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Auxiliary diagnostic methods in orthodontics: a cross-sectional study on generational and geographic differences

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ABSTRACT

Introduction: Contemporary orthodontic practice is undergoing a transition between conventional diagnostic methods and new digital technologies. With the growing integration of intraoral scanners, artificial intelligence software, and three-dimensional imaging systems, orthodontists are required to adapt to new clinical paradigms that reshape diagnosis and treatment planning.
Objectives: The main objective of this study was to investigate generational and geographical differences in the use of these tools among dentists practicing orthodontics, using a cross-sectional study design.
Methodology: Participants self-completed an online questionnaire - adapted from a previously validated questionnaire developed by hussain et al. (2022) and modified for an international context, and the link to access the questionnaire was shared on the researcher's social media and posted on dental forums for professionals from various countries, which may have introduced a high risk of selection bias. The variables examined included the diagnostic tools used, the perceived importance of each method, and the barriers to adopting new technologies. Statistical analysis was performed using the Friedman test and intergroup comparison tests, with a significance level set at $p<0.05$.
Results: The sample consisted of 103 professionals from Portugal (24.3%), France (38.8%), and Italy (24.3%), distributed across generations: Baby Boomers (9.7%), X (25.2%), Y (60.2%), and Z (4.9%). The results revealed a cross-sectional appreciation for traditional methods, such as clinical photographs, orthopantomography, and lateral cephalometric radiography. However, greater adoption of digital technologies, such as intraoral scanners and artificial intelligence, was observed among professionals from younger generations. On the other hand, older professionals demonstrated a preference for conventional impression taking and reported limitations in the use of digital tools, particularly due to lack of knowledge or infrastructure limitations. Geographic differences were not significant, suggesting increasing standardization in orthodontic practices.

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Conclusion: Minimal geographical differences were found among the three countries, suggesting an increasing standardization of orthodontic diagnostic protocols across Europe. The data demonstrate the coexistence of traditional and innovative methods in current orthodontic practice, highlighting the importance of ongoing training and technological adaptation to ensure the quality of care provided.