



Repair of defective composite restorations. A questionnaire study among dentists in the Public Dental Service in Norway



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ABSTRACT

Objectives: This study aimed to investigate dentists' treatment choices concerning "repair or replacement" of defective restorations.

Methods: A pre-coded questionnaire was sent electronically to all dentists (n = 1313) in the Public Dental Service (PDS) in Norway. Part one: The dentists were asked about age and gender, whether they performed direct restorative therapy/amount of time spent on fillings made per day due to: Primary caries, Repair of restorations or Replacement of restoration/what kind of bonding agents used and pre-treatment of the residual restoration. Part two: The dentists were asked to consider the best treatment for three patient cases with tooth/restoration fractures.

Results: Response rate was 55.8%, (69.6% females, 30.4% males). Respondent age varied from 25 to 77 years (mean 41.8, SD 12.4). Part one: The dentists spent on average 57.5% of the working day placing restorations, making from 1 to 30 (mean 7.7, SD 3.6) restorations per day. Reasons for treatment were; Primary caries 55.7% (SD 19.1%), repair of restorations 26.7% (SD 14.8%), replacement of fillings 18.2% (SD 11.2%). Two-step etch and rinse (ER), 3-step ER and Self-etch (SE) were used by 48.7%, 24.6% and 26.7% of the respondents, respectively. A silanising agent was used by 7.4%. Part two: Treatment choices: Repair with RC: 89.6% in case one, 86.9% in case two and 54.1% in case three. Young dentists suggested invasive treatment more often than old dentists (>38 years).

Conclusions: Operative dentistry claims 57.5% of PDS dentists' working day. In addition to primary caries, repair and replacement of restorations accounted for 27% and 18% of the reasons for placing restorations.

Clinical significance: The idea of "minimal intervention dentistry" seems to have great influence among dentists in PDS (Norway), as they seek to preserve dental hard tissue as much as possible by choosing repair before replacement. No gender differences were observed, but older dentists seem to favour repair compared with the younger dentists.

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1. Introduction

According to modern dental philosophy, repair of defective restorations should always be considered when evaluating treatment options [1,2]. Repair has become increasingly more popular over the last two decades as the concept of "Minimal Intervention Dentistry" (MID) has become rooted in the clinic [3–5]. In line with the concept of MID, resin-based composite (RC) will often be the first restorative material of choice for posterior restorations. One advantage with RC restorations over amalgam is that they are repairable [6,7]. According to many authors repair, refurbishment and monitoring restoration defects increase the

survival time of restorations significantly [2,8–10]. Schwendicke et al. has in a recent publication on "Consensus Recommendations on Carious Tissue Removal" recommended the following: "Retreatment of restorations should aim to repair by resealing, refurbishing, or repolishing where possible, and replacement should be last resort (strong recommendation)" [11]. On the other hand, Sharif et al. concluded in a recent Cochrane review that there is no scientific evidence to claim that repair of RC has any advantages over replacement [12]. The main shortcoming stated in this review was the absence of randomisation of the clinical trials. This challenges the dental clinician with an existential question; "repair or replacement"? Often little information is available about the age and brand of the composite restoration in question. It has been shown that the success of repair is higher for newer composite than older composite [13]. The advantages of not replacing the entire restoration due to minor flaws are several; tooth structure

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Table 1

Bonding systems used by the PDS dentists.

Bonding systems	Frequency (%)
1 step self etch	5.5
1 step self etch with separate etch of enamel	9.0
2 step self etch	4.8
2 step self etch with separate etch of enamel	7.4
2 step etch and rinse	48.7
3 step etch and rinse	24.6

and strength are preserved [1]. Furthermore, there might be reduced risk of accidental pulp damage and iatrogenic damage to neighbouring teeth, not to forget the “cycle of re-restoration” that points to the repeated treatment of teeth as a journey to destruction of the tooth [14,15]. There is also a financial issue concerning the patients, repair can be performed quicker, at a lower cost and the need for local anaesthetics is reduced [1,2].

When deciding to repair RC restorations, strategies for pre-treatment of the restoration to be repaired are important [8,13,16,17]. Different additives to bonding systems, such as silanising agents and phosphates have been shown to improve bond strength [7,18,19]. To which extent dentists actually use these products, is however unknown. Data from Mjör et al. from 1989 have often been used as a reference to how much time is used on operative treatment in dental practices. It was stated that about 60% of all operative work done is attributed to replacement of restorations [20]. There is a need for updated information on this topic. Therefore, our study aimed to assess the proportion of Norwegian dentists' working day devoted to operative treatment, in addition to display if the trends of minimal intervention dentistry influence dentists' treatment choices concerning “repair or replacement” of defective RC. The study also aimed to record dentists' use of bonding systems and clinical routines for pre-treatment of defects at the tooth/restoration interface.

2. Material and methods

A pre-coded questionnaire was sent electronically to all dentists (n = 1313) employed in the Public Dental Service (PDS) in Norway in February 2015, using the Internet-based software *QuestBack* (Oslo, Norway). The software was configured to automatically send reminders to all participants who did not reply within 2, 10 and 14 weeks. Anonymity was ensured by *QuestBack*. Information was collected regarding the respondents' age and gender, and to which extent they were occupied with the use of restorative materials on a daily basis.

The questionnaire consisted of two parts. In *part one*, the dentists were asked whether they performed direct restorative therapy or not. If they did, how much of their working day was spent placing restorations? They were also asked how many fillings they placed during a normal working day, and how many of them were due to (a) Primary caries, (b) Repair of old restorations or (c) Replacement of old restorations. Furthermore, they were asked about the kind of bonding agents used in their practice

Table 2

Type of pre-treatment used on the old restoration when repairing with RC. The respondents were allowed to choose more than one option.

Pre-treatment when repairing RC restorations	%	n=
None	2.0	14
Acid etch	82.3	587
Bonding agent	83.3	594
Silanising agent	7.4	53
Preparation of extra retention in adjacent restoration	79.8	569
Do not repair composite restorations	0.3	1
Other treatment	3.9	48



Fig. 1. Case one. What treatment would you suggest for this upper right second premolar? The tooth has a MOD composite restoration where some of the mesio Buccal part of the filling has fractured off. There is enamel around the entire restoration and the damaged part. The X-ray shows no caries and the distance to the pulp is at least 1 mm. No other pathology or discomfort/sensitivity is observed. The patient is a woman in her mid-fifties with low caries activity and normal occlusion. There are no financial limitations concerning dental treatment and the patient has no desire to improve the esthetical appearance of the restoration.

(Table 1). Finally, the dentists were asked: when repairing old restorations, what kind of pre-treatment of the residual restoration did they perform? For the latter question multiple answers were allowed (Table 2).

In *part two*, the dentists were given three patient cases with tooth or restoration fractures of increasing severity (Fig. 1–3). The respondents were asked to choose among the following alternatives when considering the best treatment strategy: (1) Repair with resin composite restorative material (RC), or total replacement of the restoration with: (2) RC, (3) Ceramic restoration (CAD/CAM), (4) Ceramic restoration (produced by a dental technician), (5) Gold inlay, (6) Crown (unspecified), (7) Other treatment (to be specified) (Table 3).

2.1. Statistical analyses

Statistical analyses were performed by descriptive statistics using chi-square tests. A significance level of 5% was used throughout. Statistical analyses were performed with IBM SPSS Statistics version 20.0.0.1 (Statistical Package for the Social Sciences; SPSS, Chicago, IL, USA).

2.2. Ethical considerations

Participation was voluntary and no remuneration was given to the respondents. Anonymity was ensured by *QuestBack*. The study was registered at the Norwegian Data Protection Authority (ID: 70269).



Fig. 2. Case two. What treatment would you suggest for this lower right second molar? The distobuccal cusp has fractured off adjacent to a composite restoration. There is enamel around the entire filling and the damaged part. The X-ray shows no caries and the distance to the pulp is at least 1 mm. No other pathology or discomfort/sensitivity is observed. The patient is a woman in her mid-fifties with low caries activity and normal occlusion. There are no financial limitations concerning the dental treatment.

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