visual oral hygiene education based on patients' own oral photographs improve clinical periodontal parameters compared with conventional oral hygiene instruction?	Prospective RCT (n=56). The intervention group (n=28) received personalised visual oral hygiene education based on 5 oral photographs combined with conventional instruction; the control group (n=28) received conventional instruction only. PI, GI, BOP, and PPD assessed at baseline, 1 month, and 3 months.	Personalised education based on visualisation of the patient's own oral health status significantly reduced plaque index (PI), gingival index (GI), and bleeding on probing (BOP) scores in the intervention group at 3 months, confirming the effectiveness of photography as a motivational tool.
6	Psychological, behavioral, and clinical effects of intra-oral camera: a randomized control trial on adults with gingivitis [14]	Does the use of an intraoral camera (IOC) during supportive periodontal therapy affect clinical, behavioural, and psychological parameters in patients with gingivitis?	RCT. 78 adult patients with gingivitis were randomised to an IOC group (n=39) or a control group (n=39). BOMP index, oral hygiene behaviours, self-efficacy, and planning were assessed at 4 months.	Use of the IOC significantly improved the BOMP index ($p<0.001$), frequency of dental flossing ($p<0.05$), and self-efficacy ($p<0.05$) compared with the control group. The IOC is an effective tool for supporting oral hygiene behaviour change.
7	Use of dental photography in pediatric dentistry practice [15]	How is dental photography currently used by paediatric dentists in clinical practice — how frequently, for what purposes, with what equipment, and what challenges are encountered?	Online survey study (29 questions, Google Forms). Distributed to 195 paediatric dentistry specialists, research assistants, and academics (January–June 2025). Statistical analysis: IBM SPSS Statistics v.21.	Dental photography in paediatric dentistry is used to a limited extent, most commonly in trauma cases and more frequently in university hospitals. The main challenges are lack of patient cooperation and anatomical limitations. Photography did not significantly affect child behaviour but improved communication with parents.
8	A cross-sectional survey to evaluate acquaintance about dental photography among dental students in daily clinical practice [2]	What is the level of knowledge and practice regarding dental photography among dental students in daily clinical practice?	Observational cross-sectional survey conducted among dental students (King Khalid University, Saudi Arabia). Assessment of knowledge, practice, and ethical attitudes towards dental photography.	Dental photography is most widely applied in patient education, treatment planning, and monitoring of treatment outcomes. The majority of students recognise its clinical utility; however, gaps in knowledge regarding technical and ethical aspects were identified.
9	Assessment of mother's ability in caries diagnosis, utilizing the smartphone photographic method [16]	Are mothers able to independently identify the presence of carious lesions in their children using photographs taken with a smartphone?	Diagnostic study. Mothers of children aged 3–5 years captured intraoral photographs using a smartphone. Images were assessed by mothers and results were compared with a dentist's clinical examination.	The smartphone photography method enables mothers to perform a preliminary independent assessment of carious lesions in their children. The findings indicate the potential of photography for early caries detection outside the dental setting, although the

No.	Title	Research question	Methodology (brief)	Main findings
				accuracy of maternal assessment was variable.
10	Intra-oral camera utilisation: a multi-perspective study on applications, challenges and future directions [17]	What are the current applications, challenges, and future directions of intraoral camera use from the perspective of multiple stakeholder groups (clinicians, patients, researchers)?	Multi-perspective study. Analysis of clinical applications, implementation barriers, and the potential of intraoral cameras based on the perspectives of multiple stakeholder groups.	Intraoral cameras constitute a versatile clinical tool enabling real-time visualisation of oral changes, which promotes active patient participation in the treatment process. Technical and organisational barriers limiting widespread implementation were identified, and future directions for the development of this technology were outlined.
11	The impact of dental photography in social media platforms on patients' selection of dentists and type of treatment [18]	What impact does dental photography published on social media platforms have on patients' selection of dentists and type of treatment?	Cross-sectional online survey. 552 adult patients attending public and private dental facilities in Saudi Arabia. Questionnaire distributed via treating dentists' social media channels.	Clinical photographs published on social media influence patients' decisions regarding the choice of dentist and type of treatment. Women were more likely than men to report that before-and-after photographs affected their choice. Dental photography on social media facilitates informed therapeutic decision-making.

RCT – randomized clinical trial; IOC – intraoral camera; IOS – intraoral scanner; PI – plaque index; GI – gingival index; BOP – bleeding on probing; BOMP – bleeding on marginal probing; PPD – probing pocket depth; MDP – Mobile Dental Photography.

DISCUSSION

A considerable variation is evident across the analysed studies with respect to sample size and the characteristics of the study populations, which has implications for the interpretation and generalisation of the findings obtained. The study by Özkal Eminoğlu D et al. comprised 56 participants with a mean age of 30 ± 11 years [13].

Although the use of repeated measurements at defined time intervals is a methodological strength, a limitation is the participants' age range, which may not reflect the population at greater risk of periodontal disease, namely, older individuals.

The survey-based study by Sahin M et al., conducted among 195 participants including research assistants, specialists, and academic staff in paediatric dentistry, is distinguished by its large sample size and the assurance of anonymity [15].

This mode of data collection may have promoted greater candour among respondents and enhanced the reliability of the opinions obtained, although the possibility of self-reporting bias should be acknowledged.

In the study by Schulz-Weidner N, comprising 70 participants aged 5–18 years, the sample size may be considered moderate given the specificity of the age group [7]. Similarly, the study by Abouzeid HL et al., involving 233 students and interns, is characterised by a large sample; however, the relatively brief three-month follow-up period may limit the assessment of long-term effects [2].

Significant limitations are evident in the study by Haji Seyed Javadi et al., which included only 35 participants — 16 dentists and 12 patients — a small sample size that substantially restricts statistical power and the generalisability of the findings [17].

In the study by Araújo MR et al., involving 78 participants randomly assigned to two groups, randomisation is a positive methodological feature; however, the lack of information on participants' age complicates the assessment of sample representativeness [14].

Noteworthy is the study by Alqabbani YN et al., which included 552 participants and examined demographic data, including age, sex, and educational level [18]. The large sample size and

broad cross-section of the study population enhance the value of the reported findings. Similarly, the study by Kale S et al., conducted among 100 mothers, may be regarded as comprising a relatively large and homogeneous group, which supports the consistency of the analyses [16].

The findings of the present work indicate that dental photography is a significant tool for patient education, clinical communication, and monitoring treatment outcomes. The observations obtained are consistent with the existing literature, which emphasises the growing importance of visual documentation in modern dental practice. Comparable conclusions were presented by Balaji et al., who demonstrated that clinical photography is widely employed in case documentation, treatment planning, monitoring of treatment outcomes, and patient education, and that it provides substantial support for dentist–patient communication [19].

An important aspect of dental photography is its influence on patients' health-related behaviours. The findings of the randomised study conducted by Araújo et al. indicate that incorporating intraoral camera images into dental consultations may improve clinical parameters of gingivitis, increase the frequency of appropriate oral hygiene practices, and enhance patients' sense of self-efficacy [14].

These observations suggest that dental photography fulfils not only an educational function but also a behavioural one, acting as a feedback mechanism that supports sustained health behaviour change. The limitations identified by the authors should, however, be considered — including the use of an additional oral hygiene device and the potential influence of the researcher — which justifies the need for further multicentre studies [14].

Dental photography also plays a significant role in patients' therapeutic decision-making. The study by Alqabbani et al. demonstrated that the publication of clinical photographs — particularly those presenting treatment outcomes — may influence patients' perceptions of clinician competence and increase interest in specific therapeutic procedures, thereby promoting more informed treatment decisions [18].

The advancement of digital technologies has substantially expanded the potential applications of dental photography. Solutions based on artificial intelligence and machine learning are increasingly widespread, enabling image analysis to detect carious lesions, assess dental plaque, and identify other oral pathologies. In the future, these technologies may provide significant support for the diagnostic process and treatment planning, enhancing the precision of clinical assessment and the efficiency of clinical practice [17,20].

An important factor conducive to the wider adoption of dental photography is the growing accessibility of relevant technology. Survey-based studies indicate that smartphones are the most used tool for capturing clinical images, facilitating the straightforward implementation of this method in everyday practice [2]. Dental photography is employed by clinicians at both early and advanced stages of their professional careers, using both mobile devices and professional photographic equipment [1,5].

Dental photography also fulfils an important function in medical documentation and the monitoring of treatment progress. The systematic acquisition of photographs enables comparison of the clinical presentation at successive stages of therapy, assessment of the efficacy of the methods applied, and monitoring of the dynamics of change, which is of relevance in long-term patient follow-up and in cases involving potentially malignant lesions [12,17]. Additionally, it may serve as a tool for assessing oral hygiene status and monitoring caries and gingivitis indices [15].

In the context of healthcare organisation, dental photography also facilitates the exchange of information between specialists, supporting the consultation process, the verification of referral indications, and the obtaining of second opinions, which may contribute to improved accuracy of therapeutic decisions and enhanced access to care [21].

Despite its numerous advantages, the use of dental photography is also associated with certain limitations. Among the most frequently cited are the costs of purchasing and maintaining equipment, the need for adequate staff training, and the organisational challenges of integrating new technologies into clinical practice [17]. At the same time, the need to develop clinicians' competencies in both the technical and ethical aspects of dental photography is emphasised [19].

Of particular importance are the ethical considerations pertaining to the protection of patient data. The acquisition and use of photographic documentation should be carried out in accordance with the principles of confidentiality and after obtaining informed patient consent, which is a fundamental element of responsible clinical practice [2].

CONCLUSIONS

Dental photography constitutes an integral element of modern clinical practice.

It supports diagnostics and treatment planning, forms part of medical documentation and enhances patient communication by enabling the illustration of medical procedures and the visualisation of treatment progress and outcomes, thereby increasing patient cooperation and motivation.

By virtue of its image transmission capabilities, it also facilitates the development of teledentistry.

However, in clinical practice, the use of dental photography may pose certain challenges.

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Conflicts of Interest

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