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Clinical longevity of direct composite resin restorations: factors associated with success
Longevidade clínica das restaurações diretas em resina composta: fatores associados ao sucesso
Longevidad clínica de las restauraciones directas de resina compuesta: factores asociados al éxito

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Abstract: Direct composite resin restorations are widely used in restorative dentistry because of their ability to restore dental aesthetics and function while preserving natural tooth structures. However, their clinical longevity depends on several factors related to material properties, restorative techniques, and patients' oral conditions. This study aimed to analyze the main factors associated with the success and clinical longevity of direct composite resin restorations. This narrative literature review adopted a qualitative, descriptive, and exploratory approach, based on the analysis of 12 selected scientific publications from 2022 to 2026 addressing technical, clinical, and behavioral aspects related to restoration durability. The findings indicated that the quality of adhesive procedures, moisture control, adequate light curing, material resistance, and proper finishing and polishing techniques are important factors influencing the clinical performance of restorations. Furthermore, inadequate oral hygiene, caries risk, parafunctional habits, and lack of regular dental follow-up may compromise their durability. The main complications discussed included fractures, marginal alterations, material wear, and loss of retention. It was concluded that the clinical longevity of direct composite resin restorations depends on an integrated approach involving individualized treatment planning, appropriate technical procedures, preventive maintenance, and active patient participation in oral health care. These findings highlight the importance of adopting evidence-based and conservative restorative practices to improve clinical outcomes and preserve dental structures over time.

Keywords: Composite Resins. Dental Restoration, Permanent. Longevity. Restorative Dentistry. Dental Restoration Failure.

Resumo: As restaurações diretas em resina composta representam uma alternativa amplamente utilizada na Odontologia Restauradora, devido à sua capacidade de restabelecer a estética e a função dentária, preservando as estruturas naturais. Entretanto, sua longevidade clínica depende de diferentes fatores relacionados às propriedades dos materiais, às técnicas restauradoras e às condições bucais dos pacientes. O presente estudo teve como objetivo analisar os principais fatores associados ao sucesso e à longevidade clínica das restaurações diretas em resina composta. Trata-se de uma revisão narrativa da literatura, de abordagem qualitativa, natureza descritiva e caráter exploratório, fundamentada na análise de 12 publicações científicas selecionadas, publicadas entre 2022 e 2026, que abordaram aspectos técnicos, clínicos e comportamentais relacionados à durabilidade restauradora. Os resultados evidenciaram que a qualidade dos procedimentos adesivos, o controle da umidade, a fotopolimerização adequada, a resistência dos materiais e a execução criteriosa do acabamento e polimento constituem fatores importantes para o desempenho clínico das restaurações. Além disso, condições como higiene oral inadequada, risco de cárie, hábitos parafuncionais e ausência de acompanhamento

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odontológico podem comprometer sua durabilidade. Entre as principais complicações discutidas, destacaram-se fraturas, alterações marginais, desgaste e perda de retenção. Conclui-se que a longevidade das restaurações diretas em resina composta depende de uma abordagem integrada, envolvendo planejamento individualizado, execução técnica adequada, manutenção preventiva e participação dos pacientes nos cuidados com a saúde bucal.

Palavras-chave: Resinas Compostas. Restauração Dentária Permanente. Longevidade. Odontologia Restauradora. Falha de Restauração Dentária.

Resumen: Las restauraciones directas de resina compuesta representan una alternativa ampliamente utilizada en la odontología restauradora, debido a su capacidad para restablecer la estética y la función dentaria, preservando las estructuras naturales. Sin embargo, su longevidad clínica depende de distintos factores relacionados con las propiedades de los materiales, las técnicas restauradoras y las condiciones bucales de los pacientes. El presente estudio tuvo como objetivo analizar los principales factores asociados al éxito y a la longevidad clínica de las restauraciones directas de resina compuesta. Se trata de una revisión narrativa de la literatura, de enfoque cualitativo, naturaleza descriptiva y carácter exploratorio, fundamentada en el análisis de 12 publicaciones científicas seleccionadas, publicadas entre 2022 y 2026, que abordaron aspectos técnicos, clínicos y conductuales relacionados con la durabilidad restauradora. Los resultados evidenciaron que la calidad de los procedimientos adhesivos, el control de la humedad, la fotopolimerización adecuada, la resistencia de los materiales y la ejecución cuidadosa del acabado y pulido constituyen factores importantes para el desempeño clínico de las restauraciones. Además, condiciones como la higiene oral inadecuada, el riesgo de caries, los hábitos parafuncionales y la ausencia de seguimiento odontológico pueden comprometer su durabilidad. Entre las principales complicaciones analizadas destacaron las fracturas, las alteraciones marginales, el desgaste y la pérdida de retención. Se concluye que la longevidad de las restauraciones directas de resina compuesta depende de un enfoque integrado que incluya planificación individualizada, ejecución técnica adecuada, mantenimiento preventivo y participación de los pacientes en el cuidado de la salud bucal.

Palabras clave: Resinas Compuestas. Restauración Dental Permanente. Longevidad. Odontología Restauradora. Fracaso de la Restauración Dental.

1. Introduction

Restorative dentistry has made significant advances in recent decades, particularly in the development of materials and techniques that enable the aesthetic and functional restoration of teeth while preserving more of their natural structures. In this context, composite resins stand out as one of the main alternatives used in direct restorations because of their versatility, ability to reproduce dental characteristics, and suitability for minimally invasive procedures. However, despite improvements in the physical and mechanical properties of these materials, the clinical longevity of restorations remains an important aspect of dental practice, since their performance depends on different factors associated with the material, restorative technique, and patient's oral conditions. According to Paula et al. (2025), the longevity of direct composite resin

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restorations in posterior teeth is a relevant topic for understanding the factors related to durability and maintenance of restorative outcomes.

The use of composite resins is directly related to the pursuit of conservative procedures capable of restoring the anatomy, masticatory function, and aesthetic harmony of compromised teeth. The development of adhesive systems and improvement of restorative techniques have helped expand the applications of these materials in both anterior and posterior teeth. However, restorative success does not depend exclusively on the properties of composite resin; aspects such as clinical planning, material selection, moisture control, appropriate application of adhesive systems, and correct finishing and polishing must also be considered. In this regard, Mendes et al. (2025) address the importance of biomimetic strategies in direct composite resin restorations, emphasizing an approach aimed at reproducing the structural and functional characteristics of natural dental tissues, while Santos et al. (2026) discuss indication criteria and the factors determining the clinical success of direct veneers.

The clinical longevity of restorations can be understood in terms of maintaining satisfactory aesthetic, functional, and biological conditions over time, considering wear resistance, marginal integrity, color stability, and the absence of complications that compromise treatment. Major causes of restorative failure include material fractures, marginal changes, staining, excessive wear, and the development of carious lesions adjacent to restorations. Furthermore, factors related to cavity extent, the amount of remaining tooth structure, and masticatory forces can directly affect the clinical behavior of restorative procedures. Souza et al. (2022) discuss the long-term survival of anterior composite resin restorations, while Santos and Vieira (2026) address the clinical longevity of these procedures in posterior teeth, highlighting the importance of understanding the particularities of each dental region for planning and maintaining restorations.

Another relevant aspect concerns the choice of restorative material and assessment of patients' individual needs, particularly given the different therapeutic possibilities available in contemporary dentistry. Although composite resins offer advantages in preserving tooth structure, ease of repair, and completion in a single visit, their indication must consider the functional and aesthetic demands of each clinical situation. Lima et al. (2026) discuss the criteria for choosing between composite resin and ceramics for aesthetic veneers, while Moura et al. (2022) address the particularities of direct composite resin veneers and indirect ceramic restorations. Additionally, Galvão et al. (2025) investigate the clinical longevity of direct and indirect composite resin veneers in anterior teeth, contributing to the discussion of the

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importance of selecting appropriate restorative techniques and evaluating their clinical performance.

In addition to the characteristics of the materials and techniques used, restoration maintenance is related to patients' habits and oral health conditions. Factors such as inadequate oral hygiene, parafunctional habits, diet, caries risk, and lack of periodic dental follow-up can compromise restorative integrity and increase the need for corrective interventions. Clinical success should therefore be understood as the result of the interaction between the quality of the restorative procedure and the care required to preserve it. Teixeira et al. (2022) address the longevity of rehabilitative treatments with direct and indirect veneers in anterior teeth, while Vale et al. (2026) discuss the quality of direct composite resin restorations performed at a dental teaching clinic, emphasizing the relevance of evaluating the technical quality of procedures. Thus, knowledge of the factors associated with restorative failures is essential for guiding clinical strategies that preserve outcomes and reduce the need for frequent replacements.

Against this background, the present study seeks to answer the following guiding question: what are the main factors associated with the success and clinical longevity of direct composite resin restorations? The relevance of this research lies in the need to understand the clinical, technical, and behavioral aspects that influence the durability of these procedures, considering their widespread use in dental practice and the importance of conservative, lasting treatments. The overall objective is therefore to analyze the main factors associated with the success and clinical longevity of direct composite resin restorations through a narrative literature review. Specifically, the study seeks to identify factors related to material properties and restorative techniques, discuss the clinical and behavioral conditions that affect restorative durability, and understand the importance of planning and dental follow-up for maintaining outcomes over time.

2. Materials and methods

This study is a narrative literature review with a qualitative, descriptive, and exploratory approach, conducted to analyze the main factors associated with the success and clinical longevity of direct composite resin restorations. This research approach was chosen because it allows scientific knowledge concerning restorative material performance, operative techniques, and clinical conditions influencing restoration durability to be gathered, interpreted, and discussed. The investigation was structured around the analysis of scientific publications in

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dentistry, considering aspects related to mechanical strength, aesthetic stability, marginal integrity, adhesive protocols, and maintenance of restorative outcomes over time.

The literature survey considered scientific publications available in national and international journals, with an emphasis on studies published between 2022 and 2026. The documentary set comprised 12 previously selected references, including literature reviews, a systematic review, case reports, and clinical studies related to direct composite resin restorations. To guide the thematic scope, the following Portuguese descriptors were considered: “resina composta” (composite resin), “restauração dentária permanente” (permanent dental restoration), “longevidade clínica” (clinical longevity), “odontologia restauradora” (restorative dentistry), and “sucesso clínico” (clinical success), together with their English equivalents. Material selection prioritized studies directly addressing restoration durability, determinants of clinical failure, and strategies employed to preserve restorative procedures.

Inclusion criteria encompassed scientific articles concerning the use of composite resins in anterior and posterior teeth, assessment of clinical longevity, direct restorative techniques, and factors affecting dental treatment performance. Comparative studies of restorative materials were also considered, provided they contributed relevant information to understanding the clinical success of composite resin restorations. Exclusion criteria comprised studies without a direct relationship to the topic, publications that did not address clinical or technical aspects of restorative procedures, and documents whose approach did not contribute to answering the guiding question. As this was a narrative review, no meta-analysis or pooled statistical assessment of results was performed; qualitative interpretation of the information presented in the literature was prioritized.

The bibliographic material was analyzed through exploratory, selective, and interpretive reading of the publications, seeking to identify convergences, differences, and authors' contributions concerning factors associated with the longevity of direct composite resin restorations. Information was organized into thematic areas related to restorative material properties, adhesive procedures, cavity characteristics, occlusal conditions, patient habits, and the importance of periodic clinical follow-up. The content was subsequently analyzed descriptively and comparatively, allowing the knowledge presented in the studies to be connected and its implications for dental practice to be discussed. Because the research used only data from scientific publications, without direct human involvement or use of individually

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identifiable information, submission to a Research Ethics Committee was not required, in accordance with the ethical provisions applicable to bibliographic research.

3. Results and discussion

Analysis of the selected literature identified different factors associated with the success and clinical longevity of direct composite resin restorations, showing that the durability of these procedures depends on the interaction between restorative material properties, quality of technical execution, patients' oral conditions, and dental follow-up. The studies address aspects related to mechanical strength, marginal integrity, aesthetic stability, and maintenance of restorative function over time. To organize the discussion, the results of the narrative review were divided into three thematic areas: technical and material factors associated with longevity; clinical and behavioral conditions influencing restorative success; and main causes of failure and strategies for maintaining clinical outcomes. The tables presented are qualitative syntheses of the literature and do not represent data obtained through original clinical research.

3.1 Technical and material factors associated with the longevity of direct composite resin restorations

The clinical longevity of direct composite resin restorations is directly related to the properties of the materials used and the quality of the procedures performed during dental treatment. Relevant factors include mechanical strength, ability to bond to dental tissues, dimensional stability, and wear resistance, all of which affect the maintenance of restorative integrity. In their literature review of posterior restorations, Paula et al. (2025) identified restorative technique, professional experience, material characteristics, tooth location, and cavity extent as factors influencing clinical performance. The authors also emphasized the importance of appropriate light curing, finishing, and polishing in achieving lasting outcomes. These findings show that selecting materials with satisfactory properties must be combined with careful execution of clinical protocols. ISSN 2675-6218

The adoption of conservative restorative techniques is another important aspect of preserving tooth structure and maintaining the function of restored teeth. Mendes et al. (2025) address biomimetic strategies applied to direct composite resin restorations, emphasizing an approach that seeks to reproduce the structural and functional characteristics of natural tissues. This perspective can be related to the need to preserve remaining tooth structure and provide

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appropriate distribution of masticatory stresses. By comparison, Braun and Menegheli (n.d.) present a clinical approach to rehabilitating fractured anterior teeth through Class IV restorations, a situation in which recovery of anatomy and aesthetics must be accompanied by care concerning restorative strength and stability. Although their focuses differ, both studies contribute to discussing the importance of individualized planning when choosing restorative procedures.

The development of different composite resin formulations has also expanded the applications of these materials, particularly given the aesthetic demands of contemporary dentistry. Silva et al. (2026) address the use of single-shade resins, whose purpose is to simplify shade selection and the aesthetic adaptation of restorative procedures. However, ease of use of a particular material should not be confused with clinical superiority over conventional formulations, because longevity depends on a combination of physical, mechanical, and optical properties, as well as application conditions. In this regard, the discussion presented by Paula et al. (2025) reinforces that composite resin selection should consider the specific needs of each restoration, avoiding generalizations based exclusively on commercial or aesthetic material characteristics.

Comparison between different restorative alternatives also demonstrates that treatment selection must consider functional, aesthetic, biological, and economic aspects. Lima et al. (2026) address criteria for choosing between composite resin and ceramics for aesthetic veneers, while Moura et al. (2022) discuss the particularities of direct composite resin veneers and indirect ceramic restorations. These approaches help explain that no restorative solution is universally superior for every clinical situation. Direct restorations offer advantages in structural preservation, repairability, and lower procedural complexity in many cases, whereas other materials may be considered for specific requirements. Longevity must therefore be analyzed together with clinical indication and the material's suitability for the patient's needs.

Table 1 - Main technical and material factors related to the clinical success of direct composite resin restorations

Factors analyzed	**Relationship with clinical longevity**	**Related authors**
Mechanical properties of composite resin	Resistance to masticatory loads, wear, and fractures of the restorative material.	Paula et al. (2025)
Adhesive systems and moisture control	Promote adhesive interface stability and reduce the risk of marginal compromise.	Paula et al. (2025); Mendes et al. (2025)
Biomimetic techniques	Seek to preserve tooth structure and reproduce its anatomical and functional characteristics.	Mendes et al. (2025)

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Factors analyzed	**Relationship with clinical longevity**	**Related authors**
Restorative material selection	Must consider aesthetic demands, tooth location, functional conditions, and treatment characteristics.	Lima et al. (2026); Moura et al. (2022)
Placement and light-curing techniques	Appropriate execution contributes to mechanical performance and restoration stability.	Paula et al. (2025)
Finishing and polishing	Influence surface smoothness, aesthetic quality, and ease of cleaning.	Paula et al. (2025)
Single-shade materials	Represent an aesthetic alternative whose indication requires assessment of material characteristics and the clinical situation.	Silva et al. (2026)

Source: Authors' own work (2026), based on a thematic synthesis of the authors indicated.

The aspects presented in Table 1 show that restorative success results from the combination of material characteristics and quality of clinical execution; durability cannot be attributed exclusively to the composition of the resin used. The discussion by Paula et al. (2025) highlights the importance of technical proficiency and control of restorative stages, while Mendes et al. (2025) broaden this understanding by addressing the application of biomimetic principles in restoring dental structures. The studies can therefore be interpreted as complementary, as they relate preservation of natural tissues to the need for appropriate procedural execution. Material selection should thus be integrated into restorative planning, considering the extent of the intervention, tooth location, and functional demands.

Another aspect observed concerns the importance of avoiding generalization of clinical outcomes across different restoration types. Procedures performed in anterior teeth may have aesthetic and functional demands that differ from those in posterior teeth, particularly regarding the distribution of masticatory forces and the extent of restored areas. Thus, although certain materials and protocols may yield satisfactory outcomes in specific situations, their indication must consider the particularities of each case. Joint analysis of Lima et al. (2026), Moura et al. (2022), and Paula et al. (2025) helps explain that restorative durability depends not only on technologically advanced materials but on compatibility between their properties, clinical indication, and the conditions under which treatment is performed.

3.2 Clinical and behavioral conditions associated with restorative success and longevity

Patients' clinical conditions are fundamental to maintaining direct composite resin restorations because the oral environment presents constant mechanical, chemical, and biological challenges. These factors include the risk of developing carious lesions, oral hygiene

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quality, eating habits, occlusal conditions, and parafunctional habits. Paula et al. (2025) identified that patient-related aspects, particularly oral hygiene habits and caries risk, can affect the longevity of posterior restorations. These factors reinforce the importance of understanding restorative treatment as part of a broader strategy to promote and maintain oral health, in which patient behavior plays a relevant role in preserving clinical outcomes.

Tooth location also influences the clinical demands associated with the restorative procedure. In anterior teeth, preserving aesthetic appearance, surface texture, anatomical contour, and color stability is an important concern, whereas in posterior teeth resistance to masticatory forces assumes greater functional relevance. Souza et al. (2022) address the long-term survival of anterior composite resin restorations, offering a perspective focused on their maintenance. Conversely, Santos and Vieira (2026) discuss the clinical longevity of direct restorations in posterior teeth, broadening consideration of the different conditions under which restorative materials are used. The thematic comparison of these studies demonstrates the need to evaluate the anatomical and functional particularities of each dental region, avoiding treating all restorations as procedures subject to identical performance conditions.

Regarding anterior aesthetic procedures, Galvão et al. (2025) conducted a systematic review comparing the clinical survival of direct and indirect composite resin veneers. The authors initially identified 50 publications, five of which met the eligibility criteria. Most included studies indicated higher survival for direct restorations; however, substantial methodological heterogeneity prevented pooled quantitative analysis. The main reported failures involved debonding and restoration fracture. These results are relevant because they suggest favorable clinical performance of direct techniques in the context analyzed but do not establish their absolute superiority in every restorative situation. Treatment selection should therefore remain linked to individualized assessment of the patient's clinical conditions.

The technical quality of procedures is also related to the training and experience of the professionals performing the restorations. By addressing the quality of direct composite resin restorations performed by undergraduates at a dental teaching clinic, Vale et al. (2026) present an important topic for discussing clinical training and the need to master restorative protocols. Developing skills in diagnosis, operative field isolation, application of adhesive materials, and occlusal assessment is an important part of professional practice. This perspective can be related to the discussion by Paula et al. (2025), who identified operator experience as a factor associated with restorative longevity. Maintaining clinical quality therefore requires not only appropriate

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materials but also technical knowledge, training, and careful evaluation of the procedures performed.

Table 2 - Clinical and behavioral factors that may influence the longevity of composite resin restorations

Factors	**Possible clinical repercussions**	**Preventive and follow-up measures**	**Related authors**
Inadequate oral hygiene	Greater biofilm accumulation and increased risk of adjacent carious lesions.	Hygiene guidance and periodic biofilm control.	Paula et al. (2025)
High caries risk	Greater likelihood of compromise of dental tissues near restorations.	Individual risk assessment and adoption of preventive measures.	Paula et al. (2025)
Parafunctional habits	Mechanical overload, wear, and possible fractures.	Occlusal assessment and individualized clinical follow-up.	Paula et al. (2025); Santos and Vieira (2026)
Tooth location	Different aesthetic and functional demands in anterior and posterior regions.	Planning according to location and anatomical conditions.	Souza et al. (2022); Santos and Vieira (2026)
Aesthetic demands	Need to preserve optical characteristics, texture, and restoration appearance.	Careful material selection and periodic aesthetic assessment.	Galvão et al. (2025); Teixeira et al. (2022)
Quality of clinical execution	May influence marginal integrity and restorative performance.	Professional training and compliance with technical protocols.	Vale et al. (2026); Paula et al. (2025)
Dental follow-up	Enables identification of changes and maintenance needs.	Reassessment according to patient risk and needs.	Paula et al. (2025); Souza et al. (2022)

Source: Authors' own work (2026), based on the discussion of clinical factors and preventive implications in the selected literature.

Analysis of Table 2 shows that restoration longevity is related not exclusively to the moment of placement but also to preservation conditions established during dental follow-up. Behavioral factors can support or compromise maintenance of clinical outcomes, particularly when associated with oral conditions that increase the risk of deterioration of restorative interfaces. In this regard, Paula et al. (2025) emphasize the relevance of oral hygiene and caries risk, while Souza et al. (2022) and Santos and Vieira (2026) enable discussion of restorative durability in different dental regions. Combining these perspectives demonstrates that assessment of longevity should consider both individual characteristics and the anatomical and functional particularities of the restored tooth.

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Another important point concerns the need to understand that aesthetic satisfaction and functional success are related but distinct dimensions of restorative assessment. A restoration may have satisfactory structural integrity yet require aesthetic maintenance because of changes in color, texture, or surface gloss. Similarly, a visually satisfactory restoration may have marginal compromise or conditions warranting clinical intervention. Teixeira et al. (2022) address the longevity of rehabilitative treatments with direct and indirect veneers in anterior teeth, while Galvão et al. (2025) present a systematic analysis of the survival of these modalities. Their combined discussion highlights that assessment of restorative procedures should encompass aesthetic, mechanical, and biological parameters, avoiding the use of restoration retention as the sole indicator of success.

3.3 Main causes of clinical failure and strategies for restoration maintenance

Failures of direct composite resin restorations are a major challenge in restorative dentistry, considering their repercussions for masticatory function, aesthetics, and preservation of dental tissues. Possible complications include fractures, marginal changes, material wear, surface staining, loss of retention, and development of carious lesions adjacent to restorations. In the literature they reviewed, Paula et al. (2025) identified secondary caries and restorative material fracture as important causes of posterior restoration failure. These results demonstrate that clinical longevity depends on maintaining restoration integrity and preserving the health of surrounding dental tissues, requiring attention to both technical aspects and patients' biological conditions.

Failures related to fracture and loss of retention also appear in the evaluation of aesthetic restorative procedures. In analyzing the survival of direct and indirect composite resin veneers, Galvão et al. (2025) found that debonding and fracture were among the most frequent causes of failure identified in the included studies. These findings relate to the discussion of the importance of adhesive protocols and appropriate distribution of functional forces, particularly in restorations subject to mechanical loading. However, the systematic review showed heterogeneity among studies, limiting the possibility of establishing general quantitative conclusions. Identifying causes of failure must therefore consider restoration characteristics, follow-up duration, and the clinical criteria used to determine success or failure.

Preventive maintenance is an important strategy for extending restoration service life and reducing the need for more extensive interventions. Early identification of surface changes,

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marginal defects, and small fractures may allow conservative measures such as repolishing, adjustments, or localized repairs when clinically indicated. Paula et al. (2025) discuss restorative repair as an alternative for extending the function of existing restorations and avoiding more invasive procedures. This approach relates to the principle of preserving tooth structure, since complete replacement of a restoration may require additional removal of healthy tissue. Nevertheless, the decision between maintenance, repair, and replacement must consider defect extent, presence of carious lesions, remaining tooth structure, and the possibility of achieving clinically satisfactory outcomes.

Using appropriate restorative techniques from the outset of treatment is also a relevant preventive strategy. Moisture control, careful application of adhesive systems, appropriate light curing, and surface finishing can help reduce complications involving marginal integrity and premature wear. In discussing biomimetic strategies, Mendes et al. (2025) present an approach directed toward restoring the natural characteristics of teeth. This perspective can be related to planning conservative restorations in which preservation of remaining tissues and recovery of function are central. Additionally, Paula et al. (2025) emphasize the importance of technical stages and preventive care for posterior restoration performance, showing that failure prevention should begin at planning and continue throughout clinical follow-up.

Table 3 - Main clinical failures of direct composite resin restorations and strategies for their prevention and management

Clinical change or failure	**Possibly associated factors**	**Prevention or management strategies**	**Related authors**
Restoration fracture	Occlusal overload, restoration extent, and mechanical limitations.	Functional assessment, appropriate material selection, and repair when indicated.	Paula et al. (2025); Galvão et al. (2025)
Caries adjacent to the restoration	High caries risk, biofilm accumulation, and local factors.	Caries risk control, oral hygiene, and periodic follow-up.	Paula et al. (2025)
Loss of retention or debonding	Adhesive interface compromise and functional loading.	Control of adhesive technique and assessment of repair feasibility.	Galvão et al. (2025)
Marginal changes	Restorative interface degradation and possible technical failures.	Margin assessment, maintenance, and intervention according to defect extent.	Paula et al. (2025)
Surface wear	Masticatory loading and material characteristics.	Appropriate resin selection and monitoring of restored surfaces.	Paula et al. (2025)
Aesthetic changes	Staining, surface changes, and individual aesthetic needs.	Polishing, repair, or replacement when clinically necessary.	Souza et al. (2022); Teixeira et al. (2022)

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Clinical change or failure	Possibly associated factors	Prevention or management strategies	Related authors
Need for replacement	Extensive failures or impossibility of conservative maintenance.	Individualized assessment to preserve tooth structure.	Paula et al. (2025); Moura et al. (2022)

Source: Authors' own work (2026), based on an interpretive synthesis of the selected publications.

The data summarized in Table 3 demonstrate that different clinical manifestations can compromise the longevity of direct restorations, requiring therapeutic decisions appropriate to the severity and extent of each change. The discussion by Paula et al. (2025) highlights the relevance of failures related to adjacent caries and material fracture, while Galvão et al. (2025) identify debonding and fracture among the main complications of the veneers analyzed. Although the studies have different subjects and methodologies, their results converge regarding the importance of structural integrity and restorative interface stability. Clinical success should therefore be assessed by considering not only the physical presence of the restoration but also its functional, biological, and aesthetic conditions during follow-up.

The possibility of conservative repairs makes an important contribution to dental practice, particularly given the need to avoid unnecessary replacements. Complete restoration removal may increase tooth structure loss and the complexity of future interventions, especially when repeated procedures are performed throughout the patient's life. In this context, Paula et al. (2025) discuss repair as an alternative for extending restorative function. This perspective can be related to the conservative principles addressed by Mendes et al. (2025), since both studies enable discussion of the importance of structural preservation. However, repair is not a universal solution, and situations in which complete replacement is the most clinically appropriate alternative must be recognized.

Overall, discussion of the selected studies shows that the longevity of direct composite resin restorations results from a multifactorial process involving technical, material, clinical, and behavioral aspects. The analysis by Paula et al. (2025) emphasizes material- and technique-related factors in posterior teeth, while Galvão et al. (2025) present evidence on the survival of direct and indirect veneers in anterior teeth. Souza et al. (2022) and Teixeira et al. (2022) contribute to the discussion of anterior restoration follow-up, whereas Mendes et al. (2025) broaden consideration of conservative strategies. Thus, the different approaches in the literature demonstrate that restorative success cannot be attributed to a single factor and requires integration of clinical planning, technical execution, and preventive maintenance.

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Finally, it must be recognized that the diversity of methodological designs in the publications limits direct comparison of results. The bibliographic set includes literature reviews, a systematic review, clinical studies, and case reports, which have different objectives and levels of scientific evidence. Furthermore, the studies address distinct restorative situations, such as anterior aesthetic veneers, posterior restorations, and dental rehabilitation procedures, making it difficult to define a single estimate of clinical longevity applicable to all cases. The systematic review by Galvão et al. (2025) itself identified substantial methodological heterogeneity among included studies, preventing pooled quantitative analysis. The results of this narrative review should therefore be interpreted as a qualitative synthesis of factors associated with restorative success, without establishing definitive causal relationships or general survival percentages.

3.4 The importance of clinical follow-up and preventive maintenance for the longevity of composite resin restorations

Periodic clinical follow-up is one of the main factors related to maintaining the quality and longevity of direct composite resin restorations, since their performance may change because of functional and biological conditions in the oral cavity. Regular dental assessment enables early identification of signs of wear, marginal changes, staining, small fractures, and possible adhesive interface compromise, supporting conservative interventions. Paula et al. (2025) address the longevity of direct restorations in posterior teeth, helping explain the importance of evaluating factors associated with restorative failures. In this context, continuous monitoring of clinical conditions may help preserve restorative function and reduce the need for more extensive restorative procedures.

Preventive maintenance is also related to the possibility of less invasive interventions, especially when restorative changes are identified at early stages. Procedures such as additional finishing, repolishing, occlusal adjustments, and localized repairs may be alternatives to complete replacement, provided the extent of compromise allows preservation of the existing restoration. By addressing biomimetic strategies in direct composite resin restorations, Mendes et al. (2025) present a perspective based on recovering the natural characteristics of teeth. This approach can be related to the principles of structural conservation guiding contemporary restorative procedures. Clinical maintenance should therefore consider not only recovery of aesthetic appearance but also preservation of tooth structure and treatment function.

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In anterior teeth, periodic follow-up is particularly important because of aesthetic demands related to color, gloss, surface texture, and visual integration of restorations with adjacent dental tissues. Changes in these characteristics can compromise patient satisfaction even when the restoration remains functionally acceptable. Souza et al. (2022) address the long-term survival of anterior composite resin restorations, while Teixeira et al. (2022) discuss the longevity of rehabilitative treatments with direct and indirect veneers. The relationship between these publications highlights the need for evaluations that simultaneously encompass aesthetic, functional, and biological criteria. Maintaining restoration appearance should therefore be accompanied by verification of marginal integrity, strength, and adaptation to dental tissues, avoiding aesthetic assessment as the sole measure of clinical success.

In posterior teeth, preventive maintenance has particularities related to the intensity of masticatory forces, restoration extent, and patients' occlusal conditions. Premature contacts, functional overload, and parafunctional habits may promote wear and fractures, making individualized assessment of restorative function necessary. Santos and Vieira (2026) address the clinical longevity of direct composite resin restorations in posterior teeth, while Paula et al. (2025) discuss factors associated with their durability. Joint analysis of these topics demonstrates that functional stability should be considered throughout dental follow-up, since the conditions under which restorations are used may change over time.

Another fundamental aspect concerns patient participation in the care needed to preserve restorative procedures. Maintaining appropriate oral hygiene habits, controlling factors associated with carious lesion development, and attending dental appointments are important measures for preserving oral health and restoration integrity. Santos et al. (2026) discuss indication criteria and factors determining the clinical success of direct composite resin veneers, a topic that connects restorative planning with the conditions required to maintain outcomes. Professional guidance should therefore consider patients' individual needs, promoting better understanding of preventive care and the importance of follow-up after treatment completion.

The quality of maintenance procedures also depends on the dentist's ability to identify changes and establish measures appropriate to clinical needs. Careful assessment of restorative integrity requires knowledge of dental materials, adhesive systems, anatomical characteristics, and conservative intervention options. By addressing the quality of direct composite resin restorations performed by undergraduates at a dental teaching clinic, Vale et al. (2026) present a relevant topic for discussing professional training and the importance of mastering restorative techniques. Improving clinical skills may therefore contribute both to initial procedural

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execution and to recognizing situations requiring maintenance, repair, or restoration replacement.

Furthermore, the choice between restorative maintenance and replacement should be based on assessment of clinical conditions and preservation of remaining tooth structure. Complete restoration replacement may involve additional removal of dental tissues, especially when repeated over the years. For this reason, localized intervention should be considered when conditions are suitable for restoring the integrity and function of the procedure. Lima et al. (2026) discuss criteria for choosing between composite resin and ceramics in aesthetic treatments, while Moura et al. (2022) address the particularities of direct and indirect veneers. Although these studies focus on treatment selection, their topics help explain the need for individualized clinical decisions that consider patient conditions, tooth preservation, and possibilities for maintenance over time.

Finally, analysis of the literature demonstrates that clinical follow-up and preventive maintenance are important components in promoting the longevity of direct composite resin restorations. Their durability should not be regarded exclusively as a result of the technique applied during intervention but as a condition involving periodic assessments, early identification of changes, and adoption of individualized preventive measures. Galvão et al. (2025), in investigating the clinical longevity of direct and indirect composite resin veneers, and Paula et al. (2025), in addressing posterior restoration durability, contribute to discussing the need to consider different clinical performance conditions. Integration of restorative planning, technical execution, patient guidance, and dental follow-up is therefore a relevant approach to promoting functionally, aesthetically, and biologically satisfactory outcomes, helping preserve dental structures and reduce unnecessary restorative interventions.

5. Final considerations

This study provided an understanding that the clinical longevity of direct composite resin restorations is associated with the interaction of different technical, material, clinical, and behavioral factors that directly influence maintenance of restorative outcomes over time. The narrative literature review showed that the success of these procedures does not depend exclusively on the physical and mechanical properties of the materials used but also on the quality of clinical planning, correct execution of restorative techniques, and patients' individual conditions. Appropriate use of adhesive systems, moisture control, efficient light curing, and

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careful finishing and polishing are therefore relevant to preserving marginal integrity, mechanical strength, and aesthetic stability.

The results discussed showed that patients' oral conditions and habits play an important role in the durability of direct restorations, particularly regarding carious lesion risk, parafunctional habits, and appropriate oral hygiene practices. Functional and aesthetic demands were also found to vary according to tooth location, making individualization of anterior and posterior restorative procedures necessary. Material and technique selection should therefore consider anatomical characteristics, the extent of compromised tooth structure, occlusal conditions, and each patient's specific needs, seeking satisfactory outcomes while preserving as much healthy dental tissue as possible.

The analysis also showed that the main complications associated with composite resin restorations involve fractures, marginal changes, loss of retention, material wear, and development of adjacent carious lesions. However, identifying these changes does not necessarily imply complete restoration replacement, since conservative interventions such as localized repairs, adjustments, and repolishing may be viable alternatives when clinically indicated. Periodic dental follow-up is therefore essential for early failure detection and adoption of preventive measures capable of extending restorative function. Nevertheless, the methodological diversity of the studies analyzed limits direct comparison of their conclusions and prevents a single estimate of clinical survival for all restorative modalities.

It is therefore concluded that the success and clinical longevity of direct composite resin restorations depend on an integrated approach based on appropriate material selection, mastery of technical protocols, individualized assessment of oral conditions, and active patient participation in maintaining oral health. The proposed objectives are considered to have been achieved through identification and discussion of the main factors associated with the clinical performance of these restorations, reinforcing the importance of conservative, evidence-based dental practices. Further longitudinal clinical studies with extended follow-up and standardized assessment criteria are recommended to expand knowledge of survival rates, failure mechanisms, and the effectiveness of maintenance strategies. This is expected to contribute to improving restorative management and promoting more durable, functional, and biologically conservative dental treatments.

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