



# **ACTIVE LEARNING IN DENTISTRY: A MODEL PROPOSAL FOR THE EDUCATION OF LIBRARIANS PROVIDING EVIDENCE-BASED INFORMATION SERVICES**

**Huriye ÇOLAKLAR, PhD** [colaklar@istanbul.edu.tr](mailto:colaklar@istanbul.edu.tr)

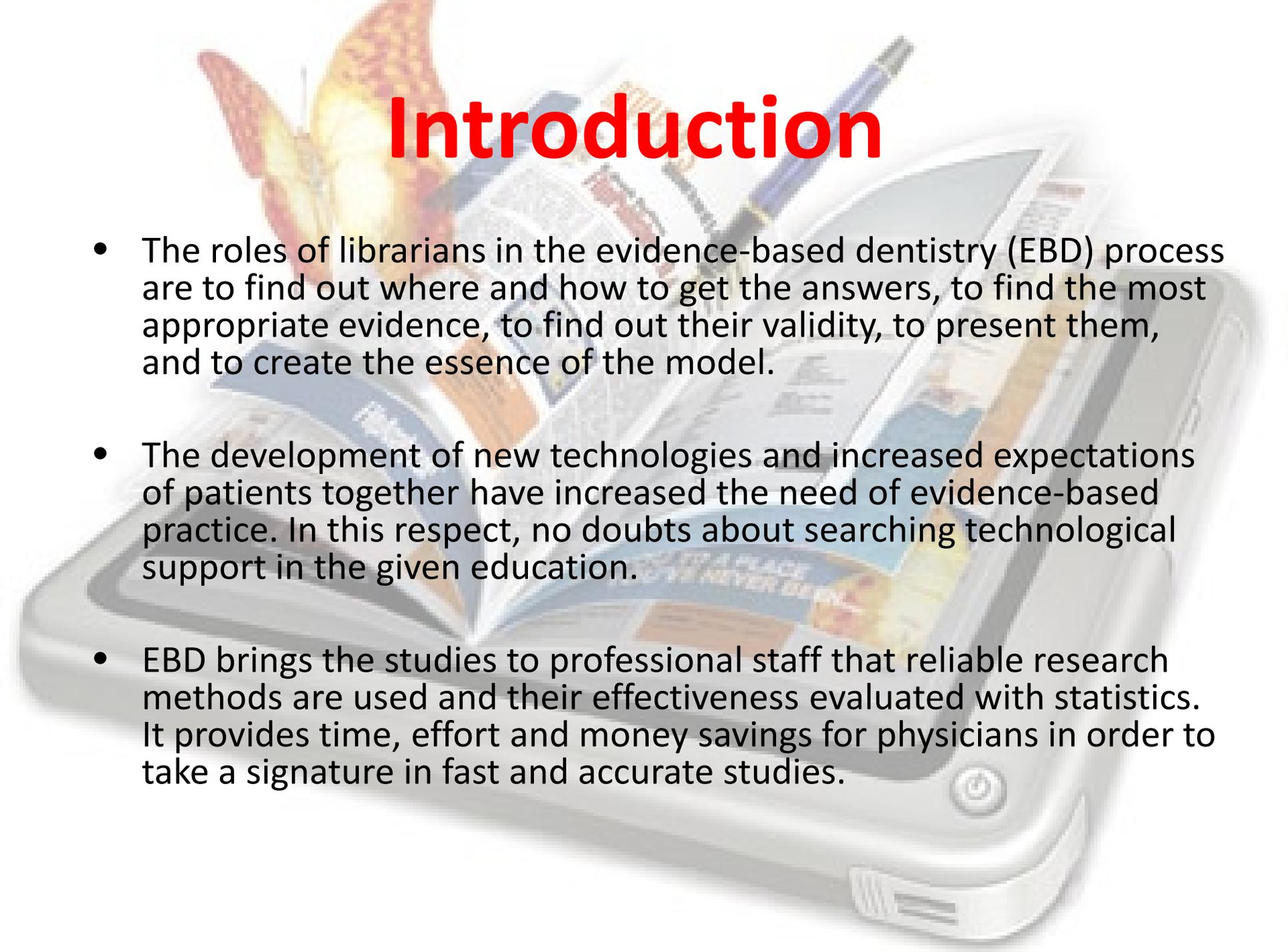
**Işıl İlknur SERT, PhD** [isilis@istanbul.edu.tr](mailto:isilis@istanbul.edu.tr)

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# Introduction

- Evidence-based practice stems from clinical, pathophysiological and epidemiological approaches which are used in the late 18th and early 19th centuries' medical practices (Cooper, 2001).
- Evidence-based medicine (EBM) helps at patient diagnosis, preparation of treatment plan, determination of treatment principles and methods, maintaining physical and mental health and laboratory studies. In addition, this way will provide the environment that is needed to do new observations and that will find answers for clinical problems. In order to practice all these, medical libraries need evidence-based information practices.

# Introduction

The background of the slide is a composite image. At the top center, a vibrant butterfly with yellow, orange, and red wings is positioned. Below it, an open book with white pages and a dark cover is visible. A blue pen lies across the book. The entire scene is set against a light, slightly blurred background.

- The roles of librarians in the evidence-based dentistry (EBD) process are to find out where and how to get the answers, to find the most appropriate evidence, to find out their validity, to present them, and to create the essence of the model.
- The development of new technologies and increased expectations of patients together have increased the need of evidence-based practice. In this respect, no doubts about searching technological support in the given education.
- EBD brings the studies to professional staff that reliable research methods are used and their effectiveness evaluated with statistics. It provides time, effort and money savings for physicians in order to take a signature in fast and accurate studies.

# What is Evidence?

According to the results of literature reviewing in different ways, definition of 'evidence' can be summarized as follows:

- Evidence as real
- Evidence as information (*expert opinion, but the experience that are not expressed verbally*)
- Evidence as private research findings
- Evidence as meta-analysis and systematic review (Yurtsever and Altıok, 2006).

# What is Evidence?

Evidence level of classification is given below:

- Systematic review that are evidence-based- collected, organized and application-generated recommendations- for clinical use as a guide- a systematic review of research studies
- Qualified research that are identified by individual sources
- Expert opinion or the result of qualified improvement programs (Yurtsever and Altiok, 2001; McClarey and Duff, 1997; Morgan, 1997; Fennessy, 1998)

# Evidence Pyramid and Its importance in Dentistry

Evidence-based applications, different degrees of hierarchies were created evidence level of reliability.

There are different levels of value at decision-making process.

There are hierarchies of research design and they are considered to have equal values. The research methodology, meta-analysis, systematic review, randomized controlled trials and concepts that are used in the evaluation of evidence-based research are briefly described in the figure 1

(<http://servers.medlib.hscbklyn.edu/ebm/2100.htm>).



**Figure 1.** Hierarchy of Evidence Pyramid.

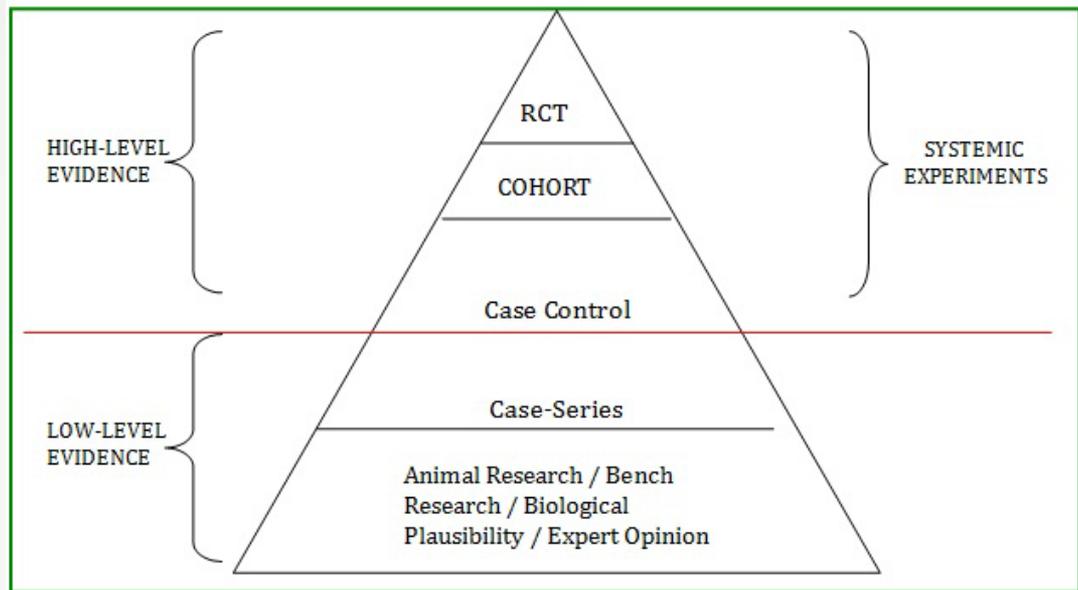
(Source: SUNY Downstate Medical Center. Medical Research Library of Brooklyn. Evidence Based Medicine Course. A Guide to Research Methods: The Evidence Pyramid: <http://servers.medlib.hscbklyn.edu/ebm/2100.htm>; Public Health Information & Data Tutorial, Hierarchy of Evidence. [cited 2011 March 05]. Available from: <http://phpartners.org/tutorial/04-ebph/2-keyConcepts/4.2.7.html>.)

# Evidence Pyramid and Its importance in Dentistry

In the layer of the evidence pyramid, reliability of evidence (the lower layer of the pyramid) is from low to high (RCT  $\frac{1}{4}$  randomized controlled trial). Reliable evidences are obtained from 3 upper level systematic experiments. "RCT" and "Cohort" studies are considered the most reliable ones (Hujoel, 2009).

In the evidence pyramid there are low-level evidence animal studies, bench research, biological plausibility, expert opinion, case reports and case studies (Figure 2). These findings are considered low-tier; research or ideas are unhealthy and unreliable evidence due to methodology.

Even though expert opinion and randomized controlled trials are low-level, they contribute to the science of medicine and health. For example, a gynecologist from New York has found that estrogen and hormone therapies are effective in menopause. Randomized controlled trials support that using powerful antioxidants prevent cancer (Hujoel, 2009).



**Figure 2. The Evidence Pyramid.**

(Source: [Hujoel, P.](#) "Grading the evidence: the core of EBD", [J Evid Based Dent Pract](#) 2009;9(3):123)

# Study Design of Evidence

Scientific research has a standard design. The criteria that is developed for this design is updated. First research designs are systematic reviews, case-control studies, randomized controlled trials (RCTs) and cohort studies, and diagnostic accuracy studies (Table 1) (Harris et al. , 2001).

Study design	Criteria
Systematic reviews	<ul style="list-style-type: none"> <li>• Comprehensiveness of sources/search strategy used</li> <li>• Standard appraisal of included studies</li> <li>• Validity of conclusions</li> <li>• <u>Recency</u> and relevance</li> </ul>
Case-control studies	<ul style="list-style-type: none"> <li>• Accurate ascertainment of cases</li> <li>• Nonbiased selection of cases/controls with exclusion criteria applied equally to both</li> <li>• Response rate</li> <li>• Diagnostic testing procedures applied equally to each group</li> <li>• Appropriate attention to potential confounding variables</li> </ul>
Randomized controlled trials (RCTs) and cohort studies	<ul style="list-style-type: none"> <li>• Initial assembly of comparable groups:               <ul style="list-style-type: none"> <li>For <u>RCTs</u>: adequate randomization, including concealment and whether potential confounders were distributed equally among groups</li> <li>For cohort studies: consideration of potential confounders with either restriction or measurement for adjustment in the analysis; consideration of inception cohorts</li> </ul> </li> <li>• Maintenance of comparable groups (includes attrition, crossovers, adherence, contamination)</li> <li>• Important differential loss to follow-up or overall high loss to follow-up</li> <li>• Measurements: equal, reliable, and valid (includes masking of outcome assessment)</li> <li>• Clear definition of interventions</li> <li>• All important outcomes considered</li> <li>• Analysis: adjustment for potential confounders for cohort studies, or intention-to treat analysis for <u>RCTs</u></li> </ul>
Diagnostic accuracy studies	<ul style="list-style-type: none"> <li>• Screening test relevant, available for primary care, adequately described</li> <li>• Study uses a credible reference standard, performed regardless of test results</li> <li>• Reference standard interpreted independently of screening test</li> <li>• Handles indeterminate results in a reasonable manner</li> <li>• Spectrum of patients included in study</li> <li>• Sample size</li> <li>• Administration of reliable screening test</li> </ul>

Source of Table: Harris R.P. et al. Current methods of the U.S. preventive services task force: a review of the process. Am J Prev Med, 2001.

Table 1. Criteria for grading the internal validity of individual studies.

# What is evidence-based practice?

Research-based practice as an evidence-based practice (evaluation of research findings and results)

Knowledge management as a process of evidence-based practice (collection of evidence-based information and literature review)

Developments of professional applications as evidence-based practice

Clinical decision, diagnosing and problem-solving process as evidence-based practice

Treatment and care management as evidence-based practice (Yurtsever and Altioek, 2006; Gould, 1998).

According to Sackett and his colleagues evidence-based practice consists some processes. These processes:

- Answering clinical questions (the best answer will be the answer).
- Determining the best evidence (Is this evidence reliable?)
- What is the right meaning of the evidence?
- Applying the evidence to clinical problem (Yurtsever and Altioek, 2006; Sackett et al., 1996)

(Source of figure: Yurtsever and Altioek, 2006; Gould, 1998)

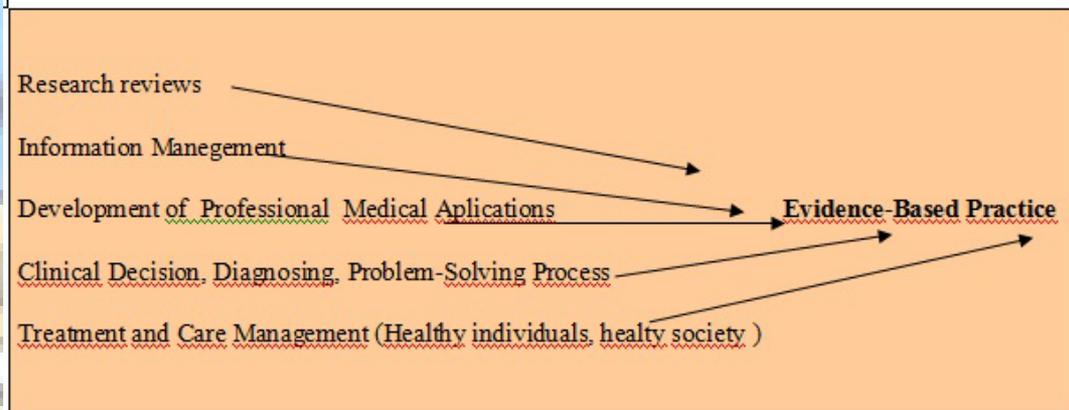
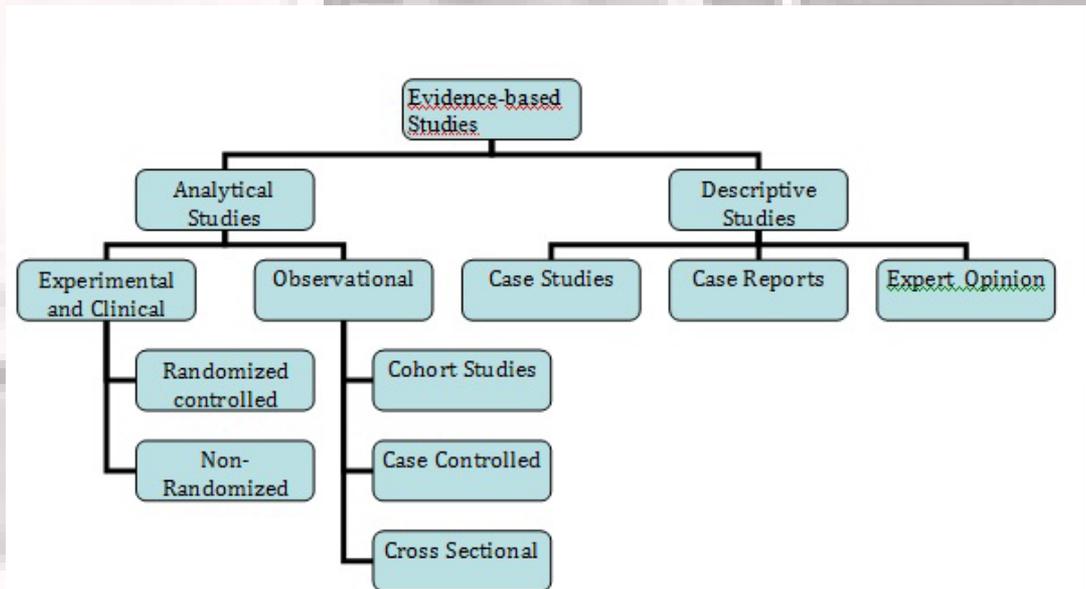


Figure 3. Evidence-Based Practices.

## The Role of the Librarian

Evidence-based studies collected in two groups: Analytical and descriptive studies. Analytical studies are grouped as experimental and clinical studies (randomized controlled and non-randomized trials) and observational studies (cohort studies, case controlled, cross sectional). Descriptive studies include case studies, case reports and expert opinion (Figure 4).



**Figure 4.** Evidence-Based Studies.

## The Role of the Librarian: Systemic Reviews



Figure 5. Systemic Reviews and Meta-Analysis.

Case series and case reports contain systematic reviews and meta-analysis studies (Figure 5). Systematic reviews divided into three groups: meta-analysis, decision analysis, and cost-benefit analysis. Systematic review is a method of collecting scientific information systematically, and reviewing and synthesizing the information with giving a value to it (Figure 6).

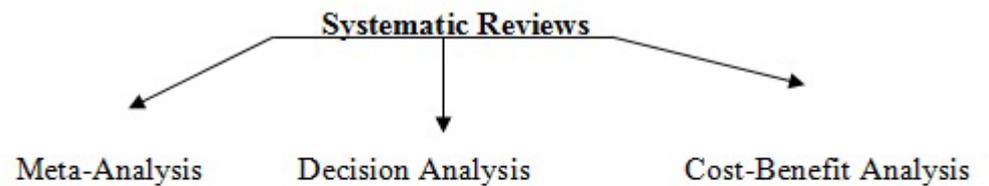
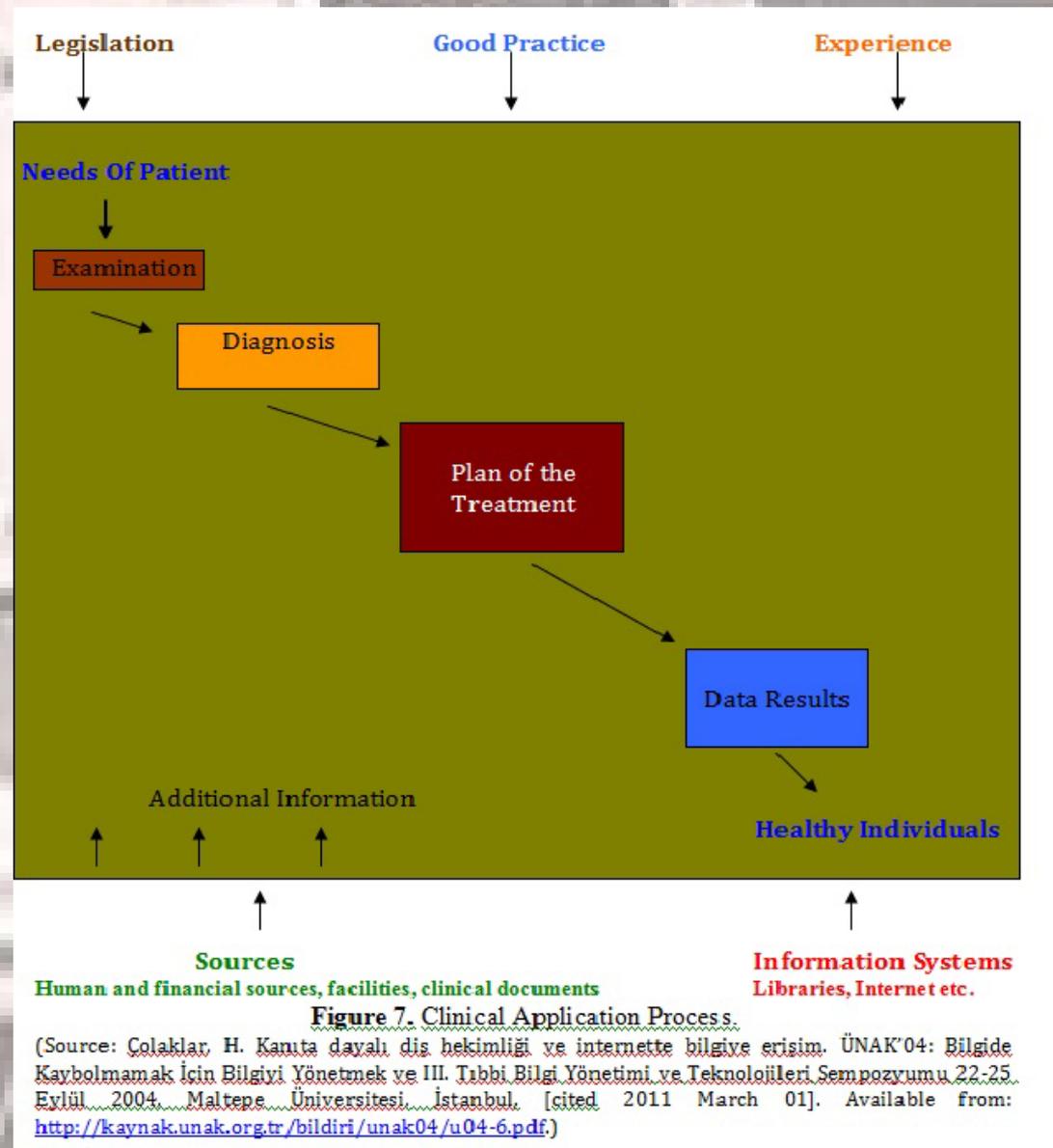


Figure 6. Systemic Reviews.

# The Role of the Librarian: Clinical Application Process

Evidence-based practice prepares examination and research environment to find out solutions to clinical problems. It is needed to access medical libraries' electronic books and journals, quickly.

Medical librarians help health care professionals in evidence collection, literature review, and meta-analysis studies. Librarians have a major role in finding the necessary resources, accessing systematic reviews, and teaching how to use evidence-based electronic data (Figure 7).



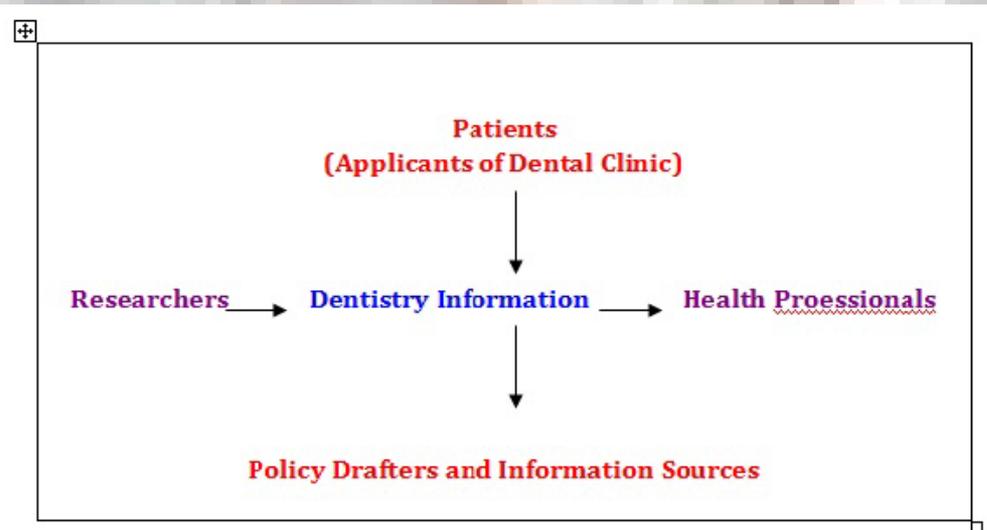
(Sources of figure: Çolaklar, 2004)

## The Role of the Librarian: Evidence-Based Dentistry Information

The roles of librarians in the process of EBM and EBD are to know how and where to find the answers, to find the most appropriate evidence, to evaluate the validity of the evidence and to offer them. To find out the most suitable evidences for clinical cases, librarians first scan the data-bases that are specifically improved for EBM and EBD. These data-bases are 'review' type secondary sources that review the clinical cases systematically, evaluate them critically and summarize them (Davidoff and Florance, 2000).

After determining the evidence, librarians, read the publication containing the evidence and by using critical evaluating techniques, they describe its significances in clinical aspects and the value of the method (Figure 8). Critical evaluation is a type of method that takes into account of the type of article according to the defined criteria, and determine its validity. The last stage of the process is presenting the scanned and evaluated information to physician (Alkan, 2008).

To benefit from alternatives of EBM in electronic serials publication management, it is essential to provide "electronic information" or "electronic journal" that users can access, transfer, store and protect (Çolaklar, 2008).



**Figure 8. Evidence-Based Dentistry Information.**

(Source: Çolaklar, H. Kanıta dayalı diş hekimliği ve internette bilgiye erişim. ÜNAK'04: Bilgide Kaybolmamak İçin Bilgiyi Yönetmek ve III. Tıbbi Bilgi Yönetimi ve Teknolojileri Sempozyumu 22-25 Eylül 2004, Maltepe Üniversitesi, İstanbul. [cited 2011 March 01]. Available from: <http://kaynak.unak.org.tr/bildiri/unak04/u04-6.pdf>.)

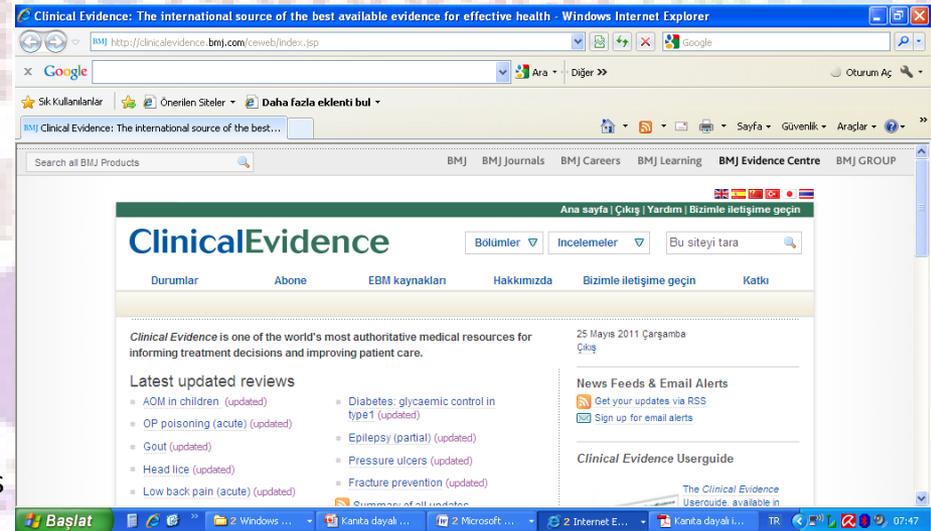
## Collaboration of Evidence- Based Dentistry and Librarian

The titles in a systematic evidence-based application:

- Clinical matters
- Scanning articles for literature review
- Published scientific researches
- Determination of articles
- Selection of important articles
- Data analysis
- Reporting invested information and using new questions (Çolaklar, 2004).

Important sources of information that are used for systematic review:

- Multi bibliographical and the full text electronic data-bases
- Data –bases that reports are scanned and important texts are cited such as SCI (Science Citation Index)
- Electronic data bases that give evidence-based information and edit indexes
- The sources relevant to subject
- Personal activities for communicating with other authors and organizations (expert opinion) (Çolaklar, 2004).



## Solving a Clinical Problem with Collaboration of Evidence-based Sources and Librarian

Evidence-based dentistry brings information together with reliable research methods and evaluates them with high level statistics, and then practices these applications that their effectiveness is proven. The International Institutes were settled such as, The Cochrane Oral Health Group, Centre for Evidence Based Dentistry, Oxford Centre for Evidence Based Medicine, American Dental Association Evidence Based Dentistry for this field. The works of systematic and meta-analysis which are high degraded evidence are in progress at this institutes.

To find solutions to clinical problems with help of medical librarian, degree of evidence sources (the original published studies), systematic reviews (Cochrane and Bandolier data-bases), evidence-based dentistry journals ( Such as the journal of Evidence-based Dental Practice), clinical guidelines and protocols ( ADA guidelines, positions and statements- <http://www.ada.org/>) should be scanned (Figure 9).

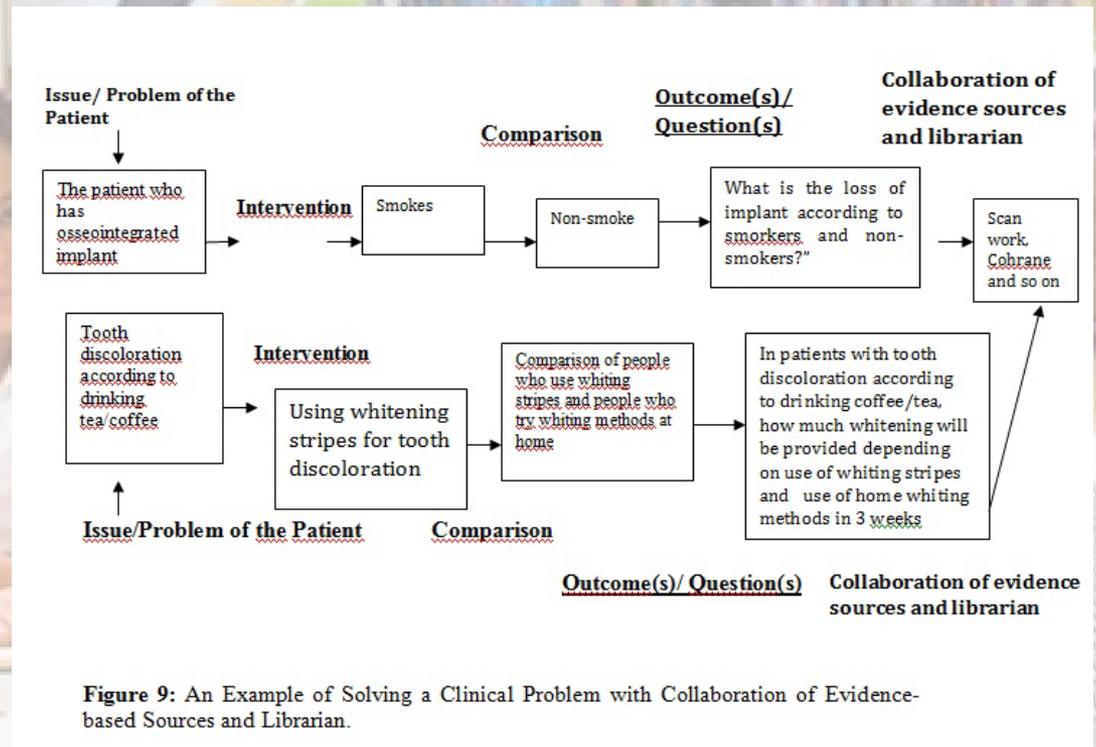


Figure 9: An Example of Solving a Clinical Problem with Collaboration of Evidence-based Sources and Librarian.

## Training Medical Librarian

It is very new to use evidence-based practice in librarian training. In 2006, Koufogiannakis and Wiebe looked specifically at undergraduates, but their meta-analysis found that computer assisted instruction was just as effective as traditional classroom teaching. In 2008, Brettle, a health librarian, performed a systematic review of instructional training; she evaluated 24 studies measuring the effectiveness of workshops and teaching and whether this work had a positive impact on patient care (Giustini, 2010).

The education modules are being designed as stand-alone web-based units so they can be incorporated in existing LIS curricula or used by practitioners as part of their continuing education experience. Currently, two pilot modules are being designed for testing in Spring and Summer 2009. The first module will be designed for LIS students and will be tested as a session in a course on information services taught at LSU and in a course on public library services taught at Drexel. The second module is designed for practitioners and will be tested as one of a Professional association's options for continuing education credit. Each module will include assigned readings, two or three case study scenarios, and either group or individual exercises in innovative information services design and implementation. case studies will be taken from a range of library settings; for the practitioners, the case studies will be drawn from their own type of library setting (Zach, 2010).

## Training Medical Librarian: World Examples

At University of Wisconsin, the course 'Information Sources and Services in the Health Sciences' is taught in the graduate program (<http://www.graduateschool.uwm.edu/students/prospective/areas-of-study/library-and-information-science/#courses>); At University of Washington Information School, the course entitled, 'Health Informatics and Health Information Management' taught in a certificate program (<http://www.pce.uw.edu/certificates/health-informatics.html>)

; At University of North Texas, there is a specialized education in 'Health Information Management' (<http://www.unt.edu/unt-dallas/brochures/himdsd.htm>). Especially at Pratt University, the course, 'Health Sciences: Services & Sources' consists "A methodical study of the organization, development and use of printed and web-based reference sources in the health sciences. Emphasis is on reference department activities and communication between librarian/information specialist and scientist"

([http://www.pratt.edu/academics/academic\\_resources/course\\_catalog/](http://www.pratt.edu/academics/academic_resources/course_catalog/)). It is the same almost in every university. Online sources are taught but the concept of evidence-based education is not drawn to the fore.

## Training Medical Librarian in Turkey

When we observe three major universities in Turkey, at Hacettepe University Faculty of Letters, there is an 'Access to Medical Information' course which is taught for Information Management senior students. Course subject areas are "Medicine and medical fields' general properties, access to medical information, using printed and electronic sources, introduction to classification systems and networks of medical field'. In addition, bibliographic control in Turkey and around the world, existing problems and suggested solutions, and creation and evaluation of a medical collection and organized information services' features are taught. Subject matter sources are taught practically ([www.hacettepe.edu.tr](http://www.hacettepe.edu.tr); <http://www.bby.hacettepe.edu.tr/>). In 2011-2012, Hacettepe University Faculty of Letters, Department of Information Management will use new licence programme. In this programme a new lesson called "Medical Information Management" covers characteristics of users in medicine and health sciences, their information needs, sources of information and access methods. Medicine libraries, types, collection, creation, open access resources, classification systems, MeSH, evidence-based medicine, etc. are included. Database applications (MEDLINE, PubMed, EMBASE, Cochrane Library, Uptodate, etc.); medical documentation, organizing of clinical data and the relevant standards are explained (<http://www.bby.hacettepe.edu.tr/lisansdersprogrami.pdf>).

There is a graduate course that is called, 'Access to Information of Medicine and Health Science' at Ankara University Faculty of Language, History, and Geography (<http://bilgibelge.humanity.ankara.edu.tr/>). Also, at Istanbul University Faculty of Letters, Information and Records Management has a senior year elective course called 'Access to Information-Science and Health Sciences' which hasn't exposed yet. Course specifically covers content of medical science and its historical development, cataloging and classification of information sources in medical field ([http://www.istanbul.edu.tr/edebiyat/bolum\\_sayfasi/bilgi\\_belge\\_yonetimi\\_bolumu.htm](http://www.istanbul.edu.tr/edebiyat/bolum_sayfasi/bilgi_belge_yonetimi_bolumu.htm)).

As we have seen there is no course content that give full information in training medical librarians that will provide evidence-based information services all around the world and in Turkey. However, it is taught for 1 or 2 hours as a subject of another course. Regarding to needs of these courses, especially recent years, there should be a course that contents only these subjects. The course can be entitled, 'Evidence-based Education and Medical Librarianship' and it will be very effective and useful.

## Evidence-based Education Model: A Course Example

Course name-code: ----- <b>Evidence-Based Education and Medical Librarianship</b>	<b>Departments of Information and Records Management</b>	
Education Term	<b>Education Methods</b> Project of Theory Practice Work/Literature Review Other Total Credit	
Language of the lesson	Turkish	
Required	Elective (7th Semester-Fall) 4th Grade	
Subject Areas	<b>Evidence-Based Information Services</b>	
Aim of the course	To teach how to make evidence-based education and where to obtain evidence-based information	
Learning Outcomes and Competences	Describing the clinical problem, determination of key-words, to learn how to find reliable evidences from literature review, understanding the hierarchy of evidence, to learn how to get top-level evidence from PubMed and meta-analysis studies	
Course textbooks/Sources	Ed. by Daniel Moran, Richard Malott, Evidence-Based Educational Methods. Academic Press, 2004. <a href="http://www.cochrane.org">www.cochrane.org</a> <a href="http://clinicalevidence.bmj.com/cweb/about/knowledge.jsp">http://clinicalevidence.bmj.com/cweb/about/knowledge.jsp</a> <a href="http://www.nlm.nih.gov/biomedical.html">http://www.nlm.nih.gov/biomedical.html</a> Clarkson J, Hamson JE, Ismail A, Needleman I, Evidence Based Dentistry for Effective Practice. Taylor & Francis, 2002.	
Evaluation Criteria	Midterms	No
	Assignments	%
	Literature Review	%
	Finals	%
<b>Week</b>	<b>Subjects</b>	
1	Principles of EB application	
2	Evidence Hierarchy	
3	Evidence-based Medical Principles	
4	How to use evidence-based sources	
5	Evidence based data-bases and information centers	
6	Principles of scanning evidence-based sources in PubMed	
7	Principles of Cochrane data-base	
8	Principles of scanning evidence-base sources in <b>BMJ Clinical Evidence</b>	
9	Principles of scanning evidence-base sources in <b>Dynamed</b>	
10	Principles of scanning evidence-base sources in <b>Uptodate</b>	
11	Principles of scanning evidence-base sources in <b>Best Evidence</b>	
12	Principles of scanning evidence-base sources in <b>Bandolier</b>	
13	Principles of scanning systematic review and case reports in <b>TÜBİTAK-National Medical Data-base</b>	
14	Discussion on assignments and literature review	
Lecturer/s		

**Table 3.** Evidence-Based Education Course Areas.

# Evidence-based Education Model: A Lesson Example

**Identification of matters:** Lithium disilicate, aluminum oxide, zirconium oxide and ceramic core products which are used for ceramic restoration widely, are examined for their cure effects by clinical researching in last ten years. The literature about ready- to-use ceramic products and systems are reviewed.

**The Purpose:** In this article, we review the literature by covering all the ceramic products and systems' properties, cementation, color, esthetics and clinical usage.

**Material and method:** At the end of the extensive literature reviewing, evidences intended treatments are researched. Peer-reviewed evidence based research articles in PubMed data-base, data-bases from the years 1996-2006, and dental journals were searched. Experiential clinical studies and retrospective studies were flyspecked.

**The Results :** There is no universal ceramic product or system for all clinical studies. But, in the literature, all the ceramic products and systems are available for clinical studies. In this systematic review, to improve ceramic products and systems clinical retrospective studies are needed.

**Discussion:** It supports the view that all the ceramic materials successful implementations are depend on the ability of the clinician.

In this literature study, clinical use of ceramic materials and systems and its recommended indicators by manufacturers were observed. Core material names, systems, material manufacturing techniques, and clinical indications are discussed. Later on, the scientific research conducted and evaluated classification of complications that are seen in result of using ceramic materials in clinical practices. Major complications, minor complications, and the rates are indicated that are provided from this study.

As you see the literature review means finding out the literature about defined subject, sharing previous clinical experiences, collecting data, evaluating data and reviewing the evidence.

It will be a great contribution to medical librarians' education if 'Evidence-Based Education and Medical Librarianship' courses and the literature review that will be lectured in these courses are taught in the Department of Information and Documentation Management.

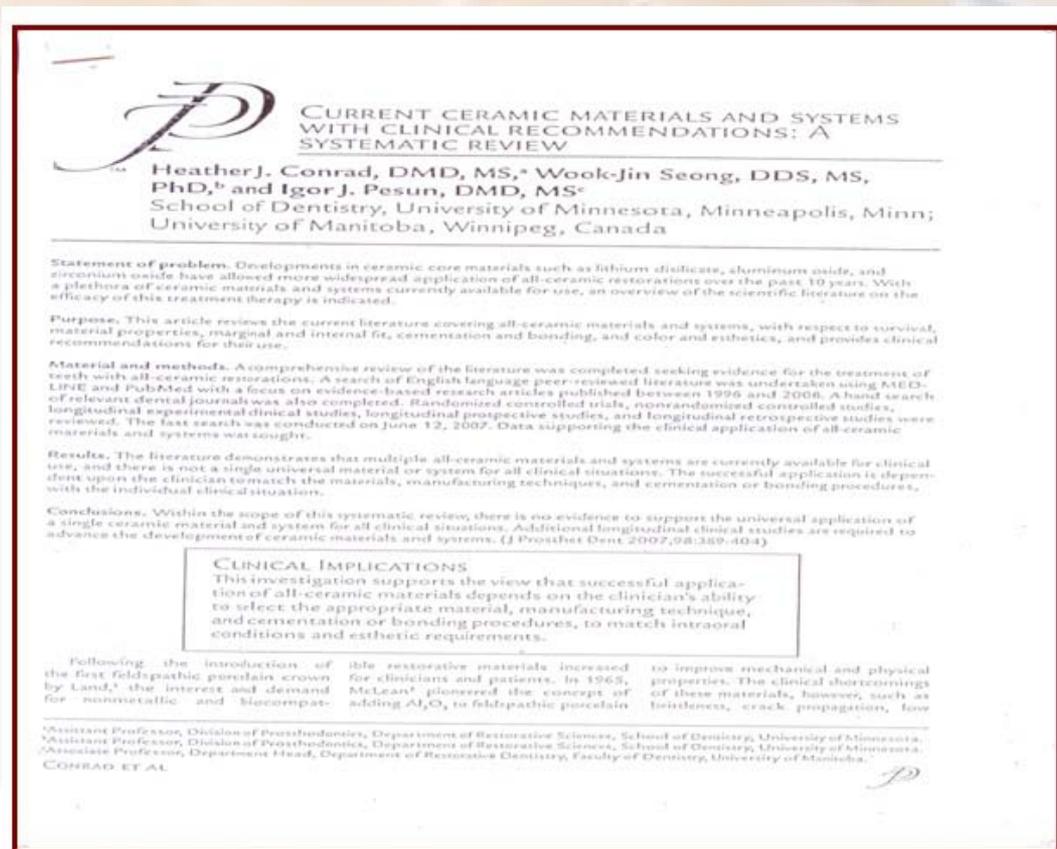


Figure 10. An example of a literature review.

## CONCLUSIONS and RESULTS

To practice evidence-based medicine and evidence-based dentistry practices:

- Health professionals should be informed about journals, evidence-based data-bases, and internet access sources
- Health professionals should be in lifelong learning process for their professional and personal developments
- Health professional should have ability to use sources in their clinical practice; they should have critical thinking and effective decision-making skills.
- There should be training studies for health professionals to develop their research culture.
- All employees should be included in evidence-based practices
- Evidence-based practices should include solving problems, diagnosing patient problems, reviewing literature, evaluating results of the applications and deciding about applications.
- To form evidence-based practices, practitioners need more qualified medical and clinical research. Evidence-based practice provide high quality of cost effective treatment, health, care, protection for dentistry, medicine, and nursing.

# CONCLUSIONS and RESULTS

Turkey is very new in evidence-based education in the field of librarianship as dentistry and health sciences. Evidence-based practices for librarians:

- Information and Documentation Management departments should have evidence-based information services in the librarianship curriculum as an elective course
- Active learning and life-long learning methods should be taught to medical librarians
- Scientific research methods should be taught to medical librarians
- Medical librarian should provide access to evidence-based information quickly and accurately when it is needed.
- Medical and Hospital libraries should create an environment based on researches and have the desired quality of evidence-based information services.
- There should be a sufficient number of qualified medical librarians trained and employed at medical and hospital libraries
- Academic institutions and health care institutions should work in collaboration and develop projects.
- Medical librarians should be a guide to health professionals in evidence-based studies.
- Evidence-based information services help health professionals in clinical and research studies by information providers, the use of high technology, and review of literature
- There should be a two half semester course in Department of Information and Documentation Management that teaches the areas, evidence-based medicine, dentistry, nursing, etc. , that evidence-based practice intensely used and should explain evidence-based information services and library services. First semester can be introduction to medical libraries. Learning evidence –based applications, data-bases and analyzing questions can be taught in the second semester.

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**THANK YOU**

**Huriye ÇOLAKLAR, PhD [colaklar@istanbul.edu.tr](mailto:colaklar@istanbul.edu.tr)**

**[İşıl İlknur SERT, PhD isilis@istanbul.edu.tr](mailto:isilis@istanbul.edu.tr)**

**Istanbul University, Istanbul-TURKEY**