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Evidence Based Periodontology: An Overview

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Abstract: *Traditionally, clinical decisions in dentistry have been based on the experience of the clinical dentist. If a given treatment seemed to work, it was utilized again; if the results were disappointing, the procedure was deserted. Evaluating clinical treatment in this fashion is difficult because it is hard to know which factors are important for success and which ones contribute to failure. This came with the concept of evidence based approach which facilitates conclusions for clinical practice based on sound research studies. The purpose of this paper is to demonstrate how evidence based approach can both inform on and benefit healthcare in periodontology*

Keywords – *Decision making, evidence based approach, meta-analysis, randomized control trial, systematic review.*

I. Introduction

Periodontics is a rapidly changing field with advances in the ability to diagnose, prevent disease and slow its progression, and regenerate lost periodontium. The recent focus is on clinical decision-making and it is our duty to offer the best possible care for patients in an evidence-based manner.
Evidence-based approach (EBA) offers a bridge from science to clinical practice.

II. What Is Evidence?

Evidence is based on the existence of at least one well-conducted randomized control trial (RCT).

III. Need For Evidence

The classic example for the need for evidence is William Hunter's focal infection theory which was originally proposed in 1900, but was later discarded in 1940s due to lack of proper evidence. Again the theory was accepted in 1989, due to studies which proved the same with proper evidence.

IV. Evidence Based Dentistry

According to the American Dental Association (ADA),

Evidence-based dentistry (EBD) is an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences.

Three components of EBD are shown in Fig 1.

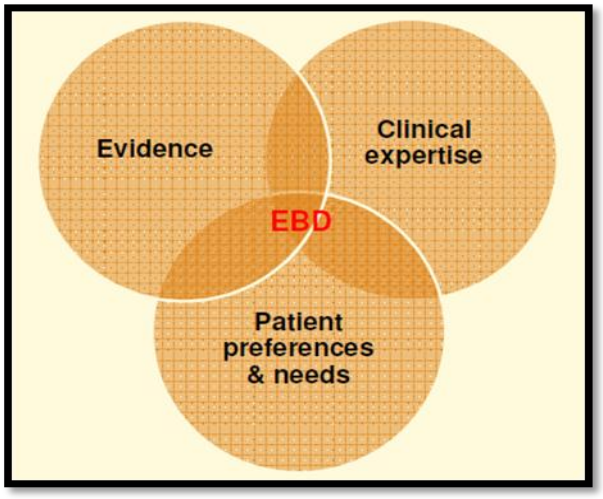


Fig 1: Components of EBD

According to Sacketts (2000),

Evidence-based practice involves integrating individual clinical practice with the best available external clinical evidence from systematic research.[1]

Mosby's Medical Dictionary has stated that evidence-based dentistry is "a systematic practice of dentistry in which the dentist finds, assesses, and implements methods of diagnosis and treatment on the basis of the best available current research, their clinical expertise, and the needs and preferences of the patient"[2]

4.1 Advantages of evidence-based approach compared with other assessment methods

The EBA is:[3]

1. Objective.
2. Scientifically sound.
3. Patient-focused.
4. Incorporates clinical experience.
5. Stresses good judgement.
6. Is thorough and comprehensive.
7. Uses transparent methodology.

The other assessment methods are given in Fig.2.

Other Methods of Collecting and Assessing Information

Method	Purpose	Strength of Inference for Clinical Decision-making
Surveys	Determines practice patterns, attitudes.	Weak
Expert opinions	Provides guidance in areas in which data may be inadequate.	Weak
Narrative literature review	Overview of reviewers' interpretation of the subject. Collection of evidence is determined by reviewers' personal experience.	Moderate
Systematic evidence review	Comprehensive, objective search and analysis of all evidence including unpublished data. More reliable and accurate conclusions and inferences.	Strong
Consensus based on EB systematic review	Combines expertise of multiple stakeholders with systematic review. Highest level of evaluation and most useful.	Strongest

Fig 2: Other methods

4.2 limitations for getting good evidence[3]

1. Inadequate steps to control bias in a study.
2. Insufficient number of participants studied.
3. Ignoring questions and outcomes of interest to patients.
4. Lack of rigorous scientific data to support clinical practices.

V. Evidence Based Periodontology

Evidence-based periodontology is the application of evidence-based health care to periodontology.[4]

A useful definition of evidence-based health care has been proposed by Muir Gray(1997):[5]

An approach to decision making in which the clinician uses the best evidence available, in consultation with the patient, to decide upon the option which suits that patient best. Therefore, evidence-based periodontology is a tool to support decision making and integrating the best evidence available with clinical practice. The highest quality evidence will be used if it exists, but if it does not, lower levels of evidence will be considered. Lower levels of evidence usually means research designs more prone to bias and therefore with less reliable data.

5.1what Evidence Based Periodontology Is Not

Evidence-based periodontology is not simply systematic reviews of randomized controlled trials, although this can be an important aspect. Evidence based periodontology is an approach to patient-care and nothing more. The expectations that are sometimes laid on it can be inappropriate.

It cannot provide answers if research data do not exist (other than using expert opinion) and it cannot substitute for highly developed clinical skills. Therefore, it can never be cookbook healthcare or use statistics in isolation to drive clinical care. Instead it is the comprehensive integration of appropriate research evidence, patient preference and clinical expertise.[4]

5.2 Clinical Relevance

One of the barriers to the application of research findings in clinical practice is the way that results are often presented. Typically, a mean value will be published, based on a statistical analysis comparing experimental groups. Such a value in conjunction with its associated 95% confidence interval is useful to determine whether there is a statistically significant difference between groups and will often be a requirement of a study designed for regulatory approval. However, this type of analysis is not designed to provide information about the probability of achieving a certain outcome were the reader to apply it in practice. Such an outcome could include achieving a health benefit or preventing further disease.

For example, in a meta-analysis from a systematic review on guided tissue regeneration (GTR) for periodontal infrabony defects, the additional benefit of using GTR over access flap surgery was a 1.1 mm gain in clinical attachment. This should, however, not be interpreted as the additional benefit to be expected every time that GTR is used instead of access flap surgery. One approach to analysing and presenting data in a more clinically useful format is to calculate the number needed to treat (NNT). This is the number of patients that would need to be treated to achieve a stated benefit (NNTb) or to avoid a stated harm (NNTh). It is derived from a dichotomous outcome such as the proportion of sites achieving at least 2 mm gain in attachment. For the GTR meta-analysis, and using this benefit, the NNTb is eight. In other words, for every eight patients treated with GTR, you can expect one to have at least 2 mm more gain in clinical attachment than if you had used an access flap (95% confidence interval).[4]

VI. Evidence-Based Periodontology Vs. Traditional Periodontology

High quality research and the use of evidence are fundamental to both evidence-based periodontology and traditional periodontology. The differences between these approaches emanate from how research informs clinical practice.

Evidence-based periodontology uses a more transparent approach to acknowledge both the strengths and the limitations of the evidence. An appreciation of the level of uncertainty or imprecision of the data is essential in order to offer choices to the patient regarding treatment options. Evidence-based periodontology also attempts to gather all available data and to minimize bias in summarizing the data. These aspects are key to decision making and are highlighted in the following table.

Evidence-based periodontology	Traditional periodontology
Similarities	
• High value of clinical skills and experience	
• Fundamental importance of integrating evidence with patient values	
Differences	
• Uses best evidence available	• Unclear basis of evidence
• Systematic appraisal of quality of evidence	• Unclear or absent appraisal of quality of evidence
• More objective, more transparent and less biased process	• More subjective, more opaque and more biased process
• Greater acceptance of levels of uncertainty	• Greater tendency to black and white conclusions

Furthermore, evidence-based periodontology acknowledges explicitly the type or level of research on which conclusions are drawn. However, one aspect that influences the reliability of the data is the control of bias. Bias is a collective term for factors that systematically distort the results of research away from the truth. Different research designs offer different possibilities for the control of bias and therefore vary in their reliability.

6.1 Components Of Evidence-Based Periodontology

Evidence-based periodontology starts with the recognition of a knowledge gap. From the knowledge gap comes a focussed question that leads on to a search for relevant information. Once the relevant information is located, the validity of the research needs to be considered in two broad areas

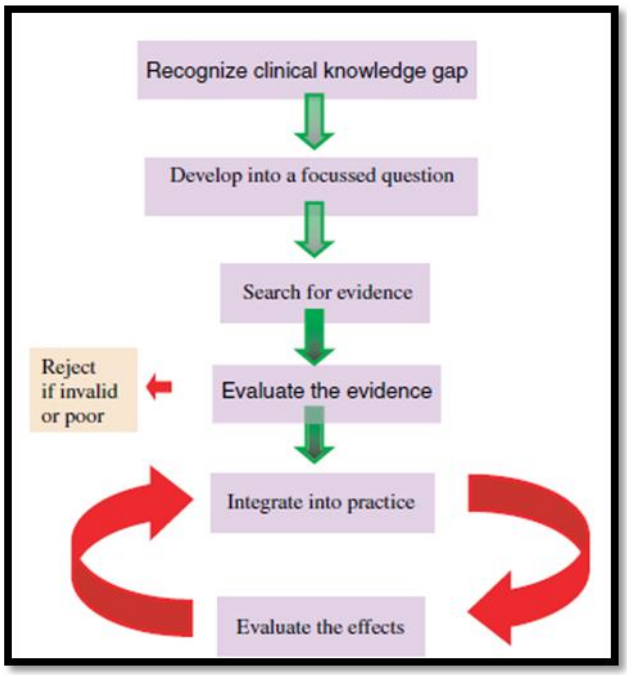
Firstly, is the science good (internal validity)?

Internal validity focuses on the methodology of research.

Secondly, can the findings be generalized outside of the study (external validity)?

External validity might be affected by the way treatment was performed. For instance, if the time spent on treatment was extensive it might not be practical to provide this therapy outside of a research study.

6.2 Steps Of Ebp:



6.3 Systematic Reviews

One important element of evidence-based periodontology is the systematic review. Systematic reviews are a research design termed research synthesis. That is, they use research methodology to pool data from multiple studies that address a particular hypothesis.

A systematic review can be defined as a review of a clearly formulated question that attempts to minimize bias using systematic and explicit methods to identify, select, critically appraise and summarize relevant research.

6.3.1 What A High Quality Systematic Review Can Do:

1. Find and summarize all available studies.
2. Provide an objective assessment of the quality or research and in particular the degree of protection from bias within the original studies.
3. Estimate research effects across multiple studies with meta-analysis.

a. Meta-analysis is valid only if studies are similar in their research question and design.
b. Meta-analysis can estimate uncertainty and precision of the effect.
c. Meta-analysis may generate hypotheses for differential effects across subgroups of the population tested.

4. If the effect is consistent across multiple studies (with small differences in design), then it may more readily possible to generalise the results to clinical practice than the results from a single study.

5. Overcome limitations of underpowered studies in detecting a true difference if such a true difference really exists.

6.3.2 What A High Quality Systematic Review Cannot Do:

1. It cannot be used in isolation to dictate clinical practice.
2. It is a synthesis of available research and must be used in context with clinical judgement and patient preference.
3. Produce strong conclusions if the research base is weak in quality.
4. Overcome limitations of narrowly designed clinical research.
5. Exclude relevant studies.
   Although the majority of hits from the search will be excluded, this is due to the deliberate strategy of achieving high sensitivity (likelihood of finding all relevant studies) but low precision (likelihood of only finding relevant studies). Therefore, it is common to find that more than 90% of the search records are totally irrelevant to the question and must be excluded.
6. Be a miracle research design: All research has strengths and limitations/weaknesses. Systematic reviews are no different from other research designs in this respect.[4]

VII. Development Of EBP

Evidence-based periodontology is built upon developments in clinical research design throughout the 18th, 19th and 20th centuries. Evidence-based medicine has only been known for just over a decade and the term was coined by the Clinical epidemiology group at McMaster University in Canada.[6]

The influence of the McMaster group spread far. One of the earliest to take up the challenge in periodontology (in fact in oral health research overall) was Alexia Antczak Bouckoms in Boston, USA. Antczak Bouckoms and colleagues challenged the methods and quality of periodontal clinical research in the mid 1980s and set up an Oral Health Group as part of the Cochrane Collaboration in 1994. The editorial base of the Oral Health group subsequently moved to Manchester University in 1997 with Bill Shaw and Helen Worthington as co-ordinating editors.

The first Cochrane systematic review in periodontology was published in 2001 and researched the effect of guided tissue regeneration for infrabony defects (Needleman et al 2001).[7] Many individuals have been active in the critical analysis of the periodontal literature. These include Jan Egelberg, Loma Linda University, Noel Claffey, Trinity College Dublin, and Gary Greenstein, University of Medicine and Dentistry of New Jersey.

There have been many notable events in evidence based periodontology.

The 1996 World Workshop in Periodontology held by the American Academy of Periodontology included elements of evidence-based healthcare, supported by Michael Newman at UCLA .

The 2002 European Workshop on Periodontology became the first international workshop to use rigorous systematic reviews to inform the consensus.

The workshop was organized by the European Academy of Periodontology for the European Federation of Periodontology, under the chairmanship of Professor Klaus Lang.

Sixteen focussed and rigorous systematic reviews formed the basis of intense consensus discussions.

A similar approach was used subsequently by the American Academy of Periodontology for the Contemporary Science Workshop in 2003.

VIII. Study Designs And Critical Appraisal

8.1 Different Study Designs

Different clinical research questions require evaluation through different study designs. A study to determine the effectiveness of surgical therapy compared with nonsurgical debridement deals with the effectiveness of a treatment option and would be best answered by a randomized controlled trial (RCT) or, ideally, a systematic review of RCTs.

However, it must be noted that although RCTs and systematic reviews of RCTs may well be the gold standard upon which to base decisions on the effectiveness of interventions, they are not necessarily appropriate, or ethical, to answer all questions. An RCT would obviously not be helpful in answering the question posed on the epidemiological evidence of plaque in the etiology of periodontitis. For such questions regarding prognosis or etiology, cohort studies would be more appropriate.

Following table illustrates the types of study designs most suitable for different types of research questions arising in periodontology. The most appropriate source of information will depend upon the type of study design being sought.[4]

Definition of study design	Used for (examples given in italics)
Experimental studies	
Randomized-controlled trial: parallel group design – a group of participants (or other unit of analysis, e.g. teeth) is randomized into different treatment groups. These groups are followed up for the outcomes of interest	Evaluating the effectiveness of an intervention *Randomized controlled trial comparing the effectiveness of surgical therapy and nonsurgical debridement.*
Randomized-controlled trial: split-mouth design – each patient is his/her own control. A pair of similar teeth, or groups of teeth (quadrants), may be selected and randomly allocated to different treatment groups.	
Non-randomized controlled trial – allocation of participants under the control of the investigator, but the method falls short of genuine randomization.	*Controlled trial comparing two methods of treating periodontal intrabony defects using pairs of sites where the LHS is always group A and the RHS group B.*
Observational studies	
Cohort: a longitudinal study, identifying groups of participants according to their exposure/intervention status. Groups are followed forward in time to measure the development of different outcomes.	Measuring the incidence of a disease; looking at the causes of disease; determining prognosis. Cohort study looking at the progress of periodontitis over time and relating this to external factors such as smoking or plaque.
Case-Control: a study that identifies groups of participants according to their disease/outcome status. Groups are investigated/ questioned to determine their exposure status	Identifying potential risk factors for a disease; looking at the possible causes of disease. *Case-control study looking at the prevalence of periodontitis and relating this to factors such as genetic markers.*
Cross-sectional: a study (survey) undertaken on a defined population at a single point in time (snap-shot). Subjects are observed on just one occasion and are not followed up.	Measuring the prevalence of a disease or risk factor in a defined population at a specific time. *A cross-sectional study to determine the current periodontal treatment needs in a specific population.*

8.2 Critical Appraisal: Why, What and How?

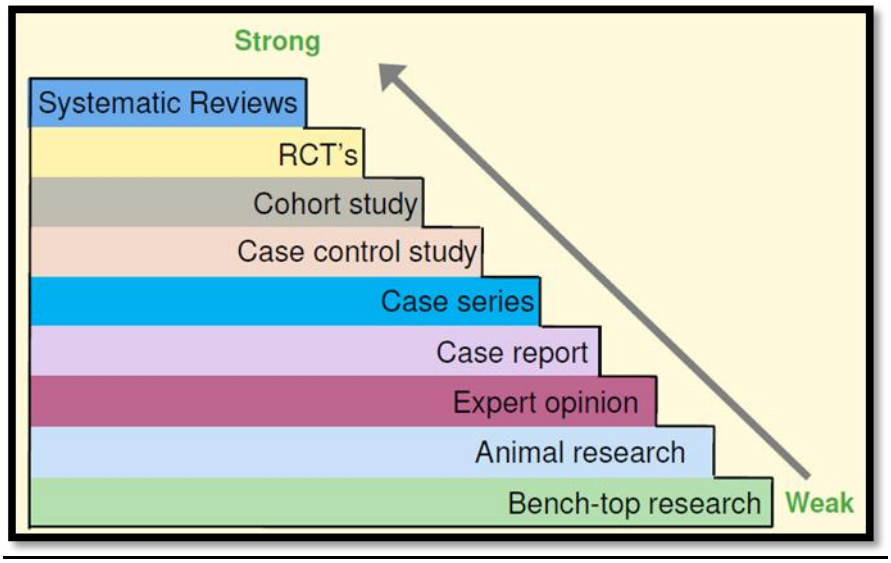
8.2.1 Why Critically Appraise?

Evidence-based periodontology, as its name implies, is periodontology that is based on evidence, but not just any so-called evidence. Richards in 2003[8] wrote a toolbox article for the journal Evidence-based Dentistry entitled: Not all evidence is created equal i.e, the quality of evidence may vary according to study design and that this has led to the concept that there can be a hierarchy of evidence.

One hierarchy is illustrated in following table and is specific to studies on therapy, prevention, etiology, and harm.

Level	Type of evidence
Ia	Systematic review (with homogeneity*) of randomized controlled trials (RCT).
1b	Individual RCT (with narrow confidence interval, see notes below).
2a	Systematic review (with homogeneity*) of cohort studies.
2b	Individual cohort study (including low quality RCT; e.g. <80% follow-up).
2c	'Outcomes' research; Ecological studies.
3a	Systematic review (with homogeneity*) of case-control studies.
3b	Individual case-control study.
4	Case-series (and poor quality cohort and case-control studies§)
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or 'first principles.

Levels of evidence



The publication of research in a high-ranking journal may not be an absolute guarantee of quality. Within the medical literature there are methodological studies which have empirically shown that quality is not merely a hypothetical concept but also affects study outcomes.

As examples of this, the reviews of Schulz et al. (1995), Moher et al. (1998) and Juni et al. (2001) showed that in studies in which there was inadequate concealment of treatment allocation, the treatment effects were exaggerated by about 40% compared to trials of higher quality.[4]

Improving the quality of reporting of clinical research in periodontology

The adequacy of reporting of clinical research is crucial if the reader is to evaluate the quality and possible impact of studies. The importance of several of the quality issues has not been thoroughly appreciated until relatively recently. Therefore, it is unfair to judge the past from the standpoint of current knowledge.

In addition, the pressure on page numbers in paper based journals can restrict detail. Hopefully this aspect will be alleviated by initiatives in electronic publication.

Guidelines are available to help the publication of clinical research. These guidelines are well accepted by high impact biomedical journals and offer guidance not only to authors but also to editors and reviewers.

These guidelines include

1. CONSORT (Consolidated Standards of Reporting Trials) for reporting randomized controlled trials and
2. STARD (Standards for Reporting of Diagnostic Accuracy) for reporting studies on diagnostic tests (http://consortstatement.org/).

In addition, three guidelines for reporting systematic reviews are available:

1. QUOROM (Quality of Reporting of Meta-analyses) (http:// consort-statement.org/),
2. MOOSE (Meta-analysis Of Observational Studies in Epidemiology) and
3. QUADAS (Quality Assessment of studies of Diagnostic Accuracy included in Systematic reviews).

For clarification, it should be remembered that systematic reviews are termed meta-analyses by some in North America, whereas the term meta-analysis is usually reserved only for the statistical combining of data which may or may not be part of a systematic review.

8.2.2 What Should Be Appraised?

Given that some evidence is better than other evidence, it seems reasonable to place greater emphasis on good than on poor quality evidence when making clinical decisions. The problem arises as to how exactly we decide what constitutes good quality evidence. This process is critical appraisal. The validity of published evidence is potentially affected by the quality of every stage of the experimental process from aims and objectives, through design, execution, analysis, interpretation, and finally publication.

Although deliberate deception is always a possibility, the majority of problems that arise are in fact unintentional. Most methodological errors may be classified as being the result of bias, confounding, or chance. Other factors could include how well treatment or supportive maintenance was provided.

8.2.3 How To Critically Appraise?

When appraising quality it is necessary to consider those factors that may affect the outcome of a study. These will inevitably vary according to both the topic of the original research and the study designs employed, so it is not possible to devise a single system that will be appropriate for every occasion. As a general rule, the aforementioned domains of bias, confounding and chance will all have to be appraised.

Some reviewers have attempted to devise composite scales that give scores for the various quality domains. These scores are then summed to an overall summary measure for the study as a whole. There are problems with this approach. Many quality items may not be based on empirical evidence and the scores attached to each item will inevitably be subjective. It is also doubtful whether a single summary score is likely to provide an adequate overall assessment of the quality of a particular study. When different composite scales are applied to the same studies, differing scores and rankings may occur. For these reasons, composite scales have largely gone out of favour. An alternative approach is to appraise each quality component Separately. For rigorous systematic reviews, independent reviewers usually undertake quality appraisal in duplicate and checklists are frequently employed for this purpose.

Item	Classification	Definition
Randomization	Adequate	If generated by random number table (computer generated or not); tossed coin; and shuffled cards.
	Unclear	Study refers to randomization but either does not adequately explain the method or no method was reported.
	Inadequate	Methods include alternate assignment, hospital number, and odd/even birth date.
Allocation concealment	Adequate	Methods included central randomization (e.g. by telephone to a pharmacy or trial office), pharmacy sequentially numbered/ coded containers, and sequentially numbered opaque envelopes.
	Unclear	If the study referred to allocation concealment but either did not adequately explain the method or no method was reported.
	Inadequate	Involved methods where randomization could not be concealed, such as alternate assignment, hospital number, and odd/even birth date.
Blinding of patient, caregiver, and examiner were considered separately	Recorded as adequate, inadequate, unclear, or for examiner blinding, not applicable if the study design precluded the possibility of blinding.	
Withdrawals and drop outs	Were all patients who entered the trial properly accounted for at the end?	
	Where dropouts occurred, the use of analyses to allow for losses (such as intention to treat) was noted.	

The use of checklists with objective criteria helps to safeguard the quality of the quality appraisal process itself. Written, piloted checklists reduce, but can never completely eliminate individual subjectivity in decisions. Having a written list means that it is more likely that the quality assessors will be both consistent and Repeatable. The results of the quality appraisal are used to assess the value of the evidence and to aid clinicians and reviewers in their efforts to place the evidence into context.

8.3 Assessing Evidence:

Twelve tools for assessing evidence:[9]

1. Be Skeptical.
2. Don't Trust Biologic Plausibility.
3. What Level of Controlled Evidence Is Available?
4. Did the Cause Precede the Effect?
5. No Betting on the Horse after the Race Is Over.
6. What Is a “Clinically Relevant Pretrial” Hypothesis?
7. Size Does Matter.
8. Is There "Even One Different Explanation That Works as Well or Better?"
9. Was the Study Properly Randomized?
10. When to Rely on Nonrandomized Evidence?
11. Placebo Effects: Real or Sham?
12. Was There Protection against Conflict of Interest?

IX. Evidence-Based Approach In Periodontal Therapy

1. EBA and mechanical nonsurgical pocket therapy
a. Effect of smoking on NST
2. EBA in periodontal regeneration
3. EBA and open flap debridement
4. EBA and mucogingival surgery
5. EBA and dental implants[10]

9.1 Evidence-Based Approach And Mechanical Nonsurgical Pocket Therapy

A total of nine reviews were searched for the best evidence. Nonsurgical pocket therapy (NST) was found to have a positive effect with the exception of pockets <3 mm. Patient, environmental, and operator factors affect therapy delivery.

No difference was found between the effect of hand and machine-driven instruments. Machine-driven instruments were faster than hand-driven instruments.

Conclusions from 1996 world workshop on periodontics:

Chemical plaque control:

The various antiplaque and/or antigingivitis agents do not offer a substantial benefit for the treatment of periodontitis. They may however contribute to the control of gingival inflammation that exists with periodontitis.

Supragingival irrigation may be used as an adjunct to toothbrushing and has been shown to aid in the reduction of gingival inflammation. Even when subgingival irrigation is used, the evidence shows that there are no clear substantial long-term benefits for the treatment of periodontitis.

Antibiotic therapy and periodontics:

The risk-benefit ratio indicates that systemic antibiotics should not be used for the treatment of gingivitis and common forms of adult periodontitis. But evidence suggests that systemic antibiotics may be useful in aggressive forms of periodontitis.

Local delivery of antimicrobial agents:

There was modest gain in clinical attachment level and decrease in probing depth and gingival bleeding. A few side effects were demonstrated namely, transient discomfort, erythema, recession, allergy, and rarely, candida infection.

Implications for future research:

1. Effect of NST in different population groups is to be estimated.
2. Operator aspects should be included in therapy effectiveness.
3. Patient-oriented research to be conducted.
4. Efficiency studies performed.
5. Use of NST in maintenance treatment to be investigated.
6. Researchers should provide details of study design, conduct, and analysis.
7. Future studies should be designed to be incorporated in future systematic reviews.

It was concluded that though adjunctive therapies continue to be explored, mechanical debridement is still the single best option available. It remains the foundation treatment for many adjunctive antimicrobial treatment investigations.

9.1.1 Effect Of Smoking On Nst (Non Surgical Therapy):

Systematic review of the effect of smoking on NST was conducted by Labriola et al. (2000) [11] Search strategy included Medline, Embase and Central. Study design was controlled clinical trial.

The outcomes were:

There was reduced pocket depth reduction in smokers, compared with nonsmokers. There was no significant difference in the change of Clinical Attachment Level (CAL) between smokers and nonsmokers.

The reason could be that the increased vasoconstriction in peripheral blood vessels of smokers leads to decrease in bleeding and edema. Also, smokers would have less potential for resolution of inflammation and edema within the marginal tissues and therefore less potential for gingival recession.

9.2 Evidence-Based Approach In Periodontal Regeneration

9.2.1 Guided Tissue Regeneration:

The study population included chronic periodontitis patients in subjects 21 years or older.
The outcomes assessed were:

Short-term clinical outcomes: It included soft tissue changes such as increased CAL and decreased PPD.

Long-term clinical outcomes: It included disease recurrence and tooth loss.

Patient-centered outcomes:

It included various factors such as ease of maintenance, change in esthetics, p/o complications, cost/benefit ratio, and patient well-being.

The meta-analysis done by Needleman et al (2001) and Murphy et al (2003),[12] revealed that: When compared with OFD, guided tissue regeneration (GTR) showed increase in CAL, decrease in PPD, and defect fill. When GTR with bone substitutes was compared with GTR alone, the results were similar. No evidence was found for difference in use of ePTFE versus bioabsorbable membranes.

Long-term clinical outcomes/patient-centered outcomes could not be determined due to lack of available data. Heterogeneity was large and bias could not be eliminated.

9.2.2 Grafting Procedures:

Meta-analysis was done by Reynolds et al (2003) and Trombelli et al (2002).
The therapeutic end points used were

Short-term changes [12 months after intervention]
Long-term changes [13 months or more]
Patient-oriented changes

Short-term changes:
Autogenous bone:

Trombelli et al (2002) [13] in his review demonstrated greater CAL gain in autogenous graft group than the control group, but the result was not statistically significant.

Reynolds et al (2003) [14] showed a statistically significant gain in CAL.

Bone allograft: Use of bone allograft showed gain in CAL, PPD reduction and increased defect fill.
Dentin allograft: Use of dentin allograft showed a gain in CAL of 2.8 mm in grafted patients as compared with 2 mm CAL gain in controls.

Coralline calcium carbonate: Use of the graft showed a gain in CAL and bone fill. But there was no improvement in pocket depth reduction.

Bioactive glass: There was improvement of bony lesion when compared with open flap debridement [OFD].

Mean difference in CAL between the two was 1.04mm. Change in bone fill noted was greater for bioactive glass, but the change was not statistically significant. Heterogeneity was present due to a study conducted by Org et al (2000) [15] which demonstrated a more favorable change following an OFD procedure.

Long-term outcomes:

Fleming et al (1998) [16] did a 6.36 months follow-up study and found that there was 0.12 mm gain in clinical attachment level gain in test group and 0.43mm decrease in clinical attachment level in control group.

Galgut et al (1992) [17] assessed and compared clinical attachment level at 12 months and 48 months. The results showed a 0.27mm decrease in clinical attachment level in grafted group and 0.14mm gain in clinical attachment level gain in open flap debridement group.

Yukna et al (1989) [18] followed up hydroxyapatite grafted patients for a period of five years. The results showed that two-thirds of the patients showed again in clinical attachment level in the grafted group and one third of open flap debridement showed a decrease in clinical attachment level.

Patient-centered outcome:

In most of the studies reviewed, there were no systemic or local adverse effects. The adverse effects noted in some of the studies were.

1. Pebbled surface texture of grafted site
2. Transient slight gingival inflammation

3. Delayed soft tissue healing
4. Exfoliation/shedding of graft material

9.3 Evidence-Based Approach And Open Flap Debridement:

Sytematic reviews were conducted by Heitz Mayfield et al(2002) [19] and Antczak et al (1993). [20]

9.3.1 Clinical Implications Of The Review:

If pocket depth reduction is the main aim, surgical treatment is the treatment of choice. If increase in clinical attachment level gain is the main aim, nonsurgical therapy is of more benefit for shallow and moderate pockets and surgical therapy is the treatment of choice for deep pockets. Predictability of treatment outcome at sites with furcation involvement or angular defect is unclear.

9.4 Eba And Mucogingival Therapy

Critical review by Pagliaro(2003) [21] on surgical root coverage led to the following conclusions: The overall clinical outcome of different techniques appears to be satisfactory, but the great variability among different studies creates difficulties in deciding which procedure is best suited for each clinical situation. The data are quite heterogeneous.

The data are seldom eligible for further comparative analysis even after some missing data are computed. The editors of periodontal journals could promote decisive measures for establishing clear mandatory standards for presenting data in research articles.

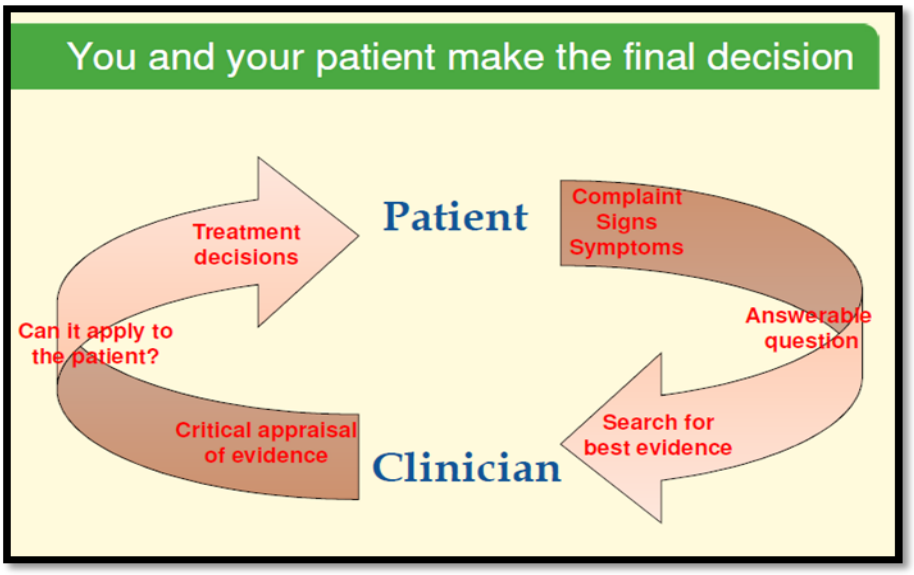
9.5 Eba And Dental Implants

Most evidence is available for titanium implants, but some evidence exists to support the use of hydroxyapatite and titanium-plasma sprayed implant surfaces, (Taylor et al 2005). [22]

There is also evidence to support the use of both two-stage systems which require a second surgery to expose the implant, and one-stage implant systems. Clinicians should exercise caution when treating patients who smoke and those with untreated periodontal diseases, poor oral hygiene, uncontrolled systemic disease and a history of radiation therapy in the region or active skeletal growth.

X. Conclusion

The principles of evidence-based healthcare provide structure and guidance to facilitate the highest levels of patient care. There are numerous components to evidence-based periodontology including the production of best available evidence, the critical appraisal and interpretation of the evidence, the communication and discussion of the evidence to individuals seeking care and the integration of the evidence with clinical skills and patient values. Hence generation of best evidence alone, is not enough to practise evidence- based healthcare. However, an understanding of the principles should help to underpin the latter aspects. Evidence-based healthcare is not an easier approach to patient management, but should provide both clinicians and patients with greater confidence and trust in their mutual relationship.



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