

## An Overview of Preventive Dental Services

### Koruyucu Diş Hekimliği Hizmetlerine Genel Bir Bakış

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#### Abstract

Prevention is the basis of 'minimal intervention' concept in dentistry. This concept involves preventing from and intercepting dental caries where possible and trying to avoid relapses by modifying the risk factors. In this connection, the preventive approach in dentistry is discussed in our review within the light of current literature.

**Key words:** Prevention, dentistry, dental caries

#### Öz

Koruma, diş hekimliğinde 'minimum müdahale' konseptinin temelidir. Bu konsept diş çürüğünü önlemeyi, mümkünse durdurmayı ve risk faktörlerini değiştirerek tekrarlamasını önlemeye çalışmayı içerir. Derlememizde, bu bağlamda diş hekimliğindeki koruyucu yaklaşımlar mevcut literatür ışığında tartışılmıştır.

**Anahtar kelimeler:** Koruma, diş hekimliği, diş çürüğü

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#### Introduction

Dental caries is still the most prevalent disease throughout the world. The critical factors, methods and approaches in preventing caries and promoting oral and dental health have been studied with great interest since earlier times. In this review, we summarised the basic preventive approaches that have been developed to prevent dental caries.

#### Prevention

Prevention is the basis for the 'minimal intervention' (MI) concept in dentistry. MI aims to prevent and intercept dental caries where possible and to avoid relapses by modifying pathological and protective risk factors. Thus primary, secondary, tertiary and also quaternary prevention should be included.<sup>1</sup>

\***Primary prevention** works both at the population level and also at family or individual level before the onset of caries disease. Populations or groups risky for developing caries, such as; low-income populations, refugees, immigrants, people with low health literacy are aimed at the population level. Public health programmes including education campaigns, serving fluoridated water, school-based interventions (education, fluoride rinses, dental sealants) are all examples. All educations should

include prevention methods (e.g. dietary habits, oral hygiene recommendations) for the socially deprived groups, families or individuals.

\* **Secondary prevention** could also be considered at population or individual level. At population level, by school-based programs, we may detect people needing dental care. At the individual level, asymptomatic lesions and those needing therapy could be detected. The objective is to intercept detected lesions using different techniques. If a patient is already affected by caries, primary and secondary protection should be considered together (e.g. topical fluoridated agents and dental sealants both for caries protection and interception of newly forming lesions).

\***Tertiary prevention** deals with symptomatic lesions, aiming to prevent further complications and treatment failures. Thus, it includes restorative procedures and patient follow-up.

\***Quaternary prevention** is the fourth dimension which has been considered recently in medicine and it prevents a patient from unnecessary medical procedures which are also important for economic issues of healthcare. In simple terms, patients at risk for a particular disease are identified and interventions ethically acceptable may be suggested.

Caries risk assesment is important and it changes the so-called caries balance toward protection rather than progression. Many methods like "Cariogram", "Caries Risk Pyramid" have been developed for caries risk assesment. This concept explores nonmodifiable factors (e.g. caries experience, decreased salivary flow) versus modifiable factors (e.g. bad oral hygiene, frequent consumption of carbohydrates, deep pits and fissures, high cariogenic bacterial count).<sup>1</sup>

Dental caries is the most prevalent disease worldwide, with the majority of caries lesions being concentrated in disadvantaged social groups. There are significant socio-economic inequities in terms of dental caries and clear socioeconomic variations in the utilisation of preventive and restorative services exist.<sup>2,3</sup> Socioeconomic inequalities in oral health have been reported in a number of countries, while the influence of country-specific health insurance systems has also been suggested.<sup>4,5</sup>

In a study carried out in England, Wales and Northern Ireland, despite relatively equitable access and higher use of dental services in UK, the least educated and those at the bottom of social hierarchy are less likely to have preventive and restorative dental services.<sup>3</sup>

National oral health data is required to assess a population's oral health needs, monitor oral health, plan effective intervention community programs and health policies, and evaluate progress toward health objectives. In that context, many investigations are made, public studies are planned. In a study targeting Asian countries, mainly Korea, the authors have concluded that; the caries prevalence remains considerably higher than that in European countries and than the targets set by WHO within the Health 21 policy framework, despite the observed decrease in caries experience indicators.<sup>6</sup> This is generally the case among Asian countries compared to European countries.

Community-based oral disease prevention programs are urgently needed to promote oral health. Even in more developed European Union member countries, where socioeconomic levels are higher, some countries' economic situation does not allow for

the allocation of sufficient public funds for healthcare in general and oral healthcare in particular. For example; although Poland is one of the largest European countries in terms of area and population, the health policy of the state focuses primarily on prophylaxis and treatment of diseases, directly threatening the health and lives of the inhabitants. Currently, expenditure on oral health accounts for only 2.7% of the public funds allocated to healthcare.<sup>7</sup>

Innovative projects like ADVOCATE (Added Value for Oral Care) are strongly needed for the newest multiperspective approach strategies. This a project funded by the European Commission's Horizon 2020 program, which aims to develop strategies for a system transition toward more patient-centered and prevention-oriented oral health care delivery within health care systems. This system should balance the restorative and preventive approaches in dental and oral health care. ADVOCATE is a partnership among 6 European Union member states, which involves collaboration among universities, state-funded health care providers, and private insurance companies in Denmark, Germany, Hungary, Ireland, the Netherlands, the United Kingdom, and Aridhia, a biomedical informatics company based in Scotland.<sup>8</sup>

Dental education is the foundation of a country's development of dental science. Economic conditions and cultural backgrounds vary across countries; hence, there are some differences in dental education between Eastern and Western models, including the education programmes, licensures, curricula, teaching methods, facilities. All actions to improve the current situation of dental education and reduce the gap between Eastern and Western education models should be made.<sup>9</sup> Every effort to keep dental education programmes up to date is made in Turkey. Interregional and administrative differences exist, but education programmes are more prevention-oriented compared to earlier years. Dental Faculty students begin to take preventive dentistry lessons more intensively and at earlier stages and their internship cover more of preventive programmes or public health projects in field.

Also, variations among different health practitioner groups exist in terms of oral and dental health prescriptions. All health practitioners associated with the target groups are important parts of the training cycle and possible prescribers of fluoride supplements. In a recent study comparing pediatricians' and family physicians' oral health training, knowledge, confidence, and practice patterns, differences in fluoride knowledge by provider type suggest fluoride guidance has been disseminated more effectively among pediatricians than among family physicians.<sup>10</sup> Educational content of oral health training programs should place increased emphasis on current fluoride guidance, early dental visits, and assessing parents' oral health. Oral health training appears to promote confidence in performing recommended oral health practices.<sup>10</sup>

More dental public health personnel will be needed in the future. While some new roles were identified, not all of these roles necessarily require a dental degree. A certain need exists for more academicians for dental schools, schools of public health, dental public health residencies, and dental hygiene programs; oral epidemiologists and health service researchers; health educators.<sup>11</sup>

Preventive dentistry involves the use of many agents with various methods. Huge amount of studies have revealed that fluoride is an effective agent in caries protection.

Fluoride strengthens enamel structure, decreases plaque formation rates, remineralizes initial caries lesions and prevents dentine hypersensitivity.

Fluorides, used either *topically* (fluoridated tooth-paste, gel, varnish, mouthrinse, lozenges, chewing gums) or *systemically* (fluoride supplements like tablettes, lozenges, chewing gum again, drops) are being used for caries prevention all over the world. Also implementations like fluoridated water, salt, milk are systemic routes of action and will be discussed later.

Professionally applied topical fluorides are effective in preventing and arresting dental caries. The use of fluoride varnish and gel is common among dental professionals, but it is uncommon in low-income countries. Fluoride varnish being easy and safe to apply, is used in many Asian countries.<sup>12</sup>

In the second half of twentieth century, the focus was on fluoride toothpastes and rinses and water fluoridation in many countries.<sup>13</sup>

Weekly rinsing with fluoride mouthwash containing 0.2% NaF was a method used throughout Turkey around 1997-1999 as a public health policy. In a project ran for 7 years while I was in a specialty training programme in Pediatric Dentistry Department of Hacettepe University, weekly visits to selected schools were empowered by educational meetings with the students and teachers, sometimes even with the students' families.

A literature review published in 2004 has concluded that fluoride toothpastes in comparison to mouthrinses or gels appear to have a similar degree of effectiveness in the permanent teeth of children but in another from the same team of researchers, it appears that mouthrinses, gels or varnishes used in addition to fluoride toothpaste seem to be more effective than toothpaste use alone.<sup>14,15</sup>

Some guidelines recommend using fluoride gels instead of fluoride varnish or vice versa, but there is no exact clinical evidence. The age of the patient, number of teeth, ability to cooperate should all be considered. In Scotland (Scottish Intercollegiate Guidelines Network, 2014) or Australia (Australian Dental Association, 2012), their use is recommended especially in the absence of fluoride toothpaste.<sup>16</sup> In some countries like France, an additional cost for the individualized trays used in gel applications and also the age limitation is effective, so fluoride gels are recommended less than varnishes.

Fluoride gels applied in disposable trays or with small cotton pellets are used as much as fluoride varnish in our country. I personally have observed the use of gels more in Oral and Dental Health Centers whilst the use of varnish was more evident in dental clinics of universities or private practice clinics. This is more likely to be a matter of preference and purchase power in private practice, while seems more likely to be dependent to accrual issues in state facilities.

Slow-release fluoride devices are used for the prevention and arrest of carious lesions both in deciduous and permanent dentition, especially in high risk patients, but the retention of glass beads remains a problem.<sup>17</sup>

The prescription of systemic fluoride supplements like tablets, drops, lozenges, chewing gums should be made precautiously regarding the patient age, the individual caries risk level, the level of fluoride in drinking water, and the dietary fluoride intake.

In a literature review and meta-analysis published in 2011, it was concluded that fluoride supplements were associated with a caries reduction in permanent teeth versus no other preventive fluoride treatment, but; the preventive effect was nearly the same for fluoride supplements and other fluoridated topical agents.<sup>18</sup>

We know that there are significant socio-economic inequities in dental caries in different parts of the world and community water fluoridation (CWF) is probably the most courageous effort to overcome this disadvantage. Dental caries is largely preventable, and CWF, meaning the controlled addition of a fluoride compound to a public water supply is one important option for prevention at the population level.<sup>19</sup> The dental health benefits are obtained when the concentration of fluoride in drinking water is 0.8 - 1.0 mg/l.<sup>20</sup>

The American Dental Association briefly verifies the fluoridation of community water supplies as safe, effective and necessary in preventing tooth decay.<sup>21</sup> This support has been the Association's position since policy was first adopted in 1950. CDC (Centers for Disease Control and Prevention) monitors the progress of the nation and individual states toward meeting the Healthy People 2020 objective on community water fluoridation—that 79.6% of people on public water systems will receive water that has the optimum level of fluoride recommended for preventing tooth decay.<sup>22</sup>

One of the main arguments made in favor of CWF is that it is equitable in its impact on dental caries.<sup>23</sup> An equitable effect of CWF has been demonstrated in cross sectional studies in several countries, including Canada, Britain, Australia, New Zealand and South Korea. One study performed in Calgary, Canada, has shown the increasing inequities in dental caries formation after the cessation of CWF in 2010 compared to times when CWF was in place. So, even if socioeconomic inequities exist, the negative effects could be lessened by certain preventive measures in terms of preventive medicine.<sup>24</sup>

In central and eastern European countries water fluoridation schemes stopped immediately before or after the political transition in the 1990s, and since then dental caries prevalence rates have increased or remained stable.<sup>25</sup>

In Turkey, water fluoridation is still not in place despite the fact that the fluoride level of our water supply is not optimal in many regions. Possible hesitations are; the nonconformity of water supply network, the heterogeneity of fluoride doses in water supplies throughout the country, the possible risk of fluorosis, the exaggerated effect of press focused on the toxic effects of fluorides. In our country, mineral water or bottled water containing more than 1mg/L fluoride should be labelled as "contains fluoride".

Slovenia is another country which has never implemented water fluoridation.<sup>26</sup>

Fluoride is sometimes added to table salt or milk in some countries or regions where the fluoridation of drinking water is not feasible.<sup>20</sup> F milk and F salt had shown some preventive effect, but they are difficult to prescribe in correct doses, and scientific evidence for assessing their effect is insufficient to draw conclusions.<sup>26</sup> There are many endemic fluorosis regions in Turkey, I think regarding mainly this factor and others mentioned before, no crucial effort for adding fluoride to salt or milk has been made in Turkey.

Fluoridated milk has been consumed in many countries like Bulgaria, Chile, China, Peru, Thailand, United Kingdom and in many others using either sodium fluoride or disodium monofluorophosphate.<sup>27</sup> Fluoridated pasteurized, UHT, powdered milk, yogurt or milk-cereal are the final forms. In many countries, milk is provided to children on an organised basis through the educational system. In these countries, the funding is often provided from local authority/municipality budgets sometimes the cost difference is absorbed by milk producers.<sup>27</sup>

The optimal concentration of fluoride ranges from 200 to 250 mg/kg salt. Fluoridation of salt destined for human consumption has been used in Switzerland since 1955. Since 1986 an increasing number of countries, now approximately 15 and mainly in Europe (e.g. Switzerland, Colombia, Hungary) and the Americans, have adopted salt fluoridation schemes.<sup>28</sup>

Besides its beneficial effects in reducing dental caries, excess fluoride intake has also its negative effects as tooth enamel and skeletal fluorosis in prolonged exposure. Exposure to fluorides can be in various ways such as; natural sources, industrial processes, drinking water, food and dental care products. So, excess fluoride intake is a major public health concern and should always be watched and coordinated closely.<sup>29</sup>

Dental sealants were introduced in 1960's and have been used since then. Deep pits and fissures either in primary or secondary dentition have been clearly related to caries risk in occlusal surfaces, and are strongly recommended for first permanent molars either as glass ionomere sealants or resin composite sealants. Resin modified glass ionomere, either nanofilled or microfilled is tried as well. Although studies focus on first permanent molar teeth, the results have shown that sealants are effective and should be recommended in second permanent molars and premolars. Also, most studies target children and adolescents, but adult patients get advantage of the preventive effect of sealants in case of many systemic and oral conditions, especially in xerostomia. Currently, the World Health Organization considers it as an effective and noninvasive primary preventive measure. School-based caries prevention programs placing mass pediatric dental sealants synchronous to immunization programs are considered as well as privately placed ones.<sup>30</sup>

Although the comparison of dental sealants to fluoride varnish has shown contradictory results, today we know that they are both effective in pit and fissure caries lesions in permanent first molars.<sup>31</sup>

As mentioned before, the follow-ups are the key for prevention-oriented oral and dental health. The recall intervals should be arranged according to the patients' needs and should be regarded as an opportunity to reinforce patient education, to monitor the effect of preventive and therapeutic actions, to intercept potential failures, etc. There is no clear consensus about the best recall interval for certain caries risk level, but varies between 3-12 months in patients younger than 18 years of age, and should not be longer than 24 months in patients aged 18 or over according to NICE (National Institute for Clinical Excellence 2004) recommendations.<sup>32,33</sup>

Follow-ups are taken seriously and the recall intervals are adjusted according to the patients' needs in my country, as well.

To resume briefly, the use of topical forms of fluoride has become the primary approach lately, instead of traditional systemic forms in public health measures. Fluoride remains a standard for caries prevention, but at the same time, oral health should be promoted at other levels like maintaining good oral hygiene and healthy nutrition, regular check-ups as apart of oral preventive programs in all countries.<sup>26</sup> Government health policies should be arranged adequately in order to lower the costs of treatment.

In addition, regarding the fact that they see their patients on a regular basis, it would be a crucial step for primary care physicians to refer their patients to dentists for regular dental visits. This group of physicians could take the advantage of communicating with their patients in any period of their lives and transform this into a chance of mentioning and advising on oral and dental health.

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