

Summary of: Factors influencing the shade matching performance of dentists and dental technicians when using two different shade guides

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VERIFIABLE CPD PAPER

FULL PAPER DETAILS

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Introduction In recent years increased patient aesthetic expectations have brought about closer scrutiny of shade taking and communication processes with the aim of increasing the chances of success of obtaining good indirect restoration appearance. When shade matching, the most popular approach is to match the shade of the natural dentition using a shade guide to specify the shade of the final restoration before fabrication. A recent alternative approach is to also specify the shade of the tooth preparation to facilitate its replication in the die upon which the restoration will be made.

Objective To assess (1) the colour vision ability of a sample of dentists and dental technicians and correlate this to their shade matching performance in a simulated clinical situation, and (2) the accuracy and reproducibility of shade matches using two shade guides. **Design** In vitro study. **Method** Consenting dentists and dental technicians within Dundee Dental School and Hospital undertook a Farnsworth-Munsell 100 (FM-100) Hue test and matched (on two separate occasions) the shades of six prepared extracted teeth, containing either a veneer or crown preparation, using both the IPS Natural Die Material shade guide (Ivoclar Vivadent) (IPS) and the Vitapan Classical shade guide (VITA Zahnfabrik) (VC). **Results** Eighteen dental technicians (16 males and 2 females) and 40 dentists (21 males and 19 females) completed the study. The raw data revealed that many subjects were inconsistent in their approach to shade matching. The IPS guide afforded greater reproducibility. No significant effects ($p > 0.05$) of subject gender and age upon overall shade matching performance were demonstrated. Performance in the FM-100 Hue test did not statistically affect ($p > 0.05$) the outcome of matching using the guides. **Conclusions** Within the limitations of this study, (a) the FM-100 Hue test was not a good predictor of dental shade matching performance, and (b) both guides performed well in the areas of shade they covered, with the Vita Classical guide matching well shades of natural unstained teeth and the IPS guide matching more closely stained/discoloured preparations.

EDITOR'S SUMMARY

With the renewed debate on the ethics of cosmetic dentistry coming to the fore, it is pertinent to view this paper as central to the issue of clinical effectiveness and technical competency.¹ From a patient's perspective the match of a tooth-coloured restoration to the existing and adjacent tooth tissue is crucial in their assessment of the success of the outcome.

This paper asks some fundamental questions about our ability as clinicians to perceive colour matches and shade assessment, the accuracy of shade guides provided for transfer of information and reproducibility from surgery to dental laboratory and the hue of the underlying tooth preparation. One might be forgiven for wondering whether, with so many variables, it is ever possible to arrive at a satisfactory, aesthetically

pleasing result. The fact that it clearly is, is a testament to the successful collaborative nature of the dental team; materials researchers, manufacturers, practitioners and technicians.

Aside from the technical issues the paper once again draws our attention to the often discussed but frequently poorly observed need for good co-operation between dentist and technician. Although unquestionably now members of the dental team since their inclusion as GDC registrants in the role of Dental Care Professionals, technicians have historically often been at a physical distance from the surgery and as such have suffered greater isolation than other team members who have direct patient contact. This has often led to breakdowns in communication, lack of understanding and consequent blame

and recrimination where restorations or appliances have been found wanting.

Mutual appreciation of skills, knowledge and experience in a professional's given field is not just essential in the provision of maximum patient care it is fundamental to good practice and to continuing education and development. Greater understanding of the processes both chairside and at the bench enable us to make the very best of the art and science of dentistry.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 211 issue 11.

Stephen Hancocks
Editor-in-Chief

1 Hancocks S. The ethics of cosmetics. *Br Dent J* 2011; 211: 501.

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IN BRIEF

- Explores a new approach to shade communication for laboratory fabricated all-ceramic restorations.
- Establishes that the FM-100 Hue test is not a good predictor of shade matching performance.
- Highlights the importance of experience in shade guide use.
- Indicates that tooth colour matching performance is not influenced by age or gender.

COMMENTARY

This paper by Alomari and Chadwick evaluated variables possibly associated with shade matching quality: type of shade guide, shade matching methods (one shade or two shades selected), and subjects' gender, age, shade matching experience and profession (dentists and laboratory technicians). The utilised colour-corrected light was of appropriate colour temperature (5,500K), colour rendering index (92) and illuminance at shade matching area (approx. 1,400 lx), while the neutral light grey card was a correct choice to prevent eye fatigue. Shade matching tests for individuals that determined what is the best match for each prepared tooth and shade guide were also well planned, although instrumental colour measurements would certainly complement their findings and the overall merit of the study.

The literature is fairly consistent when it comes to the positive influence of colour education. The same is true for shade guides with better coverage of tooth colour range and distribution. This study reported that one shade guide exhibited greater reproducibility and a lower percentage of incorrect matches, but it should be noted that it is reasonable to expect this for a shade guide with fewer tabs (and therefore fewer choices and greater colour differences among the tabs). As far as the influence of tab arrangement is concerned, some studies reported that it influenced shade matching performance, while others had the opposite findings. This study found the same percentage of exact matches for A to D arrangement and

value scale of Vita Classical, whereas the percentage of close matches was higher for value scale.

The literature is also equivocal regarding some other potential shade matching variables: a majority of studies reported that gender, age, experience and profession did not influence shade matching quality, whereas shade matching conditions and method did. In this study, gender and age did not influence shade matching results, whereas experience and profession did.

Finally, the FM-100 Hue test is a non-dental, conventional colour discrimination test, and according to several publications, its results correlate to a certain extent with the findings obtained using customised dental tests. In general, there would be no harm if both tests were used in dental colour research.

It is interesting that the study design corresponds in many aspects to the new ISO Guidance on colour measurement,¹ published after the execution of this experiment. Regardless of some wanting design details, the authors should be commended on their work in this important and complex yet sometimes neglected area.

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1. International Organisation for Standardisation. *ISO/TR 28642 dentistry – guidance on color measurement*. Reference number ISO/TR 28642:2011(E). Geneva: International Organisation for Standardisation, 2011.

AUTHOR QUESTIONS AND ANSWERS**1. Why did you undertake this research?**

In recent years heightened patient aesthetic expectations, together with the availability of new porcelains, has brought about a re-examination of techniques for shade taking. In the authors' experience the focus has been exclusively on the shade of the final restoration, with scant, if any, regard being given to the underlying preparation. It is, however, well accepted that where a crown is exclusively made up of porcelain, shine through of the underlying tooth preparation can compromise adversely the aesthetics. To address this it has been suggested that the dentist should also communicate the shade of the underlying preparation to the dental technician. If adopted this represents a paradigm shift in procedure. This work sought, therefore, to examine means of achieving this together with factors that could affect potentially the outcome.

2. What would you like to do next in this area to follow on from this work?

This work indicates that communication of the shade of the underlying preparation is both possible and reproducible. It would be interesting to study the opinions of all members of the dental team, and the patients for whom all-ceramic crowns have been provided, as to whether the additional steps involved produce tangible aesthetic benefits. It would also be of interest to learn if knowledge of one's colour matching ability can assist in improving shade taking performance.