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# Analysis and Impact of Evidence Based Medicine in the Process of Education and Decision Making in Medical Practice

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### ABSTRACT

Evidence Based Medicine (EBM) is one of the modern systems of collecting, recording and using information and data related to medicine. The research was conducted in 2018 in several health institutions (health centers and hospitals) in Sarajevo Canton. The sample was made up of family doctors and other clinical specialties. The research results suggest the doctors in BiH are familiar with the concept of Evidence Based Medicine (EBM) and in their everyday work they apply relevant contemporary knowledge, national and international guidelines for the treatment and disease therapy. The most significant obstacle to more efficient management of medical information and the implementation of EBM in practice is the perception it would require additional time and incur significant cash expenditures to the doctors. In the future, doctors will increasingly be demanded to use advanced tools and modern techniques supporting them to make the most effective treatments on the basis of their own experience.

**Keywords:** EBM - Evidence Based Medicine, EBM application in medical practice, EBM in medical institution in Sarajevo Canton

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## INTRODUCTION

Keeping an eye on recent medical information is precisely a presumption for scientific and professional action in performing the medical job, since medical knowledge and decision-making is subject to continuous changes. This typically involves recognizing the character and scope of the specific need for information, practical knowledge of how to create, organize and disseminate information, and recognize the type and form of information sources. Modern medicine represents a science that has made the most progress in the last few decades, primarily thanks to the development of technique and technology. Interest for evidence based medicine also has grown exponentially since the first occurrence of the term in the field (1). The advancement of the technology of information/telecommunications systems has resulted in wide application in all aspects of modern life, both in private and business life. One of the modern systems of collecting, recording and using information and data related to medicine is Evidence Based Medicine (EBM). The term "evidence based medicine" was first used in medical literature in 1991, referring to "the ability to assess the reliability and importance of evidence before its application in addressing everyday clinical problems" (2). EBM is commonly defined as "conscientious and prudent use of currently the most reliable evidence in the health care of individuals and populations" (3).

EBM can be adequately acknowledged through elements 1-2-3-4, which means that EBM embraces one goal, two basic principles, three key components and four steps. The specific goal is to improve the quality of clinical care; the two fundamental principles are the hierarchy of evidence and the inadequacy of the evidence itself in decision-making; the three key components are the evidence, expertise and expectations of patients; and four steps typically refer to ask, acquire, evaluate and apply (the

previously presented step represents a simplified logic of using EBM).

Nevertheless, evidence-based medicine additionally requires new skills of doctors, primarily direct access to medical databases, ability to search diligently the medical literature and basic skills in the interpretation of epidemiological and statistical results. This should be practiced not merely by doctors but also by nurses, patients themselves and health institutions. In the clinical decision-making process, which relies on a method of practice based on scientific evidence, it is supremely significant to include unambiguous, strong and available scientific evidence or reduce as much time as possible from their publication to the introduction into clinical practice (4, 5). Nowadays, doctors are naturally expected to act in accordance with the evidence-based medicine principles (6). However, numerous studies show the doctors cannot simply and easily implement new medical evidence in everyday practice. The barriers are numerous and diverse (7, 8, 9, 10).

Even with increasing availability of aggregated evidence in the form of clinical practice guides or textbooks or evidence-based databases, the implementation of recent evidence in practice remains a challenging task for doctors (11). Limiting factors are defining the right question, conducting literature searches, formulating answers to questions from available literature, and implementing individual cases for particular patients. Changing the established ideas and doctors' habits can also additionally make the implementation of these activities more difficult.

## RESEARCH RESULTS

The research was conducted in 2018 in several health institutions (health centers and hospitals) in Sarajevo Canton. The selected sample was made up of family doctors and other clinical specialties. The sample was created using random sampling method, as well as stratified, multiphase sampling to obtain a more representative sample of employees in the

health system, thus achieving representativeness in relation to the total population of doctors in BiH. Participation in the research was voluntary. All personal data collected during the survey are kept as confidential documents and are not and will not be publicly presented. The questionnaire distribution and completion were supervised by the author, resulting with 98 fully completed questionnaires. Research questions were created on the basis of a part of the research carried out by M.A. Alen Lekic spec, in 2017, whose research results were presented in the master's thesis (12). The specific aim of the research was to obtain information whether and to what extent medical workers use modern resources and access to information, primarily referring to EBM system. Data comparison with previous research will be additionally presented in this paper, on the basis of which it is possible to draw several conclusions and recommendations in accordance with the following objectives:

- Determine which sources of relevant medical information and to what extent are used in everyday medical decision-making by doctors in Bosnia and Herzegovina
- Identify the doctors' needs and the most important obstacles to more effective management of medical information and the implementation of evidence-based techniques in practice, as well as to propose improvements in the quality of medical information management and evidence-based practice.

Based on the research results, it can be concluded medical workers in a significant percentage use Internet, typically referring to the databases primarily intended for doctors such as PubMed. In addition, it is possible to conclude most respondents use other reliable sources of information available online.

**Table 1: Using sources of medical information in practice**

	2017		2019	
	Yes	No	Yes	No
Do you use internet at work?	240	123	85	13
	66%	34%	86,73%	13,27%
Do you use internet at home?	350	15	96	2
	96%	4%	97,96%	2,04%
Do you know how to access relevant medical information on the Internet?	293	44	90	8
	87%	13%	91,84%	8,16%
<b>What sources of medical information do you use on the Internet?</b>				
Internet browsers (Google, Yahoo, etc.)	296	31	89	9
	91%	9%	90,82%	9,18%
PubMed	244	51	85	13
	83%	17%	86,73%	13,27%
Other databases	87	105	60	38
	45%	55%	61,22%	38,78%
Other internet browsers	34	88	50	48
	28%	72%	51,02%	48,98%

The research results indicate a significant majority of respondents searches/consults the Internet in the choice of diagnosis or therapeutic procedure. No significant deviation has been

noticed in relation to the previous research carried out in 2017. The detailed results of both studies are presented in the following table.

**Table 2: Frequency of using sources of medical information in practice**

	2017				2019			
	Never	1-2 times per	1-2 times per week	Every day	Never	1-2 times per	1-2 times per week	Every day
How often do you consult the sources of medical information on the Internet in selecting the appropriate diagnostic or therapeutic procedure?	41 11%	127 35%	124 35%	67 19%	15 15%	36 37%	32 33%	15 15%
How often do you consult relevant medical textbooks in determining the appropriate diagnostic or therapeutic procedure?	12 3%	143 40%	134 37%	70 19%	8 8%	41 42%	40 41%	9 9%

According to the research results in the segment of using medical sources in practice, a considerable number of respondents generally or completely agree to give priority to their own professional experience in relation to relevant medical information available on the Internet, in determining the appropriate diagnostic or therapeutic procedure. It is important to emphasize that respondents are medical professionals with many years of formal and

informal education and a significant number of years of practical experience. In addition to this, a massive number of healthcare claims relate to recurrent diseases/cases whose health care process does not require consultation and research in professional medical literature. The detailed results related to decision-making on the basis of medical sources are presented below.

**Table 3: Making decisions based on sources of medical information**

	2017				2019			
	I do not agree - No (%)	I mostly disagree - No (%)	I mostly agree - No (%)	I completely agree - No (%)	I do not agree - No (%)	I mostly disagree - No (%)	I mostly agree - No (%)	I completely agree - No (%)
In making a patient-related decision, I rely more on my own professional experience in practice than on the relevant sources of medical information on the Internet?	20 5%	75 20%	192 52%	79 22%	5 5%	30 31%	50 51%	13 13%
In making a patient-related decision, I rely more on textbooks/professional books than relevant sources of medical information on the Internet?	10 3%	74 20%	178 49%	101 28%	8 8%	8 8%	55 56%	27 28%
In practice, I apply the relevant international clinical guidelines	5 1%	23 7%	193 55%	127 36%	4 4%	7 7%	52 53%	35 36%
In practice, I apply relevant domestic clinical guidelines	13 4%	28 8%	207 58%	108 30%	4 4%	8 8%	50 51%	36 37%

The advancement of medicine and treatment methods requires continuous and lifelong learning by medical workers. According to the research results presented in the following table, a significant number of medical staff independently research their subjects of interest.

**Table 4: Frequency of use of medical information sources**

	2017				2019			
	Every day	2-3 times a week	2-3 times a month	Less than once in a month	Every day	2-3 times a week	2-3 times a month	Less than once in a month
How often do you study the relevant new medical literature?	23	95	150	92	5	21	47	25
	6,39%	26,39%	41,67%	25,56%	5%	21%	48%	26%

An opportunity to access relevant sources of medical information at any time at any place is an extremely useful tool that enables medical staff to explore the subject of interest, to "consult" and to find a solution for any problems they encounter. Access to EBM from the workplace and home is an extremely important and significant factor in terms of informal education and in terms of upgrading the knowledge of medical workers. However, it is critical to point out that medical workers have a more considerable number of constraints and

obstacles that prevent them from active utilization of EBM at work and home. For example, a significant number of the respondents stated they did not know if they have an access to EBM online, or that they did not have an access at all at the workplace, or from home. It is equally important to point out that, for instance, the volume of work (for example, the number of daily patients) prevents medical workers to devote a certain amount of time to use EBM online during their working hours.

**Table 5: Access to EBM at the workplace or at home**

	2017			2019		
	Yes	No	I don't know	Yes	No	I don't know
Do you have access to specialized evidence-based medicine databases (EBM) at work?	133	174	51	40	35	23
	37%	49%	14%	41%	36%	23%
Do you have access to specialized evidence-based medicine databases (EBM) at home?	165	157	36	47	41	10
	46%	44%	10%	48%	42%	10%

The research also included a segment of medical information sources mostly used in making medical decisions. Among eight different types of sources, the respondents stated they mostly consult appropriate textbooks or

colleagues of the same specialty, rather than colleagues of other specialties, websites, scientific articles and medical databases (in relation to textbooks and colleagues of the same specialty).

**Table 6: Consultation sources of medical information when making medical decisions**

A type of medical information source to consult:	2017					2019				
	Never	Rarely	Sometimes	Often	Always	Never	Rarely	Sometimes	Often	Always
Appropriate textbook	1	17	132	129	76	2	15	30	20	31
	0%	5%	37%	36%	21%	2%	15%	31%	20%	32%
Colleagues of the same specialty	6	30	115	133	74	1	13	25	25	34
	2%	8%	32%	37%	21%	1%	13%	26%	26%	35%
Colleagues of other specialties	20	77	139	78	30	2	24	40	23	9
	6%	22%	40%	23%	9%	2%	24%	41%	23%	9%
Promotional material of pharmaceutical companies	40	118	123	68	5	10	40	25	20	3
	11%	33%	35%	19%	1%	10%	41%	26%	20%	3%
Internet browsers	14	60	117	132	34	6	19	30	25	18
	4%	17%	33%	37%	10%	6%	19%	31%	26%	18%
Scientific articles	25	76	117	88	47	5	30	31	20	12
	7%	22%	33%	25%	13%	5%	31%	32%	20%	12%
Medical databases on the Internet	56	76	108	82	29	19	20	22	21	16
	16%	22%	31%	23%	8%	19%	20%	22%	21%	16%
Other sources	92	20	25	8	2	43	20	19	6	10
	63%	14%	17%	5%	1%	44%	20%	19%	6%	10%

Based on the results of the survey, the most commonly used EBM is PubMed. However, it is also possible to conclude that for certain other

databases there has been an increase in use in relation to the results of the research from 2017, which is presented in the table below.

**Table 7: EBM databases available online**

Do you know or do you use some of the following EBM databases?	2017					2019				
	Never heard of	I'm familiar with it, but I don't	I use it a couple of times a year	I use it a couple of times a month	I use it a couple times a week	Never heard of	I'm familiar with it, but I don't	I use it a couple of times a year	I use it a couple of times a month	I use it a couple times a week
PubMed	28	62	82	126	48	7	20	32	23	16
	8%	18%	24%	36%	14%	7%	20%	33%	23%	16%
Cochrane Library	89	105	41	44	7	23	35	15	17	8
	31%	37%	14%	15%	2%	23%	36%	15%	17%	8%
Embase	115	106	31	29	7	40	31	11	9	7
	40%	37%	11%	10%	2%	41%	32%	11%	9%	7%
BMJ Clinical Evidence	89	104	56	36	9	30	31	18	11	8
	30%	35%	19%	12%	3%	31%	32%	18%	11%	8%
Trip	161	100	13	9	3	45	32	15	5	1
	56%	35%	5%	3%	1%	46%	33%	15%	5%	1%
UpToDate	121	101	39	22	8	40	28	13	9	8
	42%	35%	13%	8%	3%	41%	29%	13%	9%	8%

**Table 8: The respondents' views on EBM**

	2017				2019			
	I do not agree	I mostly disagree	I mostly agree	I completely agree	I do not agree	I mostly disagree	I mostly agree	I completely agree
It contributes to the improvement of patient health care	18	13	157	164	8	15	35	40
	5%	4%	45%	47%	8%	15%	36%	41%
It helps me to make the right medical/diagnostic decision	12	20	178	137	8	16	42	32
	3%	6%	51%	39%	8%	16%	43%	33%
It is limited by the lack of sufficiently strong and valid evidence	63	139	127	13	12	41	35	10
	18%	41%	37%	4%	12%	42%	36%	10%
It is not credible because it is under the influence of the pharmaceutical industry	45	174	94	31	10	45	33	10
	13%	51%	27%	9%	10%	46%	34%	10%
It is limited by the difficulties in practical application	23	98	167	60	5	30	43	20
	7%	28%	48%	17%	5%	31%	44%	20%
It requires additional training in skills relevant for its application in practice	37	85	162	55	20	40	30	8
	11%	25%	48%	16%	20%	41%	31%	8%
It requires extra cash expenses relevant for its application in practice	50	144	73	75	12	40	32	14
	15%	42%	21%	22%	12%	41%	33%	14%
It requires extra time to follow the most recent medical information	33	53	149	113	8	22	59	9
	9%	15%	43%	32%	8%	22%	60%	9%
It is not applicable in practice due to poor patient collaboration	42	149	134	21	18	42	30	8
	12%	43%	39%	6%	18%	43%	31%	8%
There is no benefit for the patient from its use	141	148	40	19	36	38	20	4
	41%	43%	11%	5%	37%	39%	20%	4%
The attitude of colleagues towards evidence-based medicine is negative	84	182	61	17	22	41	25	10
	24%	53%	18%	5%	22%	42%	26%	10%
Relevant evidence-based medicine sources are hardly accessible	66	134	112	35	15	38	32	13
	19%	39%	32%	10%	15%	39%	33%	13%
Government investment in evidence-based medicine is insufficient	19	53	157	114	10	17	48	23
	6%	15%	46%	33%	10%	17%	49%	23%
Patient's expectations are substantially different from evidence-based medicine recommendations	41	108	137	59	13	48	19	18
	12%	31%	40%	17%	13%	49%	19%	18%

A significant majority of the respondents stated they largely or completely agree that evidence-based medicine contributes to improving health care system. Additionally, they agreed with the statement that EBM contributes and helps in making the right medical decisions, meaning that on the basis of the patient's experience and preferences, with adequate data and information, doctors are able to bring the correct diagnoses. The research results suggest it is necessary to create better conditions in which a greater number of medical staff will be educated about the EBM itself, the ways of utilization and its application in practice. On the other hand, it

is necessary to remove/reduce other obstacles/barriers that medical workers encounter, such as, the excessive workload of medical workers and the lack of time necessary to devote for EBM.

It is also important to point out that the research results reveal that government investment in evidence-based medicine is insufficient, in other words, there is a lack of institutional and systemic investment and support in the development and implementation of evidence-based medicine.

**Table 9: The importance of EBM in everyday practice**

	2017				2019			
	Necessary	Mostly useful	Limited benefits	No benefits at all	Necessary	Mostly useful	Limited benefits	No benefits at all
How do you evaluate the importance of EBM in practice?	109	161	58	12	25	30	35	8
	32%	47%	17%	4%	26%	31%	36%	8%

Based on the results of the research, it can be concluded that EBM is necessary in practice, but it is important to point out that compared to the results from 2017 there is a greater number of respondents who stated that EBM in practice has limited benefits. One of the reasons for this can be the impossibility to implement EBM knowledge and recommendations in practice, due to limited resources of medical institutions (financial and non-financial), lack of systemic approach to employee motivation for the use and application of EBM, etc. Doctors stated they were not not sufficiently educated about techniques and practical utilization of modern databases. Moreover, there is a relative lack of computer literacy, especially among doctors of the elderly, which is not unexpected. This ultimately leads to insufficient use of relevant,

modern professional sources of information, education and application of modern methods and knowledge in the practice of doctors in medical institutions.

## CONCLUSION

The research results indicate that doctors in BiH are familiar with the concept of Medicine based on evidence (EBM) and they apply in practice relevant knowledge, national and international guidelines for determining the treatment and therapy of the disease. Regarding the sources of relevant medical information, doctors mostly utilize the textbooks and professional books or consult colleagues of the same specialties. Periodically they use the Internet as a source of medical information, while relatively rarely use specific EBM databases available on the



Internet. Respondents agree EBM is necessary in practice and the best interest of the patient and society. The most significant obstacle to more efficient management of medical information and the implementation of EBM in practice is, as already mentioned, the perception that it would require additional time and significant cash expenditures by doctors. Taking into account all of these facts, only after improving the following it is possible to start with improvement process of better use and efficiency of the use of relevant medical information available in EBM bases supporting the treatment process:

- Education process during study (acquiring adequate knowledge and skills).
- Basic prerequisites to access EBM (access to the Internet and EBM databases).
- Raising awareness and the importance of applying EBM databases in the process of providing medical services both to doctors and management of medical institutions.
- Informal education by organizing additional seminars and trainings with which doctors would more significantly improve and upgrade their knowledge about EBM (both during and after the completion of formal education).

One of the indicators of the country's development is the development of a health care system. Therefore, the political and economic order in BiH creates multiple effects on the health system, which has effects on the efficiency of health care, in the manner of managing and selecting the management of health institutions, the equipment of health institutions, the control and monitoring system, and other aspects of healthcare operations system (as a macro system), but also to the business of individual healthcare institutions and employees in the same (as a micro system). In the future, doctors will increasingly be asked to use advanced tools and modern techniques that will help them to make the most effective treatments on the basis of their own experience. All facts presented, arguments and evidence in

the work indicate that the system of medical care in BiH in the future must be improved in a number of aspects if the doctors are expected to accept and implement the EBM in their everyday practice.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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