

INVESTIGATION OF THE DENTAL TECHNICIANS' READINESS TO MANUFACTURE DENTAL PROSTHESES USING DIGITAL TECHNOLOGIES

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ABSTRACT

INTRODUCTION: Modern digital technologies allow us to generate a virtual model of the patient and to design his/her smile. The future definitely belongs to the digital technologies because they offer a reliable, predictable and highly esthetic manner of treatment.

AIM: The aim of the present study is to investigate the dental technicians' readiness to manufacture dental prostheses using digital technologies.

MATERIALS AND METHODS: A total of 159 respondents - practicing dental technicians and students - were surveyed using an online survey. The survey was conducted via a social network platform.

Results were processed with SPSS v. 20 using variational, comparative and correlation analyses.

RESULTS: Over 50% of the respondents have indicated that they use different types of digital technologies in their practice, the main reason being that the construction time is shortened and that the accuracy is improved (85.20%). There is a correlation between the length work experience and the use of new technologies ($p < 0.05$), with younger specialists being the ones who primarily use modern technology. Young specialists are willing to invest in the purchase of modern equipment and to attend additional courses on working with it.

CONCLUSION: Despite the variety of methods for recreating the prosthetic field when manufacturing prosthetic constructions, a trend towards full digitalization of the process is observed.

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The results from the conducted analyses show that digitalization is being increasingly used by young specialists (CAD planning and software application – 78.40%), who prefer it because it increases accuracy and shortens production time (85.40%).

Keywords: digital technologies, dental technicians, investigation, using

INTRODUCTION

Modern digital technologies allow us to build a virtual patient model and design the patient's smile. The future certainly belongs to digital technologies because they are a means of reliable, predictable and highly esthetic treatment.

Over the past 30 years, dental technology production has been marked by extremely rapid growth. Three major trends stand out in this rapid development: digitalization, simulation, and introduction of post-production technology (1).

The introduction of CAD/CAM systems in the dental design industry has led to the elimination of multiple manual operations, to increasing the accuracy of structures and to reducing the production time (2).

At the end of the 1980s a radically new approach to production technologies emerged - producing details by adding the material layer by layer, etc. These technologies are called additive technologies or layout technologies.

They are an alternative to technique that works on the principle of material removal. Their main advantages are as follows: they allow the production of complex parts from different materials - polymers, composites, ceramics, metals and alloys. Dense details with predetermined roughness on the surface can be made; production processes are fast, reliable and easy to manage and control (3).

The widespread use of digital technologies in CAD, simulation and calculation, and mechanical machining in CAM has stimulated the explosion of 3D printing technology, it is now extremely difficult to find an area of material production where it is not used in to a greater or lesser extent, 3D printing (4,5,6).

In recent years the development of production technologies and the development of new apparatuses for use in dentistry and dental technology has been happening at an extremely fast pace. Not all dental laboratories are able to update their equipment for such a short time and, as a result, there already is differentiation (7).

Apart from technological advances, the process is also determined by the condition and ability of the patients being treated to afford it.

There is a division in the use of health services in dentistry. Older dental laboratories serve patients with lower financial capabilities, and modern laboratories that use state-of-the-art esthetic materials with the latest technology are designed for patients, who can afford to spend more.

AIM

The aim of the present study is to investigate the dental technicians' readiness to manufacture dental prostheses using digital technologies.

MATERIALS AND METHODS

A total of 159 respondents - practicing dental technicians and students - were surveyed using an online survey. The survey was conducted via a social network platform.

Results were processed with SPSS v. 20 using variational, comparative and correlation analyses.

RESULTS

The majority of respondents are dental practitioners (42.10 %), followed by managers of dental laboratories (32.70%).

The average length of work experience is 11.8 years, with a minimum of 5 months and a maximum of 43 years. There is a significant difference between the average length of experience of dental practitioners and managers ($p < 0.001$), with managers having worked more than twice as long (7.24 years vs. 18.43 years, respectively).

According to 38.00% of the surveyed persons, the digitization in dental medicine in Bulgaria is behind the world trends.

Over 50% of the respondents have indicated that they use different types of digital technologies in their practice (Fig. 1), the main reason being that

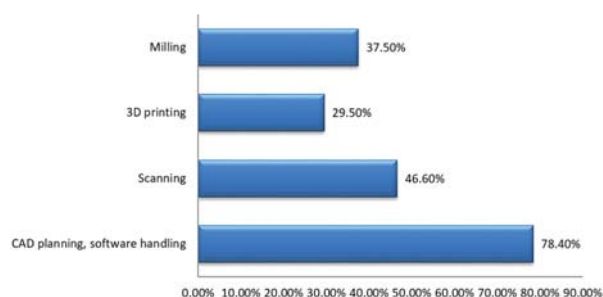


Fig. 1. Digital technologies used in the dental laboratory

the construction time is shortened and the accuracy is improved (85.20%).

There is a correlation between the length of work experience and the use of new technologies ($p < 0.05$), with younger specialists being the ones who primarily use modern technology.

Although 81.10% of respondents believe that digital technologies will not replace conventional methods in dental laboratories, we have found that there is a significant difference in dental technicians' opinion based on the length of experience ($p < 0.05$). Less experienced dental technicians believe that digitalization will shift traditional methods and technologies to engineer dental prostheses in the future (Fig. 2).

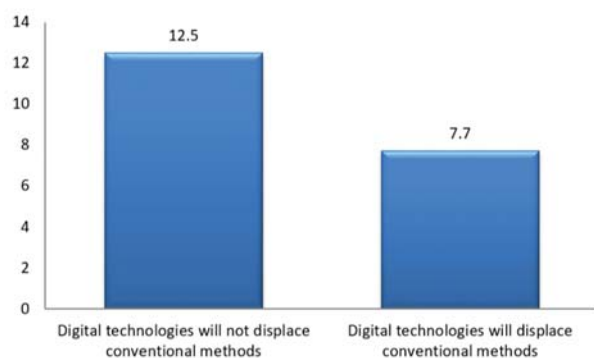


Fig. 2. Respondents' opinion on replacing conventional techniques with digital technology according to length of service

The share of those who point out that the significance of digitalization in Bulgaria is exaggerated is 73.30% and 86.40% believe that we are following the global trends. However, all of them point out

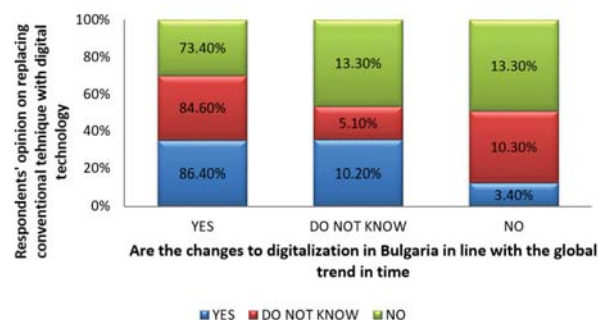


Fig. 3. Respondents' opinion for the timely digitalization and replacing conventional techniques with digital technology

that digitalization will not displace the conventional methods used in the dental laboratories (Fig. 3).

Young specialists are willing to invest in the purchase of modern equipment and to attend additional courses on working with it.

Conclusion: Despite the variety of methods for recreating the prosthetic field when manufacturing prosthetic constructions, a trend towards full digitalization of the process is observed.

The results from the conducted analyses show that digitalization is being increasingly used by young specialists (CAD planning and software application – 78.40%), who prefer it because it increases accuracy and shortens production time (85.40%).

REFERENCES

1. Dikova T, Dzhendov D, Simov M, Katreva-Bozukova I, Angelova S, Pavlova D, Abadzhiev M, Tonchev T: Modern trends in the development of the technologies for production of dental constructions”, Journal of IMAB - eAnnual Proceeding (Scientific Papers) 2015, vol. 21, issue 4, pp 974-981
2. Anderson S, Farah JW: CAD/CAM Dentistry In-office Chair-side Scanning and Milling with CEREC 3D and E4D Dentist, The Dental Advisor, 2009, 6, pp1-4
3. Brawek PK, Wolfart S, Endres L, Kirsten A, Reich S: The clinical accuracy of single crowns exclusively fabricated by digital workflow the comparison of two systems, Clin Oral Investig 2013, 17(9):2119–2125
4. Katreva I, Dikova T, Abadzhiev M, Tonchev T, Dzhendov D, Simov M, Angelova S, Pavlova D, Doychinova M: 3D-PRINTING IN CONTEMPORARY PROSTHODONTIC TREATMENT, Scripta Scientifica Medicinae Dentalis, vol. 2, No 1, 2016, pp 16-20
5. Kincade K: 3D visualization makes learning dental anatomy a snap,
6. <http://www.drbcuspids.com/index.aspx?sec=ser&sub=def&pag=dis&ItemID=313192>, Accessed July 26, 2015
7. Luthra V, Sharma V: 3D Printing, CSE – 5D, ITM University, ppt. available at www.slideshare.net
8. Ender A, Mehl A: Full arch scans: conventional versus digital impressions – an in-vitro study, Int J Comput Dent. 2011; 14(1), pp 11-21