

Dental Recordkeeping: Practice in Federation of Bosnia and Herzegovina

Seila Cilovic-Lagarija¹, Nino Hasanica^{2,3}, Elma Sokic Begovic⁴, Adisa Pestek, Ahmetagic⁵, Milan Radojicic⁶, Aida Ramic-Catak¹, Sanela Tukulija¹, Mediha Selimovic-Dragas⁷

¹Institute for Public Health FB&H, Sarajevo, Sarajevo, Bosnia and Herzegovina

²Institute for Health and Food Safety Zenica, Institute for Public Health, Zenica, Bosnia and Herzegovina

³Department of Healthcare, Faculty of Medicine, University of Zenica, Zenica, Bosnia and Herzegovina

⁴Ministry of Health of Federation of Bosnia and Herzegovina, Sarajevo, Bosnia and Herzegovina

⁵Primary Healthcare Center, Sarajevo Canton, Sarajevo, Bosnia and Herzegovina

⁶Institute for Public Health of Herzegovina-Neretva Canton, Mostar, Bosnia and Herzegovina

⁷Division for Preventive Dentistry and Pedodontics, Faculty of Dentistry, University of Sarajevo

Corresponding author: Seila Cilovic-Lagarija. Institute for Public Health FB&H. Phone: +387 33 564 625. Fax: +387 33 564 601. E-mail: seila.cilovic@gmail.com. ORCID ID: <http://www.orcid.org/0000-0003-2663-3044>.

doi: 10.5455/aim.2021.29.205-209

ACTA INFORM MED. 2021 SEP 29(3): 205-209

Received: Jul 15, 2021

Accepted: Sep 05, 2021

© 2021 Seila Cilovic-Lagarija, Nino Hasanica, Elma Sokic Begovic, Adisa Pestek, Ahmetagic, Milan Radojicic, Aida Ramic-Catak, Sanela Tukulija, Mediha Selimovic-Dragas

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Dental documentation which includes main information about a patient and dental treatment provided is a very important asset of each dental office. **Objective:** This research aims to analyze the way of fulfilling and keeping mandatory dental records and periodic reporting forms by doctors of dental medicine in the Federation of Bosnia and Herzegovina (FB&H). **Methods:** The study was observational with a cross-sectional design using a questionnaire as a study tool. The questionnaire was distributed electronically to the participants working in public health care facilities and private practice. **Results:** A total of 426 Doctors of Dental Medicine (DDM) participated in the study, of whom 58.7% of respondents were employed in dental offices in the public health sector and 41.3% in dental offices in the private health sector. Dental records are filled out only manually by 53.5% of respondents, while 9.4% fill out the records only electronically, while 37.1% of respondents fill out records both manually and electronically. The manner of keeping dental documentation between respondents employed in dental offices in the public health sector and dental offices in the private health sector differs significantly ($p < 0.05$). Almost all respondents understand the purpose and significance of keeping dental records. **Conclusion:** This paper points out that good dental records are of great importance as they allow monitoring the quality of services provided to patients for a longer period.

Keywords: Dental recordkeeping, Federation of Bosnia and Herzegovina.

1. BACKGROUND

In the 1960s, when the discussion about how computers might enhance the practice of medicine began, computer technology in the process of decision-making seemed promising. At that time, it was believed that computers will help doctors in faster access to the procedure results and literature and that the computer technology will help caregivers to reduce medical errors provided them with reminders and alerts (1).

Nonetheless, at that time, the use of computers and computer software in the healthcare system was not widely accepted because the healthcare staff, who needed to enter data necessary for continued treatment of patients, considered it time-consuming and the physicians preferred to maintain their autonomy (1).

During the 1980s, when computer

technology was improved dramatically, the need for a data interchange protocol for health care arise.

The Institute of Medicine (IOM), in 1991, published the Computer-Based Patient Record: An Essential Technology for Health Care (EMRs), which was the first document that comprehensively examines the possibilities of the application characteristic for electronic medical records (1).

The advantages of using computers and computer software are the safety of data and the possibility of reviewing and analyzing the data in any information system linked to it (1).

Information entered into the records needs to include a diagnosis and undertaken diagnostic procedures, because, aside from paper medical records, it is the only form

of records that can be used as a kind of protection in case of potential court proceedings (2).

For that reason, it is important to use medical documentation during work in dental offices. Appropriate entering and storage of data in dental records may play an important role in some cases such as, for example, identification of human victims in mass graves (3). Therefore, for example, the comparison of dental records ante-mortem and post-mortem is much easier than other methods of identification.

A dental record comprises documents with history of current diseases, clinical examination, diagnosis, performed treatment as well as a prognosis. It is very important as basics for collecting appropriate data for Dental Information System as a part of National Information Systems in all countries in the world (3).

Adequate maintenance of dental records is of utmost importance both for the dentists and for the patients, and it is an ethical and legal obligation of each dentist towards the patients as well as potential medical and legal complications (4). Knowledge of the content of dental records is also very important for forensic needs as well as for potential legal implications (5, 6).

Well and adequately designed dental documentation, which includes main information about a patient and dental treatment provided, is a very important asset of each dental office, as it improves services provided to the patient as well as the quality of patient dental care (7).

Good dental records do not imply exceptional dental services, however, they are of great importance as they allow monitoring the quality of services provided to patients over some time (8).

Increased use of digital platforms in the management of dental records has been recorded recently so the development of information systems and technologies in the dental practice and the level of knowledge about modern technologies, requires motivation and a certain level of knowledge of dentists to use digital dental records (9, 10).

Health institutions and private practitioners as well as other legal and natural persons, who provide health care within their businesses, are obliged to keep records according to the Law on Record-Keeping in Health Care System (Official Gazette of FB&H, 37/12), and regulations made based on this Law, including the Law on Health Care (Official Gazette of FB&H, 46/10 and 75/13). According to the aforementioned laws and by-laws, dental offices are obliged to keep dental records, patients' protocols, individual reports on infectious diseases, and aggregate reporting forms (11, 12).

2. OBJECTIVE

This research aims to analyze the way of fulfilling and keeping (handwritten entries and electronic records) of mandatory dental records and periodic reporting forms (monthly reports, three- and six-months reports, and annual reports) by doctors of dental medicine in the Federation of Bosnia and Herzegovina (FB&H).

3. MATERIAL AND METHODS

Procedure

The study was observational with a cross-sectional design using a questionnaire as a study tool.

According to official data of the FB&H Institute for Public Health, a piloting sample includes 10% of doctors of dental medicine from the FB&H, registered in the health statistics yearbook (11). Examinees filled out an online questionnaire, which was based on a questionnaire previously developed by Cilović-Lagarija et al. (13).

The questionnaire consisted of 12 closed-ended questions. Four questions were related to the demographic and general characteristics of the respondents, three questions were related to the practices of keeping dental records, and five questions were to the respondents' perceptions regarding keeping and maintenance of dental records. Two questions, asking about the advantages and disadvantages of dental records management, were multi-choice questions.

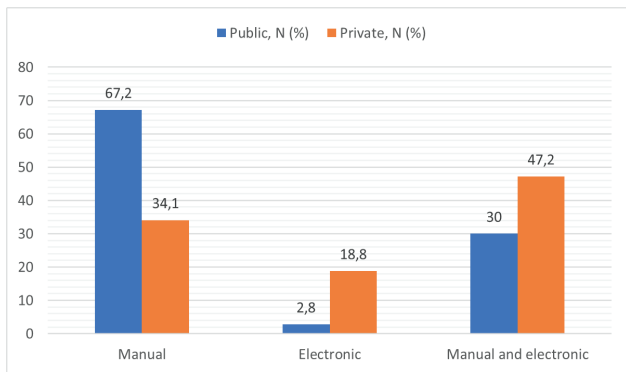
The questionnaire was distributed electronically to the participants working in public health care facilities and private practice. The responses were obtained in April 2021.

Statistical analysis of the data

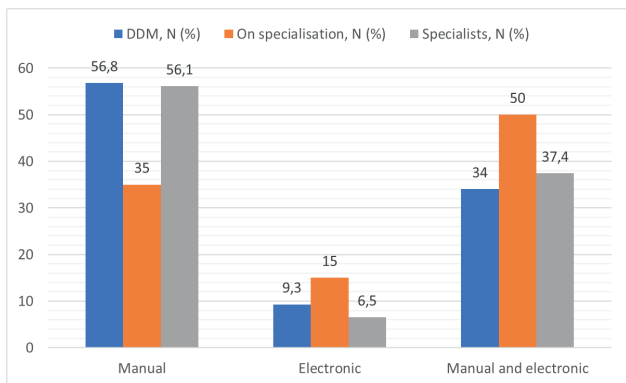
Data analysis was performed using MS Excel 2013 and SPSS Statistics 23. The results of the study were assessed by descriptive statistics. Frequency distribution and percentage were calculated. An evaluation of the statistical significance between groups was made using Pearson's Chi-squared test. The p-value < 0.05 was considered statistically significant. The data were displayed as tables and graphs.

Demographics/characteristics	N (%) of respondents
Type of health care sector employment	
Public DO	250 (58,7)
Private DO	176 (41,3)
Total	426 (100)
Gender	
Male	161 (37,8)
Female	265 (62,2)
Total	426 (100)
Age	
20-29	67 (15,7)
30-39	206 (48,4)
40-49	118 (27,7)
50-65	35 (8,2)
>65	0 (0)
Total	426 (100)
Qualifications	
DDM without specialisation	259 (60,8)
On specialisation	60 (14,1)
Specialists	107 (25,1)
Total	426 (100)
Years of professional experience	
<5	131 (30,8)
5-10	133 (31,2)
11-20	125 (29,3)
21-30	31 (7,3)
>30	6 (1,4)
Total	426 (100)

Table 1. Demographics/characteristics of participants. DO: Dental Office; DDM: Doctor of Dental Medicine



Graph 1. A manner of keeping dental documentation per type of health sector employment



Graph 2. A manner of keeping dental documentation per qualification

4. RESULTS

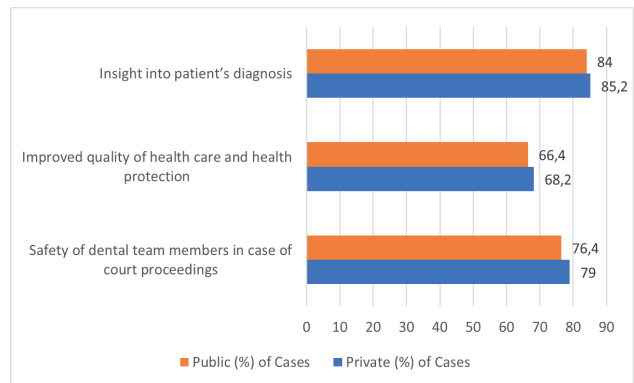
A total of 426 Doctors of Dental Medicine (DDM) participated in the study, of whom 58.7% (250) of respondents were employed in dental offices in the public health sector and 41.3% (176) in dental offices in the private health sector. The total study sample included 37.8% (161) male and 62.2% (265) female respondents. Almost half of the respondents, 48.4% (206), were in the 30–39 age group, 27.7% (118) were in the 40–49 age group and 15.7% (67) were in the 20–29 age group. More than half of the participants (60.8%) were qualified DDM without specialization. Almost one-third of the respondents 31.2% (133) had 5-10 years of professional experience, 30.8% (131) of respondents had less than 5 years of professional experience, while 29.3% (125) of respondents had 11-20 years of professional experience (Table 1).

DDMs must keep and maintain clear, accurate, and contemporaneous dental records of care provided to patients and adhere to privacy laws for dental record management.

The question ‘Do you keep and maintain dental records every day?’ was answered ‘Yes’ by 95.3% (406) of respondents, while 4.7% of respondents (20) answered ‘No’.

Basic medical documentation (protocol and dental record) only is filled out by 72.5% (309) of respondents, while the dental service work report only is filled out by 5.6% (24) of respondents. Both types of dental documentation are filled out by 21.8% (93) of respondents.

Dental records are filled out only manually by 53.5% (228) of respondents, while 9.4% (40) fill out the records only electronically, while 37.1% (158) of respondents fill out records both manually and electronically.



Graph 3. Advantages of keeping dental records per type of health sector employment (%) of Cases

	Sample Responses, N (%)	Public DO Responses, N (%)	Private DO Responses, N (%)
Insight into patient's diagnosis	360 (36,9)	210 (37)	150 (36,7)
Improved quality of health care and health protection	286 (29,3)	166 (29,3)	120 (29,3)
Safety of dental team members in case of court proceedings	330 (33,8)	191 (33,7)	139 (34)
Total	976 (100)	567 (100)	409 (100)

Table 2. Advantages of keeping dental records per type of health sector employment, N (%) of responses. DO: Dental Office

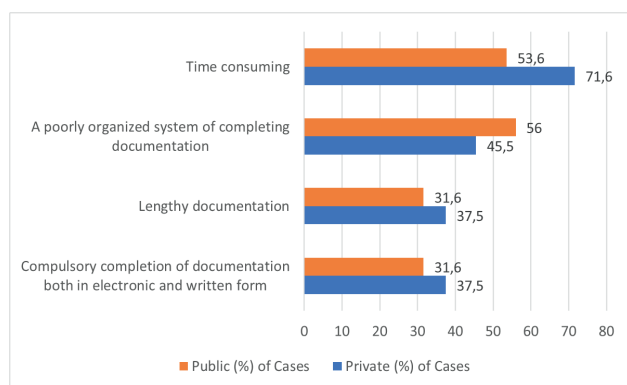
	Public DO Responses, N (%)	Private DO Responses, N (%)
Time consuming	134 (31)	126 (37,3)
A poorly organized system of completing documentation	140 (32,4)	80 (23,7)
Lengthy documentation	79 (18,3)	66 (19,5)
Compulsory completion of documentation both in electronic and written form	79 (18,3)	66 (19,5)
Total	432 (100)	338 (100)

Table 3. Disadvantages of keeping dental records per type of health sector employment, N (%) of responses. DO: Dental Office

Two-thirds of respondents employed in dental offices in the public health sector or 67.2% (168), fill out dental documentation only manually, however, almost half of the respondents employed in dental offices in the private health sector, 47.2% (83), fill out dental documentation both manually and electronically (Graph 1). The manner of keeping dental documentation between respondents employed in dental offices in the public health sector and dental offices in the private health sector differs significantly (χ^2 , $p = 0.00$).

The manner of keeping dental documentation also differ significantly (χ^2 , $p = 0.029$) between qualification groups of respondents. Half of DDMs on specialization, 50% (30), fill out dental documentation both manually and electronically. Dental documentation is filled out electronically by 15% (9) of DDMs on specialization, 9.3% (24) of DDMs without specialization, and 6.5% (7) of specialists (Graph 2).

Almost all respondents understand the purpose and significance of keeping dental records and believe that keeping dental records contributes to the improvement



Graph 4. Disadvantages of keeping dental records per type of health sector employment (% of Cases)

of health care quality, 96.9% (413), and 91.8% (391) of respondents, respectively.

Questions regarding the advantages and disadvantages of dental records management were developed as multi-choice questions.

Insight into the patient's diagnosis was the answer of choice in 84.5% of cases to the question asking respondents' opinions regarding the biggest advantage of keeping dental records (Graph 3) and it accounts for 36.5% of all responses (Table 2). Respondents' opinions regarding the biggest advantage of keeping dental records slightly differ between employed in the public health sector and private health sector, but not significantly (χ^2 , $p = 0.882$).

"A poorly organized system of keeping dental records" was the answer of choice in 56% of cases and it accounted for 32.4% of all responses of respondents employed in the public health sector to the question asking respondents' opinion regarding the biggest disadvantage of keeping dental records. However, "time-consuming" was the answer of choice in 71.6% of cases and it accounted for 37.3% of all responses of respondents employed in the private health sector to the same question (Table 3 and Graph 4). Respondents' opinion regarding the biggest disadvantage of keeping dental records differs significantly between DDMs employed in the public health sector and those in the private health sector (χ^2 , $p = 0.00$).

The majority of respondents, 91.8% (391), consider that a revision of the existing dental documentation is necessary by the Law on Record-Keeping in Health Care System.

5. DISCUSSION

The participants in this study were 426 Doctors of Dental Medicine (DDM) in the Federation of Bosnia and Herzegovina. In the public health sector is employed 58.7% (250) of them and 41.3% (176) are employed in dental offices in the private health sector. Almost all respondents understand the purpose and significance of keeping dental records and believe that keeping dental records contributes to the improvement of health care quality.

A similarly conducted study by Osborn et al. from 2000 revealed that 85% of 403 interviewed in total thought that their dental records were adequate. But the same study

showed that 15% of examinees used a simple one-page form of the report, and data analysis has shown that 9.4% to 87.1% of cases were missing information in the records (14). It can be said that those results correspond with the opinion of the participants in the present study in which most of the respondents think that the system of keeping dental records is poorly organized and time-consuming.

That is the reason why a majority of respondents, 91.8% (391) in the present study consider that a revision of the existing dental documentation is necessary.

In a study by Thyvalikakath et al. conducted in 2020 using the data of 217,887 patients with 11,289,594 individual observations, was concluded that 8% of dental observations had inaccurate data. The study by Thyvalikakath et al. identified the need to use electronic records in dental medicine integrated from many different individual systems but also larger interlinked systems of dental practice. Results have shown that such an approach enables practitioners to learn about patient outcomes using the data from their practice (15).

The results of the present study reported that two-thirds of respondents employed in dental offices in the public health sector, fill out dental documentation only manually, while almost half of respondents employed in dental offices in the private health sector, fill out dental documentation both manually and electronically and the manner of keeping dental documentation between respondents employed in dental offices in the public health sector and dental offices in private health sector differs significantly.

A study by Acharya et al. in 2011 showed on a sample of 417 examinees that basic advantages of electronic dental records are related to better access to reliable information and history of dental disease, better communication with a dentist, comprehensive, continuous, and coordinated care and easier and faster access to information about dental care. Although the participants in this study recognized the need for data related to dental care, they considered that the main disadvantages of electronic dental records included information overload, costs, personal data protection, slow electronic system, and the use of slang in the dental records (16).

Almost all respondents of the present study understand the purpose and significance of keeping dental records and believe that keeping dental records contributes to the improvement of health care quality.

These findings correspond with the study conducted by Song et al. in 2010, in which dentists considered that the information on medical history, patients' habits about oral and dental hygiene, health insurance, previous and current problems, are necessary for establishing a diagnosis and conducting an adequate dental treatment (17).

Ho et al. in their study from 2014. have shown that healthcare and administrative staff believe that dental records serve five different purposes: clinical, administrative, legal, research, and educational. All administrative staff relies on digital dental records, but they have indicated a need for more efficient management of data from the records. Although clinical records have their purpose and are very much needed, as estimated by users,

improvement and successful use of the records largely depend on possibilities for their integration and use by a wider range of stakeholders (18).

The importance of keeping dental records is not only because of the improvement of the quality of health care. Coulthard and Warburton in their study from 2007 presented a diagram showing principles of practice for investigating domestic violence, according to which one of the crucial issues is keeping accurate and detailed data on any dental injuries and related information (19,20).

One of the basic professional duties for all dentists in the Federation of Bosnia and Herzegovina, as stipulated by the law, is to keep records and report on diseases, conditions, and injuries in line with the International Statistical Classification of Diseases and Related Health Problems – 10th revision” (ICD-10).

Based on those reports, the FB&H Institute for Public Health publishes Health Statistics Annual of the FB&H. Indicators for monitoring of oral health of the population defined in this documentation ensure the quality improvement of dental care and enable dentists to successfully compare the quality of their interventions over time (21).

6. CONCLUSION

This paper points out that good dental records are of great importance as they allow monitoring the quality of services provided to patients for a longer period.

This paper emphasizes the level of knowledge about modern technologies, behavior, and motivation of dentists to use digital dental records. It points out the importance of the development of information systems and technologies in the dental practice, which requires dentists' knowledge in this field.

- **Patient Consent Form:** An informed written consent was taken from the family caregivers, following the tenets of the Declaration of Helsinki.
- **Author's contribution:** All authors were involved in the preparation this article. Final proofreading was made by the first author.
- **Conflicts of interest:** The authors declare that they have no conflicts of interest regarding the publication.
- **Financial support and sponsorship:** Nil.

REFERENCES

1. Masic I, Mihalas G. Contributions to the History of Medical Informatics. Avicena. Sarajevo, 2014.
2. Waleed P, Baba F, Alsulami S, Tarakji B. Importance of dental records in forensic dental identification. *Acta Inform Med.* 2015; 23(1): 49-52. doi: 10.5455/aim.2015.23.49-52.
3. Masic F. Information Systems in Dentistry. *Acta Inform Med.* 2012; 20(1): 47-55. doi: 10.5455/aim.2012.20.47-55.
4. Tokede O, Ramoni RB, Kalendarian E. Clinical Documentation of Dental Care in an era of EHR Use. *J Evinedt Based Dent Pract.* 2016; 16(3): 154-160.
5. Veronesi JF. Ethical issues in computerized medical records. *Crit Care Nurs Q.* 1999; 22(3): 75-80. 2018; 10(3): 158-163.
6. Charangowda BK. Dental records: An overview. *J Forensic Dent Sci.* 2010; 2(1): 5-10.
7. Devadiga A. What's the deal with dental records for practicing dentists? Importance in general and forensic dentistry. *Journal of forensic dental sciences (JFDS).* 2014; 6(1): 9-15.
8. Levitin SA, Grbic JT, Finkelstein J. Completeness of Electronic Dental Records in a Student Clinic: Retrospective Analysis. *JMIR Med Inform.* 2019; 7(1).
9. Prasetyo S, Yasin M, Apriantika I, Najatus Sakinah N, Rehuel S, Purnomo W. Overview Of Knowledge, Attitude, And Motivation Level Of Dental Practitioner In Filling Electronic Medical Records 4. *Sys Rev Pharm.* 2020; 11(3): 954-959.
10. Institute for Public Health FB&H. Health statistics annual FB&H 2019. Sarajevo, 2020.
11. Cilovic-Lagarija S, Hasanica N, Mulic M, Radojicic M, Brankovic S, Pilav A, Huseinagic S, Musa S. An overview od human resources and capacity in health care institutions in Federation of Bosnia and Herzegovina in the context of responding to the Covid-19 pandemic. *Mater Sociomed.* 2021; 33(1): 56-59. doi: 10.5455/msm.2021.33.56-59.
12. Cilović-Lagarija Š, Hasanica N, Tukulija S, Branković S, Mahmutović J, Galić D, Perić K, Čajdrić S., Mujačić S, Slijepčević S, Mrakić E, Dervišević E. Evaluation of nursing documentation: The experience of nurses from the primary and secondary/tertiary health care. *Journal of Health Sciences.* 2020; 10(3): 234-240. <https://doi.org/10.17532/jhsci.2020.1086>.
13. Kundu A, Sneha Nedunuri LS, Chand A, Johnson A. Digitization of Dental Records And its Application in Forensic and Legal Perspective: Knowledge, Attitude and Practice among the Dentists in West Bengal: Digitization of Dental Records and its Application in Forensic and Legal Perspective. *National Journal of Integrated Research in Medicine.* 2020; 11(2): 64-69.
14. Osborn JB, Stoltenberg JL, Newell KJ, Osborn SC. Adequacy of dental records in clinical practice: a survey of dentists. *Journal of Dental Hygiene.* 2000; 74(4): 297-306.
15. Thyvalikakath TP, Duncan WD, Siddiqui Z, LaPradd M, Eckert G, Schleyer T, Rindal DB, Jurkovich M, Shea T, Gilbert GH. Leveraging Electronic Dental Record Data for Clinical Research in the National Dental PBRN Practices. *Appl Clin Inform.* 2020; 11(2): 305-314.
16. Acharya A, Mahnke A, Chyou PH, Rottscheit C, Starren JB. Medical providers' dental information needs: a baseline survey. *Stud Health Technol Inform.* 2011; 169: 387-391.
17. Song M, Spallek H, Polk D. et al. How information systems should support the information needs of general dentists in clinical settings: suggestions from a qualitative study. *BMC Med Inform Decis Mak.* 2010; 10(7).
18. Ho YX, Gadd CS, Kohorst KL, Rosenbloom ST. A qualitative analysis evaluating the purposes and practices of clinical documentation. *Applied Clinical Informatics.* 2014; 5(1): 153-168.
19. Selimovic-Dragas M, Hasanica N, Sokic-Begovic E, Pestek-Ahmetagic A, Radojicic M, Brankovic S, Cilović-Lagarija S. Evaluation of Dental Health Care Efficiency in Federation of Bosnia and Herzegovina During Eight Years' Time Frame. *Int J Biomed Healthc.* 2021; 9(1): 34-38. doi: 10.5455/ijbh.2021.9.34-38.
20. Coulthard P, Warburton AL. The role of the dental team in responding to domestic violence. *British Dental Journal.* 2007; 203(11): 645-648.
21. Masic I. European Federation for Medical Informatics – the Most Influential Promoter of Medical Informatics Development for the Past 45 Years. *Acta Inform Med.* 2021; 29(2): 80-93. doi: 10.5455/aim.2021.29.80-93.