AWARENESS AND ATTITUDE OF PHYSICIANS IN HOSPITALS BELONGING TO UNIVERSITY OF ALEXANDRIA TOWARDS EVIDENCE BASED MEDICINE

Thesis

Submitted to the Medical Research Institute
University of Alexandria
In partial fulfillment of the
Requirements of the degree of

Master of Science in Biomedical Informatics & Medical Statistics

By

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Praise to "Allah", the Most Gracious and the Most Merciful Who Guides Us to the Right Way

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INTRODUCTION

INTRODUCTION

Evidence based medicine (EBM) is defined as as the conscientious, explicit, and judicious use of current best evidence. [1] It means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

Evidence based medicine is also defined as the ability to access, assess and apply information from the literature to, day to day clinical problems. [1]

It means the integration of best research evidence with clinical expertise and patients values. [2]

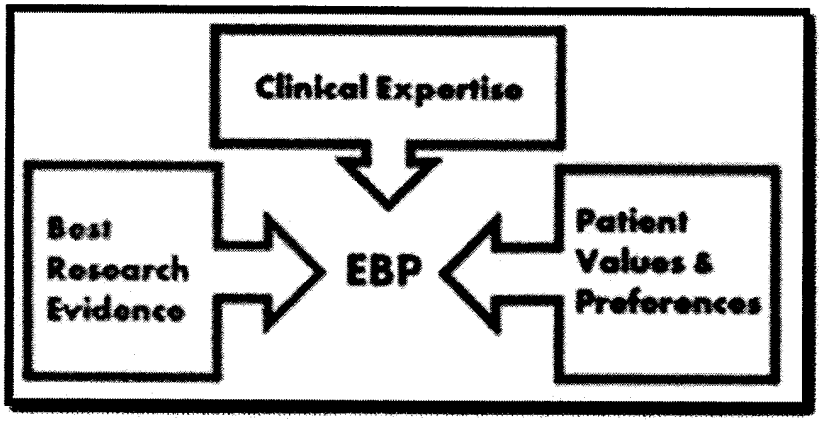

Figure (1):EBP: Evidence based practice

By best available clinical evidence we mean clinically relevant research, often from the basic sciences of medicine, and from patient centered clinical research in the accuracy and precision of diagnostic tests (including the clinical examination), the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens.[1]

Clinical evidence invalidates previously accepted diagnostic tests and treatments and replaces them with new ones that are more powerful, more accurate, more efficacious, and safer.[1]

By individual clinical expertise, we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in the more thoughtful identification and compassionate use of individual patients' predictions, rights, and preferences in making clinical decisions about their care .[1]

Good doctors use individual clinical expertise and the best available evidence, and neither alone is enough. Without clinical expertise, practice risks is becoming tyrannized by evidence, for excellent clinical evidence may be inapplicable to or inappropriate for an individual patient.

Without current best evidence, practice risks are becoming rapidly out of date to the detriment of patients. [1]

Patient values mean the unique preferences, concerns and expectations of the patient.

Importance of EBM:

The presumed benefits of EBM are: to help clinicians deal with 'information overload'; to reduce inequalities in the delivery of healthcare (and distribute healthcare resources more equitably); to reduce healthcare costs; and to justify treatment choices to the public. [3]

A review of physicians' performance suggested that learning how to practice EBM, seeking out and applying the findings of EBM summaries and adopting evidence-based practice protocols can keep us aware of medical advances and help to enhance our clinical performance. [4] EBM practice also supports decision-making shared with users, which is already favored within the medical community as the ideal of decision-making. [5]

The rapid spread of EBM has arisen from four realizations:

1. Our daily need for valid information about diagnosis, prognosis, therapy, and prevention (up to five times per inpatient and twice for every three outpatients).
2. The inadequacy of traditional sources for this information because they are out of date (textbooks), frequently wrong (experts), ineffective (didactic continuing medical education), or too overwhelming in their volume and too variable in their validity for practical clinical use (medical journals).[7]
3. The disparity between our diagnostic skills and clinical judgment, which increase with experience, and our up-to-date knowledge and clinical performance, which decline.
4. Our inability to afford more than a few seconds per patient for finding and assimilating this evidence or to set aside more than half an hour per week for general reading and study. [6, 7, 8]

EBM forms part of the multifaceted process of assuring clinical effectiveness, the main elements of which are:

- Production of evidence through research and scientific review
- Production and dissemination of evidence-based clinical guidelines
- Implementation of evidence-based, cost-effective practice through education and management of change.
- Evaluation of compliance with agreed practice guidance through clinical audit and outcomes-focused incentives. . [9]

Two types of evidence-based medicine have been proposed:

1. Evidence-based Health Care, also called as the evidence-based guidelines, is the practice of evidence based medicine at the organizational or institutional level. This includes the production of guidelines, policy and regulations.
2. Evidence-based Individual Decision Making is the practice of evidence based medicine by the individual health care provider. [3]

EBM, which has largely replaced the older term 'clinical epidemiology', is sometimes also called 'evidence-based practice'. This latter term highlights the

important point that the 'evidence' that we are talking about is empirical evidence about what actually works or doesn't work in practice. It is not scientific evidence for a mechanism of action (such as a biochemical pathway, physiological effect or anatomical feature). [10]

Historical background:

The idea of evidence based medicine have been around for a long time, during mid 19th century in post revolutionary Paris(when clinicians like Pierre Louis rejected the pronouncements of authorities that venesection was good for cholera), and sought the truth in systematic observation of patients. A much earlier origin has been nominated in ancient Chinese medicine during the reign of Emperor Qianlong, where the method of "Kaozheng" (practicing evidential research) was used to interpret ancient Confucian texts. [11] In 1972,Archie Cochrane , a Scottish epidemiologist who worked in Wales for most of his life, published a radical critique of the health and social services, "Effectiveness and efficacy: Random Reflection on Health Services" which advanced the concept that health care should be evaluated on the basis of scientific evidence rather than clinical opinion[12]. In the current era (1992) they were named EBM by a group led by Cordon Guyatt at McMaster University in Canada [13] . Since then, the number of articles about evidence-based practice has grown exponentially (from one publication in 1992 to about 1000 in 1998) and international interest has led to the development of six evidence-based journals that summarize the most relevant studies for clinical practice. With a growing awareness of the need for a more evidence based health service, the Cochrane library is currently the best source of evidence about the effects of health care. [14]

Steps of Evidence based medicine application:

The full-blown application of EBM comprises five steps: [15]

Figure (2): Steps of evidence based medicine.

- **Step 1:** Converting the need for information (about prevention, diagnosis, prognosis, therapy, causation, etc.) into an answerable question. The physicians ask what questions they have about the patient; specifically, what important pieces of medical knowledge they'd like to have in order to provide better care for this patient.

The physician's questions concern specific knowledge that could directly inform one or more "foreground" clinical decisions they face with this patient,

7. Aside from the experimental intervention, were the groups treated equally? For example, were they reviewed at the same time intervals?

The impact or the importance of the research means:

- ❖ Did the findings answer the research question?
- ❖ How large was the treatment effect?
- ❖ How precise was the estimate of the treatment effect? p value and confidence interval. [22, 23]

Clinical relevance means:

- ❖ Can the results be applied to the local population?

It is important to consider if there are any differences between the participants in the trial and the local population that would make it impossible to apply the results locally. Participants dropping out of the study must be considered as their loss may distort the results.

- ❖ Were all clinically important outcomes considered?

A single trial cannot address all the important outcomes that we are interested in, but consider if the paper has answered the original research question and whether any other important outcomes have been highlighted or missed out.

- ❖ Are the benefits worth the harms and costs?

Financial information is not normally given in a trial, but we need to consider what the negative effects could be and whether these are outweighed by the benefits. Other research, such as an economic evaluation, might help with the cost implications.[22, 23]

- *Step 4*: integrating the critical appraisal with our clinical expertise and with our patient's unique biology, values, and circumstances.
- *Step 5*: evaluating our effectiveness and efficiency in executing steps 1–4 and seeking ways to improve them both for next time.

An efficient way of evaluating our searching skills is to ask research librarians or other respected colleagues to repeat a search that we've already done and then compare notes on both the searching strategy and the usefulness of the evidence we both found. Done this way, we benefit in three ways: from the evaluation itself, from the opportunity to learn how to do it better, and from the yield of additional external evidence on the clinical question that prompted our search. [11]

It might be wise to consult our nearest health sciences library about taking a course or personal tutorial; so that we can get to the level of expertise we need to carry out this step in practicing EBM. We might even persuade one of the librarians to join our clinical team-an extraordinary way to increase our proficiency. [11]

The task of evaluating published research is daunting to many clinicians. To make the process easier, several scientists have outlined categories of evidence and stratified them in order from strongest to weakest levels. The levels also can be interpreted as starting with the most reliable or most trustworthy or the least vulnerable to bias, to the least trustworthy or the least reliable or the most vulnerable to bias.

The levels of evidence outline by Sackett and his colleagues in 2000 are as follows: [2]

1A = Systematic Review of Randomized Controlled Trials (RCTs)
1B = RCTs with Narrow Confidence Interval
1C = All or None Case Series
2A = Systematic Review Cohort Studies
2B = Cohort Study/Low Quality RCT
2C = Outcomes Research
3A = Systematic Review of Case-Controlled Studies
3B = Case-controlled Study
4 = Case Series, Poor Cohort Case Controlled
5 = Expert Opinion

Figure (3): The levels of evidence.

Hadorn and his colleagues outlined another way of classifying categories of evidence. These are the guidelines that were used to rate the quality of evidence that was used to create the Health Care Policy and Research Clinical Practice Guidelines. Only 3 levels are employed with this method: [24]

Level A = Well-conducted RCT with 100 patients or more (including multi-center and meta-analyses); well-conducted RCT with fewer than 100 patients (one or institutions and meta-analysis; well-conducted study).

Level B = Well-conducted case-control study, poorly controlled or uncontrolled (Including RCT with one or more major or three or more minor methodological flaws), observations studies with high potential for bias (case series with comparison to historical controls), case series or case reports, conflicting evidence with more support.

Level C = Expert opinion.
Several journals are introducing guidelines and instructing authors to label the strength of evidence of their research in terms of rating scales. [24]

Following are a few definitions of methodology terms that are used in the levels of evidence guidelines: [25]

(1) Systematic review = When a systematic review is undertaken it is usually restricted to RCTs. A group of reviewers search the available literature via bibliographic databases. They enter common terminologies into the databases and retrieve copies of all the articles written on a specific topic. Next they proceed to critically evaluate the methodologies and content. The final product is a synthesis of the properly completed and meaningful research into information that is relevant to practicing medical practitioners/clinicians. Examples of systematic reviews include:
   I. The Cochrane Database of Systematic Reviews:
   II. The York Database of Abstracts of Reviews of Effects (DARE).

(2) Meta-analysis = this methodology is a subset of systematic reviews that use statistical methods to combine and analyze multiple investigations.

(3)Randomized Controlled Trials = When a study involves the randomization procedure, subjects in the study are randomly allocated to each group included in the study. Each subject has an equal chance of being assigned into an intervention group, a control group, a placebo group, or a sham treatment group. This eliminates the over-representation of any one characteristic in one group. If the randomization is correctly performed, each group should be similar with respect to baseline characteristics.

Furthermore, it eliminates any bias in the assignments of individuals to groups. Without this method it is possible for a researcher to knowingly or unknowingly assign the less involved patient in the intervention group and the more involved patients in the control group. Randomized controlled trials are known to be the 'Gold Standard' for establishing the effects of a treatment.

(4) Cohort Studies = this design is also called a prospective study, or a longitudinal study. It involves the selection of a large population of people who have the same condition and/or receive a specific intervention are followed over time and compared to a group not affected by the condition. This study employs observation as the research method. The interventions are not manipulated.

(5) Matched Case-Controlled Study = this design involves choosing 2 patients, or 2 groups of patients who were exposed to 2 different interventions.
The investigator retrospectively looks back to which group or patient achieved a better outcome.

(6) Case-Series = these are reports on a series of patients with a pre identified problem.

(7) Case Report = this involves a report on the intervention and outcome for a single patient/client. [25]

Clinicians may still ask, "What is the best evidence?" The best evidence comes from research that included the randomized assignment of subjects/participants, double-blinded design (the investigators and patients were blinded to the actual treatment group in which the patients were placed), and the use of a control and a placebo group. [26]

This type of systematic research significantly increases the confidence with which a medical practitioner can believe in the effectiveness of a treatment. Readers

can place more trust in the belief that it was the treatment that caused the outcome of the treatment. In addition, readers should look for an explanation for why participants may have dropped out of an investigation. If they were the more involved patients, then the treatment may appear to be more effective than it was. They should also look for inclusion and exclusion criteria to decide whether the patients/clients included in the study were similar to the patient/client they are treating. [26]

It is believed that if we are truly committed to providing patients with the treatments that have the greatest chance at being effective then it is incumbent upon us to start with treatments supported by Level 1 or Level A methodologies. We must search for, and employ first, those interventions that have been shown to have a statistically significant treatment effect with well-controlled research studies. If there are no systematic reviews, or meta-analyses, then one may look for guidance from lower level methodologies. [26]

Awareness of physicians about EBM :

Awareness of evidence based medicine is defined as the ability to perceive and understand the concept of EBM. From the time the term evidence-based medicine was coined, [27] proponents of this approach to health care delivery have offered courses and workshops to teach and disseminate it. Some observers have expressed skepticism regarding the effectiveness of teaching EBM,[28] and multiple systematic reviews have not clarified which teaching approaches are optimal.[29] Nevertheless, the demand for courses and learning opportunities for EBM continues to increase, and EBM concepts have been disseminated worldwide.

Traditionally, EBM knowledge gain has involved problem-based, self-directed learning in which learners work in small groups supported by tutor-facilitators. Although the ingenuity of medical educators has led to the development of variations on the teaching approach and new educational formats targeted to particular settings, learner characteristics and local resources, [29, 30] short courses and workshops remain a pillar of EBM dissemination. Empirical evidence to guide the design and delivery of short courses and workshops continues, however, to be limited. To close this gap, many studies were done to determine whether teaching EBM can produce changes in knowledge across a heterogeneous sample of course formats, course content and target groups and to explore which course features and learner characteristics are particularly suited to the acquisition of EBM knowledge.

Many factors were associated with a change in knowledge and skills. for example, Greater improvements in knowledge were associated with (in order of decreasing magnitude) a requirement for active engagement in the learning process, a separate statistics session, fewer topics covered in a given time, less teaching time, smaller numbers of learners per tutor, more participants in the entire course and smaller groups.

The Awareness of evidence-based medicine is still in its infancy in the developing and especially in Arabian countries. Recent research has shown that physicians' general perception and attitude to EBM is positive [31, 32]. Despite this, there is still a need to improve research skills and critical appraisal [33] and a certain degree of rejection towards EBM's reductionist focus is evident.[34] Furthermore, implementation of new information into daily clinical practice is slow.

Surveys of knowledge, use, and attitudes toward EBM were performed in different geographical and socio-economic settings. In Jordan, after applying a self administrated questionnaire, about half of physicians had little awareness of EBM resources. Most respondents agreed that adopting EBM would put more demand on already-overworked family practitioners. Regarding the attitudes of respondents toward EBM, More than 90% of the respondents had conclusively positive attitudes toward EBM, which is consistent with empirical evidence from the medical literature. [35, 36, 37] This is a good sign for promoting the uses of EBM in clinical Practice to improve patient management. Lack of personal time was the main barrier identified by the respondents. Lack of investment by health authorities was the second most commonly identified barrier, while the availability of and access to information was perceived to be the third barrier by the Jordanian physicians.

Another survey about attitude, awareness, and practice of EBM was in government hospitals in Saudi Arabia [37], Almost all respondents had positive attitude about EBM but only about a half reported regular use of EBM in their daily clinical practice. The lack of regular distribution of updated clinical letters, journals, or guidelines was considered to be a major barrier for practicing EBM, followed by a lack of available time and internet access. Participants in this study also reported low level of awareness about extracting journals, review publications, and databases related to EBM.

In Qatar, Almost all of them welcomed the current promotion of EBM and they believed that their colleagues' attitudes were welcoming too. Most agreed that practicing EBM improves patient care and expressed the opinion that research findings were useful in their daily management of patients. The majority disagreed that EBM was of limited value in primary care but agreed that the adoption of EBM places another demand on already overloaded physicians. Most of them actively practiced EBM. The major perceived barriers to practicing EBM in primary care was lack of free personal time, limited resources and facilities, no library on the locality and lack of training workshops and courses. [38]

In European countries, a survey of attitudes, awareness, and barriers regarding evidence-based surgery among surgeons and surgical nurses in The Netherlands showed that most of the surgeons were familiar with evidence-based surgery terms. [39] Common barriers for surgeons were conflicting results and the methodological inadequacy of research reports and unawareness of evidence-based surgery and unclear research reporting for nurses.

In1998, a survey was performed among general practitioners in England about their perceptions of the route to EBM, respondents mainly welcomed EBM and agreed that its practice improved patient care. [32] They had a low level of awareness of extracting journals, review publications, and databases, and, even if aware, many did not use them. Most had some understanding of the technical terms used. In 2011, with an increasing emphasis placed on evidence-based medicine, and the use of relevant resources, a study was done to evaluate UK doctor's awareness and use of specified evidence-based medicine (EBM) electronic resources. Respondents were invited to complete an online questionnaire. The most frequently used EBM resources available via the National Library for Health were the most established and well-known resources, namely, Medline/ PubMed. The top three resources not freely available via the National Library for Health were general non-specialist specific resources. The introduction of new electronic resources to doctors must involve more than simply

promoting the URL/web location. In fact, the development of a comprehensive list of resources highlighting their strengths (and weaknesses) may be beneficial for busy doctors. [40]

Half of Belgian social insurance physicians had read about evidence-based medicine. Physicians were mainly positive about EBM. Differences of opinion existed about the difficulty of basing their medical advice on evidence. Regarding the barriers for the use of EBM, Individual barriers were cited most in the list, more specifically EBM skills and time. Other frequently reported barriers were the fact that social factors and legislation restrict the usefulness of evidence, the fact that there is no control over the practice of evidence, and that the evidence is too difficult/theoretical to apply to practice was also an important barrier.[41]

In comparison to Asian countries, A study from India provides a developing country perspective, [42] showing that a half of the surveyed physicians were aware of EBM, one third were aware of The Cochrane Library. Unlike physicians, nurses and health care consumers were not at all aware of EBM, the Cochrane Library, and systematic reviews. Another study from Pakistan showed that few respondents had attended workshops on EBM arranged by Shifa College of Medicine, Islamabad, and University of Health Sciences, Lahore. One participant explained: "Evidence based guidelines are reliable as compared to other sources of evidence because of surety about the efficacy of practices and prevent blind and injudicious use of out dated therapies". Another response from a consultant was "EBM gives similar care to the patient with equal benefits and less harm" Participants used internet based resources, books, and journals for updating their knowledge in the descending order. A few utilized other sources as well like seminars, workshops, newspapers, magazines, pharmacopoeias, media and clinical practice.[43] In this study, One of the physician and consultant didn't find any obstacle in practicing EBM in Pakistan while others identified financial restraints as the main hindrance. The other important obstacles were lack of awareness, time, motivation to update knowledge and inconvenience in leaving deeply rooted practices. Participants thought that practicing traditional medicine promote injudicious use of interventions which may be harmful for the patients. Participants thought that EBM should be introduced in the undergraduate medical education as this will enable students to develop a habit of updating their knowledge and encourage students to play their part in research work. [43]

Regarding the attitude of physicians towards evidence based medicine, Despite continuing discussion and debate,[44, 45] EBM is generally accepted, though not necessarily incorporated, as an integral component of clinical practice by medical doctors, nurses, pharmacologists, health management teams, and a long list of allied health professionals. Evidence-based practice (EBP) evolved over the late twentieth and early twenty-first century to become accepted practice for health care professions. Several professional organizations, including the Institute of Medicine, have refocused their standards to include a greater emphasis on the importance of evidence-based fundamentals as a means for improving the level of health care offered to patients. [46] However, one of the greatest barriers for adoption of EBP by clinicians is the lack of knowledge regarding proper integration into patient care. [47, 48]

Rationale of the study:

Old medical practices depended on unsystematic observations from clinical experience, an understanding of patho-physiologic principles of disease, common sense and clinical experience as a means for building and maintaining knowledge of patient management. [6] According to this paradigm, clinicians had a number of options for sorting out clinical problems. Reviewing textbooks and consulting local experts were considered appropriate ways of obtaining medical information. [16] However, most medical textbooks are not based on evidence. They tend to be out of date in relation to recent advances in scientific knowledge. In addition, there may be a number of updates in knowledge during the time lag from writing to publication. [49] Experienced physicians differ in the making of clinical judgments, which are often not based on evidence. Traditional continuous medical education does not work in improving professional practice. [4, 50] In addition to the expansion in research and discrepancy in validity, there is currently an increased interest in narrowing the gap between research findings and their implementation in clinical practice. [51, 52] Despite the development of rigorous clinical trial methods, people have been aware for decades of the gap between the results of randomized, blinded clinical studies and the practical use of treatments in the usual clinical setting. This gap results in expensive, ineffective or even harmful, decision making. EBM deals directly with the uncertainties of clinical medicine and has the potential for transforming the education and practice of the next generation of physicians.

The need for EBM in developing countries:

Developing countries have limited resources, so, it is vital that the health care provided is effective. The number of systematic reviews relevant to developing countries is increasing. So, disseminating the findings of systematic reviews to policymakers, health professionals, and consumers is an essential pre-requisite to changing practices. [53]

The application of EBM in developing countries could save millions of dollars in terms of health expenses by avoidance of unnecessary tests or prescribing inappropriate treatments for indigent patients. Thus, limited resources, inadequate drug regulations together with limited capacity for continuing medical education, all necessitate the introduction of EBM into developing countries. Action is required at all levels of health care systems, from consumers through to health professionals, ministries of health, and international organizations. [48]

In Egypt, Alexandria university hospitals, this topic is particularly complex, little studied and misunderstood, and its true impact in this setting is uncertain. Very few data is known about physicians' awareness of evidence based medicine and its proper definition, the sources of their knowledge about EBM, which web sites related to EBM they access in patient management, and the understanding of some technical terms probably used in clinical guidelines, and about attitudes towards evidence based medicine, the extent of their skills to access and interpret evidence, the barriers to moving from opinion based to evidence based practice, and the additional support necessary to incorporate evidence based medicine into everyday general practice.

AIM OF THE WORK

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The aim of this work is:

- Assessment of the physician's knowledge of evidence based medicine (Choosing the proper definition of EBM, Writing the name of any site on the net related to EBM, and understanding of some technical terms).
- Assessment of physician's attitude towards current promotion of EBM.
- Physician's opinion about barriers towards application of EBM in clinical practice.
- Physician's opinion about how to increase EBM use in every day management of patients.


SUBJECTS
&
METHODS

SUBJECTS & METHODS

Setting:

University hospitals in Alexandria include: The main University Hospital (MUH), El Shatbi Hospital, Nareeman Hospital and Medical Research Institute's Hospital. The Main University Hospital (MUH), El Shatbi Hospital and Medical Research Institute's Hospital (MRI), were randomly selected as representative to Alexandria university hospitals.

The Main University Hospital includes the following clinical departments:

- Anesthesia and Surgical Intensive Care
- Clinical Oncology and Nuclear Medicine
- Clinical Pathology
- Critical Care Medicine
- Diagnostic and Interventional Radiology
- Internal Medicine (Cardiology, Chest Diseases, Dermatology, Tropical Medicine and Neuropsychiatry)
- Surgery (Neurological surgery, Cardiothoracic Surgery, Urology, Otorhinolaryngiology , Pediatric Surgery and Ophthalmic surgery)

El Shatbi hospital includes two main departments:

- Obstetrics& gynecology department.
- Pediatric department.

Medical research institute's hospital includes the following medical departments:

- Internal medicine.
- Surgery.
- Radiology.
- Chemical pathology.
- Anesthesia.
- Cancer management.
- Clinical physiology.

The average number of physicians working in MUH is 2500, 600 in Shatbi hospital and 160 physicians are working in MRI. These numbers are taken from secretaries of each clinical department then numbers are summated to give these final numbers so, these are approximate numbers.

Study design:

This is a descriptive cross sectional study.

Study population:

Physicians working in the previously mentioned hospitals were randomly selected and interviewed to fill the questionnaire; physicians were randomly selected with different scientific degrees, both genders.

Sampling method:

A two stage sampling method was adopted. The first stage was conducted by random selection of three hospitals from the Alexandria University hospitals. The second stage was done by selection of physicians from different clinical departments in each hospital using a simple random sampling method.

Sample size:

Based on a previously published study done among Jordanian physicians with the same aim of work [35], the overall awareness rate among physicians was 43%. If we hypothesized to have a similar rate of awareness among our physicians;
A sample size of 400 achieves 80% power to estimate the true rate of physicians' awareness with maximum error in the estimate ± 7% using two-sided binomial hypothesis test at 5% level of significance (NCSS program). Expecting non response rate of about 20%, a sample of 480 physicians was taken. A sample of 24, 357, 100 physicians was selected from MRI, MUH, and El Shatbi hospitals proportionate to The number of physicians working in each cluster: 160, 600, and 2500 physicians respectively.

Data collection:

A self-administrated questionnaire was distributed to the physicians working in the previously mentioned university hospitals. The questionnaire was adopted from McColl et al [32]. It was believed that adopting a previously published questionnaire would add strength to the study because it had been already tested and would allow an international comparison to be drawn [35]. A pilot study was conducted and some modifications were done after consulting three experts in evidence based medicine to reinforce the content validity of the questionnaire and to improve understanding by physicians. Those who refused to complete the questionnaire were excluded. In such cases, another randomly selected physician from the same department was included.

The questionnaire was anonymous to ensure confidentiality.

It included the following items:

A-Personal and professional data:

1. Hospital/institute name.
2. Department.
3. Year of graduation.
4. Gender.
5. Scientific Degree.

B- Awareness about evidence-based medicine (EBM) which is defined as:

- The state or the ability to perceive the concept of EBM.

It is assessed through:

1. Asking the physician to mark the correct statement defining EBM.
2. The physician wrote the name of any site on the net related to EBM.

3- Understanding of some technical terms:

i- Confidence interval.

ii- Risk assessment:

a. Absolute risk.
b. Relative risk.

c. Number need to treat.
d. Odds ratio

iii- Systematic review and meta-analysis:
a. Heterogeneity
b. Publication bias

4- Asking the physician about the source of knowledge about EBM.

C-Attitude toward evidence-based medicine (EBM) which is defined as:

- The tendency to respond positively or negatively towards EBM.

It is assessed through:

1. Physician' attitude toward current promotion of EBM.
2. How the physicians describes the effort to search for the best current clinical knowledge on the net.
3. How research findings are useful in day to day management of patients.
4. How the respondent agrees that the adoption of EBM is another demand on already overloaded physician.
5. Physician's opinion that EBM improves patient care.
6. How much the physician needs EBM in day to day clinical practice.
7. How much the physician faces knowledge gap in clinical practice.

D- Physician's opinion about barriers toward application of EBM which is defined as:

- A belief or conclusion held with confidence but not substantiated by positive knowledge or proof.

It is assessed through:

1- Lack of time.
2- No financial gain in using EBM.
3- Lack of hard evidence.
4- Too much evidence.
5- Availability of information from other sources.
6- Patients' expectations not matching with EBM.
7- Lack of critical appraisal skills.
8- Belief of over confidence that physician does not need EBM.

E - Physician's opinion about how to increase EBM.

Data processing& Statistical analysis:

I-Data processing:

Data processing involved two main objectives: Clean data by performing data check and recoding of variables.

- **Data check:**

Range check was done to ensure that all variables had valid codes.

- **Recoding of variables:**

To produce analytic statistics, variables were recoded into forms required for analysis and production of actual statistical tabulation.

Recoding answers of knowledge questions about EBM was done. In the question about the correct definition of EBM, only the following answer was

considered as right: "EBM is the integration of the best research evidence with patient values and clinical expertise". Other choices were considered as wrong.

Regarding questions about understanding of technical terms related to EBM, (not helpful to me to understand, don't understand but would like to, some understanding) were recoded as "no understanding" while, (yes I understand, could explain to others) were recoded as "yes".

Questions about attitude towards EBM were recoded as following: "strongely welcoming, welcoming" was considered as "positive attitude", while answers "not welcoming" were considered as "negative attitude" and the answers "Don't know" were excluded from analysis. Regarding questions of the frequency of EBM need in day to day clinical practice and the frequency of knowledge gap in clinical practice, answers "< 50%, >weak" were considered as "negative attitude", answers ">50%, <weak" were considered positive attitude, While answers "Don't know EBM" were excluded from analysis.

A combined knowledge score was calculated, the score was computed by calculating the sum of positive knowledge statements. The question about source of knowledge about EBM was excluded from calculation.

A combined attitude score was computed by calculating the sum of the positive attitude statements and the reversed answers of the negative attitude statements, [41] excluding the statements which were neither positive nor negative (Don't know EBM).

II-Statistical analysis:

Statistical analysis was done using SPSS version 18 (PASW).

Sociodemographic characteristics of the physicians and other qualitative variables about knowledge and attitude were summarized by frequency and percent, pie charts.

Chi square test was done to study the presence of statistical significant association between knowledge, attitude of physicians toward EBM and different hospitals (MRI, MUH, El Shatbi), Scientific degrees (MBChB and diploma, Master, Doctor degrees) and different clinical departments (Radiology, laboratory, Clinical physiology, surgery, Obstetrics, Internal medicine, Pediatrics, Oncology, Critical care), Montecarlo test was used if more than 20% of total cells had expected cell counts < 5.

Statistical analysis of physicians' attitude towards EBM was done after exclusion of physicians' answer: don't know.

Kruskal Wallis test was done to study statistical significant difference in the median awareness, attitude scores between different hospitals, scientific degrees, and clinical departments, pair wise comparisons for significant results were done by Mann Whitney test. Non parametric tests were done due to the use of scores for awareness & attitude; the maximum scores for both were less than 10.

Statistical analysis about barriers of evidence based medicine application was done after exclusion of physicians' answer: don't know EBM.
All statistical tests were judged at.05 level of significance.

RESULTS

RESULTS

Results of the study are presented in the following sections:

Section I: Personal characteristics of the physicians included in the study and description of their knowledge and attitude towards EBM, barriers of EBM application and their opinion how to improve EBM practice.

Section II: Comparison between MRI, MUH and El Shatbi hospital regarding knowledge, attitude towards EBM, barriers of EBM application and physicians' opinion how to improve EBM practice.

Section III: Comparison between different scientific degrees (MBChB and Diploma, Master and doctor degrees) regarding knowledge, attitude towards EBM, barriers of EBM application and physicians' opinion how to improve EBM practice.

Section IV: Comparison between different clinical departments (Radiology and laboratory, Anesthesia, Surgery and obstetrics, Internal medicine and pediatrics, Oncology and Critical care) regarding knowledge, attitude towards EBM, barriers of EBM application and physicians' opinion how to improve EBM practice.

Section I: *Personal characteristics of the physicians and description of their knowledge and attitude towards EBM, barriers of EBM application and their opinion how to improve EBM practice.*

A structured questionnaire was distributed to 600 physicians. 3.5% of physicians refused to answer the questionnaire, while questionnaires from 5% of physicians were incomplete and excluded, so the study included 549 physicians out of 600 with overall response rate of 91.5%.

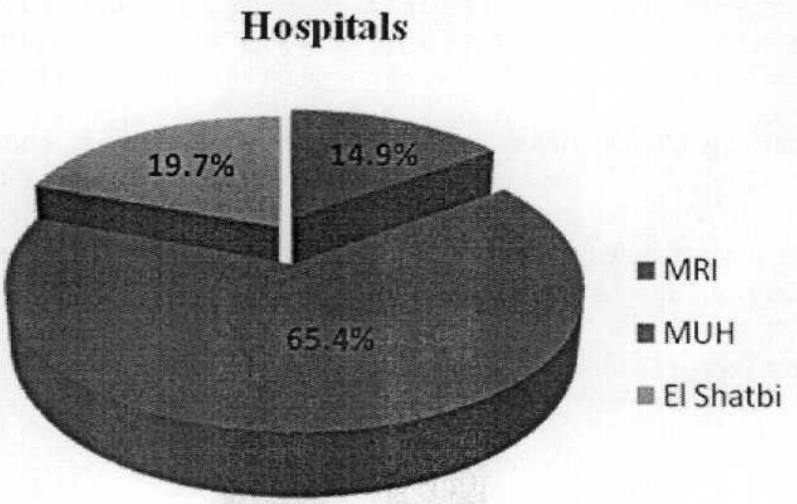
(Table 1) shows the demographic characteristics of the physicians. They were nearly equal males and females (49.7 versus 50.3% respectively). More than one third of them were MBChB (38.5%), Master (29.9%) and doctor degree (31.7%). Nearly 15% of physicians were selected from MRI, more than half of physicians (65.4%) were selected from MUH compared to 19.7% of physicians from El Shatbi hospital.

Regarding clinical departments, 72 physicians worked at clinical pathology department (13.1%), 61 physicians were surgeons (11.1%), 57 physicians were radiologists (10.4%), 80 physicians selected from internal medicine departments (14.5%), 59 physicians worked at oncology and nuclear medicine department(10.8%) relative to 59 pediatricians (10.7%) and 49 obstetricians (8.9%).

Considering years of clinical experience, the majority of physicians included in these study physicians were graduated since less than 10 years.

Table (1): Personal characteristics of the selected physicians from Alexandria University hospitals between January and June 2012 (n=549)

A- personal characteristics of the physicians		no.	(%)
Gender	• Male	273	49.7
	• Female	276	50.3
Scientific degree	• MBChB& Diploma	210	38.5
	• Master	164	29.9
	• Doctor	174	31.7
Hospital	• MRI	82	14.9
	• MUH	359	65.4
	• El Shatbi	108	19.7
Department	• Clinical pathology	72	13.1
	• Surgery	61	11.1
	• Radiology	57	10.4
	• Intenal medicine	76	13.8
	• Oncology& nuclear medicine	59	10.7
	• Clinical physiology	4	0.7
	• Pediatrics	59	10.7
	• Obstetrics& gynecology	49	8.9
	• Anesthesia	61	11.1
	• Critical care	51	9.3
Years since graduation	• >20 years	80	14.6
	• >10- 20years	97	17.7
	• ≤10 years	372	67.8



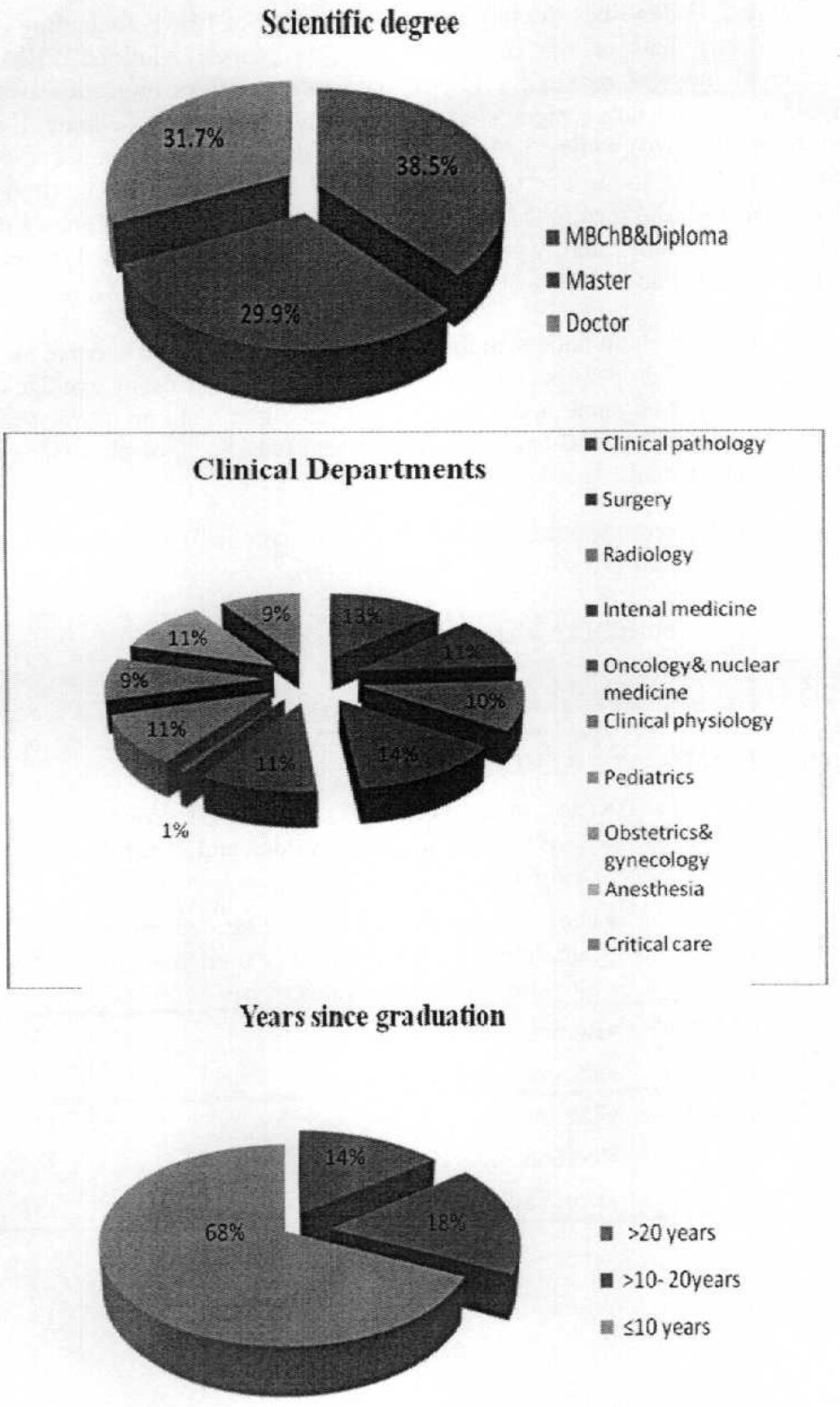


Figure (4): Personal characteristics of the physicians included in the study (n=549)

Table 2, 3 describes the physicians' knowledge of EBM .Regarding definition of EBM, nearly half of the physicians (53.2%) properly defined EBM as The integration of the best research evidence with patient values and clinical expertise. Nearly 45% of physicians remembered EBM sites as Medscape, Cochrane, E-medicine and Medline (Pubmed) while 55.2% of physicians didn't remember any site on the net related to EBM. For the source of physicians' knowledge about EBM, Almost half of the physicians (48.3%) mentioned that the internet was their source of knowledge while Attendance of lectures and workshop was the source of knowledge in 23% of physicians and relative to 28.8% of physicians who stated they don't know EBM.

For question about understanding of EBM related terms, an average of 17.8% of respondents showed proper understanding of the mentioned terms, an average of 32.2% of respondents showed some understanding , on the other hand an average of 40% of respondents don't understand but would like to and only 8.2% of physicians were not interested to understand.

Knowledge score was calculated (Maximum score is 9).The average knowledge score among physicians is 2.02(2.37), Median=1(0-9).

Table(2): Physicians' knowledge of EBM (n=549):

B-Physician's knowledge about EBM		No.	(%)
1-Definition of Evidence Based Medicine (EBM)	•Designed research strategies to show the distribution of diseases.	74	13.5
	•The integration of the best research evidence with patient values and clinical expertise.	292	53.2
	•The integration of the best research guidelines with clinical experience in making clinical decisions.	183	33.3
2- Any known site on the net related to EBM	•Remember	246	44.8
	•does not remember	303	55.2
3-The source of knowledge about EBM	•The internet	126	23
	•lectures or workshops	265	48.3
	•Don't know EBM	158	28.8

Table(3): Knowledge of some terms related to EBM presented in 549 physicians

4-Understanding of some technical terms related to EBM	Not helpful to me to understand		Don't understand but would like to		Some understanding		Yes I understand, can explain to other	
	No.	%	No.	%	No.	%	No.	%
i- Confidence interval	62	11.3	258	27.2	145	26.4	83	15.1
ii-Absolute risk	30	5.5	189	34.4	197	35.9	133	24.2
iii-Relative risk	19	3.5	174	31.7	227	41.3	129	23.5
iv-NNT	27	4.9	220	40.1	191	34.8	111	20.2
v-Odds ratio	34	6.2	204	37.2	207	37.7	104	18.9
vi-Heterogeneity	70	12.8	293	53.4	127	23.1	59	10.7
vii-Publication bias	70	12.8	283	51.5	133	24.2	63	11.5
Knowledge score score(/9): Mean ±Sd	2.02± 2.37							
Median(Min-Max)	1(0-9)							

(Table 4) describes physicians' attitude towards EBM. 35.7% strongly welcoming, 48.6% welcomed the current promotion of EBM but 4.7% didn't welcome it. About 18% of physicians quite accepted, 56.3% accepted the effort done by colleagues to search for the best current clinical knowledge on the net compared to 12.4% of the respondents who didn't accept this effort.

Although 28.4% of participants agreed that EBM is extremely useful, 55.7% agreed that it's useful in the management of patients, 13.1% strongly agreed, 49.7% agreed that the adoption of EBM places another demand on already-overloaded physicians and only 24.4% of respondents didn't accept this statement.

Near half of the respondents (47.9%) agreed, 38.1% strongly agreed that practicing EBM improves patient care. Minority of the physicians (4.7%) disagreed and 9.3% didn't know.

The frequency of EBM need in day to day clinical practice was >50% among 36.6% of respondents, one third of the physicians needed EBM 25-50% and 20.2% used it <25% in patient management.

Regarding frequency of knowledge gap the physicians faced in clinical practice, 34.2% answered every day, 29% answered every week and 26.6 of participants had a knowledge defect more than one week of clinical practice.

Attitude score was calculated (maximum score is 7). The average physicians' attitude toward EBM is 2.8±2.61, Median=3(-7to7).

In Table 5, Physicians' opinion about barriers towards application of EBM was variable. Lack of personal time was the main barrier identified by 62.8% of the respondents. Lack of critical appraisal skills was the second most commonly identified barrier (59.2%), while the availability of information from other sources was the third barrier by 57.7% of respondents. More than half of the physicians (51%) were convinced that too much evidence was a barrier of EBM practice compared to 48.3% of those who said lack of strong evidence is an important barrier. Belief of over confidence that physician does not need EBM was perceived to be a barrier by 47.2% of The participants followed by 40.3% of physicians who believed that Patients' culture not matching with current evidence and finally 31.7% of physicians considered no financial gain in using EBM a barrier for EBM application.

(Table 6) displays the opinion of the physicians about how to increase EBM application. Learning the skills of evidence based medicine was the opinion of 67.2% of the physicians. Nearly half of the respondents (49.4%) used evidence based summaries, as summaries obtained from abstracting journals and 71.8% of physicians used evidence based practice guidelines.

Table (4): Physicians' attitude towards EBM (n=549):

Attitude towards EBM		No.	(%)
1. The Physician's attitude towards current promotion of EBM	Strongly welcoming	196	35.7
	Welcoming	267	48.6
	Not welcoming	26	4.7
	Don't know	60	10.9
2. The effort done by colleagues to search for the best current clinical knowledge on the net?	Quite accepted	99	18.1
	Accepted	309	56.3
	Not accepted	68	12.4
	Don't know	73	13.2
3. The usefulness of search findings in day-to-day management of patients?	Extremely useful	156	28.4
	Useful	306	55.7
	Not useful	31	5.7
	Don't know	59	10.7
4- The adoption of EBM places another demand on already-overloaded physicians.	Strongly agree	72	13.1
	Agree	273	49.7
	Don't agree	134	24.4
	Don't know	70	12.8
5- Practicing EBM improves patient care	Strongly agree	209	38.1
	Agree	263	47.9
	Disagree	25	4.7
	Don't know	51	9.3
6-The frequency of EBM need in day to day clinical practice	>50%.	201	36.6
	25-50%	182	33.2
	<25%	111	20.2
	Don't know EBM	55	10
7-The frequency of knowledge gap in clinical practice	Every day practice	188	34.2
	Every week.	159	29
	>one week practice	146	26.6
	Don't know EBM	56	10.2
Attitude score(/7): Mean ±Sd		2.8 ±2.61	
Median(Min-Max)		3(-7 to7)	
Total		549	100

Table (5): Physician's opinion about barriers towards application of EBM:

D-Barriers towards application of EBM		No.	(%)
1- Lack of time.	Don't know	48	8.6
	No	157	28.6
	Yes	345	62.8
2- No financial gain in using EBM.	Don't know	48	8.6
	No	327	59.8
	Yes	174	31.7
3- Lack of strong evidence.	Don't know	47	8.6
	No	237	43.2
	Yes	265	48.3
4- Too much evidence.	Don't know	47	8.6
	No	222	40.4
	Yes	280	51
5- Availability of information from other sources.	Don't know	47	8.6
	No	185	33.7
	Yes	317	57.7
6- Patients' culture not matching with current evidence.	Don't know	46	8.6
	No	282	51.6
	Yes	221	40.3
7- Lack of critical appraisal skills.	Don't know	46	8.6
	No	178	32.2
	Yes	325	59.2
8- Belief of over confidence that physician does not need EBM.	Don't know	44	8.6
	No	246	45.4
	Yes	259	47.2
Total		549	100

Table(6): Physician's opinion about how to increase EBM in every day management of patients:

E-Physician's opinion about how to increase EBM application		No.	(%)
a-By learning the skills of evidence based medicine.	Yes	369	67.2
	No	180	32.8
b- By using evidence based summaries ,Such summaries may be obtained from abstracting journals.	Yes	271	49.4
	No	278	50.6
c-By using evidence based practice guidelines.	Yes	394	71.8
	No	155	28.2
Total		549	100

Section II: *Comparison between MRI, MUH and El Shatbi hospital regarding knowledge, attitude towards EBM, barriers of EBM application and physicians' opinion how to improve EBM practice.*

(Table 7) portrayed the knowledge of EBM. Knowing the proper definition of EBM was significantly different between hospitals whether MRI (62.2%), MUH (25.6%) or El Shatbi hospital (37%) (X^2=34.33, p=.001). However, remembering EBM related sites statistically didn't differ between MRI (43.9%), MUH (42.9%) and El Shatbi (51.9%) (X^2=2.72, p=.256).

Understanding of confidence interval was significantly higher in MRI (32%) than MUH (13.9%) and El Shatbi (6.5%) (X^2=24.25, p<.001*).Physicians understanding of heterogeneity significantly differed between MRI (20.7%), MUH (8.9%) and El Shatbi (9.3%) (X^2=10.03, p=.007). In respect to publication bias significant difference was also observed between MRI (20.7), MUH (9.7%), El Shatbi (10.2%) (X^2=15.94, p<.001). However, there was insignificant difference between the mentioned hospitals in understanding of other terms as absolute risk (X^2=4.4, p=.111), Relative risk (X^2=1.86, p=.395), NNT (X^2=.688, p=.079) and odds ratio (X^2=3.4, p=.182).

Comparing the computed knowledge score between the three different hospitals was done, there was significant difference in the median knowledge score between MRI 2(0-8), MUH 1(0-9) and El Shatbi 1(0-9) (Kruskal Wallis test=10.52, p=.005). After pair wise comparison was done. There was significant difference in the median knowledge score between MRI and both MUH and El Shatbi (p=.001, p=.008 respectively), while there was insignificant difference between MUH and El Shatbi (p>.05). This means that EBM knowledge is significantly higher in MRI than both MUH and EL Shatbi.

(Table 8) illustrated attitude towards EBM. Physician's attitude towards current promotion of EBM was 98.7% in MRI, 97.1% in El Shatbi and 92.9% in MUH but this difference was statistically not significant (X^2=5.63, p=.06). The attitude towards the effort done by colleagues to search for the best current clinical knowledge on the net was significantly higher in MRI (94.7%) than El Shatbi (94%) and MUH (80.7%) (X^2=21.39, p=.001). 100% of respondents in MRI agreed that EBM is useful in day-to-day management of patients relative to 96% of respondents from El Shatbi and 91.4% from MUH (X^2=7.75, p=.021).

The adoption of EBM places another demand on already-overloaded physicians was agreed by 31.7% of participants from MUH compared to 28.4% of MRI participants and 16.2% of El Shatbi participants, this difference was statistically significant (X^2=8.96, p=.011). There was also significant difference between physicians who believed that practicing EBM improves patient care in MRI (100%), El Shatbi (99%) and MUH (92.5%) (X^2=11.64, p=.003).

Though the frequency of EBM need in every day clinical practice differed highly between the three hospitals; MRI (61.8%), MUH (43.8%) and El Shatbi (15.5%)

(X^2=42.36, p<.001), the difference in frequency of knowledge gap in clinical practice between the mentioned hospitals is not significant (X^2=I.37, p=.502).

Comparison of the computed attitude score between the three hospitals was done and the median attitude score was significantly different between MRI 5(-1to7), MUH 3(-7to7) and El Shatbi 3(-7to7) (X^2=15.32, p<.001).

Pair wise comparison was done and the median attitude score was significantly different between MRI and MUH (p=.001), MRI and El Shatbi (p<.001), while it was not different between MUH and El Shatbi (p>.05) which means that physicians' attitude towards EBM was higher in MRI than MUH and El Shatbi.

Physicians' opinion about barriers of EBM practice in every day management of patients was compared between the three hospitals in (Table 9). Lack of time was considered a barrier by 92.8% of physicians in El Shatbi, 64.1% of physicians in MUH and 57.9% of MRI physicians and this opinion difference was statistically significant (X^2=33.49, p<.001). Opinion that no financial gain as a barrier for using EBM among physicians in El Shatbi (41.7%), MUH (38%) and MRI (28.9%) was statistically not significant (X^2=3.22, p=.199). The majority of physicians (80.4%) in El Shatbi, 46.8% in MUH and 43.4% in MRI were convinced that Lack of hard evidence is a barrier for EBM practice (X^2=37.09, p<.001) compared to 70.1% of physicians in El Shatbi, 58.4% of physicians in MUH and 26.3% in MRI who suggested that too much evidence is a barrier of EBM (X^2=35.7, p<.001).

A highly significant difference existed between the mentioned hospitals regarding the physicians' ideas about barriers towards application of EBM as; Availability of information from other sources (X^2=20.38, p<.001), Patients' expectations not matching with EBM (X^2=20.21, p<.001), Lack of critical appraisal skills (X^2=31.86, p<.001) and lastly Belief of over confidence that physician does not need EBM (X^2=32.24, p<.001).

Opinion about methods to increase EBM in every day patient management was illustrated in (Table 10). The physicians' opinion that learning the basic skills of EBM was an effective method to reinforce the EBM practice was different between MRI (61%), MUH (62.7%) and El Shatbi (87%) (X^2=24.06, p<.001).

A non significant difference was present between MRI, MUH and El Shatbi that using EBM summaries (X^2=4.75, p=.093) and using evidence based practice guidelines (X^2=2.98, p=.225) were important ways to augment the use of EBM by physicians.

Table (7): Comparison of physician's knowledge about EBM between MRI, MUH and El Shatbi hospital:

	A-Physicians' knowledge about EBM		MRI (n=82)		MUH(n=359)		El Shatbi (n=108)		Test of significance
			no.	(%)	no.	(%)	no.	(%)	
Understanding of technical terms related to EBM	1-Definition of Evidence Based Medicine	Wrong	31	37.8	267	74.4	68	67	Chi square test X^2=34.33 (p=.001*)
		Right	51	62.2	92	25.6	40	37	
	2- Remembering Any site on the net related to EBM	No	46	56.1	205	57.1	52	48.1	X^2=2.72 (p=.256)
		Yes	36	43.9	154	42.9	56	51.9	
	3- Confidence interval	No	56	68	309	86.1	101	93.5	X^2=24.25 (p<.001*)
		Yes	26	32	50	13.9	7	6.5	
	4- Absolute risk	No	57	70	270	75.2	89	82.4	X^2=4.4 (p=.111)
		Yes	25	30	89	24.8	19	17.6	
	5- Relative risk	No	62	76	270	75.2	88	81.5	X^2=1.86 (p=.395)
		Yes	20	24	89	24.8	20	18.5	
	6- NNT	No	66	80.5	283	78.8	89	82.4	X^2=.688 (p=.709)
		Yes	16	19.5	76	21.2	19	17.6	
	7- Odds ratio	No	61	74.4	298	83	86	79.6	X^2=3.4 (p=.182)
		Yes	21	25.6	61	17	22	20.4	
	8- Heterogeneity	No	65	79.3	327	91.1	98	90.7	X^2=10.03 (p=.007*)
		Yes	17	20.7	32	8.9	10	9.3	
	9- Publication bias	No	65	79.3	324	90.3	97	89.8	X^2=15.94 (p<. 001*)
		Yes	17	20.7	35	9.7	11	10.2	
	Knowledge score(/9) Mean ±sd¶		2.54±2.36		1.88±2.31		2.02± 2.54		Kruskalwallis test X^2=10.52 (p=.005*)
	median(min-max)		2(0-9)		1(0-9)		1(0-9)		
	p1(MRI)				U§=11427 (p=.001**)		U=10600.5 (p=.008**)		
	p2(MUH)								

*: results≤.05 are significant §: Mann-Whitney test

**: results ≤.016 are significant after bonfferoni correction ¶: standard deviation

Table (8): Comparison of physician's attitude towards EBM between MRI, MUH and El Shatbi hospital:

C-Attitude towards EBM††		MRI		MUH		El Shatbi		Test of significance
		no.	(%)	no.	(%)	No.	(%)	
1. The Physician's attitude towards current promotion of EBM	(-ve) attitude	1	1.3	22	7.1	3	2.9	Chi square test X^2=5.63 (p=.06)
	(+ve)attitude	76	98.7	286	92.9	99	97.1	
2. The effort done by colleagues to search for the best current clinical knowledge on the net?	(-ve) attitude	4	5.3	58	19.3	6	6	X^2=21.39 (p=.001*)
	(+ve)attitude	71	94.7	243	80.7	94	94	
3. The usefulness of research findings in day-to-day management of patients?	(-ve) attitude	0	0	27	8.6	4	4	X^2=7.75 (p=.021*)
	(+ve)attitude	77	100	286	91.4	96	96	
4- The adoption of EBM places another demand on already-overloaded physicians.	(-ve) attitude	53	71.6	209	68.3	83	83.8	X^2=8.96 (p=.011*)
	(+ve)attitude	21	28.4	97	31.7	16	16.2	
5- Practicing EBM improves patient care	(-ve) attitude	0	0	24	7.5	1	1	X^2=11.64 (p=.003*)
	(+ve)attitude	78	100	296	92.5	99	99	
6-The frequency of EBM need in day to day clinical practice	(-ve) attitude	29	38.2	177	56.2	87	84.5	X^2=42.36 (p<.001*)
	(+ve)attitude	47	61.8	138	43.8	16	15.5	
7-The frequency of knowledge gap in clinical practice	(-ve) attitude	20	26.3	99	31.4	27	26.5	X^2=1.37 (p=.502)
	(+ve)attitude	56	73.7	216	68.6	75	73.5	
attitude score(/7) mean(±sd)¶		3.81±1.84		2.61±2.85		2.64±2.07		Kruskalwallis test X^2=15.32 (p<.001*)
median(min-max)		5(-1to7)		3(-7to7)		3(-7to7)		
p1(MRI)				U§=11288 (p=.001**)		U=2955 (p<.001**)		
p2(MUH)								

*: results≤.05 are significant §: Mann-Whitney test
**: results ≤.016 are significant after bonfferoni correction ¶: standard deviation
††: Percentage calculated in each question after exclusion of physicians' answers (I don't know EBM)

Table(9): Comparison of Physician's opinion about barriers towards application of EBM between MRI, MUH and El Shatbi hospital:

D-Barriers towards application of EBM†		MRI		MUH		El Shatbi		Chi square test
		no.	(%)	no.	(%)	no.	(%)	
1- Lack of time.	No	32	42.1	118	35.9	7	7.2	X^{2**}=33.49 (p<.001*)
	Yes	44	57.9	211	64.1	90	92.8	
2- No financial gain in using EBM.	No	54	71.1	217	66	56	58.3	X^2=3.22 (p=.199)
	Yes	22	28.9	112	34	40	41.7	
3- Lack of hard evidence.	No	43	56.6	175	53.2	19	19.6	X^2=37.09 (p<.001*)
	Yes	33	43.4	154	46.8	78	80.4	
4-Too much evidence.	No	56	73.7	137	41.6	29	29.9	X^2=35.7 (p<.001*)
	Yes	20	26.3	192	58.4	68	70.1	
5-Availability of information from other sources.	No	38	50	129	39.2	18	18.6	X^2=20.38 (p<.001*)
	Yes	38	50	200	60.8	79	81.4	
6- Patients' expectations not matching with EBM.	No	41	53.9	205	62.3	36	36.7	X^2=20.21 (p<.001*)
	Yes	35	46.1	124	37.7	62	63.3	
7- Lack of critical appraisal skills.	No	28	36.8	139	42.2	11	11.2	X^2=31.86 (p<.001*)
	Yes	48	63.2	190	57.8	87	88.8	
8- Belief of over confidence that physician does not need EBM.	No	49	64.5	173	52.3	24	24.5	X^2=32.24 (p<.001*)
	Yes	27	35.5	158	47.7	74	75.5	

*: results≤.05 are significant

†: Percentage calculated in each question after exclusion of physicians' answers (I don't know EBM)

Table(10): Comparison of Physician's opinion about methods to increase application of EBM between MRI, MUH and El Shatbi hospital:

E-Physician's opinion about how to increase EBM application.		MRI(n=82)		MUH(n=357)		El Shatbi (n=108)		Chi square test
		no.	%	no.	%	no.	%	
a-By learning the skills of evidence based medicine.	Yes	50	61	255	62.7	94	87	X^2=24.06 (p<.001*)
	No	32	39	134	33.3	14	13	
b- By using evidence based summaries.	Yes	36	43.9	172	47.9	63	58.3	X^2=4.75 (p=.093)
	No	46	56.1	187	52.1	45	41.7	
c-By using evidence based practice guidelines.	Yes	64	78	258	71.9	72	66.7	X^2=2.98 (p=.225)
	No	18	22	101	28.1	36	33.3	

*: results≤.05 are significant

Section III: *Comparison between different scientific degrees (MBChB, Master and doctor degrees) regarding knowledge, attitude towards EBM, barriers of EBM application and physicians' opinion how to improve EBM practice*

(Table 11) showed the difference in physicians' knowledge of EBM among different scientific degrees. Physicians of Master degree who correctly defined EBM (36%) more than MBChB (33%), and doctor degrees (34.5%) but this difference was not significant (X^2=1.47, p=.479).Those who remembered EBM related sites on the net from master (59.8%) significantly differed from MBChB (31.3%), and doctor degrees (47.1%) (X^2=30.81, p<.001).

Understanding of EBM related terms as confidence interval differed whether the degree was MBChB (10%), Master (18.9%) or Doctor degree (17.2%) (X^2=6.06, p=.048). Master degree physicians properly understood absolute risk (33.5%) more than MBChB (15%) and doctor degrees (27%) (X^2=18.92, p<.001).

Regarding understanding of other terms, physicians who obtained master degree were superior to doctor degree followed by MBChB in explaining relative risk (X^2=21.58, p<.001), NNT (X^2=19.24, p<.001) and odds ratio (X^2=7.84 p=.020). However, understanding of heterogeneity and publication bias was more among physicians of doctor degree than master degree followed by MBChB& diploma, this difference was highly significant (X^2=24.51,p<.001)&(X^2=26.69, p<. 001) respectively.

A computed knowledge score was compared among the different scientific degrees. There was significant difference in the mean rank knowledge score between MBChB (231.9), Master (315.04) and Doctor Degree (298.52) (X^2=28.99 p<.001). Pair wise comparison was done and there was significant difference in mean rank knowledge score between master which was higher than MBChB (U= 11969, p<.001), Between Doctor that was also higher than MBChB (U= 14596, p<.001) but no significant difference existed between master and doctor degrees (p>.05).

(Table 12) displayed attitude towards EBM among different scientific degrees. Physician's attitude towards current promotion of EBM was 96% among master degree, 94.5% in MBChB and 93.6% in doctor degree but this difference was statistically not significant (X^2=.85, p=.654). The effort done by colleagues to search for the best current clinical knowledge on the net didn't differ whether the degree was MBChB (86.2%), master (86.9%) or doctor degree (84%)(X^2=.559, p=.756). A positive attitude towards the usefulness of research finding in patient management was recorded in 92.3% of MBChB, 96% of Master and 92.9% of doctor degree (X^2=2.09, p=.352).

The adoption of EBM places another demand on already-overloaded physicians, physicians who disagreed this statement were 27.8% (MBChB), 26% (master) and 30.1% (doctor degree) (X^2=6.1, p=.737). Also no significant difference was present in physicians' attitude that Practicing EBM improves patient care between different scientific degrees (X^2=1.794 p=.408). near half of the physicians of master and doctor degrees frequently needed EBM in clinical practice compared to about one third of MBChB physicians (X^2=2.7, p=.258). 75.8% of physicians having master degree felt a

knowledge gap significantly higher than those having MBChB (71.9%) followed by doctor degree (63.2%) (X^2=6.17, p=.046).

Generally no significant difference existed in median attitude score between MBChB 3(-7to7), master 3(-3to7) and doctor degree 3(-7to7) (Kruskal Wallis test=1.96, p=.374).

Opinion about the barriers of EBM application as presented by physicians with different scientific degrees was shown in table 13. Lack of time was significantly higher in about three quarters of physicians of MBChB degree than 71.7% of master and 61% of doctor degree (X^2=6.5, p=.039). There was significant difference between physicians of MBChB (42.4%), master (32.9%) and doctor degrees who believed that no financial gain was a barrier for EBM practice (X^2=8.48, p=.014). Insignificant difference existed between the three scientific degrees that thought of lack of strong evidence as a barrier (X^2=3.32, p=.390). Those who considered too much evidence is a barrier from MBChB (50.5%) didn't differ from master (62.3%) or doctor degree (55.3%) (X^2=4.76, p=.092). More than half of the physicians from each degree were convinced that availability of information from other sources was an important barrier for EBM use but the opinion difference was insignificant (X^2=2.23, p=.327). Either of patients' culture not matching with current evidence or belief of over confidence that physician does not need EBM didn't significantly differ between the mentioned scientific degrees. Lack of critical appraisal skills was considered a barrier by almost three quarters of physicians having MBChB(70.3%), master (69.3%) compared to about half of doctor degree physicians(X^2=12.69,p=.002).

(Table 14) illustrated opinion of physicians from different scientific degrees about how to reinforce the use of EBM. One idea supported by one fourth of MBChB participants compared to one third of those from master and 39.7% of doctor degrees was learning the skills of evidence based medicine (X^2=7.5, p=.023). Using evidence based summaries was believed by 55% of MBChB respondents who didn't significantly differ from master (48.2%) or doctor degree respondents to increase EBM application (X^2=2.58, p=.274). Finally, physicians from MBChB degree (33.6%) who suggested the use of EBM practice guidelines significantly differed from master (28%) and doctor degrees (21.8%) (X^2=6.56, p=.037).

Table(11): Comparison of physician's knowledge about EBM between MBChB, Master and Doctor degrees:

	A-Physician's knowledge about EBM		MBChB (n=211)		Master(n=164)		Doctor (n=174)		Test of significance
			no.	(%)	no.	(%)	no.	(%)	
Understanding of technical terms related to EBM	1-Definition of Evidence Based Medicine	Wrong	147	69.7	105	64	114	65.5	Chisquare test X^2=1.47 (p=.479)
		Right	64	30.3	59	36	60	34.5	
	2- remembering Any site on the net related to EBM	No	145	68.7	66	40.2	92	52.9	X^2=30.81 (p<.001*)
		Yes	66	31.3	89	59.8	82	47.1	
	3- Confidence interval	No	189	89.6	133	81.1	144	82.8	X^2=6.06 (p=.048*)
		Yes	22	10.4	31	18.9	30	17.2	
	4- Absolute risk	No	180	85	109	66.5	127	73	X^2=18.92 (p<.001*)
		Yes	31	15	55	33.5	47	27	
	5- Relative risk	No	183	87	110	67.1	127	73	X^2=21.58 (p<.001*)
		Yes	28	13	54	32.9	47	27	
	6- NNT	No	188	89.1	118	72	132	75.9	X^2=19.24 (p<.001*)
		Yes	23	10.9	46	28	42	24.1	
	7- Odds ratio	No	181	85.8	122	74.4	142	81.6	X^2=7.84 (p=.020*)
		Yes	30	14.2	42	25.6	32	18.4	
	8- Heterogeneity	No	204	96.7	145	88.4	141	81	X^2=24.51 (p<.001*)
		Yes	7	3.3	19	11.6	33	19	
	9- Publication bias	No	205	97.2	140	85.4	141	81	X^2= 26.69 (p<. 001*)
		Yes	6	2.8	24	14.6	33	19	
	Knowledge score(/9) mean(±sd) ¶		1.31(±1.69)		2.6(±2.67)		2.33(±2.56)		Kruskal Wallis test X^2=28.99 (p<.001*)
	median(min-max)		1(0-9)		2(0-9)		1(0-9)		
	mean rank		232.84		307.61		295.38		
	p1				U§=11969 (p<.001**)		U=14596 (p<.001**)		
	p2								

*: results≤.05 are significant §: Mann-Whitney test

**: results ≤.016 are significant after bonfferoni correction ¶: standard deviation

Table(12): Comparison of physician's attitude towards EBM between MBChB, Master and Doctor degrees:

C-Attitude towards EBM††		MBChB		Master degree		Doctor degree		Test of significance
		no.	(%)	no.	(%)	No.	(%)	
1. The Physician's attitude towards current promotion of EBM	(-ve) attitude	10	5.5	6	4	10	6.4	Chisquare test X^2=.850 (p=.654)
	(+ve)attitude	171	94.5	143	96	147	93.6	
2. The effort done by colleagues to search for the best current clinical knowledge on the net?	(-ve) attitude	25	13.8	19	13.1	24	16	X^2=.559 (p=.756)
	(+ve)attitude	156	86.2	126	86.9	126	84	
3. The usefulness of research findings in day-to-day management of patients?	(-ve) attitude	14	7.7	6	4	11	7.1	X^2=2.09 (p=.352)
	(+ve)attitude	169	92.3	145	96	145	92.9	
4- The adoption of EBM places another demand on already-overloaded physicians.	(-ve) attitude	130	72.2	108	74	107	69.9	X^2=6.1 (p=.737)
	(+ve)attitude	50	27.8	38	26	46	30.1	
5- Practicing EBM improves patient care	(-ve) attitude	10	5.5	5	3.2	10	6.3	X^2=1.794 (p=.408)
	(+ve)attitude	172	94.5	153	96.8	148	93.7	
6-The frequency of EBM need in day to day clinical practice	(-ve) attitude	119	64	87	56.9	87	56.1	X^2=2.7 (p=.258)
	(+ve)attitude	67	36	66	43.1	68	43.9	
7-The frequency of knowledge gap in clinical practice	(-ve) attitude	52	28.1	37	24.2	57	36.8	X^2=6.17 (p=.046*)
	(+ve)attitude	133	71.9	116	75.8	98	63.2	
attitude score(/7) mean(±sd) ¶		2.63(±2.67)		3.14(±2.09)		2.69(±2.96)		Kruskal Wallis test X^2=1.96 (p=.374)
median(min-max)		3(-7to7)		3(-3to7)		3(-7to7)		

*: results≤.05 are significant

††: Percentage calculated in each question after exclusion of physicians' answers (I don't know EBM)

Table(13): Comparison of Physician's opinion about barriers towards application of EBM between MBChB, Master and Doctor degrees:

D-Barriers towards application of EBM†		MBChB		Master degree		Doctor degree		Chisquare test
		no.	(%)	no.	(%)	no.	(%)	
1- Lack of time.	No	50	27.2	45	28.3	62	39	X^2=6.5 (p=.039*)
	Yes	134	72.8	114	71.7	97	61	
2- No financial gain in using EBM.	No	106	57.6	106	67.1	115	72.3	X^2=8.48 (p=.014*)
	Yes	78	42.4	52	32.9	44	27.7	
3- Lack of strong evidence.	No	78	42.4	76	47.8	83	52.2	X^2=3.32 (p=.390)
	Yes	106	57.6	83	52.2	76	47.8	
4- Too much evidence.	No	91	49.5	60	37.7	71	44.7	X^2=4.76 (p=.092)
	Yes	93	50.5	99	62.3	88	55.3	
5- Availability of information from other sources.	No	65	35.3	54	34	66	41.5	X^2=2.23 (p=.327)
	Yes	119	64.7	105	66	93	58.5	
6- Patients' culture not matching with current evidence.	No	97	52.4	84	52.8	101	63.5	X^2=5.25 (p=.072)
	Yes	88	47.6	75	47.2	85	36.5	
7- Lack of critical appraisal skills.	No	55	29.7	49	30.8	74	46.5	X^2=12.69 (p=.002*)
	Yes	130	70.3	110	69.2	85	53.5	
8- Belief of over confidence that physician does not need EBM.	No	95	51.1	74	46.3	77	48.4	X^2=8.09 (p=.667)
	Yes	91	48.9	86	53.7	82	51.6	

*: results≤.05 are significant

†: Percentage calculated in each question after exclusion of physicians' answers (I don't know EBM)

Table(14): Comparison of Physician's opinion about methods to increase application of EBM between MBChB, Master and Doctor degrees:

E-Physician's opinion about how to increase EBM		MBChB (n=211)		Master (n=164)		Doctor (n=174)		Chisquare test
		no.	%	no.	%	no.	%	
a-By learning the skills of evidence based medicine.	Yes	155	73.5	109	66.5	105	60.3	X^{2**}=7.5 (p=.023*)
	No	56	26.5	55	33.5	69	39.7	
b- By using evidence based summaries.	Yes	95	45	85	51.8	91	52.3	X^2=2.58 (p=.274)
	No	116	55	79	48.2	83	47.7	
c-By using evidence based practice guidelines.	Yes	140	66.4	118	72	136	78.2	X^2=6.56 (p=.037*)
	No	71	33.6	46	28	38	21.8	

*: results≤.05 are significant

Section IV: Comparison between different clinical departments (Radiology and laboratory, Anesthesia and Critical care, Surgery and obstetrics, Internal medicine and pediatrics, and Oncology) regarding knowledge, attitude towards EBM, barriers of EBM application and physicians' opinion how to improve EBM practice.

(Tables 15, 16) demonstrated the knowledge of EBM among physicians in different clinical departments. Physicians from internal medicine& Paediatric departments properly defined EBM (43%) more than surgeons& Obstetricians (37.3%), oncologists (35.6%), radiologists (28.6%) and anaesthetists& critical care physicians (22.3%) and this difference was significant (X^2=14, p=.007). Insignificant difference existed between participants from the mentioned departments in remembering EBM related sites on the net (X^2=7.71, p=.942). Although 20.3% of oncologists, one fifth of radiologists, 13.4% of Anaesthetists& critical care physicians, 14.5% of surgeons understood confidence interval, they didn't differ significantly from 9.6% of paediatricians& internal medicine physicians who understood it (X^2=7.49, p=.112), Regarding absolute risk, almost one third of oncologists relative to 28.1% of physicians from internal medicine and paediatricians, 20.5% of Anaesthetists& critical care physicians, 22.7% of surgeons, about one fifth of radiologists (X^2=4.87, p=.301). Perceiving the meaning of relative risk didn't differ between oncologists (32.2%), surgeons & obstetricians (27.3%), internal medicine physicians &paediatricians (25.2%) and Anaesthetists & critical care doctors (21.4%) followed by Radiologists& laboratory physicians (16%) (X^2=7.42, p=.115).

NNT was understood by surgeons& obstetricians (29.1%) significantly higher than oncologists (25.4%), critical care physicians and anaesthetists (20.5%), Internal medicine participants& paediatricians (17%) and finally radiologists& laboratory physicians (13.5%) (X^2=10.89, p=.028). However, insignificant difference existed between the participants from all clinical departments in understanding of odds ratio (X^2=2.54, p=.636), heterogeneity (X^2=7.84, p=.097), and publication bias (X^2=7.34, p=.119).

Generally, the median knowledge score didn't differ significantly between oncologists 1(0-9), surgeons& obstetricians 1(0-9), Internal medicine physicians & paediatricians 2(0-9), Radiologists 1(0-9), Anaesthetists & critical care physicians 1(0-9) (Kruskal Wallis test =8.86, p=.052).

(Table 17) illustrated physicians' attitude towards EBM between clinical departments. The majority of surgeons& obstetricians (97.1%) had positive attitude toward current promotion of EBM that didn't significantly differ from, Internal medicine participants& pediatricians (95.2%), Radiologists& laboratory physicians (94.9%), anaesthetists & critical care physicians (93.6%) and oncologists (90%) (X^2=2.56, p=.633). The effort done by colleagues to search for the best current clinical knowledge on the net was accepted by 96.8% of physicians from internal medicine& pediatrics that were significantly higher than surgeons& obstetricians (85.4%), oncologists(84.8%), Radiologists& laboratory physicians (83%) and lastly Anaesthetists & Critical care participants (75.5%)(X^2=21.25, p<.001). The usefulness of research findings in day-to-day management of patients was agreed by internal medicine physicians& pediatricians (97.7%), surgeons& obstetricians (95.7%), followed by radiologists& lab physicians (92.6%), oncologists (89.8%) and Anaesthetists & critical care physicians (89.7%) (X^2=7.51, p=.111). Near half of oncologists didn't agree that the adoption of EBM places another demand on already overloaded physicians, they were significantly higher than radiologists (33.6%), anaesthetists & critical care physicians (32.7%), surgeons& obstetricians (22.1%) and physicians from internal medicine & paediatrics (17.4%) (X^2=17.01, p=.002). Statistical significant difference existed between physicians from different clinical departments in their attitude that EBM improves patient care (X^2=11.04, p=.024). Despite the frequency of EBM need in day to day clinical practice was not significantly differ between physicians from clinical departments (X^2=3.42, p=.635), physicians from internal medicine& paediatrics (79.5%) felt a knowledge gap in clinical practice that significantly differed from anaesthetists & critical care physicians(76.6%), surgeons& obstetricians (68.6%), radiologists (61.7%) and 60% of oncologists (X^2=13.94, p=.004).

Computed attitude score was compared between physicians from different clinical departments and there was insignificant difference in the median attitude score between radiologists& laboratory physicians 3(-7to7), anaesthetists& critical care doctors 3(-4to7), surgeons& obstetricians 3(-5to7), physicians from internal medicine& paediatrics 3(-7to7) and oncologists (KruskalWallis test= 3.22, p=.522).

(Table 18) showed barriers towards EBM application in different clinical departments. Physicians who suggested lack of time as a barrier were significantly different between departments as: Surgery & Obstetrics (79%), Internal medicine& pediatrics (75%), radiology& laboratory department (65.8%), Anesthesia & Critical care (60.6%) and oncology department (56%) (X^2=14.7, p=.005). Regarding no financial gain in using EBM, There was insignificant difference between opinion of physicians from Internal medicine& pediatrics (38.3%), radiology& laboratory department (37.5%), Anesthesia & Critical care (35.6%), Surgery& obstetrics (29.3%) and oncology department (28%) (X^2=3.44, p=.487). Pediatricians and physicians from internal medicine department (63.3%) considered lack of strong evidence is a barrier of EBM practice compared to surgeons& obstetricians (57%), Radiologists& laboratory physicians (55%), oncologists (46%), critical care doctors & anaesthetists (36.5%)

(X^2=18.54, p=.001). Although 63% of surgeons& obstetricians were convinced that too much evidence was an important barrier for EBM use, they didn't differ from Oncologists (62%), anaesthetists and critical care doctors (55.8%), Internal medicine doctors& pediatricians (53.9%) and radiologists & laboratory doctors (49.2%) (X^2=5.2, p=.267). Also the opinion difference between physicians from different departments was insignificant about barrier of availability of information from other sources (X^2=1.31, p=.859)

Patients' culture not matching with current evidence was a barrier by more than half of Internal medicine doctors& pediatricians (58%), 47% of surgeons& obstetricians who significantly differed from radiologists & laboratory doctors (40%), critical care doctors & anaesthetists (32.7%) and oncologists (32%) (X^2=21.11, p<.001). Finally, there was significant difference between physicians' opinion from clinical departments that lack of critical appraisal is a barrier for EBM practice (X^2=13.78, p=.008).

(Table 19) identified the physicians' opinions about how to increase EBM practice. Learning the basic skills was accepted by more than half of critical care physicians & of anaesthetists (65.2%), more than one third of oncologists (39%), 38.3% of radiologists& laboratory doctors, 29.1% of surgeons& obstetricians and 25.9% of physicians from internal medicine and pediatrics. However, this opinion difference was insignificant (X^2=6.66, p=.154). Physicians who believed that using EBM summaries is an important way to reinforce EBM application didn't differ between departments as: Internal medicine& pediatrics (52.6%), Surgery & obstetrics (50.9%), Oncology (49.2%), Radiology& laboratory departments (47.2%) and lastly Anesthesia& Critical care departments (46.4%) (X^2=1.26, p=.867). There was insignificant difference in physicians' opinion of using EBM practice guidelines between clinical departments (X^2=7.73, p=.942).

Table (15): Comparison of physician's knowledge about EBM between Clinical departments:

Physician's knowledge toward EBM		radiology& laboratory		Anathesia& critical care		Surgery& obestetrics		Internal medicine&pediatrics		Oncology		Chisquare test
		no.	(%)	no.	(%)	no.	(%)	no.	(%)	no.	(%)	
1-Definition of Evidence Based Medicine	Wrong	95	71.4	87	77.7	69	62.7	77	57	38	64.4	X^2=14 (p=.007)*
	Right	38	28.6	25	22.3	41	37.3	58	43	21	35.6	
2- remembering Any site on the net related to EBM	No	74	55.6	65	58	61	55.5	71	62.6	32	54.2	X^2=7.71 (p=.942)
	Yes	59	44.4	47	42	49	44.5	64	47.4	27	45.8	

*: results ≤.05 are significant

Table(16): Comparison between Clinical departments regarding physician's understanding of some technical terms:

Understanding of some technical terms related to EBM††		radiology& laboratory		Anathesia &Critical care		Surgery& obestetrics		Internal medicine&pediatrics		Oncology		Test of significance
		no.	(%)	no.	(%)	no.	(%)	no.	(%)	no.	(%)	
1- Confidence interval	No	106	79.7%	97	86.6	94	85.5	122	90.4	47	79.7	Chisquare test X^2=7.49 (p=.112)
	Yes	27	20%	15	13.4	16	14.5	13	9.6	12	20.3	
2- Absolute risk	No	105	79%	89	79.5	85	77.3	97	71.9	40	67.8	X^2=4.87 (p=.301)
	Yes	28	21%	23	20.5	25	22.7	38	28.1	19	32.2	
3- Relative risk	No	111	84%	88	78.6	80	72.7	101	74.8	40	67.8	X^2=7.42 (p=.115)
	Yes	22	16%	24	21.4	30	27.3	34	25.2	19	32.2	
4- NNT	No	115	86.5	89	79.5	78	70.9	112	83	44	74.6	X^2=10.89 (p=.028*)
	Yes	18	13.5	23	20.5	32	29.1	23	17	15	25.4	
5- Odds ratio	No	108	81.2	95	84.8	85	77.3	111	82.2	46	78	X^2=2.54 (p=.636)
	Yes	25	18.8	17	15.2	25	22.7	24	17.8	13	22	
6- Heterogeneity	No	123	92.5	103	92	91	82.7	122	90.4	51	86.4	X^2=7.84 (p=.097)
	Yes	10	7.5	9	8	19	17.3	13	9.6	8	13.6	
7- Publication bias	No	122	91.7	102	91.1	90	81.8	121	89.6	51	86.4	X^2=7.34 (p=.119)
	Yes	11	8.3	10	8.9	20	18.2	14	10.4	8	13.6	
Knowledge score(/9) Mean ±sd ¶ median(min-max)		1.78±2.05 1(0-9)		1.72 ±2.43 1(0-9)		2.33 ±2.56 1(0-9)		2.08 ±2.24 2(0-9)		2.4 ±2.77 1(0-9)		KruskalWallis test X^{2}=8.86 (p=.052)

*: results≤.05 are significant §: Mann-Whitney test ¶: standard deviation

**: results ≤.016 are significant after bonfferoni correction

Table (17): Comparison of physician's attitude towards EBM between clinical departments:

Attitude towards EBM		radiology& laboratory		Anathesia& Critical care		Surgery& obestetrics		Internal medicine&pediatrics		Oncology		Test of significance
		no.	(%)	no.	(%)	no.	(%)	no.	(%)	no.	(%)	
1. The Physician's attitude towards current promotion of EBM	(-ve) attitude	6	5.1	6	6.4	3	2.9	6	4.8	5	10	Chisquare test X^2=2.56 (p=.633)
	(+ve)attitude	111	94.9	88	93.6	99	97.1	118	95.2	45	90	
2. The effort done by colleages to search for the best current clinical knowledge on the net?	(-ve) attitude	19	17	24	24.5	14	14.6	4	3.2	7	15.2	X^2=21.25 (p<.001*)
	(+ve)attitude	93	83	74	75.5	82	85.4	120	96.8	39	84.8	
3. The usefulness of research findings in day-to-day management of patients?	(-ve) attitude	9	7.4	10	10.3	4	4.3	3	2.3	5	10.2	X^2=7.51 (p=.111)
	(+ve)attitude	112	92.6	87	89.7	90	95.7	126	97.7	44	89.8	
4- The adoption of EBM places another demand on already-overloaded physicians.	(-ve) attitude	77	66.4	68	67.3	74	77.9	100	82.6	26	56.5	X^2=17.01 (p=.002*)
	(+ve)attitude	39	33.6	33	32.7	21	22.1	21	17.4	20	43.5	
5- Practicing EBM improves patient care	(-ve) attitude	6	4.9	8	8.2	2	2	3	2.3	6	12	X^2=11.04 (p=.024*)
	(+ve)attitude	116	95.1	89	91.8	98	98	125	97.7	44	88	
6-The frequency of EBM need in day to day clinical practice	(-ve) attitude	74	61.7	52	55.7	59	57.8	79	61.7	29	58	X^2=1.33 (p=.856)
	(+ve)attitude	46	38.3	42	44.3	43	42.2	49	38.3	21	42	
7-The frequency of knowledge gap in clinical practice	(-ve) attitude	46	38.3	22	23.4	32	31.4	26	20.5	20	40	X^2=13.94 (p=.004*)
	(+ve)attitude	74	61.7	72	76.6	70	68.6	101	79.5	30	60	
Attitude score(/7): mean(±sd) median(min-max)		2.64(±2.75) 3(-7to7)		2.73(±2.85) 3(-4to7)		2.8(±2.3) 3(-5to7)		3.25 (±2.09) 3(-7to7)		2.54(±3.33) 3(-7to7)		KruskalWallis test X^2=3.22 (p=.522)

Table (18): Comparison of Physician's opinion about barriers towards application of EBM between clinical departments:

Barriers towards application of EBM		radiology& laboratory		Anathesia& Critical care		Surgery& obestetrics		Internal medicine&Pediatrics		Oncology		Chisquare test
		no.	(%)	no.	(%)	no.	(%)	no.	(%)	no.	(%)	
1- Lack of time.	No	41	34.2	41	39.4	21	21	32	25	22	44	X^2=14.7 (p=.005*)
	Yes	79	65.8	63	60.6	79	79	96	75	28	56	
2- No financial gain in using EBM.	No	75	62.5	67	64.4	70	70.7	79	61.7	36	72	X^2=3.44 (p=.487)
	Yes	45	37.5	37	35.6	29	29.3	49	38.3	14	28	
3- Lack of hard evidence.	No	54	45	66	63.5	43	43	47	36.7	27	54	X^2=18.54 (p=.001*)
	Yes	66	55	38	36.5	57	57	81	63.3	23	46	
4- Too much evidence.	No	61	50.8	46	44.2	37	37	59	46.1	19	38	X^2=5.2 (p=.267)
	Yes	59	49.2	58	55.8	63	63	69	53.9	31	62	
5- Availability of information from other sources.	No	43	35.8	40	38.5	33	33	51	39.8	18	36	X^2=1.31 (p=.859)
	Yes	77	64.2	64	61.5	67	67	77	60.2	32	64	
6- Patients' culture not matching with current evidence.	No	72	60	70	67.3	53	53	53	41.1	34	68	X^2=21.11 (p<.001*)
	Yes	48	40	34	32.7	47	47	76	58.9	16	32	
7- Lack of critical appraisal skills.	No	43	35.8	49	47.1	33	33	32	24.8	21	42	X^2=13.78 (p=.008*)
	Yes	77	64.2	55	52.9	67	67	97	75.2	29	58	
8- Belief of over confidence that physician does not need EBM.	No	65	53.3	58	55.8	35	35	62	48.1	26	52	X^2=10.85 (p=.028)*
	Yes	57	46.7	46	44.2	65	65	67	51.9	24	48	

Table (19): Comparison of Physician's opinion about methods to increase application of EBM between clinical departments:

Physician's opinion about how to increase EBM application		radiology & laboratory		Anathesia& Critical care		Surgery& obestetrics		Internal medicine&pediatrics		Oncology		Chisquare test
		no.	(%)	no.	(%)	no.	(%)	no.	(%)	no.	(%)	
a-By learning the skills of evidence based medicine.	Yes	82	61.7	39	34.8	78	70.9	100	74.1	36	61	X^2=6.66 (p=.154)
	No	51	38.3	73	65.2	32	29.1	35	25.9	23	39	
b- By using evidence based summaries.	Yes	63	47.4	60	53.6	56	50.9	71	52.6	29	49.2	X^2=1.26 (p=.867)
	No	70	52.6	52	46.4	54	49.1	64	47.4	30	50.8	
c-By using evidence based practice guidelines.	Yes	97	72.9	32	28.6	81	73.6	96	71.1	40	67.8	X^2=7.73 (p=.942)
	No	36	27.1	80	71.4	29	26.4	39	28.9	19	32.2	

DISCUSSION

DISCUSSION

The need for evidence-based medicine (EBM),[54,55] as well as EBM guidelines[56, 57] and EBM performance indicators in the management of commonly encountered problems in general practice and primary care has been detailed recently in several papers. Some surveys have concluded, however, that the best available evidence is seldom used when making clinical decisions. [58] A review of physicians' performance suggested that learning how to practice EBM-seeking out and applying the findings of EBM summaries and adopting evidence-based practice protocols can keep us aware of medical advances and help to enhance our clinical performance. [59] By adopting the practice of EBM, it is believed that primary care will be improved significantly. Evidence-based practice also supports decision-making shared with users, which is already favored within the medical community as the ideal of decision making. [5]

Developing countries have limited resources, so, it is vital that the health care provided is effective. The number of systematic reviews relevant to developing countries is increasing. Disseminating the findings of systematic reviews to policymakers, health professionals, and consumers is an essential pre-requisite to changing practices. [53]

The application of EBM in developing countries could save millions of dollars in terms of health expenses by avoidance of unnecessary tests or prescribing inappropriate treatments for indigent patients. Thus, limited resources, inadequate drug regulations together with limited capacity for continuing medical education, all necessitate the introduction of EBM into developing countries. Action is required at all levels of health care systems, from consumers through to health professionals, ministries of health, and international organizations. [48]

In Egypt, there is no formal training on EBM, that resulted in gaps in knowledge, skills and practice of EBM and therefore most of medical professionals build their decision on their clinical experiences, consultation of colleagues and the Common sense. [60]

The Alexandria University Hospitals are considered tertiary care centers that serve not only patients living in Alexandria but patients from different neighboring villages and small towns of Behira governorate such as: Kafr el dawar, abou homos, and Abees, etc. So, a huge number of patients attend and seek medical care every day which reinforce the need for EBM application to improve the quality of patient care. This study is necessary to provide information on knowledge, and attitude towards EBM among physicians belonging to University of Alexandria especially that very few data are known about this topic among our physicians.

The last decade has been marked by an overabundance of workshops and courses all over the world on practicing and teaching EBM, or more correctly, evidence based health care. Likewise, electronic and online databases of systematic reviews and summaries of evidence are increasingly becoming available. [61] Besides, many books on EBM have been published which present common primary care questions, show how to critically appraise papers, and to evaluate different kinds of evidence. So, each

physician can learn and access EBM every day and everywhere. If the current best evidence is not considered, the clinical practice of Physicians is possibly at risk of becoming out of date, to the detriment of patients. [61]

The tool of data collection was a self-administered questionnaire consisted of closed questions about the respondent's knowledge of EBM, attitudes toward daily clinical decision making, and possible barriers to EBM application. The choice of the study questionnaire was based on a comprehensive literature review of publications of existing questionnaires. This literature review led us to base our questionnaire on that of McColl et al. [32] The idea behind using a previously published questionnaire is to ensure the validity and applicability of this questionnaire and to allow international comparison with other studies using the same one. [32, 33, 35, 37, 38, 41] The questionnaire was reviewed by a panel of 3 local experts in EBM and discussed in a validation meeting to establish content validity. The revised questionnaire was piloted and modified based on the feedback we received from respondents to ensure its applicability.

Response rate of the study:

Surveys of knowledge and attitudes toward EBM were performed in different geographical and socio-economic settings .The overall response rate in this study was 91.5%, which is a considerable achievement compared to response rates to questionnaire surveys from other countries. For example; In Jordon, the response rate was 70.5%. [35] It was still higher than that of other studies from Saudi Arabia (85.5%)[37], Belgians (48.7%) [41] This might be due to depending on online data collection in other studies while in our study personal approach to physicians and asking to complete the self administrated questionnaire was adopted. A similar approach used in a similar study conducted in United Kingdom, 2007, reported a response rate 100%. [62]

Knowledge of EBM among the physicians:

Regarding knowledge of EBM, 44.8% of physicians accessed EBM sites as Medscape, Cochrane database, E-medicine and Medline (Pubmed) while 55.2% of physicians didn't know any site on the net related to EBM. Another study was done with the same objectives among physicians in Ain Shams University in Cairo, [60] around three fourth of doctors knew about EBM. About one third of doctors had knowledge about EBM related sources of information (Cochrane Library).

For understanding of EBM technical terms, an average of 17.8% of respondents showed proper understanding of the mentioned terms, 32.2% of respondents showed some understanding that differed from staff doctors in Ain Shams University who well knew an average of 40% of these terms. [60] This lightly differed from 38.1% of Jordanian respondents who properly understood these terms. On the other hand, the terms Publication bias, number needed to treat, and heterogeneity were poorly understood by both Jordanian participants and physicians in our study. [38] Around 40% of respondents in Saudi Arabia answered the question on absolute risk correctly. Questions on the validity and predictive values were attempted by 63% of the respondents [33] and around 50% of Qatari physicians could explain EBM related terms properly. [38] This knowledge difference between the participants in our study and other Arabian respondents may be attributed to the majority who were physicians of non-

Saudi and 75% of non Qatari nationalities. In Japan, The respondents reported also insufficient knowledge of methodological EBM terms but at the same time, the majority of respondents showed enthusiasm to learn more about EBM. [63]Our physicians were very similar to the Belgian insurance physicians in the ability to interpret research results ≈19% (e.g. NNT, relative risk reduction, odds ratio, etc). [41] Belgians' self-assessed knowledge scores ranged from 0 to 21 out of a possible 28, with a mean of 6.01 ± 5.7. [41] This slightly differed from our calculated knowledge score 2.02 ±2.37 out of 9 and both are considered limited knowledge of EBM.

Generally, the study revealed that physicians' knowledge of EBM is low. Awareness and access to specialized EBM resources is still limited.

Attitude towards EBM among the studied physicians (n=549)

Regarding attitude towards EBM, The physicians had conclusively positive attitude toward EBM (average = 2.8±2.61 out of 7, median=3 ranging from-7to7). More than three fourth of our respondents welcomed the current promotion of EBM and accepted the effort done by colleagues to search for the best current clinical knowledge on the net. Almost 85% of participants agreed the usefulness of EBM in the management of patients. Physicians' attitude in this study was very close to that attitude among Ain Shams University staff, 77.8% of the sample were welcoming EBM, 62.2% agree about usefulness of research findings in daily practice. 86.5 % agreed that practicing EBM enhance patient outcome. However, 43.1 % claimed that practicing EBM increase work load. [60].This signified the positive attitude of Egyptian physicians towards EBM either in our study or in Ain Shams University. This attitude didn't differ a lot from primary health care physicians' attitude towards EBM in Riyadh region in Saudi Arabia; the current promotion of EBM was favored by the great majority (91%). They thought that their colleagues were welcoming as well (89%). Most of them agreed that practicing EBM improves patient care (93%) and said that research findings were useful in their daily management of patients (92%). Few agreed with the view that EBM was of limited value in primary care (18%) but agreed that the adoption of EBM places another demand on overloaded physicians. [33] Another study was in Eastern Saudi Arabia also among primary health care physicians; the overall mean attitude score was 23.9±3.3 of 30 points among those who had heard about the EBM concept. Most of the respondents had a positive attitude towards EBM. 89 (90.8%) of those who had heard about the concept scored above 19 out of 30 points. In calculating the respondent's answers about the statements used to assess their attitude towards EBM, 81.2% agreed (agreed and strongly agreed) that care given to patients could be improved by using EBM, 69.3% agreed that health care costs could be reduced through EBM. [64] The welcoming attitudes of primary healthcare physicians in Qatar towards EBM were similar to those in Saudi Arabia. [38] In Jordan, More than 90% of the respondents had similarly positive attitudes toward EBM. Regarding the Europeans, Also our participants' attitude didn't differ from the Norwegians' attitude that 80% agreed that EBM helps physicians towards better practice and nearly half agreed that it ''improves patients' health''.[65] In Belgians, attitude towards evidence-based medicine is also positive, Only a very small percentage of respondents didn't welcome the development of more clinical practice guidelines (4.8%) or expressed a negative attitude towards the use of electronic recommendations during their consultations (3.9%).

Physicians' opinion about barriers towards application of EBM (n=549):

Regarding the physicians' opinion about barriers towards application of EBM, The most commonly mentioned barrier was insufficient time (more than half of the physicians 62.8%). This might be attributed to extremely heavy workloads in the Alexandria University hospitals as tertiary care center. Also the same clinicians who work in these hospitals have also their private work that was another reason for lack of time. In Ain Shams University hospital, lack of time was considered a barrier by 59.1% of the physicians. This obstacle of insufficient time was echoed in many other studies. [35, 66, 67, 68] In Jordan lack of time constituted an important barrier by a similar proportion of physicians (68.8%). In Qatar it was a barrier among three fourth of the physicians. [38] It was the main perceived barrier in general practice of British clinicians (70%). [32] The situation differed in Saudi Arabia; the major perceived barriers among the respondents were work overload and the unavailability of a library in the locality by around one third of the respondents. In Belgians, lack of EBM skills was a barrier by 80% of participants. One way to increase the time available to practice EBM would be to change the emphasis of postgraduate education from lecturing to training in the access and interpretation of Evidence and in the use of these skills in practice. [54] Lack of critical appraisal skills was the second most commonly identified barrier (59.2%). This is similar to findings in other countries as 49% of Australasian physicians reported inability to recall specific appraisal criteria and 35% reported inability to record the results of appraisal for future use. [68] other barriers for EBM application in our study were availability of information from other sources, too much evidence, Belief of over confidence that physician does not need EBM, Patients' expectations not matching with EBM and lastly no financial gain in using EBM or Lack of investment by health authorities that was the second obstacle for EBM practice in Jordan. This aroused from the perception that training in EBM might add more of a financial burden to the health authorities; this is a fundamental misunderstanding of its financial consequences. Physicians who practice EBM will identify and apply the most efficacious interventions to maximize the quality and quantity of life for individual patients; this would raise rather than lower the cost of their care. [1]

Physicians' opinion about methods to improve EBM application:

Regarding the opinion of the physicians about how to increase EBM application, using EBM practice guidelines was the opinion of the majority of our physicians (71.8%) followed by learning the basic skills of EBM (67.2%) and finally using EBM summaries from abstracting journals (49.4%). The approach of medical staff in University of Ain Shams to move toward EBM practice were case review and discussion held in each department (62.5%), integration of EBM course in undergraduate curriculum (51.9%), workshops held for practicing clinician about EBM (51.3%) and a department specialized to supply the college with EBM reviews and summaries (35.3%). [60] The Jordanian participants thought that the best way to move from opinion-based medicine to EBM was by learning the skills of EBM. [38] There was agreement between our clinicians and the largest proportion of PHC physicians in McColl's study in the UK (57%) who thought that the most appropriate way to apply EBM was by using evidence-based guidelines or protocols, while 37% thought it should be by seeking and applying evidence-based summaries and only (5%) by identifying and appraising the primary literature or systematic reviews.[32]Qatari physicians were convinced that the most appropriate way to move from opinion-based medicine to EBM is through focusing on training in the critical appraisal of research.[38]

A similar opinion to Jordanian physicians was found in the Riyadh study in Saudi Arabia that most of the respondents (42.6%) thought that the best way to improve EBM application was by learning the skills of EBM, while (37.0%) thought it should be by using evidence based guidelines or protocols. [33]

Physicians' knowledge and attitude towards EBM in MRI, MUH and El Shatbi hospital and comparison with other countries:

The average knowledge score was significantly higher in MRI (2.54±2.36) than MUH (1.88±2.31) and El Shatbi hospital (2.02± 2.54) (p=.001, p=.008 respectively). Also the average attitude score was higher in MRI (3.81±1.84) than MUH (2.61±2.85) and El Shatbi (2.64±2.07) (p=.001, p<.001). This could be attributed to many reasons; first: Activities in MRI are more research oriented and the main goal is teaching and training postgraduates. Second: the presence of center of evidence based medicine which applies different research activities and continuous medical education in form of workshops for clinicians under the supervision of experts in EBM and finally: learning the basic skills about EBM is integrated as part of the curriculum in Diploma and Master degrees and taught to postgraduate students. This gives the clinicians in MRI a more chance to learn more about how to apply and practice EBM in patients care.

Comparison of EBM knowledge between different settings was done in other studies but not restricted to University sector only. In Croatia, Comparison between family medicine physicians and University physicians was done which revealed that the knowledge of EBM and the use of The Cochrane Library were more familiar and significantly higher among the University physicians. Significantly more hospital physicians than family physicians used the internet to solve dilemmas about patients (82% vs 65%, $P < 0.001$). Common search engines, such as Google search, were the most common internet resource used among family physicians, compared with PubMed among hospital physicians This can be in part explained in the study by the fact that primary health care offices are not a part of the academic network providing access to online bibliographical and information resources and could be due to the difference between them in obtained postgraduate degrees. [69]

Another comparison was done between insurance physicians employed at one of the six Belgian social insurance sickness funds and the medical inspectors employed At the National Institute of Disability and Health care Insurance (NIDH). The general knowledge and attitude scores towards EBM and clinical practice guidelines (CPG's) did not differ between physicians with two different employments. [41]

Physicians' knowledge and attitude towards EBM among different scientific degrees and comparison with other countries:

Regarding comparison between different scientific degrees, the knowledge score in our study was significantly different according to scientific degrees (p<.001). It was significantly higher in master and doctor degrees than MBChB while it didn't differ between master and doctor degrees, although it was slightly higher in master than doctor degree. This result was also expected. This might be explained that the introduction of EBM in Egypt and to our physicians was a relatively new era relative to other developed countries, so physicians with MBChB who didn't learn EBM in undergraduate curriculum have a limited knowledge of it. Clinicians who continuously

search the internet are those from master and doctor degrees. Although the attitude score was statistically insignificant between different scientific degrees, all degrees have positive attitude towards EBM. In Ain Shams University, there was no significant relation between knowledge about EBM and Physicians' job title whether Resident Assistant lecturer, Lecturer or Assistant professor& professor. [60] In Qatar, Analysis of the time since graduation shows that the highest proportion of PHC physicians who actively practiced EBM had 21–30 years since graduation (83.3%) (Doctor degree physicians), while the lowest rate (33.0%) was among those who had graduated 31–40 years ago.

Physicians' knowledge and attitude towards EBM in different clinical departments and comparison with other countries:

Comparison between different clinical departments was also an important issue in this study. There was insignificant difference in the median knowledge and attitude scores between these different clinical departments (p=.052, p=.374 respectively). The situation was different in western Saudi Arabia. For EBM knowledge, there was statistically significant difference between understanding of terms related to EBM and different specialties. There was significant difference between family medicine consultants who properly understood these terms and other specialties. [37] Furthermore in United Kingdom, trainees from surgical specialties felt more confident at assessing research evidence (p = 0.009), and medical specialty trainees felt more confident at evaluating statistical tests (p = 0.038) than those clinicians from other specialties. [62] However, in Japan, the study revealed that there was no significant difference in understanding of methodological terminology between residents from surgery and non-surgery groups (P = 0.516). [63]

In Norway, Fewer physicians in surgical specialties compared to other specialties reported ''Use of best evidence in clinical practice'' (74% versus 86%, p=.003) and ''Independent systematic review'' (66% versus 79%, p=.021) as important aspects of EBM. They also seem to use other sources of information in making their clinical decisions. While 72% of them indicated international medical journals and 70% Pub Med compared to only 49% (p<.001) and 53% (p=.011) of physicians in other specialties, they did not differ significantly from the rest of respondents in their low use of Cochrane Library. [65]

Another study surveyed the difference of EBM knowledge and attitude among a large sample of both allied health care professionals and CAM (complementary and alternative medicine) practitioners. Differences in knowledge and beliefs concerning EBP among both were found. More CAM practitioners compared to allied health professionals accessed educational literature via the Internet (95.3% v 68.1%, p=0.008). [70]

SUMMARY

SUMMARY

Evidence based medicine (EBM) is defined as the conscientious, explicit, and judicious use of current best evidence.[1] It means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

High quality health care implies clinical practice that is consistent with the current best evidence. Evidence based Medicine (EBM) has thus become an impetus for incorporating critical appraisal of research evidence alongside routine clinical practice. [30]

The presumed benefits of EBM are: to help clinicians deal with 'information overload'; to reduce inequalities in the delivery of healthcare (and distribute healthcare resources more equitably); to reduce healthcare costs; and to justify treatment choices to the public. [3]

A review of physicians' performance suggested that learning how to practice EBM, seeking out and applying the findings of EBM summaries and adopting evidence-based practice protocols can keep us aware of medical advances and help to enhance our clinical performance. [4] EBM practice also supports decision-making shared with users, which is already favored within the medical community as the ideal of decision-making. [5]

Awareness of evidence based medicine is defined as the ability to perceive and understand the concept of EBM. The Awareness of evidence-based medicine is still in its infancy in the developing and especially in Arabian countries. Recent research has shown that physicians' general perception and attitude to EBM is positive [31, 32]. Despite this, there is still a need to improve research skills and critical appraisal [33] and a certain degree of rejection towards EBM's reductionist focus is evident. [34] Furthermore, implementation of new information into daily clinical practice is slow.

In Egypt, Alexandria university hospitals, this topic is particularly complex, little studied and misunderstood, and its true impact in this setting is uncertain. Very few data are known about physicians' awareness of, attitudes towards evidence based medicine, the extent of their skills to access and interpret evidence, the barriers to moving from opinion based to evidence based practice, and the additional support necessary to incorporate evidence based medicine into everyday general practice.

The aim of this work is:

- Assessment of the physician's awareness of evidence based medicine (Choosing the proper definition of EBM, Writing the name of any site on the net related to EBM, and understanding of some technical terms).
- Assessment of physician's attitude towards current promotion of EBM.
- Physician's opinion about barriers towards application of EBM.
- Physician's opinion about how to increase EBM in every day management of patients.

This is a cross sectional study. A self-administrated questionnaire was distributed to the physicians working in the hospitals belonging to University of Alexandria. A two stage sampling method was adopted. The first stage was conducted by random selection of three hospitals from the Alexandria University hospitals; MUH, El Shatbi hospital and MRI's hospital. The second stage was done by selection of physicians from different clinical departments in each hospital using a simple random sampling method.

A pilot study was conducted and some modifications were done after consulting three experts in evidence based medicine to reinforce the content validity of the questionnaire. Those who refused to complete the questionnaire were excluded. In such cases, another randomly selected physician from the same department was included. A sample of 549 physicians was collected.

Data was collected, coded, introduced into SPSS program version 18 (PASW), checked for error, recoded into forms required for analysis and production of actual statistical tabulation.

A combined knowledge score was calculated, the score was computed by calculating the sum of positive knowledge statements. The question about source of knowledge about EBM was excluded from calculation.

A combined attitude score was computed by calculating the sum of the positive attitude statements and the reversed answers of the negative attitude statements, [41] excluding the statements which were neither positive nor negative (Don't know EBM).

Chi square test was done to study the presence of statistical significant association between knowledge, attitude of physicians toward EBM and different hospitals (MRI, MUH, El Shatbi), Scientific degrees (MBChB and diploma, Master, Doctor degrees) and different clinical departments (Radiology, laboratory, Clinical physiology, surgery, Obstetrics, Internal medicine, Pediatrics, Oncology, Critical care), Montecarlo test was used if more than 20% of total cells had expected cell counts < 5.

Kruskal Wallis test was done to study statistical significant difference in the median awareness, attitude scores between different hospitals, Scientific degrees, and clinical departments, pair wise comparisons for significant results were done by Mann Whitney test.

CONCLUSION

Conclusions

The most important findings in our study were:

- Generally, Doctors had poor knowledge about the three components of EBM. There was a lack of knowledge about and utilization of EBM related sources of information. Knowledge score was calculated (Maximum score is 9).The average knowledge score among physicians is 2.02(2.37), Median=1(0-9).

- Response of the physicians in this study was generally enthusiastic about EBM and expressed a favorable desire to learn more about the skills of EBM. An average attitude score was 2.8±2.61 out of 7 median=3 (-7to7).

- The most perceived barrier of EBM application in patient management was lack of time. Lack of critical appraisal skills was the second most commonly identified barrier, while the availability of information from other sources was the third barrier. More than half of the physicians were convinced that too much evidence was a barrier of EBM practice.

- The physicians' opinion about how to increase EBM application was by using evidence based practice guidelines then learning the skills of evidence based medicine and finally by using evidence based summaries, as summaries obtained from abstracting journals.

- Comparison of physicians' knowledge of and attitude towards EBM between the three mentioned hospitals revealed that MRI had statistically significant knowledge and attitude score than both MUH and El Shatbi hospital.

- Comparison of physicians' knowledge of and attitude towards EBM between different scientific degrees summarized that the knowledge score was significantly higher in master degree and doctor degree than MBChB degree. Although the attitude score was statistically insignificant between different scientific degrees, all degrees have positive attitude towards EBM.

- Comparison between different clinical departments concluded that there was insignificant difference in the median knowledge and attitude scores between the mentioned clinical departments.

RECOMMENDATION

RECOMMENDATIONS

1. Planning and implementing an effective EBM educational program and workshops can be conducted, updated and repeated regularly.

2. Further research to assess the knowledge, attitude of the physicians about EBM pre and post application of educational programs.

3. Making use of available facilities, the central computer units in most universities plus integration of computer technology into medical practice at all levels.

4. Incorporation of EBM approach into the application of clinical research within the medical education to undergraduate students will hopefully lead to shift in the culture of the practice of health care.

5. Health care workers should be suitably equipped to develop abilities to understand research methodologies, and it should be a requirement in all training programs. Doctors should learn how to interpret and apply research findings.

6. It is important to tailor teaching EBM to specific subgroups of physicians as those of MBChB degree with limited knowledge of EBM.

7. Focusing of EBM education in hospitals as El Shatbi where physicians have lower knowledge of EBM.

8. Teaching the clinicians the skills of critical appraisal that was the second barrier for EBM application.

9. For busy clinicians who considered lack of time is the major barrier for EBM application, evidence based care can be applied if they only directed pre-appraised resources as well as practical approaches to making EBM easier to apply.

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PROTOCOL

وعى واتجاه الاطباء نحو الطب القائم على الدليل بالمستشفيات التابعة لجامعة الاسكندرية

Awareness and attitude of physicians in hospitals belonging to University of Alexandria towards evidence based medicine.

Protocol of a thesis submitted to the
Medical Research Institute
University of Alexandria
in partial fulfillment of the
requirements for the degree of

خطة بحث مقدمة الى
معهد البحوث الطبية
جامعة الإسكندرية
إيفاءا جزئيا لشروط
الحصول على درجة

Master of Science in Biomedical Informatics And Medical Statistics

الماچستير فى المعلوماتية الحيوية الطبية و الاحصاء الطبى

By

من

Eman El Sayed Abdel Fattah Abdel Aal
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2006

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Background

Evidence-based medicine(EBM) is defined as the "conscientious, explicit, and judicious use of current best evidence. [1]

Evidence-based medicine has emerged as a new paradigm for medical practice. It involves integrating individual clinical expertise with the best available external clinical evidence and compassionate use of individual patients' rights and preferences in making clinical decisions about their care. [2]

By individual clinical expertise, we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in the more thoughtful identification and compassionate use of individual patients' predictions, rights, and preferences in making clinical decisions about their care. By best available external clinical evidence we mean clinically relevant research, often from the basic sciences of medicine, and from patient centered clinical research in the accuracy and precision of diagnostic tests (including the clinical examination), the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens.[1]

External clinical evidence invalidates previously accepted diagnostic tests and treatments and replaces them with new ones that are more powerful, more accurate, more efficacious, and safer.[1]

Good doctors use individual clinical expertise and the best available external evidence, and neither alone is enough. Without clinical expertise, practice risks are becoming tyrannized by evidence, for excellent external evidence may be inapplicable to or inappropriate for an individual patient. Without current best evidence, practice risks are becoming rapidly out of date to the detriment of patients. [1]

The best available awareness of the latest scientific evidence and the ability to critically appraise literature and assess its applicability have been identified as integral to the practice of EBM. [3]

The term 'evidence-based medicine' (EBM) was first used by a Canadian ,David Sackett and his colleagues at McMaster University in Ontario, Canada in the early 1990s.[4] Since then, it has become the latest focus in the search for improved health care.[5]The use of EBM in clinical practice is a key strategy to improve primary health care services. [6]

Providing evidence-based care to patients involves turning a clinical problem into an answerable question, systematically searching for the best evidence relevant to the question, critically appraising that evidence, and using the evidence as the basis for clinical decisions to solve the problem .[7] EBM is about trying to improve the quality of the information on which decisions are based. It helps practitioners to avoid 'information overload' but, at the same time, to find and apply the most useful information.

EBM, which has largely replaced the older term 'clinical epidemiology', is sometimes also called 'evidence-based practice'. This latter term highlights the important point that the 'evidence' that we are talking about is empirical evidence about what actually works or doesn't work in practice. It is not scientific evidence for a mechanism of action (such as a biochemical pathway, physiological effect or anatomical feature). [4]

Health needs of population are in transition, and health systems and scientific knowledge are changing rapidly. Medical practice changes constantly and the rate of change is becoming more rapid all the time. Recent papers have highlighted the need for evidence-based medicine.[8,9] It has been suggested that strategies to promote change in clinical practice are more likely to be successful if they are based on an analysis of barriers and facilitators specific to the context.[10]

Doctors need to keep in touch with new information and ideas and keep up-to-date with the evidence on various diseases in order to correctly assess patient's conditions.[11]

In Jordan, 43%of family physicians were aware of EBM. Regarding the attitude of physicians towards EBM, 63% welcomed the concept of evidence based medicine and 40% used it in their daily practice.[2] Compared to Belgian physicians, 56.2% had read about evidence-based medicine, 50.5% had attended an EBM course. Physicians were mainly positive about EBM (90.5%). [12]

In Egypt, in hospitals belonging to the University of Alexandria , few data are known about the awareness and attitude of physicians towards evidence based medicine, the extent of their skills to access and interpret evidence, the barriers to moving from opinion based to evidence based practice, and the additional support necessary to incorporate evidence based medicine into everyday work.

Aim of the work

The aim of this work is:

-Assessment of the physician's awareness of evidence based medicine through:

- choosing the proper definition of EBM
- Writing the name of any site on the net related to EBM
- Understanding of some technical terms

-Assessment of physician's attitude towards current promotion of EBM.

-Physician's opinion about barriers towards application of EBM.

-Physician's opinion about how to increase EBM in every day management of patients

Methods

Study setting:

Medical Research Institute's hospital, the main University hospital and El shatbi hospital were randomly selected as representative to Alexandria university hospitals.

Study design:

A cross-sectional study

Study population:

The physicians with different scientific degrees working in the previously mentioned Alexandria university hospitals will be randomly selected.

Sampling method:

A two stages stratified random sampling method will be adopted. The first stage consists of different strata of the previously mentioned hospitals, and then stratification will be done according to clinical departments from each stratum. A simple random sampling method will be used for selection of physicians from each department.

Sample size:

Based on a previously published study done among Jordanian physicians with the same aim of work [2], the overall awareness rate among physicians was 43%.

A sample size of 400 achieves 80% power to detect a difference of 0.07(p0-p1) between the null hypothesis that the awareness rate among physicians is 43% and the alternative hypothesis that the awareness rate among physicians is 50% using two-sided binomial hypothesis test at 5% level of significance(NCSS). Considering non response rate of 20%, so a sample of 480 physicians will be taken. The sample will be allocated proportionate to the size of hospitals strata, so a sample of 24,100,357 physicians will be selected from MRI, MUH, and El Shatbi hospitals (The size of strata: 160, 600, and 2500) respectively. The size of physicians from the departments within each hospital will be adopted by equal allocation method considering the number of clinical departments.

Data collection:

A self-administrated questionnaire will be distributed to the physicians who work in university hospitals of Alexandria, the questionnaire was adopted from McColl et al [13] with some modifications done to be more acceptable for physicians.

It will include the following items:

A-personal data:

1. Hospital/institute name.
2. Department.
3. Year of graduation.
4. Gender.
5. Scientific Degree.

B- Respondents' awareness of evidence-based medicine (EBM) through:

Awareness of EBM is defined as: the state or the ability to perceive the concept of EBM.

1. Asking the physician to mark the correct statement defining EBM.
2. The physician will write the name of any site on the net related to EBM.
3- Understanding of some technical terms:

I- Confidence interval.

II- Risk assessment:

a. Absolute risk.
b. Relative risk.
c. Number need to treat.
d. Odds ratio

III- Systematic review and meta analysis:

a. Heterogeneity
b. Publication bias

4- Asking the physician about the source of knowledge about EBM.

C-Attitude toward evidence-based medicine (EBM):

Attitude towards EBM is defined as: the tendency to respond positively or negatively towards EBM.

1. Physician' attitude toward current promotion of EBM.

2. How the physicians describes the effort to search for the best current clinical knowledge on the net.
3. How research findings are useful in day to day management of patients.
4. How the respondent agrees that the adoption of EBM is another demand on already overloaded physician.
5. Physician's opinion that EBM improves patient care.
6. How much the physician needs EBM in day to day clinical practice.
7. How much the physician faces knowledge gap in clinical practice.

D- Physician's opinion about barriers toward application of EBM as :

Opinion is defined as: A belief or conclusion held with confidence but not substantiated by positive knowledge or proof.

1- Lack of time.
2- No financial gain in using EBM.
3- Lack of hard evidence.
4- Too much evidence.
5- Availability of information from other sources.
6- Patients' expectations not matching with EBM.
7- Lack of critical appraisal skills.
8- Belief of over confidentiality that physician does not need EBM.

E - Physician's opinion about how to increase EBM .

Analysis of Results

Data management and appropriate statistical analysis will be done using SPSS program.

Qualitative variables will be summarized by frequency and percent, while quantitative variables will be summarized by measures of central tendency as mean or median and measures of dispersion as standard deviation or range after data exploration using Kolmogrov Smirnov test.

For qualitative variables, the between group comparison will be done using Chi square or Fisher's exact test .For quantitative variables, the use of parametric or non parametric tests for analysis of variance will be done according to data exploration and sample size per each group using .05 level of significance.

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APPENDIX

APPENDIX

A.

1- Medical Research Institute/ Main University Hospital/ Al Shatbi Hospital / .....

2-Department.....

3-Year of graduation: ☐ ☐ ☐ ☐

4- Gender: a- Male ☐ b- Female ☐

5- Scientific Degree:

a- MBChB

b- Diploma

c- Master

d- Doctor degree

B.

1. Mark (√) on the correct statement defining Evidence Based Medicine (EBM):

a. EBM is defined as designed research strategies used to show the distribution of diseases.
b. EBM is the integration of the best research evidence with patient values and clinical expertise.
c. EBM is integration of the best research guidelines with clinical experience in making clinical decisions.

2. Write the name of any site on the net related to EBM:

a. .....
b. I can not remember

3. choose from the first row the suitable number for each of the following terms:

1	2	3	4
Not helpful to me to understand	**don't understand but would like to**	**some understanding**	**yes ,I understand, can explain to other**

1-Confidence interval

2- Absolute risk.

3- Relative risk.

4- Number need to treat.

5- Odds ratio

6-systematic review and meta analysis: Heterogeneity.

7- systematic review and meta analysis: Publication bias.

4. <u>where did you get your information about EBM? :</u>

a. The internet.
b. Attendance of lectures or workshops about EBM.
c. I don't know EBM.

C.

1. How would you describe your attitude toward the current promotion of EBM?

a- Strongly welcoming
b- Welcoming
c- Not welcoming
d- Do not know

2. How would you describe the effort done by colleagues to search for the best current clinical knowledge on the net?

a- quite accepted
b- accepted
c- Not accepted
d- Do not know

3. How useful are research findings in your day-to-day management of patients?

a- Extremely useful
b- Useful
c- Not useful
d-Do not know

4-The adoption of EBM, although an ideal, places another demand on already-overloaded physicians.

a- Strongly agree
b- Agree
c- Disagree
d- Do not know

5- Practicing EBM improves patient care:

a. Strongly agree
b. Agree
c. Disagree
d. Do not know

6-How much you need EBM in day to day clinical practice:

a. >50%.
b. 25-50%
c. <25%
d. Do not know EBM

7-How much you face knowledge gap in your clinical practice:

a.Every day practice
b.Every week.
c.>one week practice.
d.Do not know EBM

D.

I-barriers toward practice of EBM :

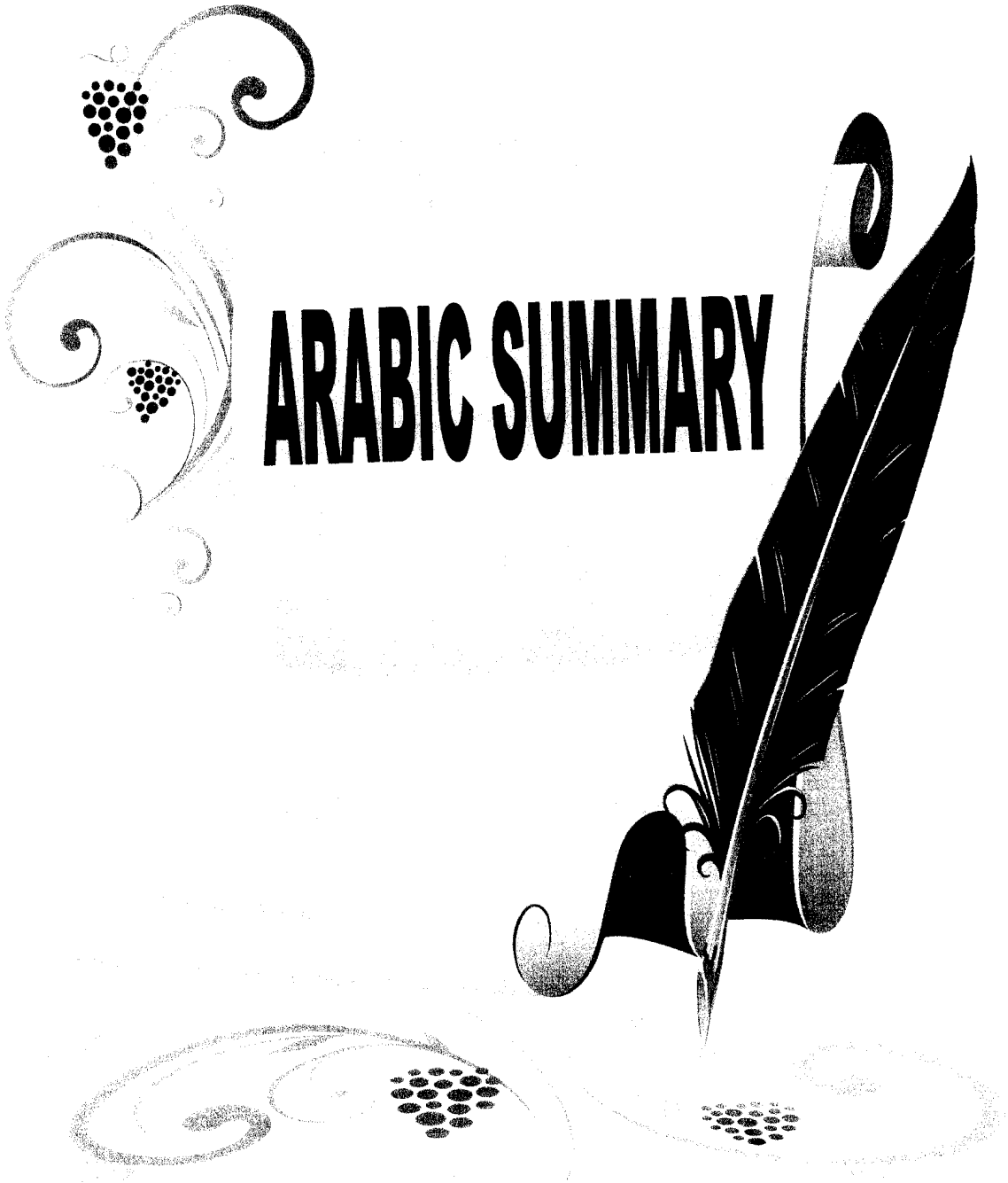
	Yes	NO	Don't know EBM
1-Lack of time.			
2-No financial gain in using EBM .			
3-Lack of hard evidence.			
4-Too much evidence .			
5-Availability of information from other sources.			
6-Patients' expectations not matching with EBM.			
7-Lack of critical appraisal skills.			
8-Belief of over confidence that physician does not need EBM.			

II- In your opinion, How can you increase your EBM practice (more than one answer is allowed)

a-By learning the skills of evidence based medicine.

b- By using evidence based summaries ,Such summaries may be obtained from abstracting journals.

c-By using evidence based practice guidelines.



ARABIC SUMMARY

الملخص العربى

الملخص العربي

يعرف الطب القائم على الدليل أنه الاستخدام الضميرى، الواضح،والعادل لخير دليل في الوقت الراهن. فهو يعنى دمج الخبرة السريرية الفردية مع أفضل أدلة خارجيـــة متاحـــة مـــن البحوث المنهجية.

الرعاية الصحية عالية الجودة تعنى الممارسة السريرية التي تنسجم مع أفضل الأدلـــة الحالية. من ثم أصبح الطب المسند إلي الدليل دافع لدمج التقييم النقدي للأدلة البحثية إلي جانب الممارسة السريرية الروتينية.

الفوائد المفترضة للطب القائم على الدليل هي : مساعدة الأطباء لتتعامل مـــع الحمـــل الزائد من المعلومات، للحد من عدم المساواه في تقديم الرعاية الصحية (توزيع الموارد علـــى نحو أكثر أنصافاً)، للحد من تكاليف الرعاية الصحية، توفير خيارات العلاج للجمهور.

بعد إعادة النظر في أداء الأطباء، أقترح أن تعلم كيفية ممارسة الطب القائم على الدليل، السعي إلي تطبيق النتائج التي توصلت إليها ملخصات الطب ا لقـــائم علـــى الـــدليل واعتمـــاد بروتوكولات الطب المسند إلي الدليل يمكن أن تبقي لنا على بيئة من التقدم الطبى وتساعد على تعزيز أدائتها السريرى. ممارسة الطب المسند أيضاً تدعم عملية صنع القرار المـــشترك مـــع المستخدمين والتي تفضل بالفعل داخل المجتمع الطبي.

تم تعريف الوعي للطب القائم على الدليل أنه القدرة على تصور وفهم مفهـــوم الطـــب المبنى على البراهين. وعى الأطباء للطلب القائم على الدليل لا يزال في مراحلة الأولـــي فـــي البلدان العربية على وجه الخصوص . وقد أظهرت الابحاث الحديثة أن تصور الأطباء عموماً وموقفهم نحو الطلب المسند للدليل إيجابياً. على الرغم من هذا، لاتزال هناك حاجة إلي تحسين مهارات البحث والتقييم النقدي وهناك درجة معينة واضحة من الرفض للطب القائم على الدليل. علاوة على ذلك، هناك بطىء في تنفيذ معلومات جديدة في الممارسة السريرية اليومية

في مصر، مستشفيات جامعة الإسكندرية، هذا الموضوع معقد بشكل خاص، درس قليلاً و يساء فهمة وأثره الحقيقى في هذا المكان غير واضح. بيانات قليلة جداً معروفة عـــن وعـــى

الأطباء واتجاههم نحو الطب القائم على الدليل، مدى مهاراتهم للوصول إلـــي وتفـــسير الأدلة، الحواجز التي تحول دون الانتقال من الإستناد بالرأي إلي الممارسة القائمة على الأدلة، والدعم الإضافي الازم لدمج الطب القائم على الدليل إلي الممارسة العامة اليومية.

الهدف من هذا العمل هو:

- تقييم وعي الطبيب للطب المسند إلي الدليل (اختيار تعريف مناسب للطب القائم علـــى الدليل، كتابة أسم أي موقع على الإنترنت يتعلق بالطب المسند، فهم بعض المصطلحات التقنية الخاصة بالطلب المسند إلي الدليل)
- تقييم موقف الطبيب نحو التعزيز الحالي للطب القائم على الدليل
- رأي الطبيب نحو التطبيق الحالي للطب القائم على الدليل
- رأي الطبيب حول كيفية زيادة تطبيق الطب المسند في الإدارة اليومية للمريض

هذه دراسة مقطعية .وزع استبيان ذاتي للأطباء العاملين في المستشفيات التابعة لجامعة الإسكندرية. أسلوب أخذ العينات قد تم على مرحلتين. قد أجريت المرحلـــة الأولـــي بإختيـــار عشوائي لثلاث مستشفيات من مستشفيات جامعة الإسكندرية (المستشفي الرئيـــسي الجـــامعي ، الشاطبي ، معهد البحوث الطبية). قد تمت المرحلة الثانية بإختيار الأطباء من مختلف الأقـــسام الإكلينيكية في كل مستشفي باستخدام طريقة العينة العشوائية البسيطة.

أجريت دراسة تجريبية وأجريت بعض التعديلات بعد التشاور مع ثلاث خبـــراء فـــي مجال الطب القائم على الدليل لتعزيز صحة محتوى الاستبيان. تم استبعاد هؤلاء الذين رفضوا استكمال الاستبيان. في مثل هذه الحالات، تم اختيار طبيب أخر عشوائياً من نفس القسم. قد تم جمع عينة من ٥٤٩ طبيباً، وقد تم جمع البيانات وترميزها وإدخالها على برنـــامج (PASW 18)، ثم التأكد من أي خطأ واعيد تشفيرها إلي صيغ لازمة للتحليل وإنتاج جداول إحصائية

قد تم احتساب درجة المعرفة معاً، وتحسب النتيجة عن طريق حساب مجمـــوع أســـئلة المعرفة الإيجابية. تم استبعاد سؤال حول مصدر المعرفة حول الطب القائم على الـــدليل مـــن حساب درجة المعرفة الكلية.

تم حساب درجة كلية لموقف الأطباء عن طريق احتساب مجموع الأسئلة الإيجابية والأجوبة المعكوسة للأسئلة السلبية باستثناء التصريحات التي لم تكن إيجابية أو سلبية.

قم تم عمل أختبار (Chi square) لدراسة وجود أرتباط دال إحصائياً بين وعى، اتجاه الأطباء نحو الطب القائم على الدليل وبين المستشفيات المختلفة (الرئيسى الجامعي، الشاطبي، معهد البحوث)، بين الدرجة العلمية للطبيب(ممارس عام ، ماجستير، دكتوراه) وأخيراً بين الأقسام الاكلينيكية المختلفة (الأشعة، المختبرات، علم وظائف الأعضاء، الجراحة، النساء والتوليد، الباطنة، الأطفال، الأورام والعناية المركزة) . تم أستخدام اختبار (Montecarlo) إذا كان اكثر من ٢٠./. من مجموع الخلايا به عدد الخلايا الموقعة <٥,٠

قد تم عمل اختبار (Kruskal Wallis) لدراسة فروق ذات دلالت إحصائية في متوسط وعي واتجاه الأطباء نحو الطب المسند بين المستشفيات المختلفة ، الدرجة العلمية والأقسام الاكلينيكية.للنتائج ذات فروق إحصائية داله، قد تم عمل اختبار(Mann Whitney)

كانت أهم النتائج في دراستنا:

بشكل عام كانت معرفة الأطباء قليلة عن المكونات الثلاثة للطب القائم على الدليل. كان هناك نقص في المعرفة حول استخدام مصادر المعلومات التي لهاصله بالطب القائم على الدليل. تم حساب درجة المعرفة (الدرجة القصوى هي ٩) متوسط بين المعرفة هي ٢٠,٥٢ (متوسط ١ (٠-٩)

كانت الاستجابة بين الأطباء في هذه الدراسة بشكل عام متحمسة نحو الطب المسند إلي الدليل، وأعرب عن رغبة لمعرفة المزيد عن مهارات الطب المسند وكان متوسط بين موقف الأطباء ٢,٨ من ٧ متوسط=٣(-٧إلي٧).

العائق الأكبر في تطبيق الطب القائم على الدليل هو ضيق الوقت.الافتقار إلي مهارات التقييم النقدي هو الحاجز التالي الأكثر شيوعاً الذي تم تحديده، في حين أن توفر المعلومات من مصادر أخرى كان الحاجز الثالث.أكثر من نصف عدد الأطباء كانوا مقتنعين أن كثرة الأدلة يشكل حاجزاً لممارسة الطب المسند إلي الدليل.

رأي الأطباء حول كيفية زيادة تطبيق الطب القائم على الدليل كان بتعلم مهاراته أولاً ثم استخدام الملخصات مثل التي يتم الحصول عليها من المجلات، وأخيراً باستخدام المبادئ التوجيهية القائمة على الدليل.

مقارنة وعي و واتجاه الأطباء نحو الطب القائم على الدليل بين المستشفيات الثلاثة المذكورة اظهرت أن أطباء معهد البحوث الطبية لديهم وعي وأتجاه ايجابى نحو الطب المسند أكثر من هؤلاء بمستشفي الشاطبي والمستشفي الرئيسي الجامعي.

مقارنة وعي و أتجاه الأطباء نحو الطب المسند بين الدرجات العلمية المختلفة لخصت أن درجة المعرفة المحسوبة كانت أكثر بشكل ملحوظ في درجة الماجيستير والدكتوراه من درجة الممارس العام.

بالرعم من أن درجة موقف الأطباء نحو الطب المسند كانت غير مختلفة أحصائياً بين الدرجات المختلفة إلا أن كل الدرجات العلمية لها موقفاً إيجابياً نحو الطب القائم على الدليل

المقارنة بين الأقسام الاكلينيكية المختلفة لخصت أنه كان هناك فروق ضئيلة في متوسط درجة الوعي واتجاه الأطباء نحو الطب المسندبين تلك الأقسام.

وختاماً، وعى واتجاه الأطباء نحو الطب المسند إلي الدليل لايختلف كثيراً عن البلدان العربية مثل الأردن، قطر، السعودية العربية ولكنة أقل من الأطباء البريطانيين.

وعى واتجاه الاطباء نحو الطب القائم على الدليل بالمستشفيات التابعة لجامعة الإسكندرية

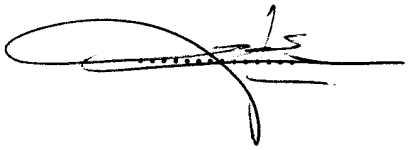
رسالة مقدمة لمعهد البحوث الطبية
جامعة الإسكندرية - إيفاءً جزئياً لشروط
الحصول على درجة

الماجستير في المعلوماتية الحيوية الطبية والإحصاء الطبى

مقدمة من

أيمان السيد عبد الفتاح عبد العال

لجنة المناقشة والحكم على الرسالة **التوقيع**



أ.د/ رامز نجيب بدوانى
أستاذ بقسم المعلوماتية الحيوية الطبية والأحصاء الطبى
معهد البحوث الطبية- جامعة الإسكندرية

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أ.د/ عادل زكى عبد السيد
أستاذ بقسم المعلوماتية الحيوية الطبية والأحصاء الطبى
معهد البحوث الطبية- جامعة الإسكندرية

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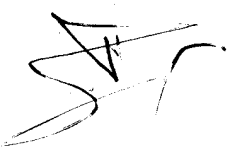

أ.م.د/ أكرم محمد فايد
أستاذ مساعد الطب الحرج
كلية الطب- جامعة الإسكندرية

المشـــرفـــون

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د. جيهان محمد شحاته

مدرس بقسم المعلوماتية الحيوية الطبية والاحصاء الطبى

معهد البحوث الطبية- جامعة الإسكندرية

وعى واتجاه الاطباء نحو الطب القائم على الدليل بالمستشفيات التابعة لجامعة الإسكندرية

رسالة

مقدمة لمعهد البحوث الطبية – جامعة الإسكندرية

إيفاءاً جزئياً لشروط– الحصول على درجة

ماجستير فى المعلوماتية الحيوية الطبية والإحصاء الطبى

من

أيمان السيد عبد الفتاح عبد العال

بكالوريوس الطب والجراحة– جامعة الاسكندرية٢٠٠٦

معيدة بقسم المعلوماتية الحيوية الطبية والاحصاء الطبى معهد البحوث الطبية

قسم المعلوماتية الحيوية الطبية والاحصاء الطبى

معهد البحوث الطبية

جامعة الإسكندرية

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