



Longevity of direct restorations in Dutch dental practices. Descriptive study out of a practice based research network



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ABSTRACT

Objectives: The aim of this retrospective practice-based study was to investigate the longevity of direct restorations placed by a group of general dental practitioners (GDPs) and to explore the effect of practice/operator, patient, and tooth/restoration related factors on restoration survival.

Methods: Electronic Patient Files of 24 general dental practices were used for collecting the data for this study. From the patient files, longevity of 359,548 composite, amalgam, glass-ionomer and compomer placed in 75,556 patients by 67 GDPs between 1996 and 2011 were analyzed. Survival was calculated from Kaplan–Meier statistics.

Results: A wide variation in annual failure rate (AFR) exists between the different dental practices varying between 2.3% and 7.9%. Restorations in elderly people (65 years and older, AFR 6.9%) showed a shorter survival compared to restorations placed in patients younger than 65 years old (AFR 4.2%–5.0%). Restorations in molar teeth, multi-surface restorations and restorations placed in endodontically treated teeth seemed to be more at risk for re-intervention.

Conclusion: The investigated group of GDPs place restorations with a satisfactory longevity (mean AFR 4.6% over 10 years), although substantial differences in outcome between practitioners exist. Several potential risk factors on practice/operator, patient, and tooth/restoration level have been identified and require further multivariate investigation.

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1. Introduction

Placing and replacing of restorations is the main work of most general dental practitioners (GDPs). The longevity of the restorations can be seen as an indicator for the quality of care delivered. Factors that have been identified as affecting the restoration performance are the filling material and their properties [1] as well as the dental piece itself and the patient (e.g., socio-economic status caries risk) and dentist characteristics (experience) [2]. The results of these reviews are however rather inconclusive. Some studies found a better performance of amalgam restorations compared to other restorative materials [3–7], while others showed a comparable survival of composite and amalgam restorations [8,9]. An increased number of restoration surfaces was shown to result in a higher re-intervention rate [10], and molar teeth and endodontically treated teeth have been reported to have

a higher risk for early re-intervention [5]. Socioeconomic status of the patient has been shown to affect the longevity of restorations [11], probably because the prevalence of dental caries is associated with social determinants [12,13]. Also the influence of caries risk of patients on restoration longevity has been demonstrated [8,14]. With respect to age and gender, some studies reported that restorations in older patients and male patients have a lower survival [15], while other studies failed to demonstrate this effect [14]. A paper from the UK, based on an insurance dataset showed that operator and practice related factors, notably changing dentists, influenced the longevity of restorations [16]. Another study, comparing different types of indirect restorations demonstrated a clear operator effect on survival [17]. However, the influence of the dentist on the results is not always obvious [18,19], as was also shown in the review of Beck et al. Overall, this is the level least investigated. This is not surprising, as most scientific research is not carried out in general dental practice, and if it is, it is not common that many operators are included and taken into account as a factor. The number of longitudinal studies on longevity of restorations placed by GDPs is limited to studies

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related to isolated dental practices [8,20,21] and public health care in Scandinavian adolescents [22,23]. On a larger scale, several longitudinal analyses have been made based on data from the NHS insurance database in the UK [5,15,16,24], but larger databases from GDPs have not been analyzed yet. Therefore there is need for a longitudinal practice based study, with at least a 5 year follow up time, and a multi factorial approach. In the Netherlands, dentists generally have a large group of listed patients who are loyal to the practice and show up regularly for checkups over a longer period of time. Moreover, most practices have electronic patient files. This offers the unique opportunity to investigate the longevity of restorations placed by a large group of dentists.

The aim of this retrospective practice-based study is to investigate the longevity of direct restorations placed by a large group of GDPs and to explore the effect of practice/operator, patient, and tooth/restoration related factors on restoration survival.

2. Materials and methods

2.1. Inclusion and data collection

General practices were recruited from the Nijmegen dental practice based research network. Within these practices, all

individual dentists were included that contributed with a minimum of 300 restorations. Within these practices, all patients were included that visited the practices for regular checkups. Data from all direct restorations placed in permanent teeth in the years 1996 to 2011 were collected from the Electronic Medical Files (EMF) of the patients. Restorations with missing variables and uncertainties were excluded from the dataset. Design and protocol were approved by the local ethics committee, METC (CMO file nr. 2013/483). Data were digitally extracted, rendered anonymous and sent to the research group by the dentists using an application designed by the two involved software firms that provided the EMF software (Exquise[®], Kwadijk, NL, starting 1999; Complian[®], Heerhugowaard, NL, starting 1996). The application transformed all data on the placed direct restorations into excel data files.

2.2. Outcome parameters

From all direct restorations, dates of restoration placement, last check-up visit of the patient and dates of re-intervention were recorded. The restoration was considered as failed if a restoration was replaced or repaired, the tooth was extracted, or in case of an endodontic or prosthetic treatment. Replacement or repair was defined as an intervention when a new restoration was placed in

Table 1
Description of study population.

	N restorations	N practices/operators
Practice characteristics, N=24 practices, N=67 operators		
<i>Location</i>		
Urban	211,605	12
Rural	147,943	12
<i>Type of practice</i>		
Solo	81,351	8
Small group, 2–3 dentists	184,798	12
Larger group, more than 3 dentists	93,399	4
<i>Practice size</i>		
Small, less than 1000 restorations per year	107,611	12
Larger, more than 1000 restorations per year	251,937	12
<i>Deprived area</i>		
Low SES	106,370	3
Medium SES	213,039	18
High SES	40,139	3
<i>Operators experience</i>		
Graduated in or before 1980	162,690	27
Graduated between 1981 and 1990	138,125	17
Graduated in or after 1990	58,733	23
Patient's characteristics, N=76,071 patients		
<i>Gender</i>		
Male	175,151	
Female	184,397	
<i>Age</i>		
5–15 years	27,319	
16–25 years	66,281	
26–45 years	155,728	
46–65 years	96,141	
66 years and older	14,079	
Tooth and restoration characteristics, N=432,044		
<i>Tooth type</i>		
Anterior	74,144	
Posterior	285,404	
<i>Number of surfaces</i>		
1	108,183	
2	145,543	
3	81,992	
≥4	23,830	

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