

RESEARCH SUMMARY

Inter-operator variability in light curing

A pilot investigation of operator variability during intra-oral light curing

A. C. Shortall, E. Harrington, H. B. Patel and P. J. Lumley *Br Dent J* 2002; 193: 276–280

Objective

To test the hypothesis that operator experience influences the efficacy of light curing in a typical posterior intra-oral location. To investigate whether short cure cycles affect performance.

Design

A cross-sectional single-centre study designed to assess the efficacy of experienced and inexperienced operators when undertaking simulated intra-oral curing.

Setting

An *in vitro* laboratory based investigation conducted in a dental school during 2001.

Materials and Methods

A computer-based technique was used to monitor light intensity in a clinical simulation. Dentists and student operators were tested for their ability to cure a posterior restoration effectively. Relative light intensity was assessed against time for each operator and test run.

Results

Experienced (qualified) operators produced more effective and consistent cure results than less experienced undergraduate students. Operator performance was not affected by variations in irradiation time.

Conclusions

This cross-sectional pilot investigation demonstrates that operator experience is a factor in successful clinical photo-curing of posterior restorations. Stable and accurate light guide positioning are required throughout the entire irradiation cycle to optimise intra-oral cure of light-activated restorations. Further investigations are planned to assess the potential of this novel method of assessment for use as a routine teaching aid in clinical practice.

IN BRIEF

- Direct placement light-activated resin-based composites are increasingly being used as an alternative to dental amalgam.
- One of the factors critical to the success of such restorations is adequate material polymerisation.
- Achieving correct stable light guide positioning for curing becomes more difficult in posterior locations.
- This pilot investigation reports on the influence of operator variability during the simulated curing of a posterior restoration.

COMMENT

Despite the ease of delivery of modern materials, the direct injection from a capsule of a single paste which only hardens after command-set light initiation, has proved to be so demanding that it requires a really good dentist to place a satisfactory resin-based composite restoration.

Incrementally inserting limited portions is not only necessary for polymerisation stress reduction, but also to ensure sufficient depth of cure. Despite the high energy output of the lamps claimed by the manufacturers, the practitioner should aim for optimal light access into the composite. In this view, even the apparently simple light guide positioning requires attention and thus, is operator dependant.

In their article, Shortall *et al.* indeed showed that there is something to be learned when it comes to successful photo-curing of restorations. They submitted four groups of operators (experienced and inexperienced dentists and experienced and inexperienced dental students) to their simulated laboratory test. This measured the efficacy of energy delivery when it comes to the difficulty posed in gaining intra-oral access for a posterior location.

If the scores were averaged per group, the clinicians with experience in placing composite restorations got better results than the inexperienced dentists, the experienced students and finally the inexperienced students. Yet there was still significant individual variation in each group as the person who obtained the highest overall score in this test was a clinical dental student.

If nothing else, hopefully these results will make dentists aware of the need for concentration on the task in hand. It has to be emphasised that they all knew they were being tested when the experiment was run. It would be interesting to see what results would have been obtained under 'non-test' routine conditions!

The importance of this study is that the light-curing, resin-based composites demand a profound understanding of the processes of adhesion, the creation of stresses on setting and the nuances of the limits of light initiation.

Prof. Dr. Carel L. Davidson, Professor in Dental Materials Sciences at the Academic Center for Dentistry ACTA, University of Amsterdam