



Evidence-Based Information Services: an Example of a Literature Review

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ABSTRACT

High quality, accurate and up-to-date information is very important in the field of health sciences. Doctors, dentists, nurses, researchers and other health professionals use medical libraries and information centers in order to meet their need for knowledge. In this study, the concepts of "evidence", "evidence-based practice", "evidence-based knowledge" are defined for medical librarians; and an important part of the evidence-based information services - the literature review - is provided. The literature review presented in medical libraries is an important part of evidence-based information services. It is one of the main topics of user education especially organized for health professionals in medical libraries. In addition, the number of publications and their results were evaluated by using keywords related to the concept of "evidence" from the PubMed database, which is frequently used by health professionals to access evidence based information. The sample of the study constitutes from systematic collections and clinical studies published in the PubMed database between the years 2000-2016. As a result of this study, "evidence-based" medicine, dentistry and nursing researches in the field of health sciences are seen to increase rapidly.

Keywords: Evidence-based information services, PubMed, Literature review, Medical librarianship.

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I. Introduction

Evidence-based medicine (EBM), evidence-based dentistry (EBD), and evidence-based nursing (EBN), which are part of the "evidence-based information" are emerging. Generally, evidence-based medicine, which meets all these concepts in general terms, is the careful, attentive and intelligent use of the best available evidence and medical practices when making decisions in the diagnosis and treatment of patients. Evidence-based applications originate from clinical, pathophysiological and epidemiological approaches used in medicine at the end of 18th and beginning of 19th century (Cooper, 2001).

EBM assists with laboratory studies in diagnosing patients, preparing treatment plans, determining treatment principles and methods, and protecting body and soul health. In health applications, evidence-based information prepares the environment for new investigations and scientific investigations in search of answers to clinical questions. In order to be able to realize these, medical libraries are required to apply evidence-based knowledge in order to be able to teach health education-medicine

based on medicine-and to transfer evidence-based information to practice.

Among the different user groups in the health field, the group with most urgent need for information is the health professionals. These users need current and proven knowledge for a variety of reasons including research, diagnosis, treatment, prognosis, decision making. Today, the meaning of making decisions about the diagnosis and treatment of diseases based only on the experience of physicians has lost its importance, and the necessity of supporting the decisions with evidence has been formed (Uysal & Uçak, 2013).

Information based on evidence is an approach to body and mental health services (Ministry of Health, 2011). In other words, it is the systematic assessment of current scientific evidence related to the clinic, the logical integration of the patient's physical, mental and general health-related situation and history, the clinical experience of the health professionals and the patient's treatment needs and preferences.

EBM and EBD help to reduce the number of diagnostic errors to a minimum and to make the best decision about treatment and therapies applied to the patient (Peker and Bermek, 2009). Evidence based medicine or evidence

based dentistry include clinical studies and good health applications. In particular, the problem of the clinic should be solved by systematic or meta-analytic studies (Chiappelli, Prolo & Newman and others, 2003).

Researchers, doctors and professionals working in the field of health sciences who need high quality information make use of medical libraries and information centers in order to fulfill such requirements. Accordingly, the contribution of medical libraries, which collect, organize, and provide evidence-based information that will shed light on improvements in health care, is a major contributor for access to these resources.

The roles of medical librarians in the evidence-based information access process are the core of this service, knowing where and how to find the answer, finding the best evidence, evaluating and presenting them for validity. Along with the development of new technologies in the field of health, the increasing expectation of patients has increased the need for evidence-based practice. In this regard, the training to be provided definitely needs technology support. By bringing together studies based on reliable research methods using evidence based medicine and evaluating them with a higher statistics, it brings proven results to the professionals.

In this study, the concepts of "evidence" and "evidence-based practice" that constitute the basis of the evidence-based information services will be explained. Later, the evidence-based information such as library resources, information resources, electronic databases will be focused on. The results of the research based on the PubMed database with a common, reliable and popular significance in the health field will be analyzed statistically. Literature review is one of the important services provided as evidence-based information services in medical libraries. In the study, the literature review is taken as an example of a evidence-based library application.

a. What is Evidence and Evidence Based Application?

There are many definitions of the concept of evidence in the medical sciences and medical literature. The word meaning of the concept of evidence is the specific research findings (Yurtsever & Altıok, 2006). The National Health Report covering the years 1994-1997, drafted by the Government of Canada, contains different definitions of the term of evidence. The evidence in this report is defined as the assessment of clinical and scientific applications as historical and scientifically based information (Canada Health Action: Building on the Legacy, 2017). The types of evidence accepted in health and medical sciences are:

- Experimental evidence: Random clinical trials, meta-analyzes and analytical studies
- Non-experimental: Observation, semi-experimental studies
- Expert opinions: consensus, commission reports
- Historical process or experience (Çolaklar & Sert, 2013; Tranmer, Squires & Brazil and others, 1998).

In terms of information and document management science, the meaning of the evidence takes different forms

(Yurtsever & Altıok, 2006).

- Evidence as Reality
- Evidence as Information (expert opinions, non-verbal but overt experience)
- Evidence as information related with confirmed or refuted beliefs
- Evidence as special research findings
- Evidence as meta-analysis and systemic review.

It is possible to define the concept of evidence as "a working and systematic study of authentic information or meta-analysis that has been verified or refuted by the findings of scientific research".

Evidence is a systematic and meta-analytic study that has been confirmed or refuted by scientific and research findings. According to this, evidence-based studies are classified into two groups as analytical and descriptive studies. Analytical studies are grouped into experimental and clinical (randomized controlled and non-randomized studies), observational studies (cohort study, case controlled, cross-sectional). Descriptive studies include case series, case presentations and expert opinions (Yurtsever & Altıok, 2006).

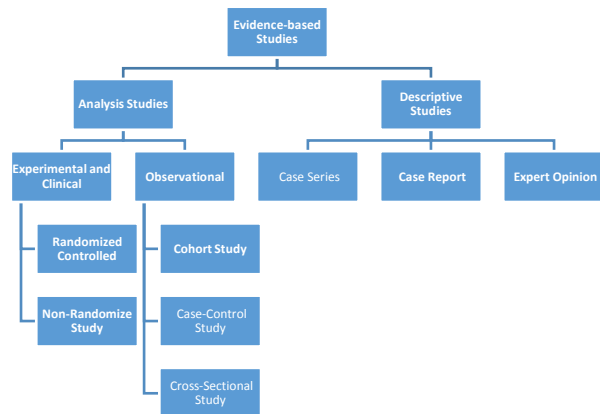


Fig. 1. Evidence-based studies

Subgroups of evidence-based studies are indicated as diagrams (see Fig. 1). Case series and case presentations consist of systematic reviews and meta-analysis studies (see Fig. 2). Systemic collections are separated into three: meta-analysis, decision analysis and economic analysis. Systematic compilation is a systematic collection, evaluation and synthesis of scientific studies using definite and reproducible methods (see Fig. 3).

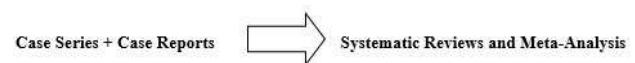


Fig. 2. Case Series & Case reports

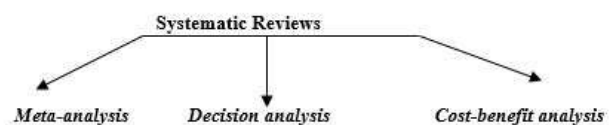


Fig. 3. Systematic reviews

Systematic reviews are important sources of obtaining evidence-based information. Librarians play an active role in the systematic compilation of these resources and in the process of access by healthcare professional to evidence based information. In addition, medical librarians try to support the next stage of meta-analysis. In other words, the collection of evidence-based information helps users of medical libraries in the process of interpreting and evaluating acquired research findings. The contribution of medical librarians is also great in the process of collecting, organizing and submitting the case series to the users of the medical libraries, which means the report obtained from the patient.

There are numerous examples in the literature that include quantitative analysis and systematic review-based evidence studies as well as studies using quantitative data. An example of accepted classification where quantitative data is prioritized is given below (Yurtsever & Altioğ, 2006, Groontenhuis & Last, 1997).

- Quantitative data and preliminary assessments that are accepted by other opinions at this level
- Studies with two or more groups of samples using the same forms
- Large-scale external research projects (eg government-funded projects, international projects)
- Adaptation of studies published by authorities to the same research questions and similar data
- Thesis studies conducted by the student through supervision (specialty and doctoral dissertations)
- Expert and research supported opinions (handbooks, opinion documents, health and medical discussion lists).

Today, among health professionals, the concept of evidence is still a matter of debate, and no consensus has yet been reached on the meaning of the evidence. The meaning of the evidence-based application is that physicians should use the most accurate information available, as well as reason and experience, along with the necessary diagnosis, the most appropriate treatment and best care for their patients.

Many concepts have emerged in the literature along with evidence-based practice. These are (PubMed MeSH, 2017):

- evidence-based medicine,
- evidence-based dentistry,
- evidence-based nursing,
- evidence-based research,
- evidence-based decision and
- evidence-based health care.

When we consider these concepts, there are five basic elements of evidence-based practices. These are (Yurtsever & Altioğ, 2006; Gould, Leonard & Weinacker and others, 1998):

- Research-based applications as evidence-based applications (research findings and outcomes are evaluated)
- Evidence-based practice as a knowledge management process (collection of evidence-based information, systematic reviews and literature review)
- Evidence-based practice as the development of professional applications

- Evidence-based practice as a clinical decision-making / problem solving process
- Evidence-based practices as treatment and care management.

As you can see, evidence-based practice is defined in many different forms and is used in different areas. Sackett et al. (Sackett, Rosenberg & Gray and others, 1996) noted that evidence-based applications are a five-step process. These are:

1. To answer questions about clinical trials (best evidence will be considered as answer),
2. To determine the most important evidence (reliability of evidence)
3. To determine the true meaning of evidence,
4. To apply the evidence to clinical problem,
5. To evaluate the effect of the application.

Evidence-based practice requires a doctor, a dentist, or a nurse take a critical look at their practice and determine which practices are based on research evidence, clinical knowledge, or traditional insights. Evidence-based practices involve the continuing self-improvement of health sciences, medical sciences or other social sciences, attaining knowledge of the field literature, and reducing gaps between research and practice.

Based on case reports and case series, the case of bone marrow bone grafting for the treatment of leukemia based on evidence-based scientific studies is an example. Also root canal treatment for oral and dental health is done by filling the empty channels with special filling materials to remove the infected or damaged pulp or to treat any inflammation. Thus, the channel treatment is made in order to remove the pain, tooth extraction is prevented, and the basis of this treatment is evidence-based applications. In addition, expert opinion and randomized controlled trials have contributed to the science of medicine and health, albeit with a low level of evidence. For example; a New York gynecologist found that menopausal estrogen and hormone replacement therapy was effective (Hujoel, 2009). Randomized controlled trials for clinical practice support "the use of potent antioxidants prevents cancer" (Hujoel, 2009).

To give an example for evidence based 1st level meta-analysis studies; Vipeholm's clinical study "Preventing dental caries in children at high caries risk" is one of the important studies investigating the relationship between dental caries and consumption of 14 sugars covering 1945-1953. In this study, it has been concluded that the food, sweets and drinks consumed between the meals is related with the increase of tooth decay. Because of ethical reasons, this work did not have a recurrence; the results were accepted in national reports in 2000 (Scottish Intercollegiate Guidelines Network, 2000)

In the light of health sciences and evidence-based applications in medicine;

- Patient and collective health services should use the evidence obtained from scientific studies effectively and efficiently,
- Efficient use of resources allocated for research and treatment,
- The use of scientific evidence instead of authority in the clinical decision-making process,

- The best decision about how treatment will be applied to the patient by minimizing diagnosis errors,
- It provides clinician and researcher supervision and clinical performance improvement (Cooper, 2001; Peker & Bermek, 2009; Richards & Lawrence, 1995; Richards, Lawrence & Sackett, 1997).

As it can be seen, clinical studies are supported with knowledge based on evidence; new research and treatment methods can be developed. The reflection of medical accumulations, experiences, information and evidence on daily routine practice is of particular importance as far as the health of the population is concerned with individual health services. In this sense, it will be possible to spread the applications of evidence-based medicine and evidence-based dentistry which are becoming more and more important in our country, both in medical education and clinical studies, at the social level.

b. Obtaining the Evidence Based Information

Evidence-based practices or evidence-based information combine reliable research methods with used scientific or clinical studies, evaluating them with an upper statistic, and bringing proven results to practice. Internationally, research institutes such as the Cochrane Database, the Cochrane Oral Health Group, the Nature Group's Evidence Based Medicine, the Evidence Based Dentistry, the Oxford Center for Evidence Based Medicine and the American Dental Association Evidence Based Dentistry have been established. Systematic and meta-analytic studies are ongoing in these institutes with high levels of evidence.

In the context of a systematic application based on evidence in health sciences and medicine, the main topics are:

- Clinical questions / clinical trials
- Scientific studies.
- Article search for literature review
- Unpublished scientific work
- Determination of articles
- Selection of important articles
- Analysis of Data
- Reporting of information and using new questions (Çolaklar, 2004).

Evidence based sources are classified with different forms in the literature. They are examined at four basic levels in most common way. These are:

1. Original studies
2. Resources synthesizing the original studies
3. Resources summarizing the original studies
4. The original works are systems that allow access to their syntheses and abstracts (Alkan, 2005, p. 45).

Important sources of information to be used in systematic review are;

- Reviews
- Multiple bibliographic and full text electronic databases
- Databases such as the SCI (Science Citation Index) where reports are scanned and important texts are cited

- Electronic databases providing evidence-based information and indexing collections
- Resources related with subject
- Expert opinions (personal communication activities with other writers and organizations) (Çolaklar, 2004).

Apart from the information sources listed above, clinical guidelines and clinical protocols are also a result of the approach of evidence-based applications. The results have facilitated the work of guides, clinics and practices that have proven effectiveness in evaluating research and that will lead to success in a professional practice in a short and correct way. There is an approximate of hundred published guides and the numbers are increasing (Oktay, 2017).

Information systems that enable health professionals to access the literature knowledge they need in order to improve the patient's treatment, care and preventive services need to be integrated with electronic health record systems. There are many benefits of providing healthcare professionals with services that integrate with electronic health record systems that provide access to the literature needed for the treatment and care of patient (Salihoğlu, 2010). According to Kuyük *et.al*, the benefits of system are as follows (Kuyük, Kaplan & Yılmaz, 2005; Salihoğlu, 2010):

- It allows access to information resources of health professionals in shorter time and with less cost. This system facilitates access to information sources such as indexes, abstract journals, articles, collections, references and books that health workers frequently refer to for information. It also makes it possible for the researcher to perform scanning, finding sources, copying and interpreting in a shorter period of time.
- For health professionals, it is easy to obtain selected and reliable information by removing the difficulties of screening, eliminating and interpreting as evidence in clinical practice, especially of medical information that is easily accessible from web pages.
- Reducing increasing costs in health care is one of the important issues. Rapid access to the literature required by health professionals for diagnosis and treatment will reduce the cost of health care in general because it will reduce the process of patient's use of hospital resources (such as length of stay, duration of treatment, recovery time).

The primary and secondary resources that will answer the clinical question are accessible from medical libraries. Evidence-based knowledge or sources of evidence can be accessed in different ways. For example; evidence-based information can be reached through consulting a specialist on the subject (expert consultation), examining scientific books, published articles or collections published in the magazines, and using evidence-based electronic databases (Carr & McGivney, 2000; Çolaklar, 2004; Çolaklar, 2008). These databases include Pubmed / MEDLINE, The Cochrane Library, Best Evidence, BMJ Clinical Evidence, Dynamed, Bandolier, Uptodate.

The most effective way to reach primary sources is the PubMed / MEDLINE database, which provides

biomedical and medical information compiled by the National Library of Medicine (NLM) and the National Institutes of Health. PubMed is the most widely used database of medical and health sciences in the world accessible over the Internet. PubMed lists over 26 million articles in the world's top 5,000 biomedical journals (<http://www.ncbi.nlm.nih.gov/pubmed/>, 2017).

Cochrane is the most commonly used data base for finding evidence-based information in the field of health sciences. Cochrane contains abstracts. It provides information on medicine and dental medicine based on evidence. This database provides current evidence on the effectiveness of treatments for doctors, nurses, health professionals, policy makers who provide all kinds of preventive health care and patients (<http://www.thecochranelibrary.com/view/0/index.html>, 2017).

BMJ Clinical Evidence includes abstracts and provides evidence-based medical information. It supports decision-making processes by summarizing known and unknown information about more than 3,000 treatment methods and over 500 medical approaches (<http://clinicalevidence.bmj.com/ceweb/index.jsp>, 2017).

DynaMed, as an evidence-based database, provides direct treatment and diagnosis information about 2000 diseases. DynaMed is a clinical reference tool primarily created by physicians for the use of physicians and other health care workers. There are more than 3,200 topic titles related to clinic applications and provide summary information on these topics. DynaMed updates its data daily. It monitors the contents of more than 500 medical journals. In this database, a content review is conducted and each article is evaluated according to its clinical and scientific validity (<http://www.ebscohost.com/dynamed/>, 2017).

UpToDate examines and evaluates the most up-to-date evidence-related medical events among more than 440 magazines, online medical resources and guides by 4400 editor physicians around the world. It contains case presentations prepared as a result of these evaluations. UpToDate database does not contain journals. However, it includes the abstracts used while preparing the case presentations. It is mostly focused on application and clinic. It includes internal diseases, gastroenterology and hepatology, endocrinology, neurology, dentistry, family medicine, hematology, infectious diseases, nephrology, gynecological diseases, cardiology, pediatrics, chest diseases and rheumatology (<http://www.uptodate.com/Home/>, 2017).

Best Evidence was developed by the Manchester Emergency Service, Manchester Royal Hospital, to provide quick, evidence-based answers to clinical questions from real applications using a systematic approach to the literature review. Although the BETS is initially focused on emergency medicine, there are a significant number of primary care services covering cardiothoracic, nursing and pediatrics

(<http://www.bestbets.org/>, 2017).

Bandolier is a database of evidence-based health information in the UK. It provides evidence-based medical information, especially on research related to pain, chronic pain, migraine, fibromyalgia, analgesics. Bandolier includes recent systematic reviews and meta-analyses from databases such as PubMed and Cochrane Library, which are updated every month. The purpose of Bandolier is to distinguish the bad and good evidence, and to ensure that anyone can reach accurate and reliable information at any time. It presents the prevalence of the disease together with evidence for diagnosis and treatment in special subject areas (eg migraine, needle injuries, gout, etc.). More than three million content items are accessed as PDFs annually from this database (<http://www.medicine.ox.ac.uk/bandolier/>, 2017).

II. Research Methodology and Findings

The research hypothesis is "the increasing number of evidence-based studies in recent years which affect the service understanding and information services of medical libraries and information services". The research is limited to the field of health and medical sciences; data was obtained by considering the most widely used PubMed database by health professionals. The sample of the study constitutes from systematic collections and clinical studies published in the PubMed database between the years 2000-2016. This database has been selected because it is the most important, popular and widely used database especially in the field of health and medical sciences.

The method of research is systematic review and literature review. Systematic compilations have a distinct place in evidence based scientific studies in health and medical sciences. The literature review was used as a research method because it includes clinical applications. Findings obtained as a result of the research were evaluated statistically.

The following results were obtained from the PubMed database using the "evidence-based" and "research" keywords published over the last fifteen years (see Table 1). According to this, after 2000s, evidence based medicine, nursing and dentistry studies have developed with evidence based applications. Accordingly, research-based medicine, dentistry and nursing researches are increasingly being defined based on evidence-based.

TABLE I
NUMBER OF PUBLICATIONS OBTAINED FROM PUBMED DATABASE BY USING THE KEYWORDS OF "EVIDENCE-BASED" AND "RESEARCH"
(SCAN DATE: MARCH 03, 2017)

YEAR	Dental Research	Research-based Dentistry	Research-based Practice	Evidence-based Practice	Evidence-based Medicine	Evidence-based Nursing	Evidence-based Dentistry
2016	8523	3	49	8620	15072	2412	808
2015	11921	4	61	8294	13296	2134	693
2014	10044	4	56	9568	12271	1964	635
2013	8119	2	50	9311	10130	1796	519
2012	7972	4	66	9174	9200	1678	442
2011	7277	2	33	8758	8793	1519	438
2010	5558	5	59	7434	7500	1367	401
2009	5359	6	44	7764	7472	1362	392
2008	5116	1	44	6986	7536	1302	287
2007	4771	4	55	6138	6900	1283	272
2006	4313	2	43	5450	6225	1142	203
2005	4047	0	44	4753	5357	873	204
2004	3751	0	40	4309	4824	814	177
2003	3530	0	42	3605	4206	647	119
2002	3219	1	48	3394	3924	564	105
2001	2998	4	44	3116	3562	501	111
2000	2795	2	46	2402	2890	419	88

TABLE II
NUMBER OF PUBLICATIONS OBTAINED FROM PUBMED DATABASE BY USING THE KEYWORDS OF EVIDENCE-BASED AND LIBRARY PRACTICE, MANAGEMENT, EDUCATION, INFORMATION SERVICES (SCAN DATE: MARCH 03, 2017)

YEAR	"Evidence-based" and "Library practice"	Evidence-based Management	Evidence-based Education	Evidence-based Information services	Medical Librarianship	Literature Review
2016	170	3941	2168	409	1098	110255
2015	137	3940	2033	382	852	104931
2014	137	4620	2247	494	696	119367
2013	130	4295	1870	426	358	105848
2012	115	4498	1889	421	234	106836
2011	104	4239	1766	414	179	100647
2010	104	4116	1637	358	165	93972
2009	122	3647	1619	381	147	90452
2008	90	3341	1472	384	155	90541
2007	78	2979	1384	328	128	90928
2006	77	2598	1223	309	134	88630
2005	60	2098	946	303	142	84636
2004	46	1838	902	239	112	81764
2003	46	1355	678	231	122	76035
2002	39	1270	640	204	114	70796
2001	31	1110	555	196	87	66824
2000	22	840	451	130	88	65665

As a result of the second screening using the keywords "evidence-based", "library practice", "education", "information services", "medical library" and "literature review" covering the years 2000-2016 in the PubMed database, the data in the above table was reached (see Table 2). According to this evidence-based practice are the subjects of research in the areas of education, administration, and librarianship. However, it seems that studies on evidence-based library applications and

information services have been seen in the literature. Accordingly, evidence-based library applications and information services for the health sciences and information and document management are quite new. It is possible to say that these evidence-based applications are becoming increasingly important in the field of medical librarianship and medical documentation, and play an active role in the development of this field.

TABLE III
EVIDENCE BASED STUDIES PUBLISHED BETWEEN 2000-2016 BY THEIR TYPES
(SCANNING DATE MARCH 03, 2017)

Studying Type	Evidence-Based Dentistry	Evidence-Based Medicine	Evidence-Based Practice	Literature Review
Clinical Trials	977	20749	18216	142297
Meta-Analysis	684	8101	5963	54821
Practice Guideline	384	14783	20670	33706
Randomized Controlled Review	659	15432	13747	76508
Systematic Reviews	2357	51854	46856	1493788
	1899	45463	40829	1475190

Using PubMed keywords such as clinical trials, meta-analysis, practice guidelines, randomized controlled trial, review, and systematic reviews, evidence-based work carried out over the past 12 years has been screened (see

Table 3). It is seen that more experiments and systematic reviews take place in the field of dentistry; and in the field of medicine, it is observed that there are a significant number of clinical collections, practice examples for the

clinic, randomized controlled studies as well as trial and systematic studies.

Considering the results of the study, it can be said that according to Table 1, evidence-based studies have increased in the dental and medical fields in the scientific journals in the last eleven years. According to Table 2, studies conducted in health and medical sciences show that literature reviews are predominant and accordingly, evidence-based library application studies are widespread. In addition, according to Table 3, it has been seen that studies relying on literature review and systemic review have been implemented recent years in health sciences Subsection1

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a. Example of Literature Review

Systematic compilations have a distinct place in evidence based scientific studies in health and medical sciences. Literature review is the study of clinical literature to determine a problem or diagnosis and a treatment plan in relation to a topic related to the clinic or in practice. As an example of the literature review, a study of the laboratory and clinical performance of dental ceramic systems by Guess et al. (Guess, Schultheis, Bonfante, Coelho, Ferencz & Silva, 2011) is provided as an example in this article. The reason to select this study is because it is a particularly systematic review of the literature as an example of evidence-based practice in dentistry education.

Literature review must be conducted by using appropriate sources to find the best evidence before starting a scientific study. In order to find answers to the questions, it is necessary to evaluate the sources of information according to the criterion such as the degree of relevance, scientific quality and applicability and select the sources providing the best evidence. In this process, informing the physician about the sources that provide evidence makes it more efficient in selection and screening processes (Köse, 2011, p.18-19).

In a literature review, information is given about the materials and systems used for treatment and the clinical results of medical applications are indicated. An example of a review study on "laboratory and clinical performance of complete ceramics systems" is included in the literature review based on the evidence (Guess, Schultheis, Bonfante, Coelho, Ferencz, 2011). In the study of Guess et al. (Guess, Schultheis, Bonfante, Coelho, Ferencz, 2011), initially the question and purpose of the study was defined. Then the material and method of the research were determined.

▪ Identification of the problem

Due to the advantages of CAD-CAM systems, the prominence and popularity of high-strength ceramics is steadily increasing. Especially zirconia is a full ceramic restoration material with increased use due to its superior

mechanical properties. The scientific literature on this subject has been reviewed.

▪ Purpose

In this article, a literature review covering complete ceramic materials and systems was implemented. Mechanical properties of these dental ceramic materials, manufacture techniques, heat interactions, breakage and suggestions for increasing the success of clinical use have been given.

▪ Material and Method

Systematic compilations of the subject were reviewed at PubMed database. As a result of extensive literature review, evidence has been sought for the success of clinical use of full ceramic restorations.

▪ Results

Full ceramic materials and systems demonstrate that dentistry is suitable for clinical applications.

▪ Discussion

It is anticipated that the development of CAD-CAM systems in the area of dentistry will be accompanied by the development of infrastructure and innovative techniques and the development of zirconium-assisted restorations (Guess, Schultheis, Bonfante, Coelho, Ferencz, 2011).

In the reviewed study, information on the clinical use of dental ceramic materials for the last ten years are analyzed (Guess, Schultheis, Bonfante, Coelho, Ferencz, 2011). These were evaluated as upper statistical data (see Figure 4 and Figure 5). Figure 4 contains information on the mechanical properties of complete ceramic materials and systems according to the manufacturer's instructions for use. It is known that zirconia material has failed less when compared to silicate and alumina substrates.

Table 1
Mechanical properties of different all-ceramic systems according to manufacturer's instructions

Material	Modulus (GPa)	Hardness (GPa)	Toughness (MPa.m ^{1/2})	Strength (MPa)	CTE °C (K x 10 ⁻⁶)	Firing (°C)
Porcelain						
Vitablocks (feldspathic)	45	NA	NA	154	9.4	780-790
Lava Ceram	78	5.3	1.1	100	10.5	810
IPS e.max ceram	60-70	5.4	NA	90	9.5	750
IPS e.max ZirPress (fluor-apatite)	65	5.4	NA	110	10.5-11	900-910
Glass-ceramic						
Occor	75	3.4	1.4	200	9.8	850
Empress esthetic (leucite)	65-68	6.2	1.3	160	16.6-17.5	625
IPS e.max Press (lithium disilicate)	95	5.8	2.75	400	10.2-10.5	915-920
IPS e.max CAD (lithium disilicate)	95	5.8	2.25	360	10.2-10.5	840
Alumina						
In-Ceram Alumina	280	20	3.5	500	7.2	2053 melting point
Procera Alumina	340	17	3.2	695	7.0	1600
Zirconia						
Carcon	210	12	9	1300	10.5	1350
IPS e.max Zir-CAD	210	13	5.5	900	10.8	1500
Lava	210	14	5.9	1040	10.5	1480
DSC Zirkon	210	12	7	1200	10.4	1500
In-Ceram YZ	210	12	5.9	>900	10.5	2706 melting point
Procera Zirconia	210	14	8	1200	10.4	1500
Prettau Zirkon Zirkonzahn	210	12.5	NA	1000	10	1600
Tooth						
Dentin	16	0.6	3.1	—	11-14	—
Enamel	94	3.2	0.3	—	2-8	—

Fig. 4. Mechanical properties of full ceramic materials and systems (Source: Guess, Schultheis, Bonfante, Coelho, Ferencz, 2011, p. 334)

Study	Ceramic Material	Observation Period (y)	Type of Restoration	Sample Size	Survival Rate (%)	Fracture (%)	Veneer Fracture (%)
Coelho et al. ¹⁰ 2005	Cercon Veneer n.s.	2	Single crowns	75	90	7	0
Griffin & Huggins ¹⁸ 2010	Cercon Cercon Plus	2	Single crowns	54	98	0	0
Chiriac et al. ¹⁹ 2009	Noble Proxima Zirconia Vita Lumen Noble Porcel Zirconia	3	Single crowns	204	92.7	0	2
Schmitt et al. ²⁰ 2010	Lava Lava Ceram	3	Single crowns	18	100	0	5
Schwitzer et al. ²¹ 2009	Cercon Cercon Ceram S	2	4- to 7-unit FDP	20	95.5	3	3
Yamada et al. ²² 2010	Cercon Ceramion Z	2	3-unit FDP	31	90	0	10
Saier et al. ²³ 2009	Cercon Cercon Ceram S	3	3- to 5-unit FDP	28	100	0	25
Bauer et al. ²⁴ 2009	Cercon Cercon Ceram Express	3	3-unit FDP	21	90.5	5	0
Riedinger et al. ²⁵ 2010	Cercon Cercon Ceram S Experimental veneering ceramic	4	3- to 4-unit FDP	88	94	1	13
Wirths et al. ²⁶ 2009	Cercon Cercon Ceram S Cercon Ceram Express	4	3- to 4-unit RDP/Cantilever FDP	24 34	96 92	0 0	13 12

Fig. 5. Clinical application results of Zirconia-based crowns (Source: Guess, Schultheis, Bonfante, Coelho, Ferencz & Silva, 2011, p. 336)

In Figure 5, the clinical application results of zirconia-based crowns are discussed. In this article, long-term clinical trials have shown that the anterior and posterior IPS Empress 2 crowns are long lasting (Guess, Schultheis, Bonfante, Coelho, Ferencz, 2011).

In the above literature review, the use of monolithic leucite and lithium disilicate glass ceramics in dental restoration gives promising clinical and laboratory results for small restorations such as inlay, onlay, lamina and crown. It is strongly recommended to compare metal ceramic restorations with full ceramic systems in advanced laboratory studies.

As it can be seen, the literature review is to find out the literature necessary to conduct research on a particular topic, to share previous clinical experiences and practices, to collect data, to evaluate the data and to examine the evidence.

III. Discussion: The Role of Librarian in Evidence Based Information Services

Evidence-based medicine and evidence-based dentistry, which are part of medical information, can be described as careful, attentive, and intelligent use of the best available evidence when making decisions in the diagnosis and treatment process of patients (Çolaklar, 2004, Sincan, 2003). In this definition, diagnosis, treatment definition / process and clinical applications / evidence are the basic concepts for both. EBM assists with laboratory studies in diagnosing patients, preparing treatment plans, determining treatment principles and methods, and protecting body and soul health. In addition to this, it establishes an environment to implement new research and reviews to search answers for clinical questions.

As evidence-based applications are based on evidence-based information, there is a need for rapid access to medical libraries, electronic resources and electronic journals. Medical librarians also provide the collection of these scientific evidence, review the literature, and assist health professionals in their meta-analysis work. Medical librarians play a major role in the efficient and effective

use of evidence-based electronic databases, where information is sought by health professionals, systematic reviews are accessed.

Medical-based librarianship supports physician and health professionals' decisions about patient health, training and research activities, usually in hospital clinics. They also aim to deliver the most valuable and synthesized information that they need, specific to the case, problem solver, meaningful, quality, filtered, strong evidence, with the least amount of cost, as soon as possible, with a sensitive approach to medical applications based on evidence. Medical-based librarianship is considered a branch of medicine and health sciences advisory librarians focused on providing value-added services (Alkan, 2008, p. 320).

Generally, librarians in medicine and health sciences, especially clinical librarians, are obliged to take part in QT applications and make literature searches from evidence-based databases such as the Cochrane Library (Alkan, 2008, p. 319).

The medical librarian is a special subject librarian who serves a specific field to the health sciences and medical library users. Therefore, the quality and education of the medical librarian who supports medical services, medical education and scientific research is very important (Evidence Based LIS, 2016).

Medical librarians provide user training to medical science and medical students, medical resources in libraries, medical databases, e-magazines and e-books, etc. Again, he/she provides lectures or seminars on how to conduct a scientific research on undergraduate and doctoral students, literature review, resource writing, etc. He/she selects books for both undergraduate and Ph.D. students' course schedules, carries out the purchase and provides the use of these books. Prepares literature about the subject before the lectures from the books in the library.

The medical librarian prepares an answer to clinical questions, to make new investigations and researches. Librarians use key electronic databases such as Cochrane, MD Consult, and PubMed, which are primarily evidence-based, in their searches to find the best evidence for clinical cases. Medical librarians are thus experts in the educational, clinical, academic and scientific activities of both students and lecturers and doctors.

The roles of medical librarians in the evidence-based information access process are the core of this service, knowing where and how to find the answer, finding the best evidence, evaluating and presenting them for validity. Librarians use databases specifically developed for KDT and KDD, primarily in their search for the best evidence for clinical cases. These databases are secondary sources of review (Davidoff & Florance, 2000) that summarize and review clinical evidence from the primary literature in a systematic and critical manner.

Once the librarians have identified the evidence, they read the publication containing the evidence and use its critical evaluation techniques to value its clinical meaning and method. Critical evaluation can be defined as an assessment technique applied to determine its clinical

validity according to criteria determined by considering the type of the article. Screening results and assessment information are presented in the final stage (Alkan, 2008).

Medical librarians benefit from the use of evidence-based practices in the management of user services, so that information in electronic media or an electronic document can be accessed, transferred, used and protected by their users (Çolaklar, 2008).

IV. Conclusion

Today, adapting to rapidly developing new approaches plays a crucial role in fighting diseases, protecting human and community health in all areas of medicine and health sciences, as well as in every area. Evidence based information is increasingly foreground in health field studies. Clinical trials are guided by evidence-based information and clinical guidelines that are readily accessible in the electronic environment. In this study, literature review is given as an example of evidence-based application as a guide for librarians. This topic is summarized in order to form a general idea and it is a research and basic research in different areas such as librarianship and health sciences in the future.

Whereas evidence-based applications are the foundation of medicine and health sciences, these applications are also applicable to social and sciences. Evidence-based education in Turkey is a new application in the field of librarianship as well as in health sciences and medicine. In order to train new generation medical librarians in the field of information and document management and implement evidence-based applications,

- In the information and document management departments, elective courses for information based services should be put into librarianship education.
- Medical librarians should also be taught active learning, lifelong learning, health literacy and medical literacy methods.
- Medical librarians should be taught methods of scientific research.
- Medical libraries should provide quick and accurate access to scientific knowledge and knowledge based on the evidence they need.
- An environment based on research and based on the desired and high quality evidence based information services in medical and hospital libraries should be created.
- A qualified and sufficient number of medical librarians who will provide these services in the medical and hospital libraries should be trained and employed.
- Universities and institutions providing health services should work in cooperation and develop joint projects.
- Medical librarians should act as a guide to working with health professionals on evidence-based work.

Healthcare science and medical knowledge-based information services help clinicians and researchers of health professionals with the use of information providers and high technology and literature review.

The importance of evidence-based information services depends on the clear definition of health-related medical

information, the accurate, reliable and rapid acquisition, protection and use of this information, and the demonstration of the health benefits of scientific applications. The result of this study will shed light on the training and education of qualified medical librarians.

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