

# Caries and restoration prevention

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Is it possible to maintain lifelong oral health with no or few restorations in populations that traditionally have had high incidences of caries? The answer is yes. Research has led to great advances in the prevention of primary dental caries. According to current knowledge in cariology, the development of caries to the extent that it requires surgical intervention largely can be prevented.

Implementation of effective preventive programs in general dental practice requires the active participation of dentists and dental hygienists, who have the primary responsibility for educating and training patients in preventive behaviors. Attention to other factors under the control of clinicians, notably criteria regarding when to place restorations, is important in understanding the improvements recorded.<sup>1</sup> In addition, patients' motivation and compliance are essential to ensure the success of most preventive approaches to dental caries.

Different age groups of patients have been studied to demonstrate the effect of various preventive and restorative programs. The World Health Organization (WHO) has focused on 13- and 14-year-olds,<sup>2</sup> while others have studied 18- to 20-year-olds.<sup>3</sup> Studies of the decrease in caries initially focused on children and adolescents, and the question of whether the effect

## ABSTRACT



**Background.** The authors analyzed studies of decayed, missing and filled (DMF) rates for surfaces and teeth in Norway published during the last 30 years. The result of active fluoride therapy combined with a change in criteria for when to place restorations led to a marked reduction in the need for restorations.

**Methods.** The authors reviewed independent, cross-sectional DMF studies of representative samples of young adults performed every 10 years during the period 1973 through 2006. The clinicians involved in the studies used standardized and calibrated methods. The authors of this article also reviewed an additional series of studies collecting DMF data from representative samples of 15-year-old adolescents that also had been carried out independently from 1979 through 1996. In these studies, the investigators examined clinical records and bitewing radiographs with attention to progression of carious lesions and restorative treatments.

**Results.** The authors noted a marked reduction in the mean decayed, missing and filled surface (DMFS) scores from 1973 through 2006 in the two adult groups. They also found a significant decrease in treatment of caries. The reduction was most marked after the mid-1990s. They noted that the most dramatic change in the data from the 15-year-olds resulted from a change in the treatment criteria during the 1980s. Approximal lesions in enamel were monitored by the investigators of those studies in combination with the use of fluoride toothpaste.

**Conclusion and Clinical Implications.** A caries treatment approach based on active caries-preventive treatment and restrictive criteria for restoration placement are good bases for reducing the need for restorations as shown in cross-sectional studies reviewed.

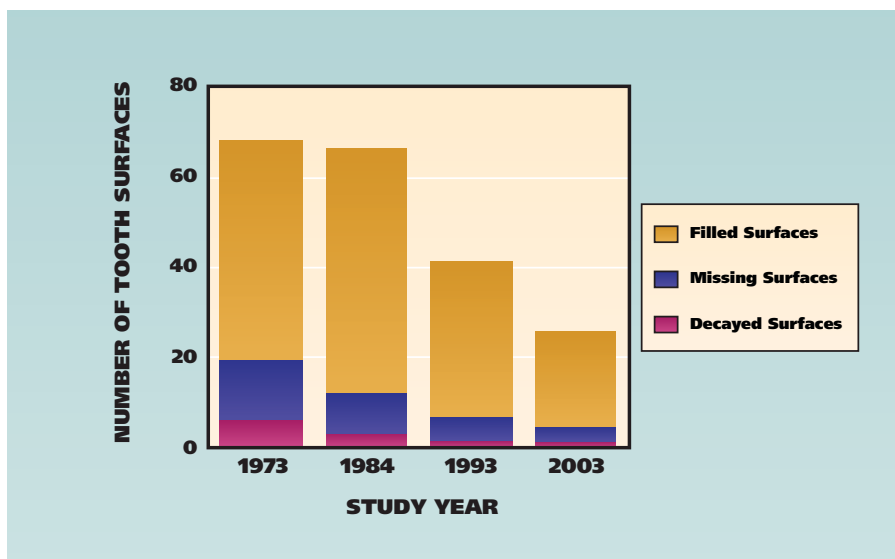
**Key Words.** Restorative dentistry; operative; general practice; research; review literature.

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**Figure 1.** Cross-sectional decayed, missing, and filled surfaces' data for representative samples of 35-year-olds in Oslo, Norway, during a 30-year period from 1973 through 2003. Source: Skudutyte-Rysstad and Eriksen.<sup>5</sup>

noted was merely a postponement of the onset of the caries remained at issue until it was shown that the caries decline was maintained into adulthood.<sup>4</sup>

This article interprets published data and trends in oral health development and change in treatment criteria across more than 30 years. It focuses on the caries and restoration situation in Norway, but the situation is much the same in all the Scandinavian countries and in some non-Scandinavian countries. Aside from this geographical focus, the clinical and science aspects of our assessment should be comparative between countries.

#### METHODS AND MATERIALS

This article focuses on published cross-sectional data regarding decayed, missing and filled surfaces (DMFS)/decayed, missing and filled teeth (DMFT) from 1973 through 2006. We based our selection of the age groups on the assumption that the adult groups comprising people aged 35 to 44 years were considered to represent the dental care provided well into adulthood and that people aged 15 years represent the outcome of dental care in childhood.

We present data on the adults first because they represent the endpoint of the outcome of the dental restorative care in this review. One group was from an urban area<sup>5</sup> and the other from a rural area.<sup>6</sup> We present results from the 15-year-

old age group<sup>7</sup> to assess if the improvements noted in the decayed, missing and filled (DMF) data regarding the adults' teeth and tooth surfaces are consistent with the results from the 15-year-olds and if they conform to the relatively rapid improvements noted in the adult groups.

#### RESULTS

**The adult groups.** Data on representative samples of 35-year-olds in Oslo, the capital city of Norway, have been recorded by investigators<sup>5</sup> every 10 years for several decades as part of a health survey of people in this age group. DMFS/DMFT data have been recorded by these investigators since 1973, and the

last examination was completed in 2003. Thus, cross-sectional data across a 30-year period are available.<sup>5</sup> The criteria for recording caries were standardized (WHO criteria), and the clinical examiners' methods were calibrated at each of the examinations across the 30-year period.

The DMFS data from this urban population in 1973 showed that, on average, 70 tooth surfaces had been restored or were missing or carious (Figure 1).<sup>5</sup> The restored surfaces constituted by far the largest component of the DMF index; almost 50 surfaces involving 16 teeth had been restored. Decay, including primary and secondary (recurrent) caries, averaged 6.5 surfaces on 3.2 teeth, and 2.8 teeth were missing. Third molars were not included in the DMF index.

A marked decrease in the DMF index did not become apparent until the 1993 survey, and the decrease continued in the 2003 investigations. From 1973 to 2003, the data showed a 62 percent reduction in DMFS, an 83 percent decrease in the mean number of carious lesions and a decrease of 73 percent of missing teeth. The number of restored surfaces decreased by 56 percent. Primary and secondary caries together, on average, were diagnosed in less than one tooth surface per

**ABBREVIATION KEY.** DMF: Decayed, missing and filled. DMFS: Decayed, missing and filled surfaces. DMFT: Decayed, missing and filled teeth. WHO: World Health Organization.

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