



# A Call for Reporting Dichotomous Clinical Outcomes in Laser Dentistry Trials to Enhance Evidence-Based Decision Making

Fatemeh Darabi<sup>1</sup> , Masoud Shabani<sup>2\*</sup> 

<sup>1</sup>Department of Public Health, Asadabad School of Medical Sciences, Asadabad, Iran

<sup>2</sup>School of Dentistry, Ardabil University of Medical Sciences, Ardabil, Iran

\*Corresponding Author: Masoud Shabani, Email: [Drshabani1347@gmail.com](mailto:Drshabani1347@gmail.com)

**Citation:** Darabi F, Shabani M. A call for reporting dichotomous clinical outcomes in laser dentistry trials to enhance evidence-based decision making. *J Oral Health Oral Epidemiol* 2026;15:2511.1815. doi:10.34172/johoe.2511.1815

**Received:** November 19, 2025, **Revised:** February 21, 2026, **Accepted:** May 17, 2026, **ePublished:** June 25, 2026

## To the Editor,

The evolution of modern dentistry over the past several decades has been characterized by the emergence of biological therapeutic innovations designed to enhance tissue preservation, stimulate regeneration, and improve long-term clinical outcomes.<sup>1</sup> Technologies such as laser-assisted therapy, biomimetic restorative strategies, bioactive materials, osseous substitution techniques, bone graft-mediated regeneration, and osteoinductive implant systems have fundamentally shifted the focus of dental care from purely mechanical repair toward biological therapeutic models. These approaches aim not only to restore structural integrity but also to support biological healing, improve tissue integration, and optimize functional recovery.<sup>2</sup>

Laser dentistry has become an integral component of minimally invasive dental care, offering advantages including improved surgical precision, enhanced decontamination, reduced postoperative discomfort, and accelerated healing. Systematic reviews evaluating laser-assisted periodontal and surgical therapies have demonstrated improved clinical outcomes compared to conventional approaches, highlighting the growing clinical importance of laser technologies in modern dental practice.<sup>3</sup> Similarly, biomimetic dentistry has emerged as a paradigm emphasizing preservation of natural tooth structure and restoration of biomechanical integrity through biocompatible materials and minimally invasive techniques. These approaches aim to replicate the structural and functional characteristics of natural dental tissues, thereby improving restoration longevity and overall treatment outcomes.<sup>4</sup>

In parallel, bioactive restorative materials have expanded therapeutic capabilities by promoting remineralization,

enhancing biological interaction with dental tissues, and facilitating repair processes. These materials actively participate in biological processes, contributing to dentin regeneration and improving restoration stability.<sup>5</sup> Advances in regenerative dentistry, including osseous substitution and bone grafting procedures, have further enabled reconstruction of deficient alveolar bone and successful implant placement in compromised clinical situations. Regenerative approaches have demonstrated substantial improvements in bone volume, structural stability, and implant success potential, supporting their widespread clinical use.<sup>6</sup>

Osteoinductive implant technologies have further improved implant outcomes by enhancing osseointegration through surface modifications that promote cellular attachment, differentiation, and bone formation. These technologies improve implant stability and integration, contributing to long-term implant survival and clinical success.<sup>6</sup> In addition, contemporary remineralization strategies—including laser-assisted remineralization and bioactive therapeutic approaches—have demonstrated significant potential in improving enamel repair and enhancing mineral recovery, further expanding biological therapeutic options.<sup>7</sup>

Laser technologies have also been applied in the diagnosis and management of oral mucosal disorders, including potentially malignant lesions such as oral leukoplakia. Clinical studies have demonstrated the effectiveness of laser-assisted interventions in lesion management, improving treatment precision and therapeutic outcomes.<sup>8</sup> These advancements collectively illustrate the rapid integration of biological technologies into contemporary dental care and their increasing importance in clinical practice.



Despite the growing adoption of these innovations and the promising outcomes reported in clinical studies and systematic reviews, a critical methodological limitation persists across contemporary dental research: The lack of standardized reporting of dichotomous clinical outcomes. Dichotomous outcomes—defined as binary clinical events such as treatment success or failure, survival or non-survival, integration or non-integration, healing or non-healing, and recurrence or non-recurrence—are fundamental to evidence-based clinical decision making. These binary outcomes allow calculation of the absolute risk reduction, relative risk, odds ratios, and the number needed to treat (NNT), which are essential for evaluating treatment effectiveness and guiding clinical decision-making.<sup>1,2</sup>

In many clinical studies evaluating contemporary dental technologies, investigators primarily report continuous surrogate outcomes such as probing depth reduction, fluorescence measurements, marginal bone loss, or stability indices. While these continuous measures provide valuable biological and mechanical insights, they are not directly translated into clinically meaningful success or failure outcomes. Clinicians must ultimately determine whether a treatment has succeeded or failed, whether regeneration has occurred or not occurred, and whether integration has been achieved or not achieved. Binary outcome measures provide the most clinically relevant information for patient-centered decision making and treatment planning.

This limitation is evident across multiple domains of contemporary dental innovation. Systematic reviews of laser-assisted periodontal therapy have demonstrated improved clinical parameters but often lack clearly defined binary success or failure endpoints, limiting the ability to perform risk-based clinical evaluations.<sup>3</sup> Similarly, biomimetic restorative approaches and bioactive materials have demonstrated promising clinical effectiveness, yet studies frequently emphasize material performance and biological interaction rather than clearly defined restoration survival or failure outcomes.<sup>4,5</sup>

Regenerative bone grafting and osseous substitution procedures have also demonstrated significant clinical benefits; however, many studies focus on radiographic bone gain or volumetric changes without explicitly defining graft success or failure using standardized dichotomous criteria.<sup>6</sup> Implant surface modification studies likewise report improvements in stability and integration parameters but do not consistently provide binary integration or failure outcomes necessary for quantitative clinical risk assessment.<sup>6</sup>

Re-mineralization studies evaluating novel bioactive and laser-assisted therapeutic approaches frequently report changes in fluorescence values or mineral density rather than explicitly defining lesion arrest or progression using binary clinical criteria.<sup>7</sup> Similarly, laser-assisted management of oral leukoplakia and other oral lesions often reports descriptive or continuous outcomes without clearly defining complete resolution versus persistence

or recurrence using standardized dichotomous outcome definitions.<sup>8</sup>

The absence of standardized dichotomous outcome reporting significantly limits the ability to synthesize evidence, perform reliable meta-analyses, and derive clinically meaningful risk estimates. Without binary event data, clinicians cannot accurately determine treatment success probabilities or compare therapeutic effectiveness across different treatment modalities. This limitation reduces the clinical applicability of research findings and weakens the foundation of evidence-based dental care.

Standardized reporting of dichotomous clinical outcomes would substantially enhance research transparency, reproducibility, and clinical relevance. The inclusion of clearly defined binary outcome measures and presentation of the results in 2×2 contingency tables would allow us to calculate the risk measures essential for evidence-based clinical decision making. Such reporting would facilitate systematic reviews, improve meta-analytical accuracy, and strengthen the scientific basis for clinical practice.

We therefore strongly encourage journal editors, peer reviewers, and clinical researchers to adopt standardized reporting of dichotomous clinical outcomes in studies evaluating contemporary dental innovations, including laser-assisted therapies, biomimetic restorative approaches, bioactive materials, regenerative bone grafting, osseous substitution techniques, and osteoinductive implant systems.

As part of our ongoing efforts to advance biological and evidence-based dental care, including laser-assisted therapies, biomimetic restorative protocols, bioactive material applications, regenerative grafting, and implant integration technologies, we are developing clinical protocols aimed at improving treatment predictability and biological outcomes. This study was registered in the Iranian Registry of Clinical Trials (IRCT2013061113639N1), and ethical approval was obtained from the Ethics Committee of Ardabil University of Medical Sciences (ARUMS: Rec.1391.1023).

Improving the reporting of dichotomous clinical outcomes will strengthen the scientific validity of contemporary dental research and enhance clinicians' ability to deliver precise, biologically guided, and evidence-based patient care.

#### Acknowledgments

We appreciate Ardabil University of Medical Sciences for approving and financially supporting this study.

#### Authors' Contribution

Conceptualization: Masoud Shabani  
Data Curation: Masoud Shabani  
Formal Analysis: Masoud Shabani  
Investigation: Masoud Shabani  
Methodology: Masoud Shabani  
Project Administration: Fatemeh Darabi, Masoud Shabani  
Supervision: Fatemeh Darabi, Masoud Shabani  
Software: Masoud Shabani  
Resources: Fatemeh Darabi, Masoud Shabani

Validation: Fatemeh Darabi, Masoud Shabani  
 Visualization: Fatemeh Darabi, Masoud Shabani  
 Writing—original draft: Fatemeh Darabi, Masoud Shabani  
 Writing—review & editing: Fatemeh Darabi, Masoud Shabani

#### Competing Interests

The authors declare that there is no conflict of interest.

#### Data Availability Statement

Data will be available upon request to the corresponding author.

#### Ethical Approval

This study was performed according to the principles of the Declaration of Helsinki (2013 revision, Fortaleza, Brazil). The study was approved by the Ethics Committee of Ardabil University of Medical Sciences (ARUMS: Rec.1391.1023).

#### Funding

Founding for this study was provided by Ardabil University of Medical Sciences (Grant Nos.10506000 and 10503000).

#### References

- Sackett DL. Evidence-based medicine. *Spine (Phila Pa 1976)* 1998;23(10):1085-6. doi:10.1097/00007632-199805150-00001
- Ismail AI, Bader JD. Evidence-based dentistry in clinical practice. *J Am Dent Assoc* 2004;135(1):78-83. doi:10.14219/jada.archive.2004.0024
- Behdin S, Monje A, Lin GH, Edwards B, Othman A, Wang HL. Effectiveness of laser application for periodontal surgical therapy: systematic review and meta-analysis. *J Periodontol* 2015;86(12):1352-63. doi: <https://doi.org/10.1902/jop.2015.150212>
- Singer L, Fouda A, Bourauel C. Biomimetic approaches and materials in restorative and regenerative dentistry: review article. *BMC Oral Health* 2023;23(1):105. doi:10.1186/s12903-023-02808-3
- Abozaid D, Azab A, Bahnsawy MA, Eldebawy M, Ayad A, Soomro R, et al. Bioactive restorative materials in dentistry: a comprehensive review of mechanisms, clinical applications, and future directions. *Odontology* 2026;114(2):349-77. doi:10.1007/s10266-025-01162-w
- Elboraey MO, Alqutaibi AY, Aboalrejal AN, Borzangy S, Zafar MS, Al-Gabri R, et al. Regenerative approaches in alveolar bone augmentation for dental implant placement: Techniques, biomaterials, and clinical decision-making: a comprehensive review. *J Dent* 2025;154:105612. doi:10.1016/j.jdent.2025.105612
- Aras A, Celenk S, Atas O. Comparison of traditional and novel remineralization agents: a laser fluorescence study. *J Oral Health Oral Epidemiol* 2020;9(1):38-44. doi:10.22122/johoe.v9i1.1063
- Larsen MK, Sorensen JA, Godballe C, Thygesen TH. Oral leukoplakia: diagnosis and treatment. *J Oral Health Oral Epidemiol* 2016;5(2):57-69.