Keywords

Stomatology; Prosthodontics; Digital dentistry; Dental implants; Clinical outcomes; Minimally invasive dentistry

Authors

[1]Akhatov Vokhidjon Asatullayevich,
[1]First-year clinical resident at Asia International University, 74, Gijduvanskaya str, Bukhara city, 200118, Uzbekistan; E-mail: ahatovvohid@gmail.com
https://orcid.org/0009-0008-9270-6022
[2]Saidov Akbar Ahadovich,
[2]Professor of the department of orthopedic dentistry and orthodontics of the Bukhara State Medical Institute, 23, Gijduvanskaya str, Bukhara city, 200118, Uzbekistan; E-mail: akbar_saidov@bsmi.uz
https://orcid.org/0009-0009-7535-9839
[3]Makhsumova Sayyora Sanjarovna,
[3]PhD, assosiate professor, Tashkent state medical university. imahsumova@inbox.ru
[4]Makhmudova Lola,
[4]DSc, associate professor, Faculty and hospital therapy, Bukhara state medical institute, Bukhara Uzbekistan. lolamahmudova21@gmail.com
https://orcid.org/0000-0003-4222-8137
[5]Rustamov Uktam Mardonkulovich,
[5]Director of Strategic Development Meros International Hospital
Uktam.rustamov@gmail.com
https://orcid.org/0009-0003-9218-4379

Received-19-05-2026
Revised-22-06-2026
Accepted-26-06-2026
Doi:10.1922/ejprd.v34i4s.1447



# Advancements in Stomatology: Evaluating the Clinical Outcomes of Contemporary Prosthodontic and Restorative Techniques

**Abstract:**
Stomatology has seen a significant advancement over the past few years, especially in the field of prosthodontic and restorative dentistry whereby technological advancement and the development of materials have seen great enhancement in the treatment outcomes. This is a review of the recent developments in digital dentistry, implant prosthodontics, restorative materials, and minimally invasive procedures, and it is based on their clinical efficacy. The literature search was performed in the best databases such as PubMed, Scopus, Web of Science, and Google Scholar to locate the studies published within the timeframe of 2017-2026. The relevant studies were identified according to the focus on clinical, functional, aesthetic, and biological outcomes. The review emphasises that treatment accuracy, effectiveness, and personalisation have been improved by such means of digital workflows as CAD/CAM systems, intraoral scanning, and additive manufacturing. The development of new implantation procedures and computer-assisted surgery has only increased predictability and success of tooth replacement in the long-term. The recent adhesive systems, nanocomposites, bioactive materials, and minimal invasive techniques have played a part in enhancing durability, aesthetics, and tissue maintenance in restorative dentistry. Modern methods also indicate positive clinical results in terms of survival, functionality, patient satisfaction, and bio-compatibility. Nevertheless, such obstacles as high cost, technical sensitivity, heterogeneity of existing studies, lack of evidence are still of concern. In general, modern restorative and prosthodontic methods are a significant improvement in modern dental care and have great potential for further development due to further innovations, standardisation and patient-oriented clinical practise.

## 1. Introduction

Stomatology where the diagnosis, prevention, and management of the oral and maxillofacial disorders are involved is a field that has experienced significant developments in the past few decades, especially in the realm of prosthodontics and restorative dentistry. These disciplines are essential to the recovery of oral functionality, esthetics and quality of life of the patients, particularly when it comes to tooth loss, compromise of structure, or pathological state. The traditional approaches to prosthodontics and restorative practises used to be based on manual fabrication and conventional materials and had been found to be unpredictable as far as precision, chairside time, and long-term clinical outcomes are concerned.[1,2]

Digital dentistry has brought major changes in the modern clinical practise. Computer-aided design and computer-aided manufacturing (CAD/CAM), intraoral scanners and additive manufacturing are some of the technologies that have increased the accuracy, productivity, and reproducibility of dental restorations. Digital processes allow creating

highly fabricated prostheses with enhanced marginal fit and minimised human error.[3,4] Moreover, models of additive manufacturing, such as three-dimensional (3D) printing, have increased the range of prosthodontics by enabling quicker production of the interim and definitive restorations of similar mechanical qualities as those produced using conventional approaches.[5,6]

Artificial intelligence (AI) also stands as one of the transformative technologies that are coming to dental practise, enhancing the diagnostic accuracy, treatment planning, and predictive analytics.[7,8]

Parallel to the technological innovations, dental biomaterials have been used to enhance clinical outcomes through innovations. Modern restorative materials, such as resin-based composites, zirconia, and lithium disilicate ceramics, have better mechanical strength, improved aesthetics, and biocompatibility than the previous ones.[9] The functional properties of restorative materials have also been improved with the introduction of nanotechnology and bioactive elements, which allow antimicrobial activity, the ability to remineralise, and degradation resistance.[10,11] Also, the creation of adhesions has made the restoration treatment much more durable and marginal, which makes it possible to connect therapeutic methods with minimal intrusion.[12,13]

Another pillar of contemporary prosthodontics is implant dentistry, which provides a stable and reliable long-term outlook to the process of replacing the tooth. The improvements in the design of implants, surface alteration, and surgery procedures have rendered the process of implantation much more successful and acceptable. Computer-guided implant placement methods and protocols of immediate loading have decreased the amount of time spent on treatment and preserved the clinical reliability.[14,15] The benefits of implant-supported prostheses have been shown to have high survival rates and favourable clinical outcomes, which once again contribute to the reason why implant-supported prostheses are considered a standard mode of treatment.[16,17]

Despite these valuable improvements, the clinical effectiveness of modern-day prosthodontic and restorative methods is an important issue to assess the evidence-based practise. Outcome measures that are very important are longevity, functional efficiency, aesthetic satisfaction and biological compatibility. Modern restorative and implant-supported prostheses, when used long-term, have shown positive survival rates, but due to inconsistency in study design, material aspects, and patient issues, a thorough assessment of the existing evidence is essential.[18] Additionally, issues like material wear, technical issues, and technique sensitivity keep affecting the clinical outcome and treatment success.[19]

Moreover, the growing interest in minimal invasive and patient-centred dentistry has transformed treatment philosophies in the modern clinical practice.[12] Alternative methods put a high value on the conservation of natural tooth structure and functional and aesthetic outcomes are improved by using conservative solutions and multifaceted diagnostic devices. The interdisciplinary approach to treatment planning, which is a combination of prosthodontics, restorative dentistry, periodontics, and digital technologies, has provided the opportunity for a more comprehensive and individual approach to the management of care. Moreover, the expectations of patients have also changed and become more aesthetic, durable and time-efficient, which is another factor that leads to further innovation of materials and techniques.[20] Although all these developments have been made, many issues, including the inconsistency of clinician competence, the cost factor, and patient-specific requirements still pose significant challenges to having the best results in the long term implementation of these technologies in normal dental practice.[21]

Considering the high rates of development of stomatology, the synthesis of existing evidence and the assessment of the clinical implications of new technologies and materials are critically needed. The purpose of the review is to give a thorough discussion of the changes in the field of prosthodontic and restorative dentistry, focusing on their clinical performance. Incorporating the results of recent research, this article aims at filling the gap between technological innovation and clinical application thus helping clinicians to provide effective, evidence-based, and patient-centred care.

## 2. Methodology of Review

This extensive literature review was carried out in order to review the current developments in stomatology, particularly, the field of prosthodontic and restorative dentistry and its clinical performance. The search of the electronic databases such as PubMed, Scopus, Web of Science, and Google Scholar was conducted to identify the studies published between 2017 and 2026. The keywords were used in different combinations, prosthodontics, restorative dentistry, dental implants, CAD/CAM, biomaterials and digital dentistry.

Original research, reviews, and meta-analyses, reporting any type of clinical, functional, aesthetic, or biological outcomes related to modern dental techniques, were eligible to be included.[22] Review papers that did not have clinical relevance or outcome measures were eliminated.[23]

The information was retrieved and organised into thematic groups like digital workflows, implant dentistry, biomaterials, and restorative innovations.[24] Because of the heterogeneity of the study designs and assessment procedures, a qualitative synthesis strategy was used. It made it possible to critically compare the methods and materials and outline their performance, strengths, and weaknesses in clinical practise.[12] Figure 1 is used to show sequential development of dental caries with underlying biological processes like formation of acid and demineralisation of the enamel, and then development of clinical lesions of caries. As the disease progresses, it causes structural damage to tooth tissues which eventually require restorative or prophylactic dental procedures. The model emphasises the connection between etiological factors, clinical

outcomes, and treatment needs in the contemporary dental practice.

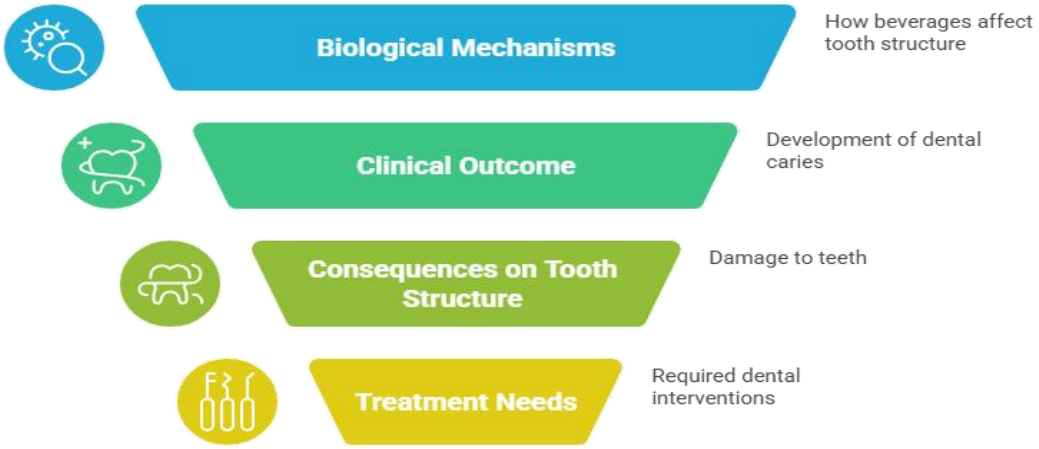


**Figure 1. Progression of Dental Caries: From Biological Mechanisms to Treatment Needs**

## 3. Results of Literature Search and Evidence Synthesis

### 3.1 Overview of Prosthodontic and Restorative Dentistry

Prosthodontic and restorative dentistry are sub-specialities of stomatology concerned with restoration of the oral functions, beauty as well as functioning and structural integrity of dentition. Prosthodontics is concerned mainly with replacement of missing teeth and other related oral structures using fixed, removable or implant-supported prostheses, whereas restorative dentistry focuses on the repair and maintenance of natural teeth that have been lost to caries or trauma, or to wear.

Historically, these disciplines were based on traditional methods of impressions, hand-made production, and materials that had little sustainability and aesthetic opportunities.[18] Nevertheless, improvements in the adhesive systems, biomaterials, as well as digital technologies have brought about a greater precision and results in treatment.[25] The contemporary restorative practice has focused on the least invasive methods that do not affect healthy tooth structure but enhance functional aesthetic outcomes. More so, interdisciplinary treatment planning has facilitated integration of prosthodontics and restorative dentistry thus providing comprehensive treatment to the patient. This synergy contributes to long-term clinical outcomes because it comprises restorative efficacy, prosthetic steadiness and biological compatibility.[21] Prosthodontic and restorative dentistry have complementary functions in restoration and maintenance of oral health, and are demonstrated in Figure 2.

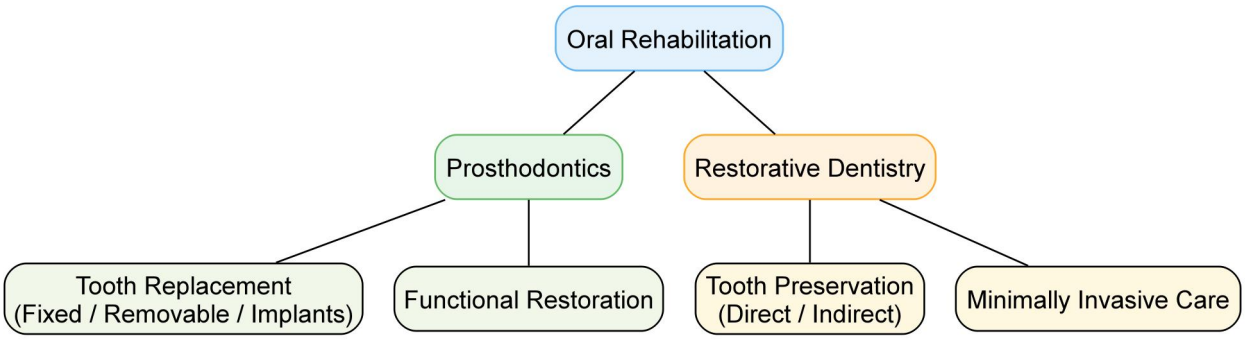


**Figure 2. Relationship Between Prosthodontic and Restorative Dentistry in Oral Rehabilitation**

### 3.2 Contemporary Advancements in Prosthodontics

Contemporary prosthodontics has evolved to a significant level with the introduction of digital technologies and novel biomaterials and new clinical practises. The most recent digital dentistry technique that has revolutionised the processes of the prosthetic industry and made them more precise and faster is computer-aided design and computer-aided manufacturing (CAD/CAM), and there is also the potential of producing a customised restoration.[26] Precision and comfort are also improved with the help of virtual planning and intraoral scanning for the patient.[27]

Improved clinical outcomes have also been achieved as a result of the development of dentistry in implants. The accuracy of the surgical operation and the time to healing are reduced, which makes the treatment more predictable with the help of assisted software in the positioning of implants and an immediate loading regimen.[28] The present reviews also report high survival rates and reduced complications associated with the use of modern implants.[29]

Additionally, high-performance biomaterials, including zirconia and hybrid ceramics, have contributed to the increase in the mechanical strength, wear resistance, and aesthetics of prosthetic restorations.[30,31] Additive manufacturing technologies, such as three-dimensional (3D) printing, have become technologies that have increased the prosthodontic capabilities, allowing the production of prostheses with acceptable mechanical properties within a short period.[32] All these advancements lead to more efficient, less invasive and patient-oriented prosthodontic care. The overview of recent technological and materials innovations is in Table 1.

**Table 1. Advances in Prosthodontic Materials and Technologies**

| Category | Advancement | Clinical Benefit | Reference |
|---|---|---|---|
| Digital dentistry | CAD/CAM systems | High precision | 33 |
| Implantology | Guided implant surgery | Predictability | 15 |
| Biomaterials | Zirconia ceramics | Strength & esthetics | 32 |
| Composites | Nanocomposites | Durability | 9 |
| 3D Printing | Additive manufacturing | Rapid fabrication | 32 |

### 3.3 Advances in Restorative Techniques

Developments in restorative dentistry have greatly enhanced the retention, functionality, and beauty of natural dentition by creating new materials and least invasive techniques.[23] Among the most remarkable developments is adhesive dentistry, where contemporary bonding systems have improved the longevity and marginal integrity of restorations. The advantages of contemporary adhesive approaches are enabling stronger bonding of enamel and dentin and thus the minimisation of microleakage and enhancement of clinical outcomes in the long-term.[12]

Composites made of resin have also developed significantly with the advent of nanocomposites and bulk-fill resin which provide better mechanical strength, wear resistance and less polymerisation shrinkage.[34] These materials allow for easy positioning and achieve aesthetic results similar to the natural tooth structure.[9]

Also, the inclusion of antimicrobial and bioactive ingredients, including nanoparticles and remineralising agents, has improved the functionality of restorative materials by facilitating resistance to secondary caries and promoting tooth remineralisation.[35]

Minimal invasive restorative procedures have also changed the practise of dentistry by focusing on the preservation of healthy tooth structure. Preventive and conservative interventions are performed with the help of techniques like resin infiltration and technologies of early caries detection.[36,37] All these developments lead to longer-lasting, biologically compatible, and patient-centred restorative results. The modern restorative materials such as ceramics, composites, and bioactive systems are categorised in a systematic way according to their composition and clinical use as illustrated in Figure 3.

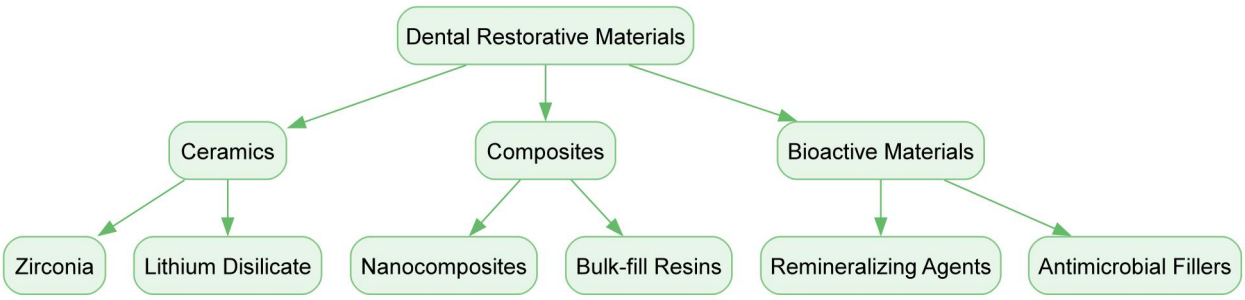


**Figure 3. Classification of Contemporary Dental Restorative Materials**

### 3.4 Digital and Technological Integration

Digital and technological advancements have transformed contemporary prosthodontic and restorative dentistry, promoting the accuracy of diagnosis, treatment planning, and clinical outcomes to a high degree. Intraoral scanners, CAD/CAM systems, and virtual treatment planning are only a few examples of the progress achieved in digital dentistry, which allows obtaining accurate data and optimising workflows.[38] The intraoral scanning has already been used to a great extent to substitute the traditional methods of impressions by providing better patient comfort, fewer mistakes in the procedure, and more precise results in the creation of prostheses.[4]

Computer-aided design and manufacturing (CAD/CAM) technologies are used to promote the production of high-quality restorations at a consistent level of precision. Clinicians can use these systems to digitally design restorations and mill them or additively manufacture them, thus decreasing turnaround time and enhancing clinical predictability.[39] Moreover, additive manufacturing, especially three-dimensional (3D) printing, has broadened the horizons of dentistry by facilitating quick prototyping and printing of intricate prosthetic designs with decent mechanical characteristics.[40]

Artificial intelligence (AI) is a new technology that is set to revolutionise dentistry, especially in diagnostics, radiographic interpretation, and treatment planning.

The analysis of large datasets can be performed by AI-driven systems to identify caries, evaluate bone quality, and predict the outcomes of treatment with high precision, which can be used to support clinical decision-making and eliminate variability related to the operator.[41]

Besides, digital technologies have enabled interdisciplinary collaboration and patient-centred care by enhancing visualisation, simulation, and communication. Virtual smile design and digital mock-ups enable the patient to see the result of the treatment before the intervention, which increases patient satisfaction and informed consent.[42] All in all, the advent of digital and technological innovations has persisted in influencing accuracy, efficiency, and innovation in modern dental practise. Digital technologies in the domain of prosthodontics have a systematic course of work, starting with data collection and ending with the final placement of the prosthesis, as Figure 4 shows.

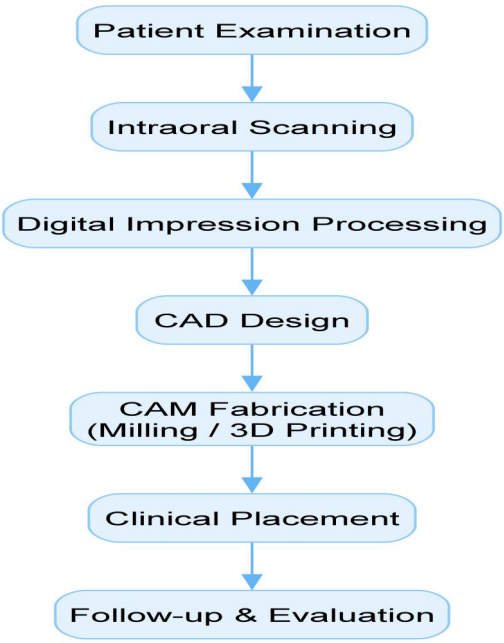


**Figure 4. Digital Workflow in Contemporary Prosthodontics**

### 3.5 Clinical Outcomes of Contemporary Techniques

**The clinical outcome** analysis plays a key role in identifying the effectiveness and the long-term success of modern procedures in prosthodontics and restorations. The current innovations have greatly enhanced the key outcome parameters, such as longevity, functional performance, aesthetic satisfaction, and biological compatibility. According to long-term research, modern restorative materials and prosthetic solutions have a high survival rate, especially when high-grade ceramics and implant-supported restorations are used.[18]

Functionally, better masticatory efficiency and occlusal stability have been attained by using precise fabrication methods and better material properties. Digital workflows and CAD/CAM technologies have a positive impact on the marginal fit and occlusal accuracy, which decreases the risk of mechanical complications, including fractures or debonding. Moreover, the implant-supported prostheses demonstrated predictable functional results, which allow restoring chewing performance and enhancing patient comfort.[43]

Tooth-colored restorative materials, including zirconia and composite resins, which are highly similar to the natural dentition, have also been of great importance in providing aesthetics. These materials offer high translucency, colour stability and surface finish, which leads to increased patient satisfaction and psychosocial well-being.

**The biological outcomes,** such as periodontal health and peri-implant tissue stability, are such important indicators of success of the treatment. Developments in materials and less invasive methods have minimised the effects of inflammatory reactions and enhanced the adhesion of tissues. Nevertheless, there is still a risk of complications (material wear, secondary caries, and peri-implant diseases), which highlights the importance of selecting and maintaining cases correctly.[44] In general, modern methods show positive clinical results, which justifies their extensive use in the modern dental practise. The key clinical outcomes related to modern methods are presented in Table 2.

**Table 2. Clinical Outcomes of Contemporary Prosthodontic and Restorative Techniques**

| Outcome Parameter | Description | Clinical Impact | References |
|---|---|---|---|
| Longevity | Survival rates of restorations | Increased durability | 18 |
| Functional performance | Mastication and occlusion | Improved efficiency | 17 |

| | | | |
|---|---|---|---|
| Aesthetic outcomes | Colour and translucency | Higher satisfaction | 7 |
| Biological response | Tissue compatibility | Reduced inflammation | 19 |
| Mechanical strength | Wear resistance | Lower failure rates | 30 |

### 3.6 Comparative Analysis: Traditional vs Modern Approaches

The shift between the conventional and the modern prosthodontic and restorative methods has greatly contributed to the efficiency of the clinical field, accuracy, and patient outcomes. The traditional methods that are based on manual impressions and control in a laboratory tend to be rather time-consuming, and their results can be erroneous, which can influence the marginal fit of restorations and their durability.[45] On the contrary, contemporary digital workflows combining CAD/CAM systems and intraoral scanners offer high accuracy and reproducibility and decrease the treatment time.[46] The development of materials is also another difference between the modern and the traditional approaches. The previous restorative materials were weak and unattractive, and the modern biomaterials like zirconia, nanocomposites, and hybrid ceramics have better mechanical strength, wear resistance, and natural look.[20] Moreover, the contemporary methods focus on minimally invasive interventions, which do not harm the structure of healthy teeth and encourage long-term biological compatibility.

Clinically, contemporary methods are more predictable and satisfactory to patients because of better functional and aesthetic results. Nevertheless, they can be associated with increased initial expenditures and special training. Nevertheless, contemporary prosthodontic and restorative approaches offer more effective, accurate, and patient-focused treatment than the conventional ones. Despite the benefits of contemporary prosthodontic and restorative treatment, several complications and difficulties remain. Technical problems like fracture of materials, debonding and wear are still a problem especially in resin-based restorations and ceramic prostheses. Also, the digital workflows, being extremely precise, rely on the skills of the operator and calibration of equipment that can lead to errors when mismanaged.

Long-term treatment success is still an issue due to biological complications, such as secondary caries, periodontal inflammation, and peri-implant diseases.[47] Moreover, advanced technologies and materials can be too expensive and unreachable in resource-restricted environments. Digital systems also need clinician training and a learning curve to adopt them. Thus, the selection of cases, the technique, and frequent maintenance are necessary to reduce complications and maximise clinical outcomes. Table 3 provides a comparison between the traditional and modern methods of prosthodontics.

**Table 3. Comparison of Traditional and Contemporary Prosthodontic Techniques**

| Parameter | Traditional Techniques | Contemporary Techniques | References |
|---|---|---|---|
| Impression method | Conventional impressions | Digital intraoral scanning | 4 |
| Fabrication | Manual lab procedures | CAD/CAM workflows | 30 |
| Accuracy | Operator-dependent | High precision | 27 |
| Time efficiency | Multiple visits | Reduced chair time | 12 |
| Materials | Metal-ceramics | Zirconia, hybrid ceramics | 7 |
| Customization | Limited | Highly personalized | 5 |

## 4. Discussion

As noted in the current review, the current developments in prosthodontic and restorative dentistry have profoundly influenced clinical practice by embracing the use of digital technologies, innovative biomaterials and minimally invasive procedures. Precision and reproducibility, as well as efficiency of fabrication of prosthetics, have increased with the introduction of CAD/CAM systems, intraoral scanning, and additive manufacturing and have contributed to better overall predictability of treatment as well as reducing the errors[4] Moreover, the survival rates and long-term stability of implant dentistry have proven to be quite high because of the advances in the design of implants, guided surgical procedures, and immediate loading.[15,16] The development of restorative materials, especially nanocomposites, zirconia, and bioactive systems, has also led to increased mechanical strength, wear stability, and biocompatibility, which result in a greater functional and aesthetic outcome.[9]

Nevertheless, a couple of issues are still present, such as expensive nature of digital technologies, technique sensitivity, and specialised training required, which can restrict the prevalence of such technologies in clinical environments, particularly in resource-scarce environments.[20] Moreover, the differences in the literature related to the study design, outcome measurements, and follow-up years make it challenging to develop uniform clinical guidelines and compare the long-term effectiveness.[22] Biological and technical problems, including peri-implant diseases, restoration failure, and material degradation, still determine long-term success and require special care in selection of cases and maintenance procedures.[19]

The development of new technologies like artificial intelligence is also likely to increase the accuracy of diagnoses, treatment planning, and personalised care, but it also presents ethical issues regarding data privacy, accountability, and clinical decision-making.[41] Thus, the research that needs to be conducted in the future is

high-quality, long-term clinical trials with standardised outcome measures to enhance the evidence-based and facilitate evidence-based clinical decision-making. In general, even modern methods provide significant advances in efficiency, accuracy, and patient satisfaction, but they can only be implemented successfully with a balanced approach incorporating the application of the latest technological advances with the expertise of the clinician and patient-centred care.

### 4.1 Patient-Centred, Ethical, and Regulatory Perspectives

Modern developments in the field of prosthodontic and restorative dentistry have greatly contributed to patient-centred care in terms of quality of life, psychological well-being, and satisfaction with the treatment. Oral functionality and aesthetics restoration is associated with better mastication, speech, and self-confidence, which has a positive impact on social interactions and mental health.[48] Online applications like virtual smile design, CAD/CAM-based restorations also increase patient engagement as they enable visualisation of the treatment results before intervention. Nevertheless, the issues of accessibility and affordability are also crucial, with more complex technologies and implant therapies being more expensive and thus not accessible to everyone.[20]

Ethics and regulations are also crucial in the adoption of new technologies. Artificial intelligence and digital tools are associated with the issues of data privacy, diagnostic accuracy, and clinical accountability. Moreover, it is necessary to follow the requirements of material safety and biocompatibility closely to guarantee patient safety in the long term.[49] Clinical protocols also need to be standardised to ensure consistency and reliability in the outcome of treatment in different clinical settings. In general, innovation and ethical responsibility and patient-centred care are the key to the sustainable development of contemporary dentistry.

\

### 4.2 Clinical Implications and Recommendations

Although there has been significant progress in the field of prosthodontic and restorative dentistry, there are a number of constraints in the existing literature. One of the issues is that no long-term clinical trials are evaluating the sustainability and efficiency of newer materials and digital techniques. The majority of the available research is dedicated to short- to medium-term outcomes, which makes it impossible to make conclusions about long-term success and possible complications. Also, studies are rather heterogeneous in terms of methodologies, sample sizes, materials and evaluation criteria, which makes direct comparisons difficult and limits the generalizability of results. The lack of standardised outcome measures also complicates the comparison of clinical effectiveness in studies.

The clinical implications and recommendations are limited, which underscores the necessity of clear clinical implications and recommendations. The clinicians are to implement evidence-based methods that combine existing studies with clinical and patient-specific variables. Decision-making models may help to choose the right materials and treatment modalities depending on the requirements of a particular case. Moreover, standardised clinical protocols and outcome measures have to be developed and implemented to enhance consistency and reliability of research and practice. The next research directions should be based on the long-term assessment and the high-quality clinical trials to enhance the evidence base and inform the best treatment approaches in contemporary dentistry.

## 5. Conclusion

The modern clinical practice has been influenced to a great extent by the advancements in stomatology, especially in the field of prosthodontic and restorative dentistry. Digital technologies, such as CAD/CAM systems, intraoral scanning, and artificial intelligence, have enhanced the accuracy of diagnosis, treatment planning, and accuracy of the prosthetic fabrication. Not only have these innovations improved clinical efficiency, but they have also helped to improve more predictable and patient-specific treatment outcomes. Simultaneously, the creation of new high-technological biomaterials has enhanced the performance of dental restorations in terms of functionality and aesthetics. High-strength ceramics and better resin composites are some of the materials that have been found to be more durable, wear-resistant and biocompatible. The use of implant dentistry has also increased the scope of treatment by offering a reliable and long-term solution to tooth replacement, which improves the functional results and patient satisfaction. Besides, the trend toward minimal intervention and patient-centred practice has facilitated the loss of natural tooth structure, and consequently, achieves excellent aesthetic and functional outcomes. Although these developments have been made, there are still issues of cost, access, technical skills and long-term clinical validation. In general, modern prosthodontic and restorative procedures provide significant clinical and patient care improvements. Further innovation, along with the standardisation of clinical practice and the emphasis on the individualised approach to treatment, is likely to improve the sphere and increase the quality of the contemporary dental care.

## References

1. Mannocci F, Bitter K, Sauro S, Ferrari P, Austin R, Bhuva B. Present status and future directions: The restoration of root filled teeth. Int Endodontic J. 2022 Oct;55(S4):1059–84. doi:10.1111/iej.13796
2. Ferracane JL. A historical perspective on dental composite restorative materials. Journal of Functional Biomaterials. 2024;15(7):173.
3. Basar N, Kulkarni R, Kharsan V, Bala HP. Conservative Correction of Midline Diastema and Anterior Spacing with Lithium-Disilicate Veneers: A Case Report [Internet]. 2025 [cited 2026 Mar 27]. Available from: https://ijbrs.com/wp-content/uploads/2025/08/IJBRS_Vol_1_No_03_2025-4-1.pdf

4. D'Ambrosio F, Giordano F, Sangiovanni G, Di Palo MP, Amato M. Conventional versus digital dental impression techniques: what is the future? An umbrella review. Prosthesis. 2023;5(3):851–75.
5. Jain S, Sayed ME, Shetty M, Alqahtani SM, Al Wadei MHD, Gupta SG, et al. Physical and mechanical properties of 3D-printed provisional crowns and fixed dental prosthesis resins compared to CAD/CAM milled and conventional provisional resins: A systematic review and meta-analysis. Polymers. 2022;14(13):2691.
6. Pantea M, Ciocoiu RC, Greabu M, Ripszky Totan A, Imre M, Țâncu AMC, et al. Compressive and flexural strength of 3D-printed and conventional resins designated for interim fixed dental prostheses: An in vitro comparison. Materials. 2022;15(9):3075.
7. Sen N, Us YO. Mechanical and optical properties of monolithic CAD-CAM restorative materials. The Journal of prosthetic dentistry. 2018;119(4):593–9.
8. Schwendicke F, Samek W, Krois J. Artificial Intelligence in Dentistry: Chances and Challenges. J Dent Res. 2020 Jul;99(7):769–74. doi:10.1177/0022034520915714
9. Aminoroaya A, Esmaeely Neisiany R, Nouri Khorasani S, Panahi P, Das O, Ramakrishna S. A Review of Dental Composites: Methods of Characterizations. ACS Biomater Sci Eng. 2020 Jul 13;6(7):3713–44. doi:10.1021/acsbiomaterials.0c00051
10. Dias HB, Bernardi MIB, Bauab TM, Hernandes AC, de Souza Rastelli AN. Titanium dioxide and modified titanium dioxide by silver nanoparticles as an anti biofilm filler content for composite resins. Dental Materials. 2019;35(2):e36–46.
11. Deng J, Ren L, Pan Y, Gao H, Meng X. Antifungal property of acrylic denture soft liner containing silver nanoparticles synthesized in situ. Journal of Dentistry. 2021;106:103589.
12. Cadenaro M, Josic U, Maravić T, Mazzitelli C, Marchesi G, Mancuso E, et al. Progress in Dental Adhesive Materials. J Dent Res. 2023 Mar;102(3):254–62. doi:10.1177/00220345221145673
13. Van Meerbeek B, Yoshihara K, Van Landuyt K, Yoshida Y, Peumans M. From Buonocore's pioneering acid-etch technique to self-adhering restoratives. A status perspective of rapidly advancing dental adhesive technology. Journal of Adhesive Dentistry. 2020;22(1):7–34.
14. Sun C, Zhao J, Liu Z, Tan L, Huang Y, Zhao L, et al. Comparing conventional flap-less immediate implantation and socket-shield technique for esthetic and clinical outcomes: A randomized clinical study. Clinical Oral Implants Res. 2020 Feb;31(2):181–91. doi:10.1111/clr.13554
15. Khaohoen A, Powcharoen W, Sornsuwan T, Chaijareenont P, Rungsiyakull C, Rungsiyakull P. Accuracy of implant placement with computer-aided static, dynamic, and robot-assisted surgery: a systematic review and meta-analysis of clinical trials. BMC Oral Health. 2024 Mar 21;24(1):359. doi:10.1186/s12903-024-04033-y
16. Antonoglou GN, Stavropoulos A, Samara MD, Ioannidis A, Benic GI, Papageorgiou SN, et al. Clinical Performance of Dental Implants Following Sinus Floor Augmentation: A Systematic Review and Meta-Analysis of Clinical Trials with at Least 3 Years of Follow-up. International Journal of Oral & Maxillofacial Implants [Internet]. 2018 [cited 2026 Mar 27];33(3). Available from: https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=08822786&AN=131345177&h=q%2B1Vtr2QJXTapHNeiK%2F%2Fp5WShIOuodcZ7EXF9Dst9R5J7hXNMHyxY81l04o6qWYtECclB7TCnSKrZhg%2Bj5XnMg%3D%3D&crl=c
17. Pjetursson BE, Valente NA, Strasding M, Zwahlen M, Liu S, Sailer I. A systematic review of the survival and complication rates of zirconia-ceramic and metal-ceramic single crowns. Clinical Oral Implants Res. 2018 Oct;29(S16):199–214. doi:10.1111/clr.13306
18. Fotiadou C, Manhart J, Diegritz C, Folwaczny M, Hickel R, Frasheri I. Longevity of lithium disilicate indirect restorations in posterior teeth prepared by undergraduate students: A retrospective study up to 8.5 years. Journal of Dentistry. 2021;105:103569.
19. Wierichs RJ, Kramer EJ, Meyer-Lueckel H. Risk Factors for Failure of Direct Restorations in General Dental Practices. J Dent Res. 2020 Aug;99(9):1039–46. doi:10.1177/0022034520924390
20. Teusner D, Ju X, Brennan D. Dental responsibility loadings and the relative value of dental services. Australian Dental Journal. 2017 Sep;62(3):372–7. doi:10.1111/adj.12515
21. Zafar MS, Amin F, Fareed MA, Ghabbani H, Riaz S, Khurshid Z, et al. Biomimetic aspects of restorative dentistry biomaterials. Biomimetics. 2020;5(3):34.
22. Sailer I, Barbato L, Mojon P, Pagliaro U, Serni L, Karasan D, et al. Single and partial tooth replacement with fixed dental prostheses supported by dental implants: A systematic review of outcomes and outcome measures used in clinical trials in the last 10 years. Clinical Oral Implants Res. 2023 May;34(S25):22–37. doi:10.1111/clr.13926
23. Hazrati E, Eftekhar SP, Mosaed R, Shiralizadeh Dini S, Namazi M. Understanding the kynurenine pathway: A narrative review on its impact across chronic pain conditions. Mol Pain. 2024 Jan;20:17448069241275097. doi:10.1177/17448069241275097
24. Mannocci F, Bitter K, Sauro S, Ferrari P, Austin R, Bhuva B. Present status and future directions: The restoration of root filled teeth. Int Endodontic J. 2022 Oct;55(S4):1059–84. doi:10.1111/iej.13796
25. Ferracane JL. A historical perspective on dental composite restorative materials. Journal of Functional Biomaterials. 2024;15(7):173.
26. Joda T, Ferrari M, Gallucci GO, Wittneben J, Brägger U. Digital technology in fixed implant prosthodontics. Periodontology 2000. 2017 Feb;73(1):178–92. doi:10.1111/prd.12164
27. Mangano F, Gandolfi A, Luongo G, Logozzo S. Intraoral scanners in dentistry: a review of the

current literature. BMC Oral Health. 2017 Dec;17(1):149. doi:10.1186/s12903-017-0442-x
28. Soegiantho P, Suryawinata PG, Tran W, Kujan O, Koyi B, Khzam N, et al. Survival of single immediate implants and reasons for loss: a systematic review. Prosthesis. 2023;5(2):378–424.
29. Thanissorn C, Guo J, Jing Ying Chan D, Koyi B, Kujan O, Khzam N, et al. Success rates and complications associated with single immediate implants: a systematic review. Dentistry Journal. 2022;10(2):31.
30. Skorulska A, Piszko P, Rybak Z, Szymonowicz M, Dobrzyński M. Review on polymer, ceramic and composite materials for cad/cam indirect restorations in dentistry—Application, mechanical characteristics and comparison. Materials. 2021;14(7):1592.
31. Zhang Y, Lawn BR. Evaluating dental zirconia. Dental Materials. 2019;35(1):15–23.
32. Alkhateeb RI, Algaoud HS, Aldamanhori RB, Alshubaili RR, Alalawi H, Gad MM. Fracture load of 3D-printed interim three-unit fixed dental prostheses: Impact of printing orientation and post-curing time. Polymers. 2023;15(7):1737.
33. Alenezi A, Alsweed M, Alsidrani S, Chrcanovic BR. Long-term survival and complication rates of porcelain laminate veneers in clinical studies: a systematic review. Journal of clinical medicine. 2021;10(5):1074.
34. Javaid M, Haleem A. Current status and applications of additive manufacturing in dentistry: A literature-based review. Journal of oral biology and craniofacial research. 2019;9(3):179–85.
35. Fan M, Zhang M, Xu HH, Tao S, Yu Z, Yang J, et al. Remineralization effectiveness of the PAMAM dendrimer with different terminal groups on artificial initial enamel caries in vitro. Dental materials. 2020;36(2):210–20.
36. Enan ET, Aref NS, Hammad SM. Resistance of resin-infiltrated enamel to surface changes in response to acidic challenge. J Esthet Restor Dent. 2019 Jul;31(4):353–8. doi:10.1111/jerd.12471
37. Elhennawy K, Askar H, Jost-Brinkmann PG, Reda S, Al-Abdi A, Paris S, et al. In vitro performance of the DIAGNOcam for detecting proximal carious lesions adjacent to composite restorations. Journal of dentistry. 2018;72:39–43.
38. Dorozhkin SV. Dental applications of calcium orthophosphates (CaPO4). J Dent Res. 2019;1(2):1007.
39. Basar N, Kulkarni R, Kharsan V, Bala HP. Conservative Correction of Midline Diastema and Anterior Spacing with Lithium-Disilicate Veneers: A Case Report [Internet]. 2025 [cited 2026 Mar 27]. Available from: https://ijbrs.com/wp-content/uploads/2025/08/IJBRS_Vol_1_No_03_2025-4-1.pdf
40. Revilla-León M, Özcan M. Additive Manufacturing Technologies Used for Processing Polymers: Current Status and Potential Application in Prosthetic Dentistry. Journal of Prosthodontics. 2019 Feb;28(2):146–58. doi:10.1111/jopr.12801
41. Yeslam HE, von Maltzahn NF, Nassar HM. Revolutionizing CAD/CAM-based restorative dental processes and materials with artificial intelligence: A concise narrative review. PeerJ. 2024;12:e17793.
42. Ichikawa T. JPS drives prosthodontics with pride and responsibility. journal of prosthodontic research. 2017;61(4):351–2.
43. Piszczatowska K, Czerwaty K, Cyran AM, Fiedler M, Ludwig N, Brzost J, et al. The emerging role of small extracellular vesicles in inflammatory airway diseases. Diagnostics. 2021;11(2):222.
44. Walton TR, Layton DM. Intra- and inter-examiner agreement when assessing radiographic implant bone levels: Differences related to brightness, accuracy, participant demographics and implant characteristics. Clinical Oral Implants Res. 2018 Jul;29(7):756–71. doi:10.1111/clr.13290
45. Alharmoodi R, Al-Salehi S. Assessment of the quality of endodontic re-treatment and changes in periapical status on a postgraduate endodontic clinic. Journal of Dentistry. 2020;92:103261.
46. Yabul A, Dayan C, Geckili O, Bilhan H, Tuncer N. Evaluation of volumetric wear of abutments on the retention loss of ball attachment systems in implant-retained overdentures: An in vitro study. Clin Implant Dent Rel Res. 2018 Oct;20(5):778–84. doi:10.1111/cid.12644
47. Rabbani Arshad S, Zoljanahi Oskui I, Hashemi A. Thermal Analysis of Dental Implants in Mandibular Premolar Region: 3D FEM Study. Journal of Prosthodontics. 2018 Mar;27(3):284–9. doi:10.1111/jopr.12486
48. Revilla-León M, Sadeghpour M, Özcan M. A Review of the Applications of Additive Manufacturing Technologies Used to Fabricate Metals in Implant Dentistry. Journal of Prosthodontics. 2020 Aug;29(7):579–93. doi:10.1111/jopr.13212
49. Zhang Y, Kelly JR. Dental ceramics for restoration and metal-veneering. Dental Clinics of North America. 2017;61(4):797.