



CPD4dentalnurses

YOUR FUTURE IN YOUR HANDS

Evidence-Based Dentistry

Aims: To give an overview on the meaning of evidence-based practice and how to identify information that can be used to enhance clinical practice and improve patient care.

Objectives: On completion of this verifiable CPD article the participant will be able to demonstrate, through completion of a questionnaire, the ability to:

- Know the definition of evidence-based practice.
- Identify the three main components that make up evidence-based practice.
- Demonstrate knowledge of the hierarchy of evidence.
- Identify some considerations when critically appraising literature.
- Demonstrate knowledge on how to apply evidence-based dentistry to clinical practice.
- Know some of the challenges and benefits of applying evidence-based dentistry to clinical practice.

Introduction

Evidence-Based Dentistry is a systematic approach to dental practice that integrates the best available scientific evidence with the clinician's clinical experience and the patient's values and preferences. It offers a structured approach to delivering the highest standard of oral healthcare and it has revolutionised the field of dentistry by promoting a more rigorous and patient-centred approach to dental care.

The General Dental Council Standards Guidance states that "You must provide good quality care based on current evidence and authoritative guidance."¹ The General Dental Council also expects that registrants are able to: "explain, evaluate and apply the principles of an evidence-based approach to learning, clinical and professional practice decision making."² Therefore it is important that dental professionals understand the importance of applying evidence-based dentistry to their work.

This article will explore the principles, challenges and benefits of applying evidence-based dentistry to practice.

What is Evidence Based Medicine?



The term “evidence-based medicine” was first introduced by Gordon Guyatt from Canada in 1990. Subsequently, the Canadian Researcher David Sackett then co-authored the article “Evidence based medicine: What it is and what it isn’t”, in 1996 and defined evidence-based medicine as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.”³

Evidence-based decision-making is, therefore, much more than believing a newspaper article, or something a colleague has told you. It is necessary to further investigate such information in order to make an informed decision as to whether to apply it to your professional practice.

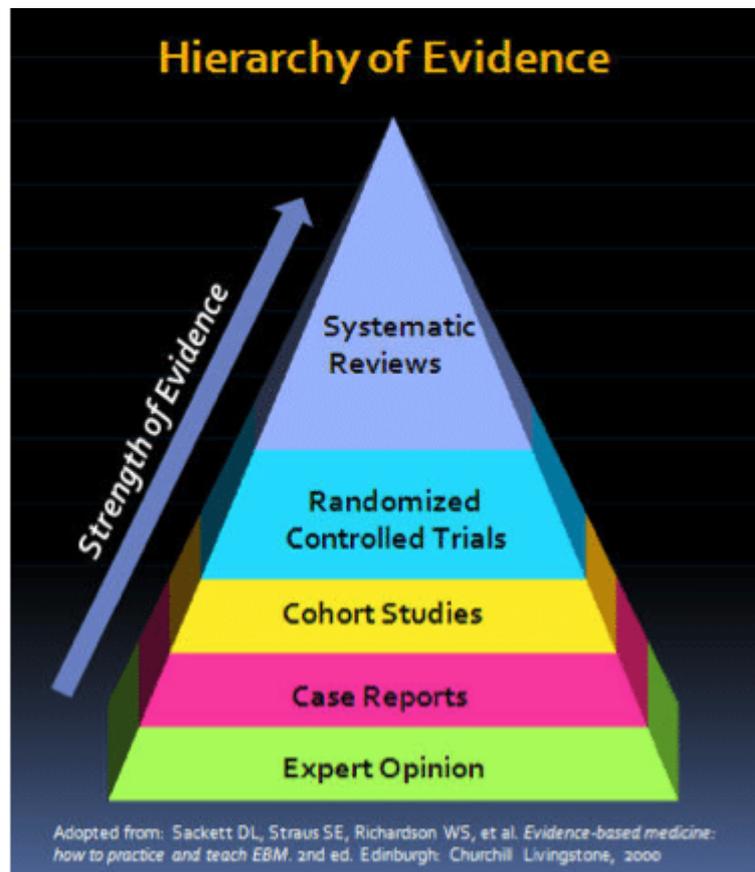
Evidence-Based Dentistry (EBD), is based on the following principles:

- 1) The integration of evidence: The foundation of EBD is the incorporation of high-quality, relevant research evidence into clinical decision making.
- 2) Clinical expertise: Dental professionals must apply their professional knowledge and skills to interpret and adapt the research evidence to individual patient cases.
- 3) Patient values and preferences: Dental care must be aligned with the patient’s values, preferences, and circumstances, ensuring a patient-centred approach.

1) Best Research Evidence

To practice evidence-based dentistry it is necessary to ensure that the evidence is of high quality. Research may be qualitative or quantitative. Quantitative research is structured and focuses on quantifying data and relationships. It deals with numerical data and statistical analysis. Qualitative research “collects non-numerical data that explores human behaviour, attitude, beliefs and personality characteristics unamendable to quantitative research.”⁴

The hierarchy of evidence is a framework used in evidence-based medicine and research to rank the quality and strength of different types of research studies or evidence sources. It is often displayed as a pyramid, with the tip showing the highest form of evidence and the base showing the lowest.



Systematic Reviews and Meta-Analyses: These are at the top of the hierarchy and provide the highest level of evidence. They involve a comprehensive review of multiple high- quality studies to summarise and analyse the data.

Randomised Control Trials: These are experiments where patients are randomly assigned to different treatment groups, allowing for a direct comparison of the effects of interventions.

Cohort Studies: These observational studies follow a group of patients over time, assessing the outcomes of specific exposures or interventions. Prospective cohort studies, where data collection starts after study begins, are generally considered stronger than retrospective ones, where data is collected after the outcomes have already occurred.

Case Reports: These are descriptive studies that provide information about individual cases or a small group of cases. They are considered weaker evidence due to their limited scope and potential for bias.

Expert Opinion: While valuable, expert opinions are at the bottom of the hierarchy in terms of scientific evidence. They are based on clinical experience and expertise rather than empirical research.

2) Clinical Expertise



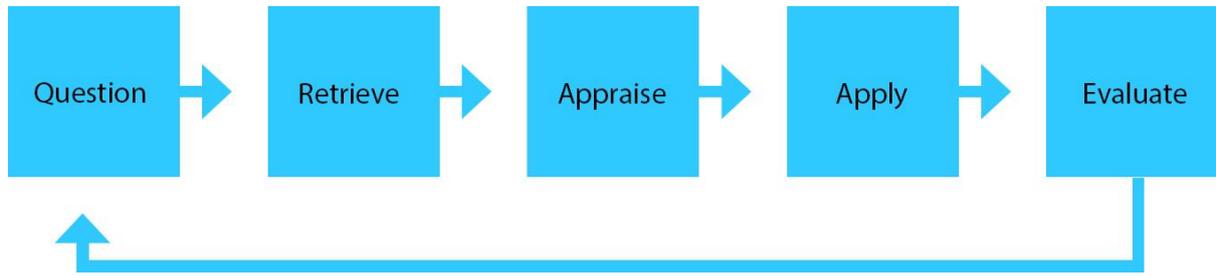
Clinical expertise is the ability for the dental professional to use their own clinical skills, experience and knowledge to “rapidly and correctly diagnose a particular patient state of health and to assess the risk and benefits of the different interventions considering the particular clinical state and the clinical setting.”⁵

3) Patient Values



Recognising the importance of patient- centred care, EBD considers the values, preferences, and priorities of the patient. Dental professionals should engage in shared decision making with their patients, taking into account factors such as the patient’s oral health goals, lifestyle and concerns. This collaborative approach ensures that treatment plans align with what the patient desires and can adhere to, promoting better patient satisfaction and treatment outcomes.

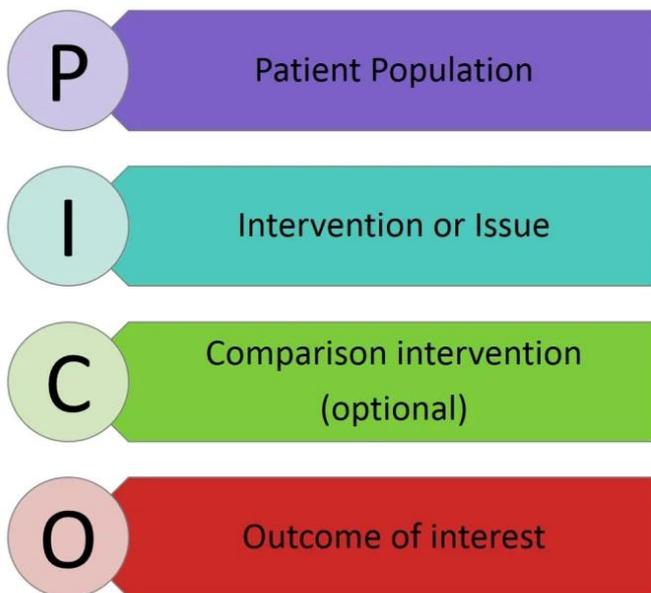
The Stages of EBD



The five steps of Evidence based Practice were first described in 1992 and consist of the following steps:⁶

1) Formulating Question

This involves identifying a specific question related to patient care that can be answered through evidence. The question can be structured using the PICO(T) format, which includes elements like patient/population, intervention, comparison, outcome and time.



For example, if you wanted to identify whether a powered or manual toothbrushing was better for oral health, the PICO format may be as follows:

Population – Adults aged 18 and over
Intervention or Issue- Use of electric toothbrush
Comparison- Manual brushing
Outcome- Dental plaque and gingivitis

2) Retrieving the Evidence



Once a question has been formulated, the next step is to retrieve the best available research.

Primary research involves collecting original data first hand through experiments, surveys, interviews or observations to generate new knowledge or insights directly from the source.

Secondary research involves analysing existing data collected by others, such as research articles, reports, statistical data and reviews with the purpose to synthesise existing knowledge, identify trends and support primary research findings. Examples of secondary research are literature reviews, meta-analysis, systematic reviews and data analysis from public data bases.

Dental guidelines are produced by collating the best available evidence available.

To search for evidence related to your question, a systematic search of relevant literature should be conducted, using reputable databases. It is important to select studies that are methodologically sound and provide the best evidence to answer the clinical question.

Examples of reputable places to search for evidence include:

- Cochrane Library
- PubMed
- TRIP Database
- DARE (Database of Abstracts of Reviews of Effectiveness)
- National Guideline Clearinghouse
- Scottish Clinical Effectiveness Programme
- Dental Elf

Using the example question as to whether a powered electric toothbrush is better than a manual toothbrush for oral health, a search in the Cochrane Library would find the systematic review. "[Powered /electric toothbrushes compared to manual toothbrushes for maintaining oral health](#)". A systematic review is considered the highest level of evidence. In addition, the Department of Health's [Delivering better oral health: an](#)

[evidence-based toolkit for prevention](#), would also provide relevant evidence. Patients may come into the surgery stating that they have read in a tabloid newspaper, for example one saying that powered toothbrushes damage the teeth. With knowledge of how to retrieve reputable research, the dental professional can direct patients to the correct location to retrieve data.

3) Critically appraising the literature



Critically appraising the literature will allow the dental professional to have confidence in the treatment and advice that they are providing for their patients.

When critically appraising literature there are certain questions that can be asked. There are numerous checklists that are available for evaluating studies. The following is an example:

1. What is the research question? - Is the research question clearly defined and relevant to the field of study?
2. What type of study was conducted? - Is the study design appropriate for answering the research question (e.g., randomized controlled trial, cohort study, case-control study)?
3. How was the sample selected? - Are the inclusion and exclusion criteria clearly stated? Is the sample size adequate to detect a meaningful effect?
4. How were the variables measured? - Are the methods of measurement valid and reliable? Are the outcomes measured in a consistent and unbiased manner?
5. What were the interventions or exposures? - Are the interventions or exposures well-defined and consistently applied?

6. What were the main results? - Are the results clearly presented? Are the statistical analyses appropriate and correctly interpreted?

7. What is the level of evidence? - Does the study provide strong evidence (e.g., high internal and external validity)? Are the conclusions supported by the data?

8. Are the findings generalisable? - Can the results be applied to other populations or settings?

9. What are the potential sources of bias? - Are there any biases in the study design, data collection, analysis, or interpretation of results?

10. What are the implications for practice? - How do the findings impact clinical practice, policy, or further research?

Critically appraising the literature involves critically evaluating the quality and validity of the selected studies. This is achieved by assessing the strength of evidence, considering study design, sample size, bias and other factors. Systematic reviews will have carried out a critical appraisal on the studies included. The following should be considered:

✚ **Validity of the Study Design:** The strength of the study design can influence the validity of the findings. Randomized controlled trials (RCTs) are often considered the gold standard for establishing causality, but observational studies can provide valuable insights, particularly when RCTs are not feasible.

✚ **Sample Size and Power:** Adequate sample size is crucial for the reliability of study results. Small sample sizes can lead to type II errors (failing to detect a true effect).

✚ **Measurement and Data Collection:** Valid and reliable measurement tools are essential for accurate data collection. Inconsistent or biased measurement methods can skew results.

✚ **Statistical Analysis:** Appropriate statistical methods are necessary to analyse the data correctly. Misuse of statistical techniques can lead to incorrect conclusions.

✚ **Bias:** Identifying and controlling for biases and confounding variables is critical for ensuring the validity of the study's findings.

✚ **Relevance and Applicability:** The study's findings should be relevant to the research question and applicable to the population of interest.

4) Applying the Evidence to Practice

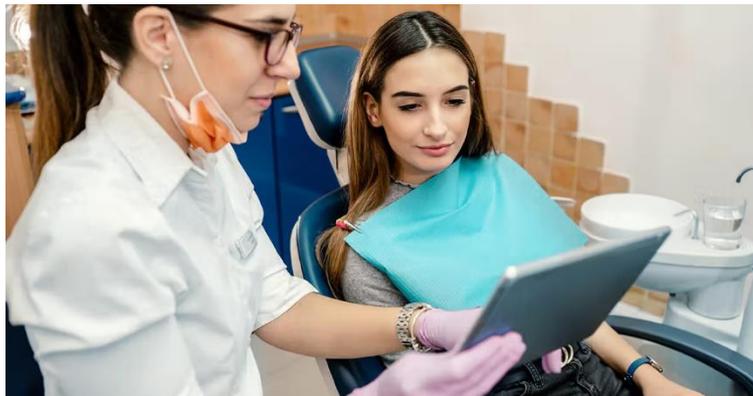
Applying the evidence to practice involves integrating the critically appraised evidence with clinical expertise and considering patient preferences, circumstances and values. If involving treatment options for example, evidence can be discussed with the patient,

and the potential benefits and risks of different treatment options can be discussed. This should be individually tailored to each patient.

5) Evaluating the Outcome

Once the chosen intervention has been implemented, the dental team then need to monitor the impact on patient outcomes. The process can be reflected on, and procedures adjusted so that there is continuous improvement. Clinicians are continuously carrying out CPD and keeping up to date with new evidence and should be willing to adapt as new research emerges.

The Benefits of EBD



Utilising evidence-based dentistry offers numerous benefits, which enhance the quality of patient care and improve clinical outcomes. Some advantages are as follows:

- ✓ **Improved Patient Outcomes:** EBD relies on the best available evidence to guide clinical decisions, leading to more effective treatments and better outcomes for patients.
- ✓ **Increased Quality of Care:** By integrating high-quality research findings into practice, clinicians can provide care that is scientifically validated and up to date.
- ✓ **Enhanced Clinical Decision-Making:** EBD equips practitioners with a structured approach to evaluating and applying research findings, thereby improving clinical judgment and decision-making.
- ✓ **Patient-Centred Care:** EBD emphasises the inclusion of patient preferences and values in treatment planning, ensuring that care is tailored to individual needs and circumstances.
- ✓ **Cost-Effectiveness:** By utilising evidence-based interventions, clinicians can avoid unnecessary or ineffective treatments, potentially reducing healthcare costs and increasing the efficiency of care delivery.

- ✓ **Professional Development:** Engaging with EBD encourages continuous learning and professional growth, helping practitioners stay current with the latest advancements and best practices in dentistry.
- ✓ **Standardisation of Care:** EBD promotes the use of standardised protocols based on the best evidence, leading to more consistent and reliable care across different practitioners and settings.
- ✓ **Enhanced Credibility and Trust:** Providing care based on solid scientific evidence can enhance the credibility of dental practitioners and build trust with patients and colleagues.
- ✓ **Regulatory Compliance:** EBD aligns with clinical guidelines and regulatory standards, ensuring that practices meet the required benchmarks for quality and safety.
- ✓ **Reduction of Clinical Variability:** EBD helps minimise variations in treatment approaches by providing a common framework for evaluating and implementing clinical practices.
- ✓ **Ethical Responsibility:** Practicing EBD is part of ethical clinical practice, ensuring that patient care is based on the best possible evidence and not influenced by outdated practices or personal biases.

The Limitations of EBD

Whilst offering a scientific and structured approach to dentistry, there are some limitations:

- **Quality of Evidence:** The available evidence may be of varying quality. Not all studies are well-designed, and some may have biases or methodological flaws.
- **Quantity of Evidence:** For many clinical questions, there may be a lack of sufficient high-quality research, making it difficult to draw firm conclusions.
- **Applicability:** Research findings may not be directly applicable to individual patients due to differences in demographics, health status, or other contextual factors.
- **Time and Resources:** Practitioners may lack the time and resources to thoroughly review and apply the latest research findings in their practice.
- **Complexity of Clinical Decisions:** Clinical decisions often involve complex factors that cannot always be captured in research studies, including patient preferences and socioeconomic factors.
- **Lag in Research to Practice:** There can be a significant delay between the generation of new evidence and its implementation in clinical practice. It has been reported that only 10% of dental care is based on validated research and

that it “may take 17-20 years to implement research-based knowledge to patient care.”⁷

- **Conflicting Evidence:** Sometimes, studies provide conflicting results, making it challenging to determine the best course of action.
- **Bias and Influence:** Research can be influenced by funding sources, leading to potential conflicts of interest that may bias the results.
- **Over-reliance on Evidence:** Exclusive reliance on evidence can undervalue clinical experience and patient preferences, which are also critical components of effective patient care.
- **Variability in Guidelines:** Different professional organisations might develop varying guidelines based on the same evidence, leading to confusion among practitioners.

These limitations highlight the need for a balanced approach in EBD, where scientific evidence, clinical expertise, and patient preferences are integrated to provide the best possible care.

Continuing Professional Development



Dental Care Professionals must undertake Continuing Professional Development to maintain their registration. The General Dental Council (GDC), do not quality assure CPD. They encourage dental professionals to:

- ✓ Ask CPD providers about their quality assurance processes.
- ✓ Consider what quality assurance has been done before.
- ✓ Make careful choices about CPD.
- ✓ Seek out quality CPD representing value for money.

When reading on-line CPD or CPD journal articles it is important to be mindful of where the author got their information from. Is there a list of references so that you can check that the information is up to date and that claims are being supported by reliable evidence? Has the CPD been peer reviewed? It is also important to check for potential bias- for example is the CPD influenced or biased by commercial organisations?

The same rules apply if attending courses. It is important to know that the speaker is knowledgeable and has references to back up statements.

The General Dental Council provide recommendations for CPD topics, but they are not compulsory or a requirement for registration. CPD should be driven by the dental professional's Personal Development Plan. Full CPD articles are available on the website on the Enhanced CPD scheme and Personal Development Planning.

Conclusion

Evidence based dentistry combines the best scientific research, clinical expertise, and patient preferences to improve dental care. Despite its limitations, such as varying quality of evidence and challenges in applying research to individual patients, evidence-based dentistry provides a structured approach that enhances treatment outcomes. By balancing research findings with clinical experience and patient needs, evidence-based dentistry helps ensure more effective and personalised dental care.

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Personal Development Plan and Reflective Learning

This CPD is linked to the following GDC Enhanced CPD Development Outcomes:

A. Effective communication with patients, the dental team and others across dentistry, including when obtaining consent, dealing with complaints, and raising concerns when patients are at risk.

B. Effective management of self and effective management of others or effective work with others in the dental team, in the interests of patients; providing constructive leadership where appropriate.

C. Maintenance and development of knowledge and skill within your field of practice.

D. Maintenance of skills, behaviours and attitudes which maintain patient confidence in you and the dental profession and put patients' interests first.

Reflective learning is now a requirement of the GDC Enhanced Professional Development Scheme. As such, you will now need to answer some reflective learning questions, before your certificate is generated.

Please remember that you need to fill this in on completion of the exam, but you can also update this at any time from your CPD log. If you take a few moments to write your reflection on completion, you will have fulfilled the Enhanced CPD requirements.

Further Reading

[The Cochrane Library](#)

[Dental Elf](#)

References

1. General Dental Council Standards (2013) Principle 7: Maintain, develop and work within your professional knowledge and skills. Available at: <https://standards.gdc-uk.org/pages/principle7/principle7.aspx> (accessed 07/06/2024)
2. General Dental Council (2015) Preparing for Practice: Dental team learning outcomes for registration. Available at: [GDC learning outcomes PRINT.qxd:Layout 1 \(gdc-uk.org\) \(accessed 07/06/2024\)](#)
3. Sackett, D.L., Rosenberg W., Muir Gray, J., Haynes. B., Richardson, W. (1996) Evidence based medicine: what it is and what it isn't. Available at: <https://www.bmj.com/content/312/7023/71> . Accessed 11/10/2023
4. Chai et al. (2021) A concise review on Qualitative Research in Dentistry . Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7908600/>. Accessed 31/10/2023
5. Sadaf, D (2019) How to apply evidence-based principles in clinical dentistry. Available at: [How to apply evidence-based principles in clinical dentistry - PMC \(nih.gov\)](#) (accessed 31/10/2023)
6. Gundray, K., Walmsely, AD. (2016) Evidence-based dentistry in everyday practice. Available at: <https://www.dental-update.co.uk/content/evidence-based-dentistry/evidence-based-dentistry-in-everyday-practice/> (accessed 22/05/2024)
7. Sadaf. D (2019) How to apply evidence principles in clinical dentistry. Available at: https://www.researchgate.net/publication/331018728_How_to_apply_evidence-based_principles_in_clinical_dentistry (accessed 07/06/2024)