



Digital workflow in orofacial harmonization: a systematic review

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ABSTRACT

Introduction: Digital workflow has been progressively incorporated into Orofacial Harmonization with the aim of improving diagnostic accuracy, optimizing treatment planning, and enabling objective assessment of patients' concerns and aesthetic outcomes. The introduction of facial scanners and Artificial Intelligence tools allows the creation of a "3D virtual patient," integrating superficial anatomy with intraoral data and bone imaging. This evolution is crucial to ensure that aesthetic and functional procedures respect individual proportions and overall facial harmony.

Objective: To systematically evaluate the available scientific evidence regarding the application of digital workflow in Orofacial Harmonization, identifying the main technological innovations and their contribution to achieving accurate results.

Methods: A systematic review was conducted according to the PRISMA 2020 guidelines. The search was performed in the PubMed, Scopus, Web of Science, and Cochrane Library databases, including studies and articles published between 2020 and 2025 that focused on technological innovations applied to facial planning. Clinical trials and observational studies related to digital technologies in facial aesthetics were included. Case reports, in vitro studies, and articles lacking a clear methodology were excluded. Two independent reviewers carried out study selection and data extraction, with risk of bias assessment performed according to the methodological design of each study.

Results: A total of 412 records were identified, of which 21 studies met the eligibility criteria. The most commonly used technologies included three-dimensional facial imaging systems, such as facial scanners, and aesthetic simulation software. The main reported benefits were rapid and accurate image capture, elimination of distortions associated with conventional photography, improved detailed analysis of facial proportions, identification of asymmetries, simulation of procedures, and

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longitudinal documentation of treatment progression through volumetric analysis. Artificial Intelligence plays a fundamental role through the automatic recognition of cephalometric landmarks and proportional analysis. Digital analysis of facial expressions assists in determining the correct injection or treatment points, increasing procedural accuracy and minimizing the risk of complications. However, most studies presented small sample sizes, short follow-up periods, and a moderate risk of bias.

Conclusion: Digital workflow demonstrates significant potential to enhance diagnostic accuracy and clinical documentation in Orofacial Harmonization. Facial scanners have multiple applications in Orofacial Harmonization, revolutionizing diagnosis, treatment planning, and outcome monitoring. However, the available scientific evidence is predominantly observational and methodologically limited. Randomized clinical trials with standardized protocols and long-term follow-up are required to strengthen evidence-based practice in this field.
