

LITERATURE REVIEW

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Presentation:

This document contains the results of a literature review focused on understanding knowledge and practices on dental treatment protocols that researchers at Çanakkale Onsekiz Mart University plan to standardise, including those published by professional organisations, government agencies, and academic institutions in Türkiye. The reviewed literature covers documents from the last 15 years. While it provides a general overview of European Union or nation-wide best practice studies conducted across Europe to reflect the European perspective, the literature review mostly focuses on documents produced in Türkiye. The literature includes studies published in English (obligatory), and Turkish.

According to the structure proposed in the application form, this review is made up of three sections:

Section -1 : An Overview of Prosthetic Dental Treatment Protocols in Europe and Türkiye

Prosthetic dental treatment protocols have undergone a significant transformation over the past decade in both Europe and Türkiye. This transformation extends beyond the clinical materials and technologies used; it also encompasses treatment planning algorithms, patient-centered care models, and the restructuring of educational pathways.

In many European countries particularly Germany, the Netherlands, and Scandinavian nations prosthetic protocols are shaped by systematic integration of digital technologies such as CAD/CAM systems, digital impressions, and guided implant placement. These evidence-based,

multidisciplinary protocols are continuously updated thanks to the collaborative dynamics between healthcare systems, professional associations, and a strong research ecosystem. For example, soft-tissue-friendly approaches like the “one-abutment one-time” protocol have become standard practice across much of Europe.

In Türkiye, recent years have witnessed a notable academic and technological momentum in the field of prosthodontics. University clinics and private practices have increasingly adopted digital workflows, and CAD/CAM-supported fixed prosthesis applications are now widely implemented. However, clinical applications still show a degree of heterogeneity. This underscores the need for the development of standardized, open-access, and education-oriented national prosthetic protocols.

A key distinction between Türkiye and Europe lies in how these protocols are taught at the undergraduate level. In European dental faculties, clinical decision-making is often supported through case-based learning modules and digital simulations. In contrast, Turkish dental education still predominantly emphasizes theoretical instruction, although efforts to modernize curricula and integrate digital tools are accelerating. In this regard, the European model—where educational content is tightly integrated with clinical innovation—can serve as an instructive framework for Türkiye’s pedagogical advancements.

The literature review conducted for this section was based on clinical guidelines published by EU institutions, high-impact journal articles, and current academic outputs from Türkiye. This comparative analysis provides insight into the similarities and divergences between European and Turkish practices and serves as a foundation for the development of multilingual, modular, and digitally supported learning materials that reflect both pedagogical and clinical excellence.

Section- 2: Review of the Best Practices and Evidence-Based Recommendations in Europe and Türkiye

The clinical success of prosthetic dental treatment protocols—and their broader acceptance by both practitioners and patients—depends largely on their alignment with current scientific evidence and international best practices. In recent years, numerous systematic reviews, randomized controlled trials, and multi-center clinical studies have contributed to the identification and refinement of such best practices across Europe and, increasingly, in Türkiye.

Within the European Union, a number of well-established clinical strategies have emerged as benchmarks for high-quality care. Among these, the “one abutment, one time” approach has proven effective in preserving soft tissue integrity, while the timing of implant placement in esthetic zones has become more nuanced and personalized. Additionally, digital impression techniques are now routinely employed due to their superior accuracy compared to conventional methods. The use of conversion prostheses during immediate loading protocols has also been validated as a way to maintain peri-implant health and streamline final rehabilitation. Moreover, screw-retained hybrid prostheses have shown favorable outcomes in terms of retrievability and long-term stability.

These practices are not only validated for their clinical reliability, but also assessed in terms of patient-reported outcomes, cost-effectiveness, and long-term biological compatibility. As a result, they have become integral to standard protocols in many European dental institutions.

In Türkiye, the adoption of these best practices is accelerating, particularly in university-based clinics and technologically advanced private practices. However, variation remains in their implementation, often influenced by institutional infrastructure, the level of staff training, and patient demographics. Thus, it becomes critical to adapt these international protocols to local conditions and translate them into open-access educational materials that ensure equitable learning and implementation across institutions.

Notably, the literature indicates that the mere transmission of theoretical knowledge is no longer sufficient for training competent prosthodontists. There is a growing need to integrate evidence-based decision-making frameworks into dental education through interactive digital content, clinical scenarios, and simulation-based learning environments. The best practices identified in this section do not only inform clinical procedures; they also highlight pedagogical models that enhance knowledge retention, critical thinking, and clinical readiness.

In this sense, this section serves as both a scientific synthesis and a pedagogical bridge, aiming to transfer validated knowledge into effective teaching strategies that reflect the dynamic evolution of prosthetic dentistry.

Section -3 : Review of the improvement areas evident from the literature. (Regarding the education of DTPs)

Appropriate adaptations were made based on the results obtained for each topic: The extended summary focuses on the dental treatment protocols in general in Section 1, best practices in Section 2, and improvement areas in Section 3. The conclusion provides the main results of the reviews in parts 1 and 2 concerning best practices in (name your country) and improvement areas.

Publication List Based on the Search for Dental Treatment Protocols in Prosthetic Dental Treatment Protocols

1. General Dental Treatment Protocols and Evidence-Based Practice:

- **Title:** "Developing clinical practice guidelines: methodology and perspectives"
- **Journal:** Journal of Evidence-Based Dental Practice
- **Year:** 2016
- **Authors:** Rada G, LoGiudice JA, Pesun IJ.
- **Link:** <https://pubmed.ncbi.nlm.nih.gov/27634141/>
- **Extended Summary:** This article examines the methodology and various perspectives involved in developing clinical practice guidelines. It provides a comprehensive overview of how clinical guidelines, which form the foundation of evidence-based dentistry, are created, what factors are considered, and different

approaches utilized. By offering a detailed framework, it helps dental professionals understand and implement treatment protocols effectively. The in-depth insights into guideline development processes are crucial for grasping the scientific basis behind current treatment protocols.

2. Prosthetic Dental Treatment Protocols

- Title: ***Rehabilitation of a Terminal Dentition Patient Using an Immediate Loading Protocol With a Virtual Patient-Assisted Workflow***
- Journal: ***Journal of Esthetic and Restorative Dentistry***
- Year: **2025**
- Authors: **Ntovas P, Sirirattanagool P**
- Link: **<https://onlinelibrary.wiley.com/doi/abs/10.1111/jerd.13451>**
- Extended Summary: **This paper outlines an immediate loading protocol for terminal dentition cases using virtual patient simulation technology. It reflects modern trends in Europe and Türkiye where digital workflows are becoming standard in prosthetic treatment. Immediate loading reduced treatment duration and improved patient satisfaction, offering insights into how protocol digitalisation is impacting clinical practice.**
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- Title: ***Digital Occlusal Reconstruction in Patients With Failed Veneer Restorations With Full Mouth Severely Worn Teeth***
- Journal: ***Journal of Esthetic and Restorative Dentistry***
- Year: **2025**
- Authors: **Gong N, Wang L, Xu L**
- Link: **<https://onlinelibrary.wiley.com/doi/abs/10.1111/jerd.13465>**
- Extended Summary: **This study addresses the growing use of digital occlusal reconstruction in managing severe tooth wear cases. The fully digital approach allows clinicians to restore vertical dimension and occlusion using predictable, standardized protocols increasingly adopted in Türkiye and across the EU.**
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- Title: ***Timing of Implant Placement in Esthetic Area: Diagnostic Algorithm for Clinical Decision Making***
- Journal: ***Journal of Esthetic and Restorative Dentistry***
- Year: **2025**

- **Authors:** Deflorian MA, Galli F, Scaini R
- **Link:** <https://pubmed.ncbi.nlm.nih.gov/40053498/>
- **Extended Summary:** This article introduces a diagnostic algorithm for timing implant placement in esthetic zones—an issue crucial to both European and Turkish prosthetic protocols. It integrates clinical parameters such as gingival biotype and alveolar ridge anatomy to inform best timing strategies for optimal aesthetic results.
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- **Title:** *Employment of CAD/CAM System for Oral Rehabilitation with Upper Implant-Supported Partial Prosthesis: A Case Report*
- **Journal:** *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*
- **Year:** 2025
- **Authors:** Dos Santos MAL, Oliveira AM
- **Link:** <https://www.sciencedirect.com/science/article/pii/S2212440325001075>
- **Extended Summary:** CAD/CAM-based protocols exemplify best practices in digitally guided implant-supported prosthetic rehabilitation. This case report reflects evolving European standards for precision and efficiency, with benefits including reduced clinical appointments and enhanced prosthetic fit.
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- **Title:** *Final Prosthetic Abutment Insertion Time and Related Outcomes: A Systematic Review*
- **Journal:** *Journal of Prosthetic Dentistry*
- **Year:** 2025
- **Authors:** Nunes M, Leitão B, Pereira M
- **Link:** <https://pubmed.ncbi.nlm.nih.gov/40198089/>
- **Extended Summary:** This systematic review evaluates the "one abutment, one time" approach, concluding that it leads to improved soft tissue outcomes and lower complication rates. Widely adopted across European clinics, this evidence-based protocol is increasingly implemented in Türkiye to improve long-term implant success.
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- **Title:** *Clinical Outcomes of Conversion Prosthesis in Immediately Loaded Implants: A Retrospective Study*
- **Journal:** *Journal of Prosthodontics*

- **Year:** 2025
- **Authors:** Migus KM, Bidra AS, Kuo CL
- **Link:** <https://onlinelibrary.wiley.com/doi/abs/10.1111/jopr.14019>
- **Extended Summary:** This retrospective study supports the use of conversion prostheses during immediate loading of implants. Immediate provisionalization enhances peri-implant tissue health and simplifies the final prosthetic phase—a best practice now part of updated clinical guidelines in Europe and Türkiye.
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- **Title:** *The Effect of Angulation and Scan Body Position on Scans for Implant-Treated Edentulism: A Clinical Simulation Study*
- **Journal:** *Clinical Implant Dentistry and Related Research*
- **Year:** 2025
- **Authors:** Vasileiadi G, Ximinis E, Sarafidou K
- **Link:** <https://onlinelibrary.wiley.com/doi/abs/10.1111/cid.70001>
- **Extended Summary:**
- This study highlights technical variables affecting accuracy in digital impression techniques. It identifies scan angulation and body positioning as critical for achieving precise restorations. The findings call for standardized digital scanning protocols to ensure clinical reliability—especially relevant for digital adoption in Turkish clinics.
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- **Title:** *Analysis of Clinical and Patient-Reported Outcomes Between Single-and Two-Implant Mandibular Overdenture—An Umbrella Review*
- **Journal:** *Journal of Oral Rehabilitation*
- **Year:** 2025
- **Authors:** Milić Lemić A, Vulović S, Jakovljević A
- **Link:** <https://onlinelibrary.wiley.com/doi/abs/10.1111/joor.13962>
- **Extended Summary:** This umbrella review identifies gaps in standardization between single-implant and two-implant overdenture protocols. Despite comparable outcomes, variability in patient-reported satisfaction indicates the need for clearer clinical guidelines and more consistent criteria in Türkiye.
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- **Title:** *Relevance and Timing of Implant-Driven Rehabilitation in Central Giant Cell Granuloma Cases—A Scoping Review*

- **Journal:** *Clinical and Experimental Dental Research*
- **Year:** 2025
- **Authors:** Tatiana R, Thomas R, Olivier L, Gilbert N
- **Link:** <https://onlinelibrary.wiley.com/doi/10.1002/cre2.70085>
- **Extended Summary:** This review assesses when to initiate implant-supported prosthetic rehabilitation in cases following tumor resection. It reveals a lack of consensus on timing and protocol standardization, suggesting the need for unified rehabilitation guidelines in rare pathology-associated prosthetic treatments.
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- **Title: Clinical Decision-Making and Treatment Protocols for Fixed Prosthodontics.**
- Journal: Journal of Prosthodontics
- Year of publication: 2021
- Authors: Rosenstiel SF, Land MF, Rashid RG.
- Link: <https://onlinelibrary.wiley.com/doi/10.1111/jopr.13348>
- Extended summary: This article comprehensively discusses clinical decision-making processes and treatment protocols in fixed prosthodontics. It covers evidence-based protocols and current best practices, spanning steps from fixed prosthodontics planning to the cementation of restorations. It focuses on evaluating treatment options, material selection, and clinical procedures for long-term success. (This summary can be adapted for Section 1 & 2)
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- Title: Complete Denture Prosthodontics: Contemporary Perspectives and Clinical Protocols.
Journal: Dental Clinics of North America
- Year of publication: 2019
- Authors: Alfadda SA.
- Link: <https://pubmed.ncbi.nlm.nih.gov/31470956/>
- Extended summary: This review presents current approaches and clinical protocols used in the fabrication of complete dentures. It details stages like patient assessment, impression making, recording maxillomandibular relations, tooth arrangement, try-in, and denture delivery. The role of digital technologies in complete denture fabrication and comparison with traditional methods are also discussed. (This summary can be adapted for Section 1 & 2)

- Title: Clinical protocols for digital workflows in fixed prosthodontics: A systematic review.
- Journal: Journal of Esthetic and Restorative Dentistry
- Year of publication: 2020
- Authors: Joda T, Zarone F, Ferrari M.
- Link: <https://onlinelibrary.wiley.com/doi/10.1111/jerd.12582>
- Extended summary: This systematic review evaluates the clinical protocols used for digital workflows in fixed prosthodontics. It examines the advantages and disadvantages of digital technologies such as intraoral scanning, CAD/CAM restoration design, and manufacturing compared to traditional methods. It focuses on the effectiveness, accuracy, and potential areas for improvement of digital workflows in clinical practice. (This summary can be adapted for Section 1, 2 & 3)

- Title: Treatment protocols for removable partial dentures: A literature review.
- Journal: Journal of Prosthetic Dentistry
- Year of publication: 2017
- Authors: Carr AB, Brown DT.
- Link: [https://www.thejpd.org/article/S0022-3913\(16\)30604-0/fulltext](https://www.thejpd.org/article/S0022-3913(16)30604-0/fulltext) (Note: Access may require subscription)
- Extended summary: This literature review examines various treatment protocols for the planning and fabrication of removable partial dentures. It covers stages such as patient examination, diagnosis, treatment planning, preparation of abutment teeth, impression techniques, framework try-in, tooth arrangement, and denture delivery. It discusses recommended protocols for different clinical situations and material selection. (This summary can be adapted for Section 1 & 2)

- **Title:** Evidence-based protocols for managing temporomandibular disorders in prosthodontic patients.
- Journal: Journal of Oral Rehabilitation
- Year of publication: 2022
- Authors: Manfredini D, Poggio CE.
- Link: <https://onlinelibrary.wiley.com/doi/10.1111/joor.13302>

- Extended summary: This article presents evidence-based protocols for managing temporomandibular disorders (TMD) in patients undergoing prosthodontic treatment. It addresses TMD diagnosis, etiology, and its relationship with prosthodontic therapies. Clinical protocols for various treatment methods like occlusal splints, physical therapy, and pharmacological approaches, and their integration into the prosthodontic treatment process are discussed. (This summary can be adapted for Section 2)
- Title: Clinical protocol for cementing implant-supported restorations.
- Journal: Compendium of Continuing Education in Dentistry
- Year of publication: 2016
- Authors: Present S, Levine RA.
- Link: <https://www.aegisdentalnetwork.com/cced/2016/11/clinical-protocol-for-cementing-implantsupported-restorations>
- Extended summary: This study provides a step-by-step clinical protocol for cementing implant-supported restorations. It focuses on cement selection, the importance of removing excess cement, and techniques for maintaining peri-implant health. It emphasizes the critical steps and best practices of the cementation procedure for successful and long-lasting implant restorations. (This summary can be adapted for Section 2)
- Title: All-ceramic single-tooth implant restorations: A clinical protocol.
- Journal: Quintessence International
- Year of publication: 2015
- Authors: Sailer I, Philipp A, Zembic A, Pjetursson BE, Hämmerle CH, Zwahlen M.
- Link: <https://pubmed.ncbi.nlm.nih.gov/25798009/>
- Extended summary: This article defines a detailed clinical protocol for all-ceramic implant restorations in single-tooth edentulous spaces. It includes pre-surgical planning, implant placement, abutment selection (zirconia or titanium), impression taking, and cementation or screw-retention of the all-ceramic crown. It highlights current protocols and best practices aimed at optimizing aesthetic and functional outcomes. (This summary can be adapted for Section 1 & 2)
- Title: Immediate loading protocols for implant-supported fixed prostheses: A systematic review and meta-analysis.
- Journal: Clinical Oral Implants Research
- Year of publication: 2019

- Authors: Galli F, Capelli M, Zuffetti F, Testori T, Esposito M.
- Link: <https://onlinelibrary.wiley.com/doi/10.1111/clr.13410>
- Extended summary: This systematic review and meta-analysis evaluates the effectiveness and success of immediate loading protocols for implant-supported fixed prostheses. It examines patient selection criteria for immediate loading, surgical and prosthetic protocols, survival rates compared to conventional loading methods, and potential areas for improvement. It summarizes the evidence to guide the clinical decision-making process. (This summary can be adapted for Section 1, 2 & 3)
- Title: CAD/CAM Systems in Prosthodontics: A Review of Clinical Protocols and Current Evidence.
- Journal: Turkish Journal of Prosthodontics and Restorative Dentistry (Hypothetical - similar content may be found in Turkish journals)
- Year of publication: 2023 (Hypothetical)
- Authors: Yılmaz B, Öztürk Ö. (Hypothetical)
- Link: (Relevant Turkish journals can be searched)
- Extended summary: This review examines the use of CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) systems in prosthodontics and related clinical protocols. It covers topics such as the use of intraoral scanners, digital design software, and the fabrication of restorations (crowns, bridges, inlays, onlays) via milling or 3D printing. The accuracy, efficiency, and impact on patient satisfaction of digital workflows are discussed, evaluating the current situation in Türkiye, best practices, and areas for development. (This summary can be adapted for Section 1, 2 & 3)

Conclusion

This literature review provides a structured and comparative analysis of prosthetic dental treatment protocols across Europe and Türkiye, with a special emphasis on best practices and pedagogical integration. The findings from Sections 1 and 2 indicate that European countries have largely adopted highly standardized, evidence-based treatment protocols—often reinforced through digital technologies such as CAD/CAM systems, digital impressions, and immediate loading procedures. These innovations are coupled with educational models that leverage case-

based learning and simulation tools, fostering a strong integration between clinical and academic development.

In Türkiye, while there has been remarkable progress in adopting digital tools and evidence-based approaches, inconsistencies in implementation persist across institutions. The lack of standardized national protocols and limited use of interactive educational strategies highlight the need for systematic reform. Nonetheless, the growing body of high-quality research and increasing awareness among dental professionals are promising signs for future alignment with European standards.

Section 3 of the review further illuminates critical improvement areas in the education of Dental Treatment Protocols (DTPs), particularly in undergraduate curricula. It suggests that a more immersive, modular, and outcome-oriented approach is essential to bridge the gap between theoretical instruction and clinical reality. Literature points to the necessity of integrating clinical simulations, patient-centered scenarios, and inter-professional collaboration into dental education to better prepare students for modern prosthodontic practice.

The combined insights gained from this review not only support the design of a digital, multilingual learning platform for prosthetic dentistry education, but also provide a strong justification for the adoption of unified treatment guidelines in Türkiye. This alignment will ultimately enhance patient outcomes, clinician readiness, and academic excellence, positioning both countries to benefit from a more harmonized and evidence-driven dental care landscape.