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PROFESSIONAL PAPER

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An Overview of Human Resources and Capacity in Health Care Institutions in the Federation of Bosnia and Herzegovina in the Context of Responding to the COVID 19 Pandemic

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ABSTRACT

Background: 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. **Objective.** To make an overview of the situation at the primary and hospital health care level with the aim of assessing the existing human resources and capacity of health care institutions in FB&H, with which we entered in COVID-19 pandemic. **Methods.** This retrospective study presents the efficiency of health care in FB&H measured by number of medical doctors, and other medical staff during the time period of five years. Data of the Institute for Public Health FB&H were used. The Institute for Public Health FB&H is authorised by the law to conduct and implement statistical research in the field of health care in line with relevant laws and by-laws. The Institute is obliged to report on organisational structure, human resources and medical equipment. **Results.** Presented data include the number of health care employees in medical institutions in FB&H in the period 2015-2019 per 100,000 inhabitants and their numbers in primary health care, family medicine, secondary and tertiary level of health care in 2019. The study also presents the number of doctors of medicine, specialists and medical residents in FB&H, the number of nurses of all profiles and levels of education as well as medical staff and other employees in the public health care system in FB&H in 2019. **Conclusions.** The COVID-19 pandemic in FB&H

has confirmed the fact that human resources in health care are insufficient, especially in the field of public health and epidemiology. The availability of these health facilities and human resource is not uniform throughout the FB&H, which may affect the capacity of the health system in some parts of the FB&H to meet the needs of providing services during COVID-19 pandemic.

Keywords: health care employees, human resources, COVID-19, pandemic, epidemiology.

1. BACKGROUND

The goal of health care is the promotion, improvement of health, prevention of diseases, detection of diseases, effective treatment, and rehabilitation (1). Federation of Bosnia and Herzegovina (FB&H) is organized in 10 Cantons covering an area of 26,110.5 km² with the population of 2,190,098 people in 2019 (2). Health care system in FB&H 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 (3).

In the FB&H, health care is organized at the primary level of health care through health centres, secondary and tertiary level of health care is provided through clinical centres and hospitals. The availability of these health facilities is not uniform throughout the FB&H, which may affect the capacity of the health

system in some parts of the FB&H to meet the needs of providing services during COVID-19 pandemic. The situation is similar with the capacities of public health which include Institutes for Public Health (4).

2. OBJECTIVE

The aim of this study is to make an overview of the situation at the primary and hospital health care level and to assess the existing human resources in health care institutions in FB&H with which we entered in COVID-19 pandemic.

3. MATERIAL AND METHODS

This study presents an observational retrospective study. Analytical-descriptive methodology was used. The study covers a period of five years, 2015-2019, and refers to the area of FB&H.

The Institute for Public Health FB&H is authorised by the law to conduct and implement, statistical research in the field of health care in line with relevant laws and by-laws (5-8).

The Institute is obliged to report on organisational structure, human resources and medical equipment no later than the end of May for the previous year. According to reporting period, last data, from human resource and medical equipment were from 31.12.2019. In that regard, we have made an overview of the situation at the primary and hospital level of health care in order to assess the existing human resources in health care institutions of FB&H in the time of pandemic COVID-19.

4. RESULTS

The organisational structure in FB&H is as follows: at the primary health care level there are 80 health care centres, the secondary and tertiary level of health care is provided by 24 institutions that include three clinical centres, eight general hospitals, seven cantonal hospitals, three special hospitals and three hospitals for rehabilitation. The total capacity of hospital beds is 7,315. At the Federation level there is also the Institute of Transfusion Medicine, while some cantons such as the Sarajevo Canton, have the Institute of Sports Medicine, Students' Protection etc. in addition to the aforementioned institutions (a total of nine institutes). In FB&H public health system is organised through 10 cantonal Institutes for Public Health and the Institute for Public Health FB&H.

According to the data of regular health care statistics related to the public sector of health care, in 2019 health care institutions in FB&H had a total of 26,811 employees (1,208/100,000 inhabitants) (4).

The number of Doctor of Medicine in FB&H has been increasing since 2015, when there were 4,764 Doctors of Medicine as compared to 2019 when their number was 5,092. According to the data, the number of nurses was 12,594 in 2015, while in 2019 there were 13,513 nurses employed in medical institutions of FB&H (4).

Year	Doctor of Medicine	Doctor of Dental Medicine	Master of Pharmacy	Nurses with university education	Nurses with secondary school education
2015	204	25	14	27	539
2016	215	27	15	35	570
2017	218	27	15	44	556
2018	224	27	17	50	561
2019	232	28	16	60	502

Table 1. Health care employees in medical institutions in FB&H in the period 2015-2019 per 100,000 inhabitants

	2015	2016	2017	2018	2019
Doctor of Medicine, total	1,573	1,568	1,600	1,633	1,771
Number of specialist	901	890	929	898	1,264
Nurses	2,966	2,999	2,917	2,957	3,416

Table 2. Health care employees in primary health care 2015-2019

	2015	2016	2017	2018	2019
Doctors of medicine, total	832	839	856	860	1,023
Number of specialist	773	764	784	786	808
Nurses	1,418	1,399	1,329	1,321	1,705

Table 3. Health care employees in family medicine 2015-2019

	Doctor of Medicine	Nurses	Number of beds	Discharged patients	Hospital days
2015	2,346	6,277	8,379	238,930	1,811,671
2016	2,311	6,236	8,255	243,505	1,767,041
2017	2,263	5,934	8,252	242,807	1,737,927
2018	2,291	6,084	8,107	245,432	1,714,172
2019	2,283	5,476	7,872	244,276	1,683,888

Table 4. Health care employees in hospital health care level and number of beds 2015-2019

According to the data of the Institute for Public Health FB&H, in 2015 health care sector in FB&H employed 204 Doctors of Medicine, 25 Doctors of Dental Medicine, 14 Masters of Pharmacy and 539 nurses per 100,000 inhabitants. During the period 2015-2019 there was an increase in the number of medical staff with the number in 2019 reaching 232 Doctors of Medicine, 28 Doctors of Dental Medicine, 16 masters of pharmacy and 502 nurses per 100,000 inhabitants (Table 1).

The age structure of Doctor of Medicine is unfavourable. In 2019 more than one fourth of Doctor of Medicine (1,401; 27.5%) were aged 55 and over, while less than one fifth of Doctor of Medicine were aged 45-54 (833; 16.3%). Total of 1,442 (28,3%) of Doctor of Medicine were aged 35-44 years. The highest number of Doctor of Medicine, specialists in all branches of medicine in 2019, were 55 years old or over.

According to the data of regular health statistics for 2019 in FB&H, one third of all Doctor of Medicine, 1,771, and 3,416 nurses worked in primary health care. Primary health care include: family medicine, general medicine, paediatrics, school medicine, department of lung diseases, mental health center, emergency care, health visiting. Primary health care was provided by 80,9

Specialization	2015		2016		2017		2018		2019	
	M	F	M	F	M	F	M	F	M	F
Anaesthesiology with reanimathology	56	112	55	112	55	122	59	127	52	117
Infectology	13	39	11	42	11	38	13	38	12	37
Internal medicine	141	171	131	170	136	168	136	161	120	150
Pneumophthisiology	38	61	35	60	35	61	33	64	40	57
Radiology	59	88	57	87	66	91	61	101	50	81
Emergency medicine	57	55	58	60	61	62	59	65	59	77

Table 5. Health workers with university degree by specialization and sex 2015-2019 M – male; F – female

	2015		2016		2017		2018		2019	
	M	F	M	F	M	F	M	F	M	F
Epidemiology	19	34	19	30	20	32	19	32	16	28
Hygiene and health ecology	5	8	5	8	7	7	7	7	8	5
Social medicine	3	12	4	12	4	13	4	11	5	8

Table 6. Health care employees in public health 2015-2019. M – male; F – female

Doctors of Medicine and 156 nurses per 100,000 inhabitants, therefore, there were in average two nurses per one doctor of medicine (Table 2).

Family medicine. According to the data of regular health statistics for 2019, over one half of all Doctor of Medicine (57.8%) and nearly one half of nurses (49.9%) employed in primary health care in FB&H worked in family medicine services. Of the total of 1,023 Doctors of Medicine in those services, over two-fifths (808) had completed specialisation in family medicine (Table 3).

Family medicine has one working team per 1,800 insured persons older than six years of age. The basic composition of a family medicine team is as follows: one doctor of medicine specialised in family medicine or a Doctor of Medicine with special education in family medicine, one nurse with secondary school education (4, 9, 10).

Hospital health care. In 2019 hospital health care in FB&H was provided in 24 hospitals (general and cantonal hospitals, clinical hospital, clinical centres, specialised hospitals, and hospital for rehabilitation) with 2,283 doctors of medicine (44.8% of all doctors of medicine in FB&H) and 5,476 nurses. In 2019 there were 104 Doctors of Medicine and 250 nurses per 100,000 inhabitants working in hospitals, and there were in average 2.3 nurses per one doctor of medicine. In 2019 there were 3.6 beds per 1,000 inhabitants in FB&H, which was similar to previous years (Table 4) (4, 9).

Specialist and consultative health care during the COVID-19 pandemic. Some branches of specialist and consultative health care, as well as the data on available medical staff during the COVID-19 pandemic are presented in Table 5. According to the latest published data from the Institute for Public Health FB&H there were 182 anaesthesiologist, 221 specialists of internal medicine, 29 emergency medicine specialists, 51 specialists of infectology and 97 specialists of pulmonology working in health institutions on the territory of the FB&H (4, 9).

Public health. According to the Law on Health Care, public health at the level of primary health care in FB&H is implemented through hygiene and epidemiology services, which are organised at health care centres or public health institutions.

Nearly two-thirds of employees in public health institutes in all five years included in the study were medical staff, one-fourth were administrative and technical staff, while medical associates

were represented with 11%. The activities in Institute for Public Health in FB&H were mainly carried out by Doctor of Medicine, who made less than one-fourth (23.6%) of all medical staff in public health institutes in 2018. Majority of Doctor of Medicine (80.7%) were specialists in some of the public health disciplines – social medicine, epidemiology, hygiene and microbiology. Over a half of medical staff were nurses (59.4%), and 17% were medical staff with completed health care studies at the university level, whose representation in the structure of employees is increasing. Among non-medical staff in public health institutes the highest representation was by chemistry and physics engineers, nutrition technologists, IT staff, economists, and lawyers.

According to the latest data published by the Institute for Public Health FB&H, the total number of doctors of medicine specialised in epidemiology in FB&H on 31 December 2018 was 51, with 27 (62.94%) of them being in the age group over 55 years of age (4, 9).

Number of hospital beds. The number of hospital beds for 2019 is 7,315, while the number of intensive care beds in all hospitals is 523. The rate of hospital beds is 329.6 per 100,000 inhabitants (4). Only five hospitals in the FB&H have departments of infectious diseases with a total of 180 beds (4).

5. DISCUSSION

This epidemic is a great challenge for the health care system and the authorities in terms of timely response with efficient and adequate interventions, policies and recommendations. Since 16 March 2020, when the state of natural disaster was proclaimed, the main response against the COVID-19 pandemic has been provided by medical staff along with citizens who have complied with restrictive measures. A breakdown of the number of medical staff, available capacities in health care institutions, organisational structure in the health care system is a basis for an analysis of the health care system of a country (4, 9).

In the European Union (EU) the highest rate of doctors of medicine per 100,000 inhabitants is found in Greece with 625, which is followed by Austria with 515, Portugal 443 and Norway 442, while the average in EU is 343 doctors of medicine per 100,000 inhabitants (11, 12). The rate of Doctor of Medicine in FB&H in 2019 was 232/100,000 inhabitants.

According to the latest available data of the World Health

Organisation, FB&H has a significantly lower number of beds (370/100,000) as compared with the average of the European region (553/100,000), as well as in comparison with selected countries in the region, except Albania (289/100,000) (9).

The number of nurses varies according to differences in health-care systems. The number of nurses compared with physicians also varies between healthcare systems, and between hospitals and long-term nursing care facilities. Ireland had 1,288 active nursing professionals (including midwives) per 100,000 inhabitants in 2018, followed by Luxembourg with 1,172 nurses in 2017. Germany, Sweden, France and Denmark all recorded more than 1,000 practising nursing professionals per 100,000 inhabitants. Slovenia had 343, Greece 195, Croatia 166 and Romania 74 recorded nursing professionals (13). Health workforce imbalances and shortages are a major concern in the European Region. The number of physicians and nurses has increased by approximately 10% over the past 10 years. Still, it is unlikely that this increase will be stable and sufficient to cover the needs. There are five times more doctors of medicine in some countries than in others. Some countries have nine times fewer nurses than others (14-16). A norm for public health care at the primary level of health care, i.e. hygiene and epidemiological services includes one working team per 40,000 inhabitants (10). One team comprises one doctor of medicine specialised in epidemiology, one bachelor of sanitary engineering with completed first cycle of higher education (or the 6th grade of higher education according to domestic law), and two nurses or sanitary technicians with secondary school education. If an area for which these services are provided requires three or more teams, then one team can have a specialist in hygiene and health ecology (17-21). According to this staffing norm, hygiene and epidemiology services in the territory of FB&H need 55 Doctors of Medicine specialised in epidemiology, which indicates a lack of this profile, that is, in addition, inadequately distributed geographically. Proper management of human resources is critical in providing a high quality of health care. Effective human resources management strategies are greatly needed to achieve better health care outcomes (21-24). The COVID-19 pandemic in FB&H has confirmed the fact that human resources in the field of health care are insufficient, particularly in the field of public health, primarily doctors of medicine specialised in epidemiology, but also doctors of medicine with other specialities (25, 26). It needs to be pointed out that a large part of duties was taken over and carried out by medical staff of other educational profiles.

6. CONCLUSION

In a situation of mass spread of infectious diseases (especially in pandemic form), the ability of outpatient health facilities to take part of the pressure to solve the health problems of patients is extremely important. Where there is well-developed primary health care, trained to act in a pandemic, enormous pressure on hospitals can be prevented.

The leaders in the healthcare system are, of course, healthcare professionals. The number of health workers, who are currently leading the main fight in the COVID-19 pandemic, must be institutionally and systematically planned.

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