RESEARCH SUMMARY

Cost-effectiveness of restorations

Long-term cost-effectiveness of single indirect restorations in selected dental practices

P. G. Kelly and R. J. Smales *Br Dent J* 2004; 196: 639-643

Objective

To determine the relative cost-effectiveness of alternative methods for restoring large tooth substance loss in adults.

Methods

Long-term survival estimates and discounted costs for 245 large indirect restorations were used to calculate their incremental cost-effectiveness over 15 years when compared with direct placement Class II cusp-overlay amalgams and Class IV multisurface resin composites, placed in 100 patients from three private dental practices.

Results

The direct placement restorations were more cost-effective than the indirect restorations at all time intervals over the 15-year study period. The full gold crown and the ceramometal crown were the most cost-effective indirect posterior and anterior restorations respectively. The cast gold onlay and the porcelain jacket crown were the least cost-effective indirect posterior and anterior restorations respectively.

Conclusions

When clinically practicable, large direct placement restorations should be placed initially in preference to indirect restorations.

IN BRIEF

- The most cost-effective large restorations placed in this study were posterior amalgams and anterior resin composites.
- The benefits of direct placement restorations also include less discomfort and less removal of sound tooth substance with fewer biological consequences.
- There was no support found for the practice of replacing large amalgam and resin composite restorations with crowns to prevent potential tooth fractures.
- Where indirect posterior restorations were thought necessary, full gold then ceramometal crowns were more cost-effective than cast gold onlays.
- Similarly, for indirect anterior restorations, ceramometal crowns were more cost-effective than porcelain jacket crowns

COMMENT

Determination of 'the best' treatment for a given situation is an endless pursuit in all healthcare professions, and is perhaps more difficult in dentistry than most disciplines due to the relative lack of both diagnostic and outcome data. The analysis by Kelly and Smales displays both the earnestness of the pursuit, and the weakness of the resulting determination. The survival experience of four types of cast restorations are determined and compared with previous reports of survival of three types of direct restorations. An economic analysis using discounting and the survival rates examines the cost-effectiveness of the alternative direct and indirect restorative approaches. The analysis reveals that direct restorations are cost-effective, compared with all four types of cast restorations. This is an important result, one that may not be intuitive to all clinicians. But the analysis is open to a variety of potential biases and limitations that will surely be cited.

Consider the sources of bias that are inevitable in the foregoing analysis. Most importantly, the assignment to treatment was not randomised. Each tooth received a restoration that was presumably the most appropriate given a variety of patient and clinician concerns, behaviours, and beliefs. Because the diagnoses leading to initial placement of the restorations are not known, it is impossible to refute the assertion that the teeth (and patients) receiving indirect restorations differed in terms of their condition and prognosis than the teeth receiving direct restorations, and that these differences influenced restorative outcomes. In addition, the survival analyses and subsequent cost analyses excluded restoration failures supposedly unrelated to the restoration, but these reasons included endodontic access and extraction for periodontal disease. It is well known that placement of cast restorations is associated with elevated short-term rates of pulp death,¹ and crown contours and margins may also contribute to periodontal disease.² Critics may also note the very small numbers for two indirect restoration types, the inaccessibility of the details of the survival analysis for direct restorations, and the threat to external validity posed by the limited number of clinicians represented in the analysis. Some may also be concerned by the perspective of the analysis. Outcomes that may be more important to the individual patient than direct costs, such as opportunity costs, convenience, appearance, and perceived oral health, are not included in the cost-effectiveness analysis.

This analysis is one of few currently available that help illuminate the pursuit of 'the best' treatment, but the light it sheds is less than bright. The absence of necessary diagnostic and outcome data and the multiple threats to internal validity due to the study design and exclusion criteria render the analysis open to challenge. Dentistry has a good deal of work still to do before alternative approaches to producing oral health can be fully evaluated.

1. Martin J, Bader J. Five-year treatment outcomes for teeth with large amalgams and crowns. *Operat Dent* 1997; **22**: 72-78.
2. Bader J, Rozier R, McFall W. The effect of crown receipt on measures of gingival status. *J Dent Res* 1991; **70**: 1386-1389.

J. Bader, Professor in Operative Dentistry, University of North Carolina
doi:10.1038/sj.bdj.4811300