Evidence-based prosthodontics

Asbjørn Jokstad
Faculty of Dentistry
University of Toronto, Canada
What can be considered as truths in prosthetics?
What can be considered as truths in prosthodontics?

Who says so?

How can they say?!
What are truths in prosthodontics?

Who says so? How can they say?!

I.e. A reflection of the three basic questions posed in Philosophy:

1. What is there? (ontology)
2. How do we know? (epistemology)
3. Why should I? (ethical decisions)
What are truths in prosthodontics?

Who says so? How can they say?!

1. e. A reflection of the three basic questions posed in Philosophy:

1. What is there? (ontology)
2. How do we know? (epistemology)
3. Why should I? (ethical treatment decisions)
What are truths in prosthodontics?

Who says so? How can they say?!

1. What is there in prosthodontics? (ontology)
2. How do we know? (epistemology)
3. Why should I? (ethical treatment decisions)

Why do the theories and practices taught in different school undergraduate & prosthodontic graduate programs differ so much?

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Scientific studies can be graded according to the theoretical possibility of an incorrect conclusion.

This is reflected by the design of the study.

...we will never know exact answers in science....
<table>
<thead>
<tr>
<th>Level</th>
<th>Therapy/Prevention, Aetiology/Harm</th>
<th>Prognosis</th>
<th>Diagnosis</th>
<th>Differential diagnosis/symptom prevalence study</th>
<th>Economic and decision analyses</th>
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<tr>
<td>1a</td>
<td>SR (with homogeneity*) of RCTs</td>
<td>SR (with homogeneity*) of inception cohort studies; CDR† validated in different populations</td>
<td>SR (with homogeneity*) of Level 1 diagnostic studies; CDR† with 1b studies from different clinical centres</td>
<td>SR (with homogeneity*) of prospective cohort studies</td>
<td>SR (with homogeneity*) of Level 1 economic studies</td>
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<td>1b</td>
<td>Individual RCT (with narrow confidence interval)</td>
<td>Individual inception cohort study with &gt; 80% follow-up; CDR† validated in a population</td>
<td>Validating cohort study with good reference standards; or CDR† tested within one clinical centre</td>
<td>Prospective cohort study with good follow-up****</td>
<td>Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence, and including multi-way sensitivity analyses</td>
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<td>All or none case-series</td>
<td>Absolute SpFins and SnNouts¶</td>
<td>All or none case-series</td>
<td>Absolute better-value or worse-value analyses †††</td>
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<td>SR (with homogeneity*) of Level &gt; 2 economic studies</td>
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<td>Individual cohort study (including low quality RCT; e.g., &lt;80% follow-up)</td>
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<td>Expert opinion without explicit critical appraisal, or based on economic theory or &quot;first principles&quot;</td>
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“Doubt is not a pleasant condition, but certainty is an absurd one”

Voltaire (1694-1778)
Therapy/ Prevention/ Education

• Which implant design / surgical technique / maintenance regime / education strategy provides the best result?*

*Clinical, patient-centred, surrogate or economic outcomes
Therapy/ Prevention/ Education

1. Random allocation of the participants to the different interventions
2. Outcome measures of importance for at least 80 per cent of participants who entered the investigation
3. A statistical analysis consistent with the study design

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Prognosis

• How predictable is the performance of the implant “Speedy Fantastico” in the upper posterior jaw?
• What is the risk that patients will experience a fractured screw, abutment or implant?
Prognosis

1. A cohort of persons, all initially free of the outcome of interest

2. Follow-up of at least 80 per cent of patients until the occurrence of either a major study criteria or the end of the study

3. A statistical analysis consistent with the study design.
Diagnostic tests

- Does the use of RFA or the Periotest to predict loading strategy have any merits?
- What is the validity of the Zarb and Lekholm bone quality classification?
Diagnostic tests

1. Clearly identified comparison groups, at least one of which is free of the target disorder
2. Either an objective diagnostic standard or a contemporary clinical diagnostic standard with reproducible criteria
3. Interpretation of the test without knowledge of the diagnostic standard result
4. Interpretation of the diagnostic standard without knowledge of the test result
5. A statistical analysis consistent with study design
Etiology – Harm

- Does trace elements from implants cause adverse general effects?
- Has a certain batch of implants been contaminated during the production process?

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Etiology – Harm - Causality

- Randomised controlled trial > clinical controlled trial > cohort > case-control > cross-sectional > single case

- A statistical analysis consistent with the study design.

**Note:** These are purely probabilistic considerations
Views /beliefs /perceptions

• How does implant prostheses impact on the patient’s daily life?

• Why are colleagues hesitant to implement implant prosthetics in their practices?
Appropriate Study Designs to address implementation of interventions

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Influences on treatment decisions

- Resources
- The last patient
- Experience
- Evidence
- Litigation
- Education
- Audit
- Payment systems

Dental Practice

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Correct treatment decision

Survival estimates

Dentist:patient relationship

Two-way communication

Patient values & preferences

Risk factors – odds ratios

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Outcome probabilities

% worst case scenarios

Cost increments
Historically, prosthodontic decision making has always been influenced by:

1. a narrow range of technical solutions (limited by biology) and

2. the patient finances.

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“Doctors prescribe medicine of which they know little, to cure diseases of which they know less, in human beings of which they know nothing”

Voltaire

French Philosopher (1694-1778)
Traditional prosthodontic decision making is equivalent to how evidence-based medicine is meant to be practiced.

Evidence-Based Practice:

- The patient’s circumstances
- The evidence
- The patient’s wishes

Making clinical decisions


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Evidence-based Practice

Recognition of need of evidence

Search for Evidence

Make Sense of Evidence

Act on Evidence

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Primary research papers

Generating evidence from research

Synthesising the evidence

The patient's circumstances

The evidence

The patient's wishes

Making clinical decisions

How many in the audience here can comfortably state that they were adequately trained to critically appraise primary research papers?
The new graduate

Advertising
- producers
- colleagues

Head/ Staff/
Demonstrator-
filtered

“Curriculum”

”The Classic
literature”

Publications in prosthodontics

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Decision Making in Dental Treatment Planning

WALTER B. HALL

SECOND EDITION

ALAN H. CLOSKIN
W. EUGENE ROBERTS
EUGENE E. LEBARBE

Patient with a COMPLEX DENTAL PROBLEM who is SYMPTOMATIC or in ACUTE PAIN

Radiographs, clinical tests, laboratory tests

Determine:
Is etiology odontogenic?

A) Acute nonodontogenic emergency
B) Acute odontogenic emergency

C) Dental pain

Treating by specialist (dentist or physician)

D) Dentoalveolar

E) Periodontal health

Surgery

F) Operative

G) Periapical surgery

H) Extraction

I) Periapical surgery (traction)

J) Extraction

K) Periapical surgery (traction)

L) Extraction

M) Periapical surgery (traction)

N) Extraction

O) Periapical surgery (traction)

P) Extraction

Q) Periapical surgery (traction)

R) Extraction

S) Periapical surgery (traction)

T) Extraction

U) Periapical surgery (traction)

V) Extraction

W) Periapical surgery (traction)

X) Extraction

Y) Periapical surgery (traction)

Z) Extraction

Evaluate healing and prognosis

Canals control

Pulp exposure

INTERMEDIATE RESTORATION

RESTORABLE

Nonrestorable

PULPOTOMY or PULPECTOMY

EXTRACT

INTERMEDIATE RESTORATION

ROOT PLANING

RHEUMATOMA ROOT AMPL INFECTED (IF WARRANTED)

PREVENTIVE

SPLINTING

SURGERY

Nonrestorable

Salvageable

Extract

Nonextractable

SPLINTING

SURGERY

Nonrestorable

SPLINTING

SURGERY

Nonrestorable

SPLINTING

SURGERY

Nonrestorable

SPLINTING

SURGERY

Nonrestorable
Publications in Dentistry

N=1284

Source: Ulrich's International Periodicals Directory

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The Information Overload

Advertising
- producers
- colleagues

Meetings/courses

Dental literature

Colleagues

WWW

Patients & (-groups)

Popular magazines & Media

Dental ‘science’
25 000 articles/yr

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Because of the volume and time constraint....

Perhaps we can stick to read only review papers?
Secondary research papers

Reviews in Dentistry (n=12,367) (2007: 191)

(Source: Medline. OVID search strategy: review.pt + exp dentistry)

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Reviews - problems

Usually:

• written by a single topic expert
• based on their understanding of the literature
• no methodology is given
• a broad based subject is addressed
• the conclusions and advises differ
Example: Are splints an efficacious intervention for patients with TMD?
Oral splints: the crutches for temporomandibular disorders and bruxism?

T. T. Dao and G. J. Lavigne
Faculty of Dentistry, University of Toronto, Ontario, Canada.

Despite the extensive use of oral splints in the treatment of temporomandibular disorders (TMD) and bruxism, their mechanisms of action remain controversial. Various hypotheses have been proposed to explain their apparent efficacy (i.e., true therapeutic value), including the repositioning of condyle and/or the articular disc, reduction in the electromyographic activity of the masticatory muscles, modification of the patient's "harmful" oral behavior, and changes in the patient's occlusion. Following a comprehensive review of the literature, it is concluded that any of these theories is either poor or inconsistent, while the issue of true efficacy for oral splints remains unsettled. However, the results of a controlled clinical trial lend support to the effectiveness (i.e., the patient's appreciation of the positive changes which are perceived to have occurred during the trial) of the stabilizing splint in the control of myofascial pain. In light of the data supporting their effectiveness but not their efficacy, oral splints should be used as an adjunct for pain management rather than a definitive treatment. For sleep bruxism, it is prudent to limit their use as a habit management aid and to prevent/limit dental damage potentially induced by the disorder. Future research should study the natural history and etiologies of TMD and bruxism, so that specific treatments for these disorders can be developed.

..the true efficacy for oral splints remains unsettled.
Occlusal treatments in temporomandibular disorders: a qualitative systematic review of randomized controlled trials

Heli Forssell\textsuperscript{a,*}, Eija Kalso\textsuperscript{b}, Pirkko Koskela\textsuperscript{c}, Raili Vehmanen\textsuperscript{d}, Pauli Puukka\textsuperscript{e}, Pentti Alanen\textsuperscript{f}

\textsuperscript{a}Department of Oral Diseases, Turku University Central Hospital, Lemminkäisenkatu 2, FIN-20520 Turku, Finland
\textsuperscript{b}Department of Anaesthesia, Helsinki University Central Hospital, Haartmaninkatu 4, FIN-00290 Helsinki, Finland
\textsuperscript{c}Department for Oral Health, Centre of Health and Social Services, City of Jyväskylä, Hannikäisenkatu 11-13, FIN-40100 Jyväskylä, Finland
\textsuperscript{d}Health Center of Tampere, Suurmakasi 17 B, FIN-33200 Tampere, Finland
\textsuperscript{e}Social Insurance Institution, Research and Development Center, Pelolantie 3, FIN-20720 Turku, Finland
\textsuperscript{f}Institute of Dentistry, University of Turku, Lemminkäisenkatu 2, FIN-20520 Turku, Finland

Received 22 January 1999; received in revised form 17 June 1999; accepted 25 June 1999

\textbf{Abstract}

To investigate whether studies are in agreement with current clinical practices, a systematic review of randomized controlled trials (RCTs) of occlusal treatment studies from the period 1966 to March 1999 was undertaken. Eighteen studies met the inclusion criteria, 14 on splint therapy, and 4 on occlusal adjustment. The trials were scored using the quality scale presented by Antczak et al., 1986a (A.A. Antczak, J. Tang, T.C. Chalmers, Quality assessment of randomized control trials in dental research. J. Methods. J. Periodontal Res. 1986a:21:305–314). The overall quality of the trials was fairly low, the mean quality score was 0.43/1.00 (range 0.12–0.78). The most obvious methodological shortcomings were inadequate blinding, small sample sizes, short follow-up times, great diversity of outcome measures and numerous control treatments, some of unknown effectiveness. Splint therapy was found superior to 3, and comparable to 12 control treatments, and superior or comparable to 4 passive controls, respectively. Occlusal adjustment was found comparable to 2 and inferior to one control treatment and comparable to passive control in one study. Because of the methodological problems, only suggestive conclusions can be drawn. The use of occlusal splints may be of some benefit in the treatment of TMD. Evidence for the use of occlusal adjustment is lacking. There is an obvious need for well designed controlled studies to analyse the current clinical practices. © 1999 International Association for the Study of Pain. Published by Elsevier Science B.V.
Cited References

**Occlusal treatments in temporomandibular disorders: a quality analysis**
Forsell H, Kalso E, Kjaer I, Kihlberg A
PAIN
83 (1) 2000 104-118

**Oral splints: The crutches for temporomandibular disorders**
Dao TTT, Lavigne G
CRITICAL REVIEWS IN ORAL BIOLOG Y (3): 342-361 APR 1999

12 refs appear in both papers

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Clear the checkbox to the left of an item if you do not want to search for articles that cite the item...
SRs can show:

A review being published in a highly reputable journal does not necessarily mean it can’t be biased.
Therefore, the reviews should be "Systematic"
“Systematic reviews” appearing 1971, 1972, 1973?
"Systematic" review?

Is just a word!

Learn how to recognize one…
How many in the audience here can comfortably state that they were adequately trained to critically appraise secondary research papers?
Information is not synonymous to knowledge and even less so to clinical competence.
How quickly do dentists adopt to new research information?

Impacted wisdom teeth?
TMD management?
Need for restoration replacement?
Caries and remineralization potential

Why does the science transfer to dentists seem to be ineffective?
SIGN Publication Number 43

Management of Unerupted and Impacted Third Molar Teeth

A National Clinical Guideline

This guideline was issued in 2003 and will be reviewed in 2002 or sooner if new evidence becomes available. Any updates to this guideline in the interim period will be noted on the SIGN website. Comments are invited to assist the review process. All correspondence and comments for SIGN publications should be sent to the SIGN Secretariat.
1979: NIH Consensus dev. Conference for removal of third molars


1996: NHS R&D. National guidelines

Sept 1997: FacDentSurg RoyCollSurg(Eng)

1998: Effectiveness Matters 3(2)

2000: NHS R&D HTA Programme

2000: NICE Guidelines
"...studies ....appear to motivate a more restrictive approach today compared with 10 years ago"
Even if we have new research

1. This is not necessarily known amongst the dental clinical practitioners
Even if we have new research

1. This is not necessarily known amongst the dental clinical practitioners

2. Do educators ensure that they adequately prepare our future health professionals to change behavior, attitude and techniques rapidly in light of new knowledge?
Useful, or just cookbook dentistry?

Decision Making in Dental Treatment Planning

SECOND EDITION

WALTER B. HALL

ALAN H. GLOSKIR
W. FRED CREEDS
EUGENE F. LABARRE
Are dentists worse or better than other health professions?
The Cochrane Collaboration

- 1972: 1st trial
- 1972-1987: +6 trials
- 1989: 1st SR

From 1992
Cumulative meta-analysis of RCTs
Even if we have new research

1. This is not necessarily known amongst the dental clinical practitioners
2. Have our educators adequately prepared students to change .... in light of new knowledge?
3. Who’s responsibility should it be to disseminate (new) research results that impacts directly on patient care?
Who should be responsible?

Who should be responsible?
The state of research on oral implants

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FACULTY OF DENTISTRY

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