Journal of Health Sciences

RESEARCH ARTICLE Open Access

Efficiency of dental health care in Federation of Bosnia and Herzegovina

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ABSTRACT

Introduction: Despite the great improvements in the oral health status of the population across the world, oral diseases remains a major public health issue connected with a lost of numerous school days for children and absenteeism from work in adults. This effect is particularly evident in low and middle income countries as Bosnia and Herzegovina. This retrospective study presents the efficiency of dental health care in Federation of Bosnia and Herzegovina measured by number of visits and performed dental treatments during the time period of six years, from 2005-2011.

Methods: Data were collected by evaluation of the results obtained by forms which are mandatory to be completed by dentists.

Results: The number of graduated dentists from 2007 to 2011 decreased from 108 in 2007 to 68 in 2011. In the same time, number of dentists employed in public sector slightly increased from 529 in 2005 to 587 in 2011. Number of extracted permanent teeth decreased from the 412 extracted permanent teeth per dentist in 2005 to 364 in 2011. Small number of filled primary teeth comparing to large number of extracted primary teeth showed negligence in their treatment.

Conclusion: Having in mind that improving oral health in developing countries is a very challenging objective we can conclude that dental health care system in Federation of Bosnia and Herzegovina need to be reform in order to improve oral health in general, particularly in children population.

Keywords: oral health, efficiency, Federation of Bosnia and Herzegovina

INTRODUCTION

Dental health care as a part of the health care system in general, is essential for promoting, improving and maintaining oral health of the population. Through an efficient dental health service, patients can be advised of risks factors whose modification could reduce the incidence of oral diseases, and further, how controlling such factors can contribute to maintain a good quality of life. Comparing with developed countries, where most of dental clinics are equipped with the latest technical facilities and supported by health professionals from various specialties that allow their cooperation to benefit the patient, dental health services in developing countries, are mostly directed to provide emergency care only or interventions towards certain age group popula-

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Submitted 3 August 2013 / Accepted 8 September 2013

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tion. The most common diseases are dental caries and periodontal disease and frequently intervention procedures consists of treating existing problems and restoring teeth and related structure to normal function (1).

Bosnia and Herzegovina with the principle of organization of the dental health care is no exception. Federation of Bosnia and Herzegovina (FBH) is organized in 10 Cantons covering an area of 26 110,5 km^2 with the population of 2 338 277 people (2). Health care system in FBH is organized on federal level, cantonal level and municipality level that have different jurisdiction, determined by law. The organization of health care system on Cantonal level with the coordination from Federal level represents a real situation with the possibility of decentralization of health care system according to the experiences of developed countries.

Oral health care in FBH is organized as insurance funded public health services and private practice. Accessibility to oral health care facilities differs between administrative units (3), which has it's repercussion on oral health of population in general. Dental health care in FBH is organized as a primary, secondary and tertiary oral health care and all dental profesionals are obliged by law to fulfill the report forms about deseases, conditions and injuries according to the „International Statistical Classification of Diseases and Related Health Problems – tenth revision" (ICD-10) (4).

The aim of this study is to evaluate the efficiency of dental health care in FBH presented by number of visits and performed dental treatments during the time period of six years from 2005-2011.

METHODS

Procedures

Monthly rates of total dental care procedures, preventive procedures, collective procedures, restorations and extractions for every single dental office were collected and presented as a unique anual report of dental care in FBH published by Institute for Public Health of FBH in their publication „Health statistics annual of Federation of Bosnia and Herzegovina" (5). The data for this study were colected from „Health statistics annual of Federation of Bosnia and Herzegovina " during the time period of six years, from year 2005 to 2011. The data includes number of dentists graduating during the time period year 2005 to 2011, number of doctors of dental medicine (DDM) employed in public sector, between years 2005 and 2011 and visits and delivered services in dental care for the same time period. The lack of data of number of doctors of dental medicine employed in the private sector was partially determined, indirectly, by the number of graduate doctors of dental medicine. The assumption is that one part of graduates is employed in the private sector, but that data were not available yet. Variables, number of doctors of dental medicine (DDM) have been analyzed as the number of DDM per 100.000 population, morbidity data as number of disease per 10.000 population and number of visits and performed treatments per doctor of dental medicine.

Statistical analysis

Relationship between variables is computed by analyzing Pearson coefficient of linear correlation. Preliminary analyzes were conducted to prove the satisfaction of the assumptions of normality, linearity and homogeneity of variance.

RESULTS

This section outlines the main characteristics of outcome data in dental service in FBH over the six years based on publication „Health statistics annual of Federation of Bosnia and Herzegovina". Table 1 shows how the number of graduated doctors of den-

TABLE 1. The number of graduated doctors of dental medicine during the period from 2005 to 2011 and number of doctors of dental medicine/ number of DDM per 100.000 populations employed in public sector during the same time period.

Year	Number of graduated Doctors of Dental Medicine	Number of Doctors of Dental Medicine/ number of DDM per 100.000 populations*
2005	57	529/23
2006	107	573/25
2007	108	547/23
2008	66	514/22
2009	78	515/22
2010	55	595/25
2011	68	587/25

* The data of number of doctors of dental medicine employed in the private sector is missing.

TABLE 2. Diseases, injuries and health related problems (ICD-10) registered by dental health care professionals in Federation of Bosnia and Herzegovina during time period from 2005.to 2011.

Diseases, injuries and health related problems (ICD-10)		Time period						
		2005.	2006.	2007.	2008.	2009.	2010.	2011.
1.	Malignant neoplasms (C00-C08)	26	91	4	15	9	36	44
2.	Disorders of tooth development and eruption (K00)	11890	13601	9865	10857	12573	11729	12625
3.	Embedded and impacted teeth (K01)	9010	13305	13389	8825	8174	8509	8691
4.	Dental caries (K02)*	292493	358061	263564	312689	303447	309097	316248
5.	Other diseases of hard tissues of teeth (K03)	71889	69796	71408	55780	39654	41864	36999
6.	Diseases of pulp and periapical tissues (K04)	219896	231382	231965	267357	250842	249602	221733
7.	Gingivitis and periodontal diseases (K05)	56569	69252	51884	49864	55219	54522	51442
8.	Other disorders of gingiva and edentulous alveolar ridge (K06)	3704	4041	6735	5000	5595	5299	6195
9.	Dentofacial anomalies including malocclusion (K07)	30641	30201	29239	34485	36844	41280	43070
10.	Other disorders of teeth and supporting structures (K08)	21289	23484	25921	24846	23247	24505	21608
11.	Cysts of oral region, not elsewhere classified (K09)	1000	947	967	1423	1280	1132	1394
12.	Other diseases of jaws (K10)	8900	10854	15378	18346	18089	18535	19364
13.	Diseases of salivary glands (K11)	602	310	374	197	210	497	374
14.	Stomatitis and related lesions (K12)	4690	4792	3816	4964	4371	11767	3752
15.	Other diseases of lip and oral mucosa (K13)	2438	3504	2608	3182	2814	2965	2669
16.	Diseases of tongue (K14)	537	703	666	639	622	972	1074
17.	Injury of head, face and oral cavity (SOO-SO9,TOO-TO4,T20,T90)	1372	768	204	268	364	358	433

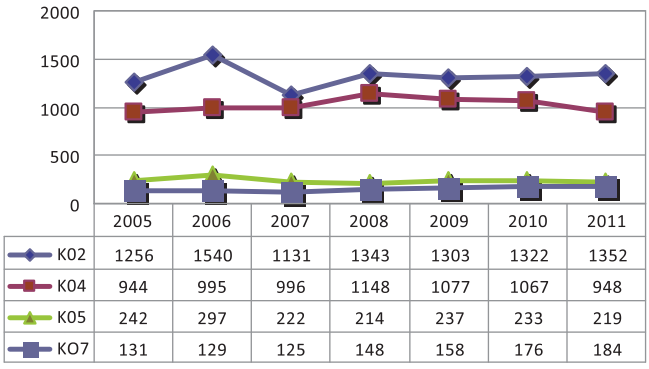
* Dental caries is still the most prevalent oral disease in FBH.

tal medicine and the number of doctors of dental medicine employed in public sector changed during the period from 2005-2011. Visible reduction of number of dentists employed in public sector in years 2008 and 2009 is not statistically significant. Pearson coefficient of linear correlation shows positive correlation between an increased number of dentists employed in public sector and an increased number of graduate dentists where r = 0.012, n = 7 and p = 0.979 (Table 1) (5). It is noteworthy that there is no evidence of number of doctors of dental medicine employed in the private sector so total number of employed dentists can be estimated only.

Table 2 presents number of diseases, injuries and health related problems registered by dental health care professionals in Federation of Bosnia and Herzegovina during time period from 2005.to 2011. rate per 10.000 population (5). Those results where coded and classified by "Application of the International Classification of Diseases to Dentistry and Stomatology (ICD-DA)" (6). It is derived directly from the Tenth Revision of the International Classification of Diseases (ICD-10) (4) with the intention to provide a coherent system for coding and classifying data on oral and dental disorders. In 2011 dental caries (K02) and periodontal diseases (K05) are still most prevalent oral diseases and rate for Dental caries (K02) is 1352 per 10.000 population, for K04 - rate 948 per 10.000 population, and K05 - 219 per 10.000 population. Rate for Dental caries (K02) in 2005 is 1256 per 10.000 population, in 2006. rate is 1540 per 10.000 population, in 2009. rate is 1303 per 10.000 population and in 2010. rate is 1322 per 10.000 population.

Considering a number of registered malignant neoplasms (C00 – C08), from 91 cases in year 2006 to 4 cases in 2007 it can be concluded that neoplasms are not detected occasionally. All other lesions that are suspicious, benign, malignant or diagnosed as some of autoimmune diseases were classified as K13 or K10 group (Table 2) (5).

Diseases diagnosed as dental caries (K02), other diseases of hard tissues of teeth (K03), diseases of pulp and periapical tissues (K04) and gingivitis and



	2005	2006	2007	2008	2009	2010	2011
K02	1256	1540	1131	1343	1303	1322	1352
K04	944	995	996	1148	1077	1067	948
K05	242	297	222	214	237	233	219
KO7	131	129	125	148	158	176	184

FIGURE 1. Number of dental caries (K02), diseases of pulp and periapical tissues (K04), gingivitis and periodontal diseases (K05) and dentofacial anomalies (K07) per 10.000 populations, recorded in time period from year 2005 to 2011. Diseases diagnosed as dental caries (K02), other diseases of hard tissues of teeth (K03), diseases of pulp and periapical tissues (K04) and gingivitis and periodontal diseases (K05) per 10.000 populations showed a little variation compared to the observed time period.

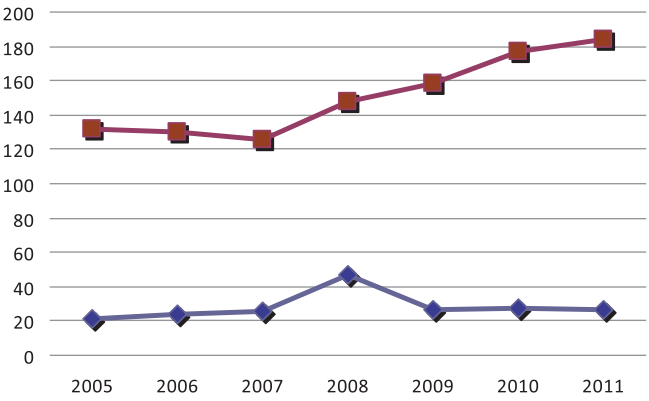


FIGURE 2. Number of dentofacial anomalies and number of removable orthodontic applianc-es recorded in time period 2005 to 2011. The figure shows increased number of dentofacial anomalies during the time period from 2005 to 2011. This trend can be considered one of the reasons for the increased number of removable orthodontic appliances recorded in the same period.

periodontal diseases (K05) showed a little variation compared to the observed time period (Figure 1) (5).

Table 3 shows number of visits and performed treatments per doctor of dental medicine in public dental service during the time period years 2005 to 2010. It is interesting to note a small number of filled deciduous teeth (30 per doctor of dental medicine in 2010.) comparing with the number of extracted deciduous teeth in the same time period (119 per doctor of dental medicine in 2010.) Having in mind that early extraction of deciduous teeth usually leads to loss of space, a large number of extractions of primary teeth can be partly considered as the cause of increased number of dentofacial anomalies (KO7) (5).

A strong positive correlation has been seen between the increased number of dentofacial anomalies (K07) and increased usage of removable orthodontic appliances where r = 0.126, n = 7, and p =0.788 (Figure 2) (5).

Very interesting information, from the dentist's point of view, is the almost equal number of fillings in permanent dentition and extracted permanent teeth, which certainly increased the number of patients who needs partial dentures or even total prosthesis as a treatment (Table 3) (5).

DISCUSSION

The biggest recent changes in European oral healthcare were found to have occurred in Eastern Europe, where there has been wide scale privatization of the previously public dental services (7). Bosnia and Herzegovina is no exception. This paper reports the findings of retrospective study that was designed to deepen understanding about the impact of organization of dental health care in Federation of Bosnia and Herzegovina on oral health of population in general. The main findings were: The number of dentists employed in public sector slightly increased from 529 in year 2005 to 587 in 2011, but there are no data for private sector in FBH; diseases diagnosed as dental caries (K02), other diseases of hard tissues of teeth (K03), diseases of pulp and periapical tissues (K04) and gingivitis and periodontal diseases (K05) showed a little variation compared to

TABLE 3. Number of visits and performed treatments per doctor of dental medicine in public dental service during the time period year 2005 to 2010.

Treatments	Year					
	2005	2006	2007	2008	2009	2010
Filled primary teeth	34.0	29.0	28.0	34.0	38.0	30.0
Filled permanenth teeth	439.0	436.0	433.0	563.0	548.2	479.5
Extracted primary teeth	163.0	163.0	143.7	152.0	141.3	118.6
Extracted permanenth teeth	412.0	421.0	411.3	473.4	445.3	370.6
Complete dentures	8.0	8.1	7.7	10.4	9.5	8.1
Partial dentures	8.0	6.8	6.3	8.2	6.9	5.9
Single crowns	5.0	3.6	4.5	3.2	3.6	2.9
Removable orthodontic appliances	9.4	9.7	11	21.2	11.9	10.7
Periodontal treatment	200.6	172.2	197.6	260.5	267.0	251.5
All visits. total	1775.1	1716.8	1696.0	2063.2	2032.2	1840.6

Small number of filled deciduous teeth per doctor of dental medicine comparing with the number of extracted deciduous teeth in the same time period.

the observed time period; almost equal number of fillings in permanent dentition and extracted permanent teeth, which certainly increased the number of patients who needs partial dentures or even total prosthesis as a treatment; it has been observed a small number of filled deciduous teeth (30 per doctor of dental medicine in year 2010) comparing with the number of extracted deciduous teeth in the same time period (119 per doctor of dental medicine in year 2010).

More than 20 years after widespread adoption, the strategy of WHO „Health for All through primary health care“ still has not been fully implemented. Bosnia and Herzegovina national capacity and resources like human, financial and material, are still insufficient to ensure availability and open access to essential health services of high quality for individuals and population, especially in deprived communities.

The health system in Bosnia and Herzegovina is characterized by centralized structure, providing treatments on demand, with increasing number of doctors specialist in different areas, who basically provide health care on primary level. Organization of dental health sector in Bosnia and Herzegovina and the oral health of the population depend on method of financing, on relationship between socioeconomic factors of dental health care and the level of utilization of dental services. Dental health care is based on the specific population group like pregnant women, preschool children, school children and adults. This kind of organization neglected population as a whole.

Changes in organization of oral health care in Federation of Bosnia and Herzegovina, which have happened lately, corresponds with recent changes in European oral health care. Bosnia and Herzegovina, like some EU member states, operate the Bismarkian system with health insurances which proclaim "Universal health insurance" offering wide population coverage, comprehensive treatment and some benefits. Despite wide option for the people to get health care it is estimated that 15 % of population in general are not covered by health insurance. Population coverage with health care deviates in cantons and regions, deviations is even more noticeable in municipalities (8). In order to reduce inequities in access to oral health services and improves the efficiency of the health system in general the process of change is indispensable.

Limited access to oral health services can be considered as one of the reasons for such a big number of extracted primary teeth as well as permanent teeth (Table 3). Because of limited access to oral health services teeth were often left untreated and later extracted because of pain or discomfort.

Visits and performed treatments in dental service

The results of this study found that the extraction of permanent teeth is the most common treatment in

dental offices in FBH (Table 3.). These results correspond with the results registered by WHO where 78 % of edentulous adults in Bosnia and Herzegovina, aged 65 years and more, present the biggest percentage of edentulous people in the world (9). Although, losing teeth as a natural consequence of aging, is still seen by many people throughout the world, those results indicates the need to reorient oral health services in Bosnia and Herzegovina towards prevention and oral health promotion. Having in mind a pain and suffering that accompany oral diseases, impairment of function and reduced quality of life, those needs become more pronounced.

Incidence rates of malignant neoplasms found in this study (Table 3) coincide with the incidence rates in most countries worldwide (10). Those incidence rates relate directly to risk behaviors such as smoking and alcohol consumption. It seems, while oral and pharyngeal cancers are both preventable, in BH, like in most countries, they remain a major challenge to oral health programmes.

Oral health personnel and morbidity

The issue of oral health personnel - which categories of personnel need to be educated, their duties and the numbers of each - has for many years been of great concern. The importance of this matter really has become evident in a number of dental caries (K02), diseases of pulp and periapical tissues (K04) and gingivitis and periodontal diseases (K05) recorded in time period years 2005 to 2011 (Table 2). According to the fact that oral health in Bosnia and Herzegovina can be considered as the worst in the Europe (11) it seems that the production of dentists in BH appears irrelevant to the oral health needs and demands. Severity of oral health burdens registered in this study partially can be considered as the result of changing of socio-demographic factors. In order to improve oral health, the adjustment of existing oral health manpower structures with the training programmes for types of personnel which would match the oral health needs, are needed in Bosnia and Herzegovina.

Reform of oral health services in Federation of Bosnia and Herzegovina should lead to increased interest in basic preventive oral health interventions (especially in high-risk populations) as an easy and reliable approach to reduce systemic load of curative dental treatments with the aim to improve not only oral health but the health in general. Unfortunately, the human, financial and material resources are still insufficient to meet the need for oral health care services and to provide universal access, especially in disadvantaged communities. Having in mind evident accelerated aging of the population which will be intensify over the coming years, it is obvious that improving oral health for health authorities in Federation of Bosnia and Herzegovina will be a very challenging objective.

CONCLUSIONS

This study highlighted the importance of oral health in public health outcomes, with the goal of developing a comprehensive public health strategy that would include preventive oral health measures within overall prevention and wellness approaches. The need for strengthening disease prevention and health promotion programmes in order to improve oral health conditions in general is evident.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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