



Evidence-Based Medicine

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Evidence based medicine has been a strongly emerging subject in medical practice over the years. Its application in dentistry is on the rise ever since. Its constant progression has been considered as one of the important origination in healthcare industry. Its introduction has led to high developments benefitting each and every member part of the industry. This has also derived various pros and cons, and a debatable discussion of its practice.

Considering all its limitations and its movement in crisis, our job is to move ahead and instigate effective ways, and create exemplary evidence to improvise our practice and healthcare system and provide the best suited treatments for the patients, efficiently and cost-effectively.

Keywords: EBM; Medicine; Healthcare

History of Evidence-Based Medicine (EBM) goes way back in 1970s when Archibald Cochrane was the pioneer of EVM (Evidence-based Veterinary Medicine). His belief that the medical interventions should not be done without proper evidence, “effectiveness” and “efficiency” of treatments, conduction of Randomised Controlled Trials (RCTs) to gather evidence were among few of the concepts put forth by him to determine the appropriate and cost-effective treatment measures in clinical practice [1]. When EBM came into the frame in 1990, it was then known as “Scientific Medicine” which was first named by Dr. Gordon Guyatt, a residency coordinator at McMasters University Internal Medicine. It was a unique and a new concept which referred to teaching medicine at bedside. He got his inspiration from his supervisor Dr. David Sackett who had laid a foundation on the same. As the response from his peer mates was not welcoming and consoling, he re-launched his idea by transforming the title into “Evidence-Based Medicine” and making it the core part of the residency program. This was then published in 1991 in an ACP Journal Club editorial [2].

EBM is “the process of systematically finding, appraising, and using contemporaneous research findings as the basis for clinical decisions” [3].

It is a multi-phase process which consists of- “Doing” mode: the first four steps given in the table below are carried out before intervention.

“Using” mode: the searches are restricted the sources which have already been critically appraised for evidence base like, evidence based guidelines and summaries.

“Replicating” mode: the evidence is used only those given by the respected opinion leaders [3].

1. Convert information needs into answerable questions
2. Track down the best evidence with which to answer these questions
3. Critically appraise the evidence for its validity and importance
4. Integrate this appraisal with clinical expertise and patient values to apply the results in clinical practice
5. Evaluate performance

Table 1: Steps involved in the practice of evidence-based medicine.
(Straus and McAlister, 2000)

EBM is an important part of general medicine. Nonetheless its role in dentistry is an integral one. When EBM plays its part in dentistry, it is known as Evidence-based Dentistry.

There is a huge distinction between evidence-based and based on evidence. Dentistry can be practiced successfully not by selecting the required evidences conveniently (based on evidence), but

by gathering best available research evidence (evidence-based). As “best available research evidence” is emphasised, it implies to the most essential nature of dentistry which is to spot the best form of treatment to a given patient at that moment whilst recognizing the research evidence to be constantly evolving [4].

Gold standard for good evidence is very strong evidence from at least one published systematic review of multiple randomized-controlled trials. This ranks the top among the hierarchy of the studies and the evidence. The level one marks the best evidence [5].

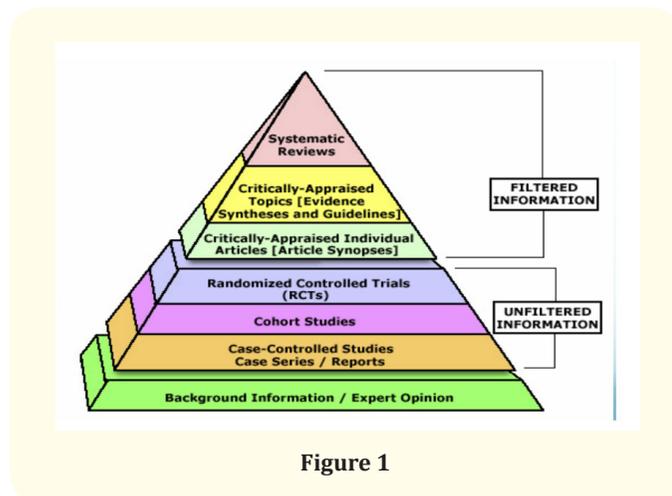


Figure 1

There are series of actions to be followed with EBM or EBD where once appraised, one can “act” on it, “discard” it, “store” it and more importantly “update” it [5].

Whenever a new concept is presented, there are combinative views. Even clinicians go back and forth with their application of EBM depending on the type of clinical problem. These positive and negative aspects lead to criticisms [3].

Advantages

In a rapidly developing technological world, one needs to be updated on all the current issues. Types of disease and their treatments have also changed overtime. Dentistry is advancing each day with new approaches to treatment of diseases. Such advances are obligatory so that the patients requiring complex needs of treatment are taken care of by the dentists [6].

“Origin of evidence based practice” has led to increase in knowledge of the clinical practitioners and improvement in their skills.

One of the major advantages of practising EBD is that “it improves the effective use of research evidence in clinical practice”. Since there has always been a problem solving approach in clinical

dentistry, the evidence can be used for early, effective and new treatments and those with ineffective outcomes can be discarded [5].

The other advantage is that “it uses resources more effectively”. Meaning, out of numerous systemic reviews, it uses the most effective ones. This helps in reducing the expenditure of extra resources. For example, in case of a systemic review which suggests on changing the whole system of clinical approach to a particular disease will disregarded as this will be leading to requirement of significant resources. Instead, a systematic review indicating the most effective method of clinical approach will be considered [5].

“Reliability on evidence rather than authorities to make a clinical decision” is another important lead. Usage of textbooks or authorities for the treatment decision is unadvisable as these books may not be updated. Frequent review of the present evidence should be done so that we become skilled to evaluate the evidence based on our clinical practice. The skill of critical appraisal of a review or evidence is essential to assist in deciding the best suited treatment for a given disease [5,7].

“Monitoring and developing clinical performance” has been conducted by peer review. When this was successful, a clinical audit was introduced in general dental practice on experimental basis. This helped in improving the quality of the clinical environment and dental practice as it focused on encouraging EBD [5].

“Patient satisfaction and compliance” is among the crucial part. When there are numerous evidences and data to support any clinical therapy, patients will be more accepting towards it.

There will be a greater chance of timely, efficient, and patient-centred delivery of quality health care [8].

Disadvantages

The aim of EBD is to support the ordinary clinical practitioners and encourage the primary dental care practitioners to look into the evidences and updates and improve their practice so that they use the right mode of treatment and apply it to regular clinical problems.

Nevertheless, taking clinical decisions based on evidences does pose various problems.

Amount of evidence

There are about 2.5 million journal articles published every year. The number has kept increasing since last two centuries [9]. Out of these many journal articles, about more than 37,000 articles are related to dentistry [10].

It is not possible to refer all the articles and not all of these articles would be relevant to clinical practice [5].

Quality of evidence

The increasing number of evidences is basically to provide data for the clinical practice enhancement. This can lead to compromising in the quality of evidence. Many of the articles in dentistry do not undergo a peer review and when they do, there is high chance of publication bias. Most of the times, just the positive data is presented leading to huge publication bias. To avoid this, negative results should also be reviewed, which are equally valuable [5].

Dissemination of evidence

The good evidences which can be adopted into clinical practice can happen when there is good broadcasting of it. There should be provision of good accessibility and availability of the evidence to all the respective individuals. Otherwise, even the good evidence can take a long time to be a part of practice as a norm [5].

Practice based on authority rather than evidence

In spite of innumerable publications of the researches, varied number of people still preach “practice-based” policy, especially the older professionals mainly because they practiced before EBD came into picture [5]. According to them, it undermines their clinical expertise and their experience. This brings up the question whether this group will comply to adopt the new, modern and unfamiliar guidelines and techniques [11].

Cost

Considering EBM is the best way to practice, one needs to consider the amount of resources required to conduct research on each and every known illness, which is impossible to accomplish [11].

Lack of evidence

Due to insufficient funds for research, evidences cannot be produced because of lack of research, especially in the treatment of rare diseases. If no money is funded to conduct such research, there is a possibility that the progress of treatment halts in spite of advances in technology and research possibilities [11].

Lack of skills

Some critics have said that those who have not been trained completely and specifically in research will not have sufficient knowledge to interpret the data and hence struggle with the adoption of guidelines. Also, skills get hard to adopt due to busy schedule and deficient time in healthcare profession [11].

Universalism

Assuming that EBD is a success, will that be applicable universally to every human being? For instance, a treatment is scientifically proven to be effective, it will affect each and every individual in a different way due to the factors like genetics, race, age, sex, ethnicity, etc [11].

Applicability

Not all the trials can be conducted for evidence. There are certain trials which pose ethical approval issues.

It's movement in crisis

When Evidence Based Medicine (EBM) was introduced more than 20 years ago, effectiveness and efficiency were two important concepts which were put forward by Archibald Cochrane into clinical practice. He believed that, unless “effectiveness” and “efficiency” of the treatment, even those which have been accepted widely, are validated, no medical intervention should be performed. He is called to be the father of EBM [1].

Regardless of all the advantages and successes in the previous times, not everyone was as welcoming. It did possess varied acceptance issues due to innumerable drawbacks. These drawbacks came into realisation when it was started to put into practice. Many of the critics who support EBM have argued that it is now a movement in crisis.

It is leading to “distortion of the evidence-based brand”, affecting its “quality”. Meaning, the pharmaceutical and medical devices companies, depending upon their promoting drug/device set an outline for research to get a pre-set outcome. For instance, many medicinal companies promote the use of mouthwashes. These companies bribe the dentists to promote their product due to which several patients end up using it on a daily basis as halitosis is the most common concern among many. Its overuse may lead to oral cancer, alcohol intoxication, and poisoning due to wrongful ingestion [12].

Many pharmaceutical companies who fund for the research usually have a pre-set abstract for the research. “Publication bias” plays a major role in such situations. For example, Colgate funds for the research to test the effects of a new tooth paste. Due to pre-set research aim and conclusion, the negative results are not published. Evidence is incomplete without negative results, if present. A new dentifrice was launched by Colgate in the year 2014 (Colgate Maximum Cavity Protection with Sugar Acid Neutraliser) where the added benefits of the tooth paste were campaigned. Later in March 2015, the Swedish Council on Health Technology Assessment (SBU) reported that they seven studies were conducted of which three had high risk of bias, and only four studies were considered for further analysis which indicated that the new dentifrice is more efficacious than the conventional fluoride toothpaste. The study had mentioned 14,000 participants during the promotion of the tooth paste, which either have been overstating or must have included unpublished studies (may contain in combination of fluoride) and also, only half of the population received new intervention [13].

There is “too much evidence” which leads to uncontrollable perplexity among the varied guidelines so documented causing difficulty in choice of treatment. Sometimes certain evidences have focussed on the same topic. For example, we have innumerable evidences related to caries and Periodontitis but not many on other.

There can be “barrier” in adoption of EBD. By definition, EBD is combination of evidence, patient needs or preferences and clinical expertise and opinion. With growing access to internet information, patients are always opinionated and hence certain guidelines given in EBD cannot be acknowledged by practitioners. For example, a partially edentulous patient with severe ridge loss may want to have implant treatment, whereas by guidelines, such patients can only be treated with removable appliances due to lack of bone support.

EBM is more a science of “marginal gains”. The interventions which were done to create impact on a larger scale for certain diseases were conducted long ago. The trials now focus more on the marginal differences between the treatments and the risk factors causing the disease rather than focussing on the outcomes as the days of finding new treatments to improve the outcomes are over. For example, in case of edentulous treatments, the protocol is to use a more stable final impression material, polyether [14]. Few people developed type IV allergies due to the presence of an allergin in base paste, which interfered with their eating habits [15]. In such cases the focus of the disease and clinical care “shifts” to assessment of risk factors in population.

There is “more emphasis on following the algorithmic rules” than following “shared decision making” (SDM). Meaning, the clinicians are more focussed on following the set rules than making a decision combining the evidence (guidelines), clinical expertise and patient preferences. For example, a dentist during the placement of an implant follows all the rules during placement but the systemic disease or local condition which may lead to the failure may go unnoticed while focussing on rules and steps. Especially, an inexperienced clinician may treat mechanically following the protocol and not make a clinical judgement.

“Poor fit for multimorbidity” majorly indicating those amongst aged population. Multimorbidity and polypharmacy are major causation in changes in pharmacokinetics and pharmacodynamics leading to drug interactions. For example, during an oral cancer therapy, when a patient is exposed to radiotherapy following the guidelines and protocol, it slowly changes the oral system. It influences the patient’s lifestyle by causing the following:

- **Sore mouth and throat:** with multiple ulcers hence, forcing the patients to consume analgesics and topical anaesthetics for pain relief.
- **Pain on swallowing:** may have to be on liquid diet and can use a tube feeding to keep their calorie intake up-to-date.
- **Xerostomia:** as the treatment damages the salivary glands, causing decrease in salivary flow. This in turn may lead to tooth decay and mouth infections. An artificial lubricating agent, a salivary stimulant has to be used to treat Xerostomia.
- **Taste changes:** Due to radiotherapy and chemotherapy, the patient may have a loss of taste sense, a metallic taste, or dulled taste. This in turn affects the appetite causing weakness.
- **Trismus:** radiotherapy can cause damage to the nerve supplying muscles of mastication, hence causing restriction in opening of the mouth. One will have to undergo physiotherapy to get rid of Trismus.

Actions to move it forward

After understanding all the crisis occurring in Evidence-Based Practice, there are various ways to re-implement it with improvements. We now move forward to Real Evidence Based Practice.

Focusing on individualisation of care for the patient and making it the top priority. It controls the process to avoid dominating the outcome, meaning it concentrates more on the individual treatment than on the diagnostic tests. Keeping this into consideration, depending on individual management needs, vigilantly distinguishing the priority whether to treat, investigate, or screen [16].

Nevertheless, its focus on population as a whole has major role to play. Conditions which are widespread and are commonly occurring like caries have been taken care by water fluoridation. Such large scale programmes follow the same principles as applied in clinical care and their success depends on the area of relevance, practicality, and acceptability. This happens by involvement of local communities in the decision making [16].

The patient should be made involved in the treatment decision making. Evidence-based is basically the combination of Evidence, Clinical expertise and Patient preference. This means, a treatment should not just be restricted based on evidence, neither solely on clinical expertise nor on patient preference. Making sensible use of judgement, knowledge, experience, status of the disease and research evidence will bring out best quality care [16].

Real evidence based practice is “not based on rules but judgement”. As a new practitioner, due to lack of experience, may focus more on rules, following the protocol mechanically. But the expert will make an initial quick diagnosis with the help of the history and examination, asks to conduct relevantly required tests to rule out other possibilities. The clinician should be an empathetic listener, not just follow set rules. They should be trained enough to inform the patient about their disease and assure them comfort and best

possible care. In certain diseases like oral cancer, the patient becomes emotionally unstable, during which the clinician's support and empathy plays a major role. In spite of following all the protocols, if a clinician fails to provide social care, the treatment goes in vain [16].

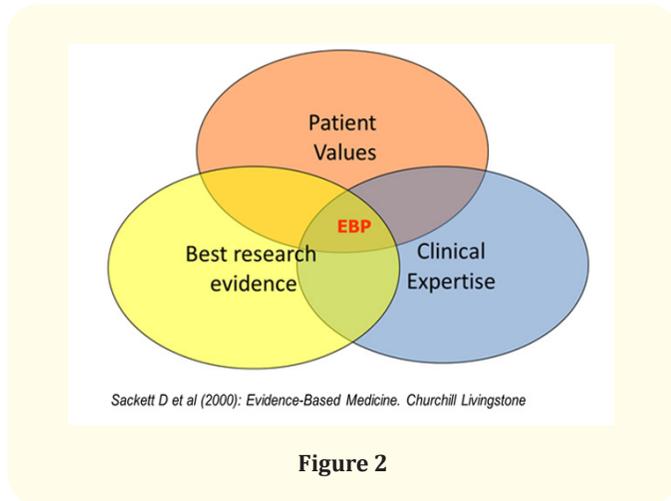


Figure 2

To achieve all of the above mentioned actions, the patients should demand for more, better quality, easily understandable and well-presented evidence which can be applied individually. Various steps should be taken to input patient views to enhance the quality of Evidence-Based practice. For example, the NICE guidelines have now incorporated more patient-friendly guidelines on recall visits [17].

Not just the patients, the publishers should demand for the study which genuinely contributes to the evidence. This can be done by involving the studies presenting significant P-values along with presentation of Confidence Intervals and by eliminating the studies which do not provide only P-values and not Confidence intervals, so that it meets their standards [16].

The clinicians should be better trained to critically appraise the researches to skill themselves in better quality judgement and to learn shared decision making treatments. They should be taught to recognize the flaws of a research so that they make use of the "best evidence" in application of their clinical practice based on how and when required [16].

There should be improvement in production of evidence. The researches and trials should be conducted to provide an outcome that can influence and enhance the treatment modalities and ways of management and the final outcomes. It should be in such way that it implies on how to use it, where to apply it, when to use it. Apart from publishers, the policy makers and independent funders must make sure that the dissemination, production and synthesis

meets the high quality standards in clinical and public health evidence [16].

The research agenda for real evidence-based practice must be broader, it should include all the possible types of research. It should include for example, the patient experience during treatment, anxiety, etc. In dentistry, a lot of clinical trials are required for a better evidence provision [16].

Conclusion

Despite various disadvantages, progressing towards curbing the limitations and implementing better ways to clinically practice based on best available evidence can drastically change the scenario. To deliver this movement, patients, clinicians, policy makers, publishers, research funders, researchers have a joint role play [16].

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