Evidence-based prosthodontics

Asbjørn Jokstad
Faculty of Dentistry
University of Toronto, Canada

What can be considered as truths in prosthodontics?

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?!

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 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?

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....

Oxford Centre for Evidence-based Medicine Levels of Evidence (May 2001)

Level	Therapy/Prevention, Aetiology/Harm	Prognosis	Diagnosis	Differential diagnosis/symptom prevalence study	Economic and decision analyses
1a	SR (with homogeneity*) of RCTs	SR (with homogeneity*) of inception cohort studies; CDR† validated in different populations	SR (with homogeneity*) of Level 1 diagnostic studies; CDR† with 1b studies from different clinical centres	SR (with homogeneity*) of prospective cohort studies	SR (with homogeneity*) of Level 1 economic studies
1b	Individual RCT (with narrow Confidence Interval‡)	Individual inception cohort study with ≥ 80% follow-up; CDR† validated in a single population	Validating** cohort study with good††† reference standards; or CDR† tested within one clinical centre	Prospective cohort study with good follow-up****	Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence; and including multi-way sensitivity analyses
1c	All or none§	All or none case-series	Absolute SpPins and SnNouts††	All or none case-series	Absolute better-value or worse-value analyses ††††
2a	SR (with homogeneity*) of cohort studies	SR (with homogeneity*) of either retrospective cohort studies or untreated control groups in RCTs	SR (with homogeneity*) of Level >2 diagnostic studies	SR (with homogeneity*) of 2b and better studies	SR (with homogeneity*) of Level >2 economic studies
2b	Individual cohort study (including low quality RCT; e.g., <80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of CDR† or validated on split-sample§§§ only	Exploratory** cohort study with good†††reference standards; CDR† after derivation, or validated only on split-sample§§§ or databases	Retrospective cohort study, or poor follow-up	Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses
2c	"Outcomes" Research; Ecological studies	"Outcomes" Research		Ecological studies	Audit or outcomes research
3a	SR (with homogeneity*) of case-control studies		SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies
3b	Individual Case-Control Study		Non-consecutive study; or without consistently applied reference standards	Non-consecutive cohort study, or very limited population	Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations.
4	Case-series (and poor quality cohort and case-control studies§§)	Case-series (and poor quality prognostic cohort studies***)	Case-control study, poor or non-independent reference standard	Case-series or superseded reference standards	Analysis with no sensitivity analysis
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on economic theory or "first principles"

"*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?**

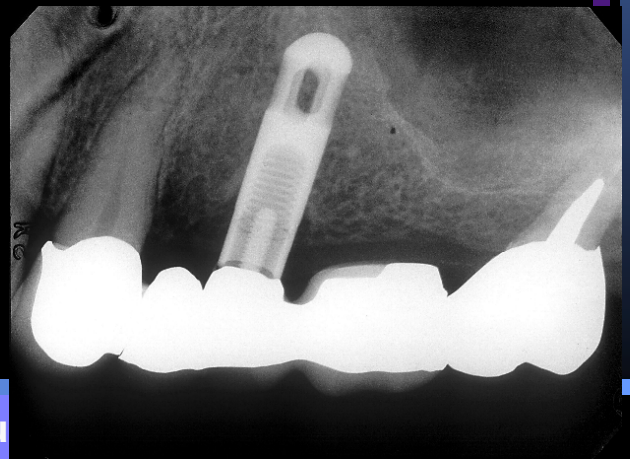
** Clinical, patient-centred, surrogate or economic outcomes*

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

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?

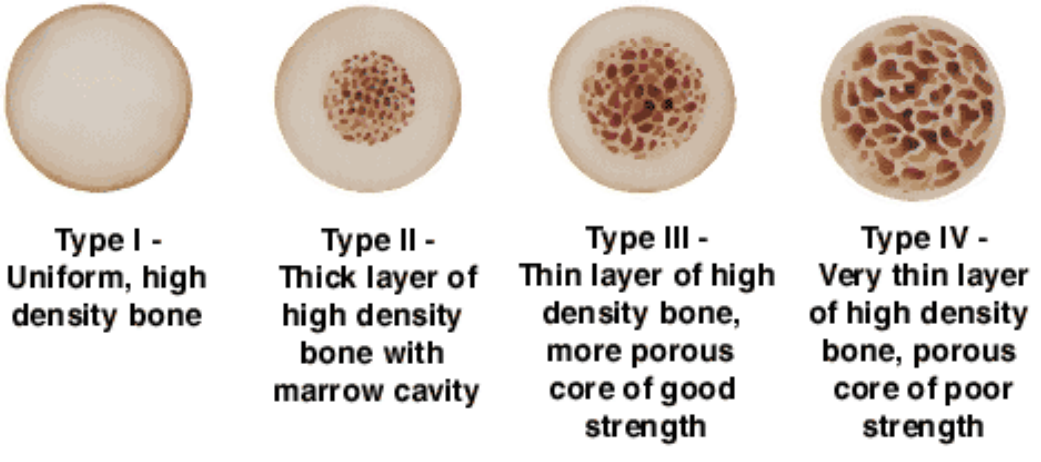


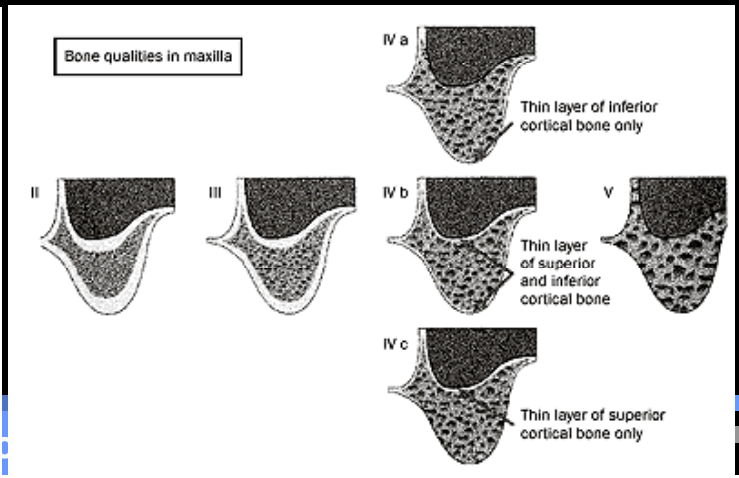
Prognosis

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?

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

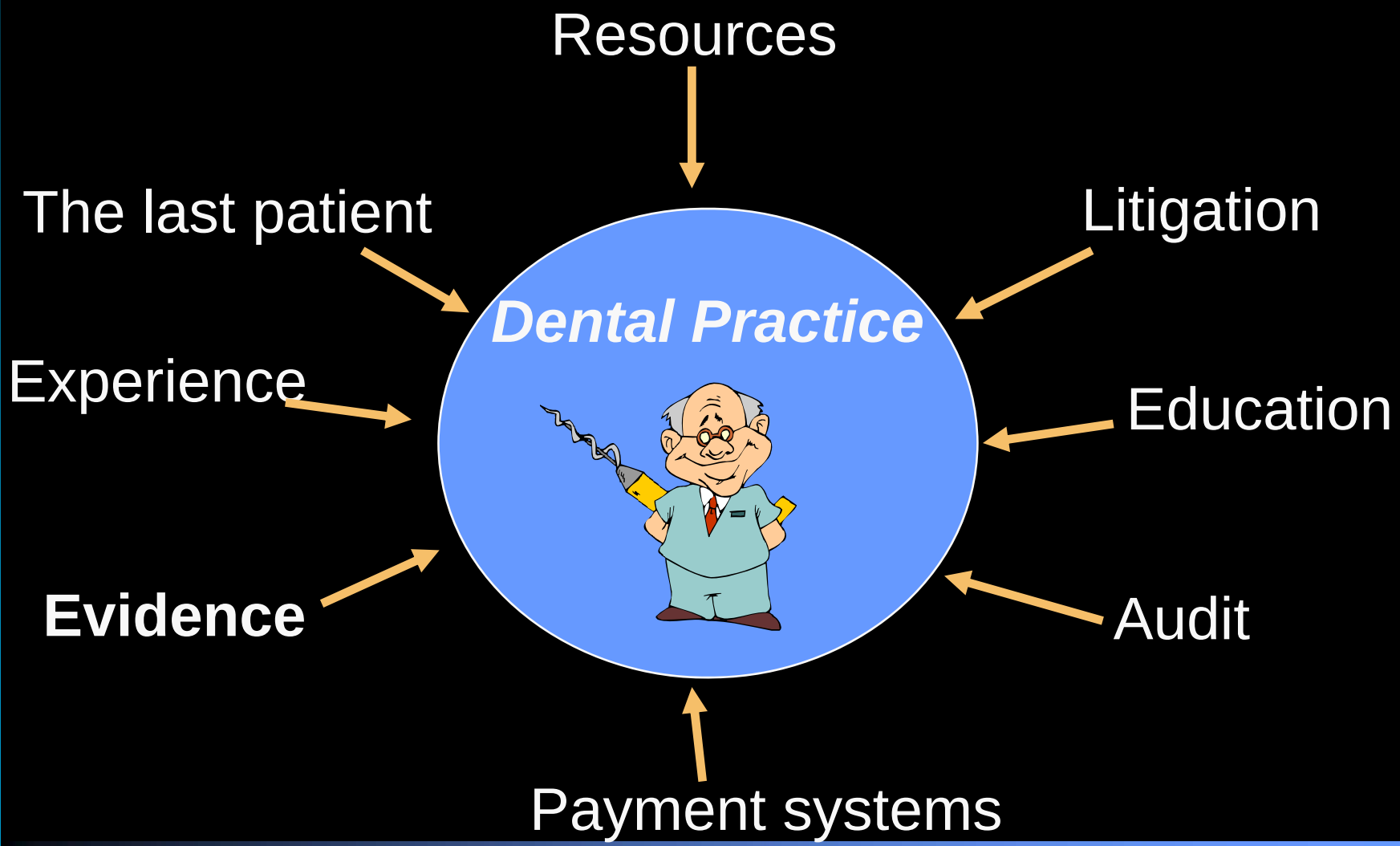
Views /beliefs /perceptions

- 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

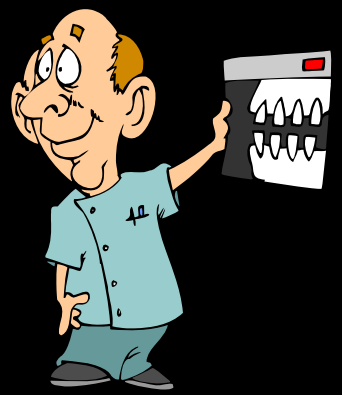
	Qualitative research	Survey	Case Control	Cohort	RCT	Non-experimental	Systematic review
Effectiveness: Does it work?				☆	☆☆	☆	☆☆☆
Process of intervention/ delivery: How does it work?	☆☆	☆				☆	☆☆☆
Salience: Does it matter?	☆☆	☆☆					☆☆☆
Safety: Will it do more good than harm?	☆		☆	☆	☆☆	☆	☆☆☆
Acceptability: Will the patient accept the intervention?	☆☆	☆			☆	☆	☆☆☆
Cost effectiveness: Is it worth paying for the intervention?					☆☆		☆☆☆
Appropriateness: Is this the right intervention for this patient?	☆☆	☆☆					☆☆
Satisfaction with the intervention: Are users, providers and other stakeholders satisfied?	☆☆	☆☆	☆	☆			☆

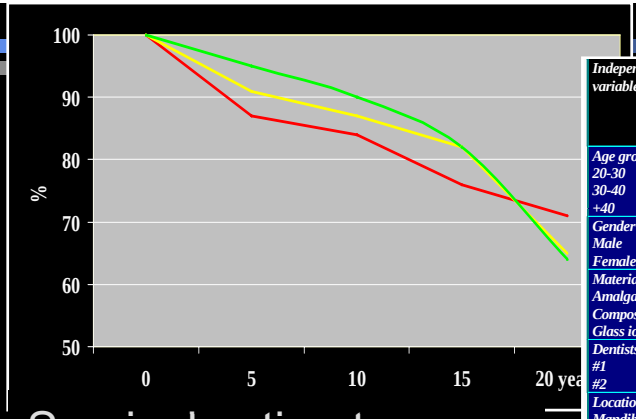
Influences on treatment decisions



Correct treatment decision

Dentist:patient relationship
Two-way communication





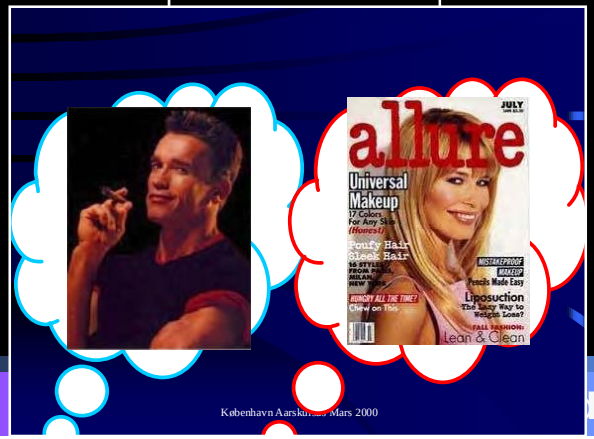
Survival estimates

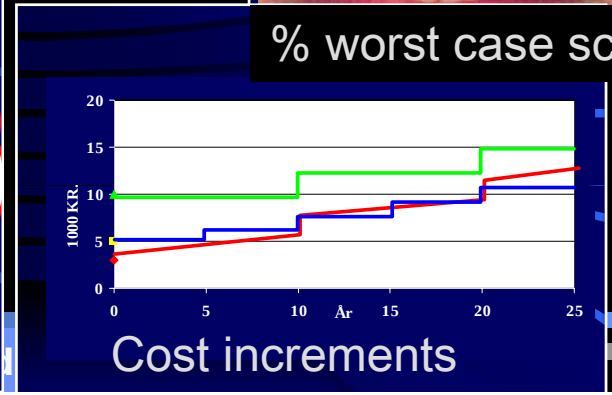
Risk factors – odds ratios

Independent variables	*Bi-variate odds ratios*	*significance*	*Confidence intervals bivariate odds ratios*	*odds ratios*	*significance*	*Confidence intervals for multivariate odds ratios*
Age group						
20-30	-	-	-	-	-	-
30-40	2.32	**	1.15 - 3.13	2.52	**	1.35 - 3.33
+40	2.63	***	1.43 - 3.08	2.63	***	1.83 - 3.8
Gender						
Male	-	-	-			
Female	2.42	**	1			
Material						
Amalgam	-	-	-			
Composites	1.12	NS	0			
Glass ionom.	3.12	***	2			
Dentists						
#1	-	-	-			
#2	1.34	NS	0			
Location						
Mandible	-	-	-			
Maxilla	1.55	*	1			

Outcome probabilities

% worst case scenarios

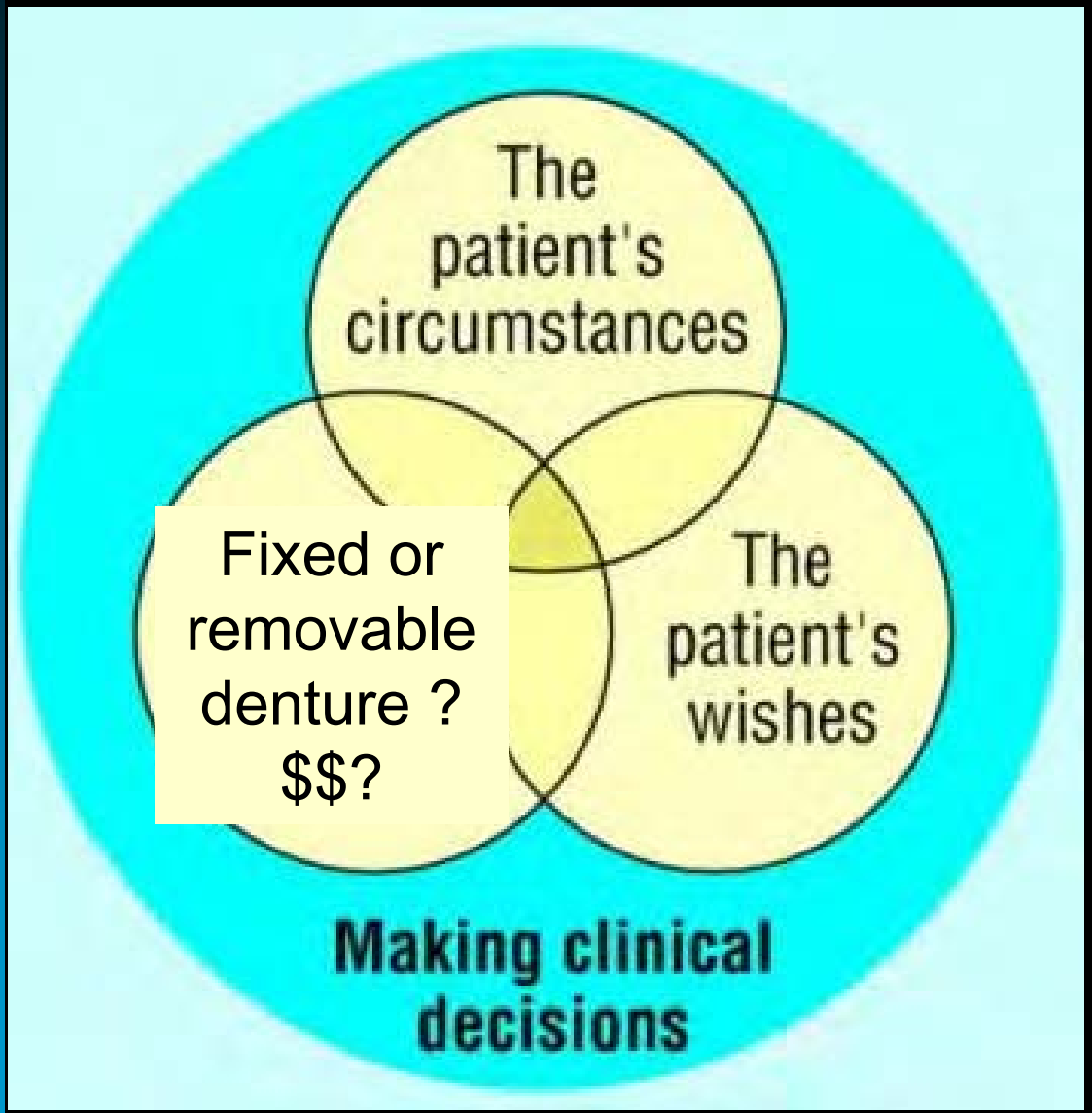




Cost increments

Patient values & preferences

Decision making in prosthodontics



Historically, prosthodontic decision making has always been influenced by:

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

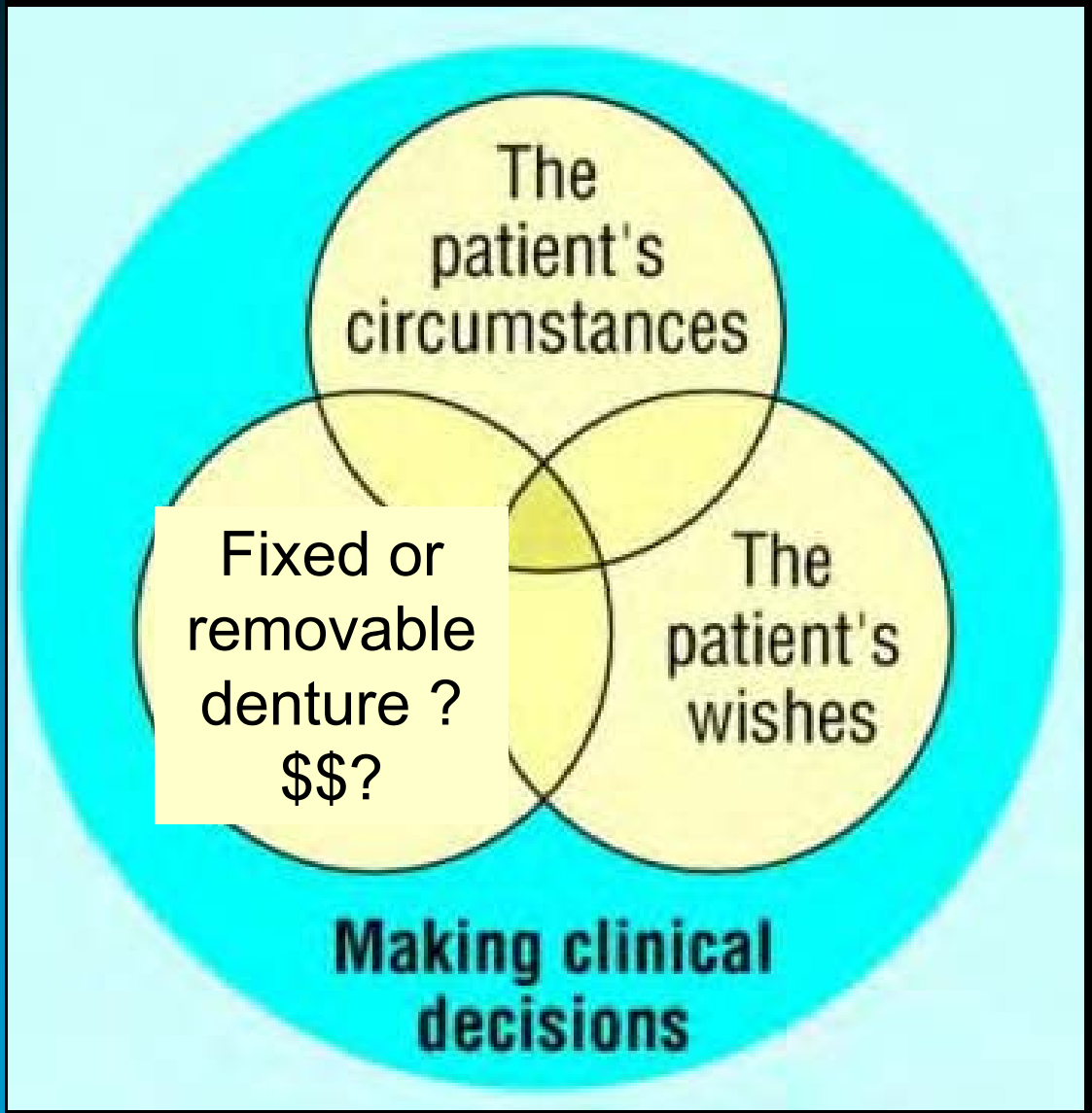
2. the patient finances.

" 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)

Decision making in prosthodontics



Traditional prosthodontic decision making is equivalent to …

how evidence-based medicine is meant to be practiced

From: Haynes et al. Br Med J 1998; 317:273-6

Evidence-Based Practice:

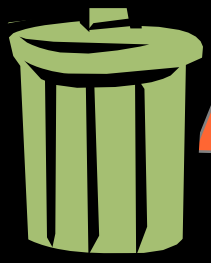
Modified from Haynes et al. BMJ 1998;317:273-6

Evidence-based Practice

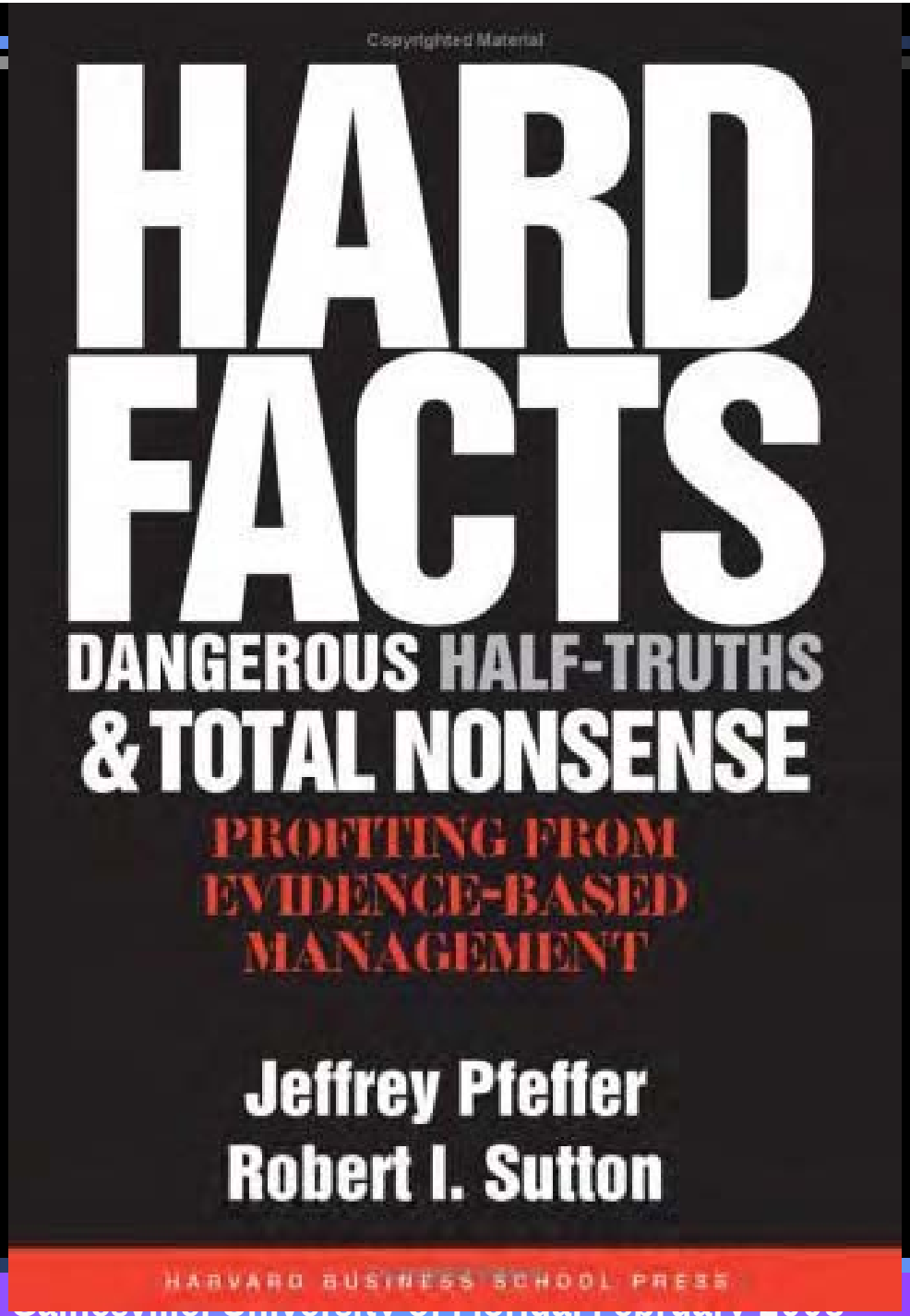
Recognition of need of evidence

Search for Evidence

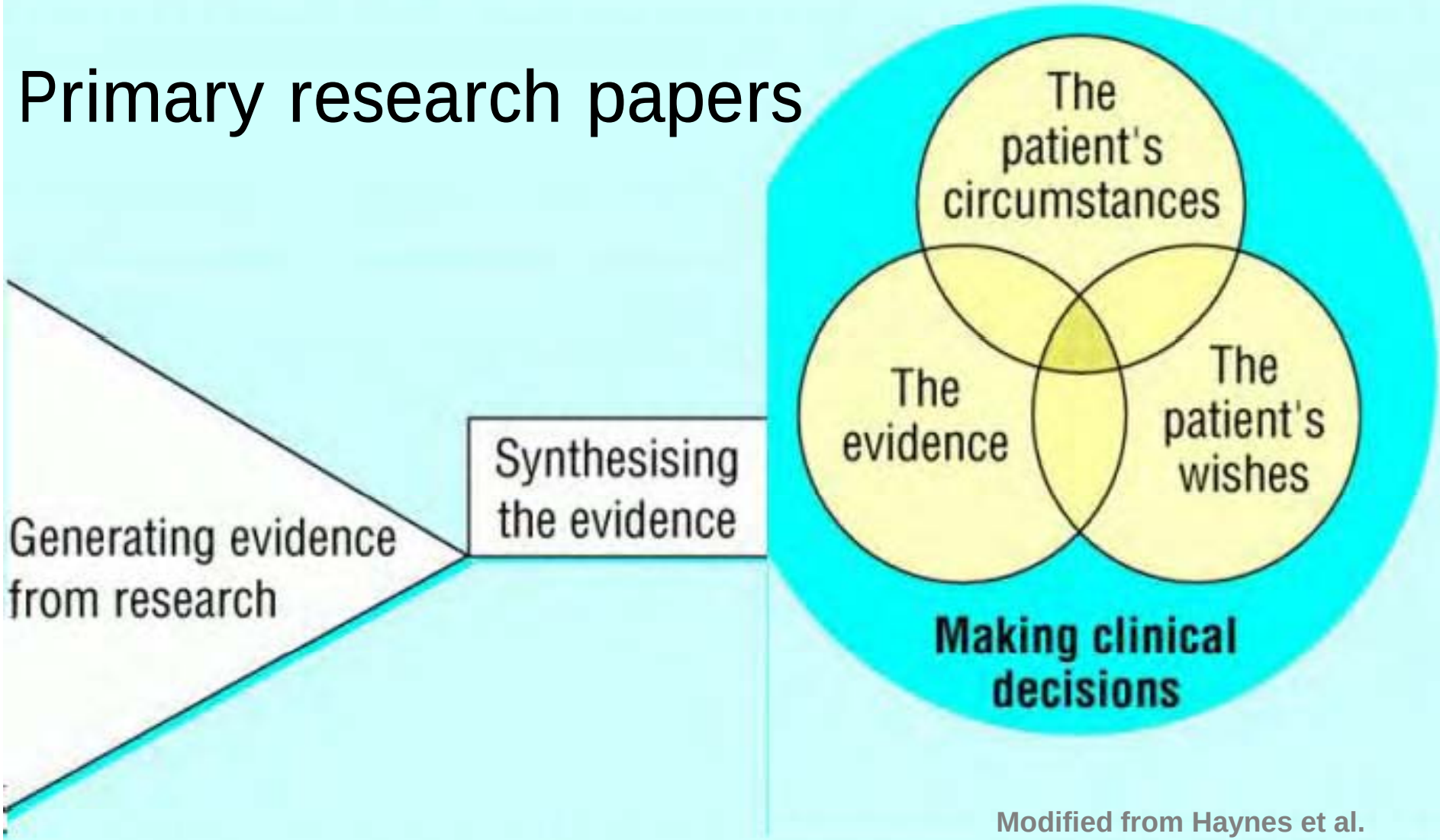
Make Sense of Evidence



Act on Evidence


Copyrighted Material
HARD FACTS
DANGEROUS HALF-TRUTHS & TOTAL NONSENSE
PROFITING FROM EVIDENCE-BASED MANAGEMENT
Jeffrey Pfeffer
Robert I. Sutton
HARVARD BUSINESS SCHOOL PRESS

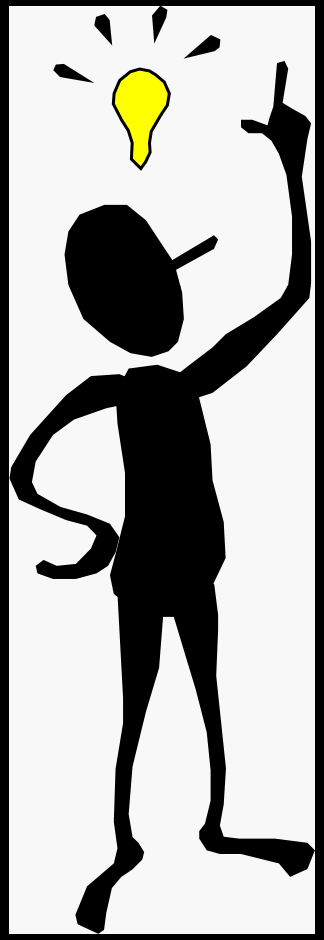
Primary research papers



Modified from Haynes et al.
BMJ 1998;317:273-6

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

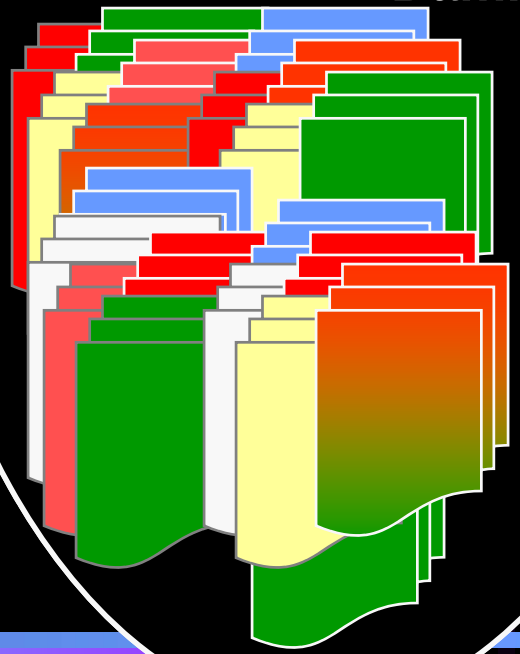
Head/ Staff/ Demonstrator-filtered

“Curriculum”

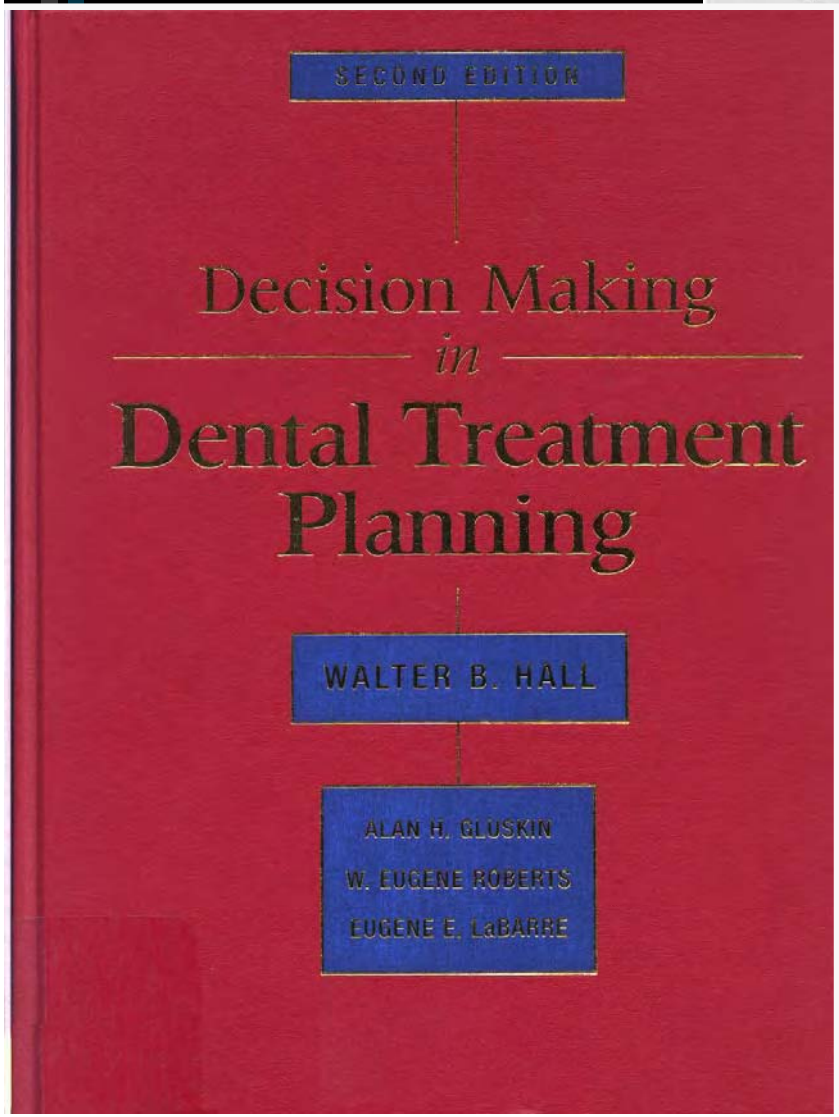
”The Classic literature”

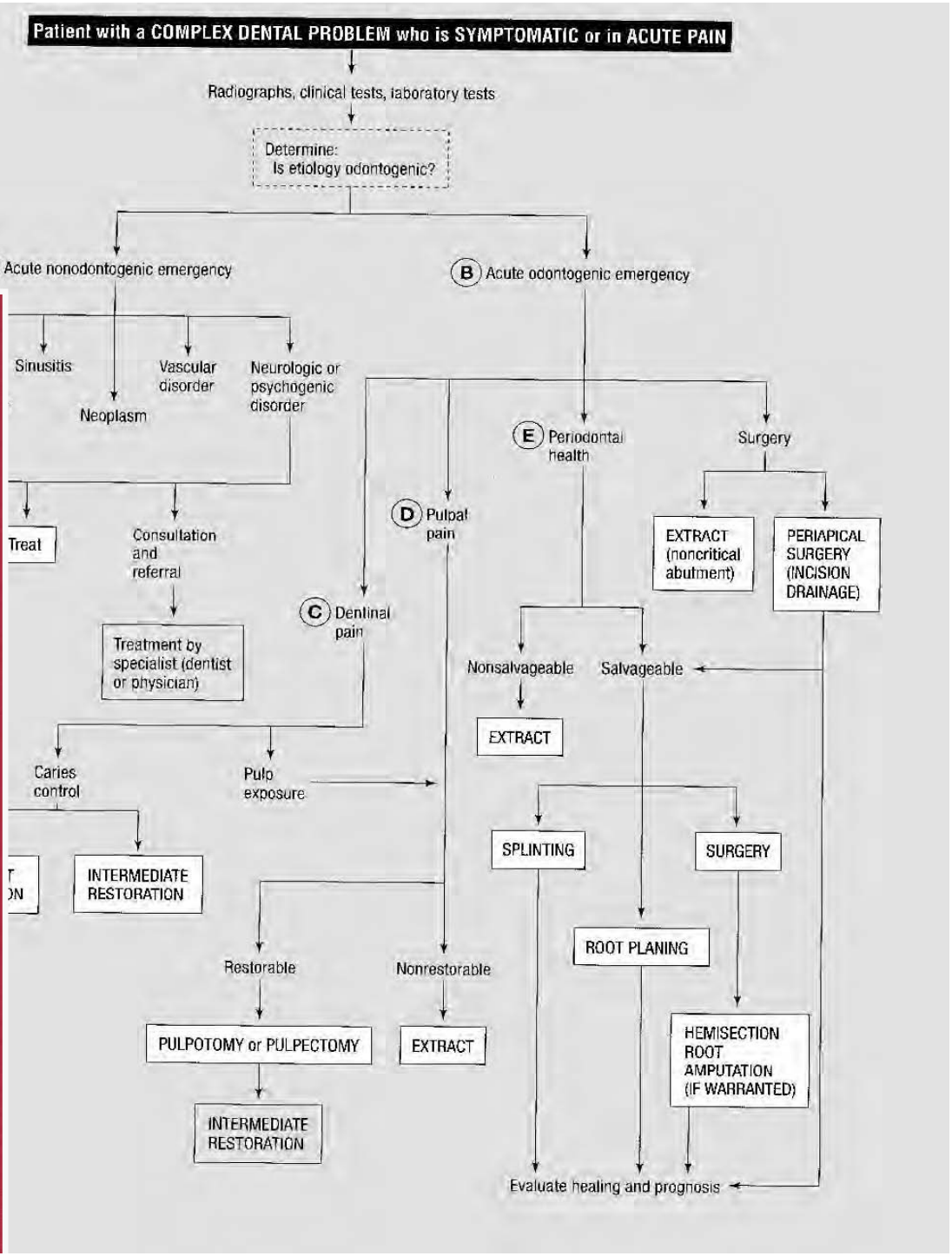
Publications in prostho-dontics

Truth
Relativ
Damn l

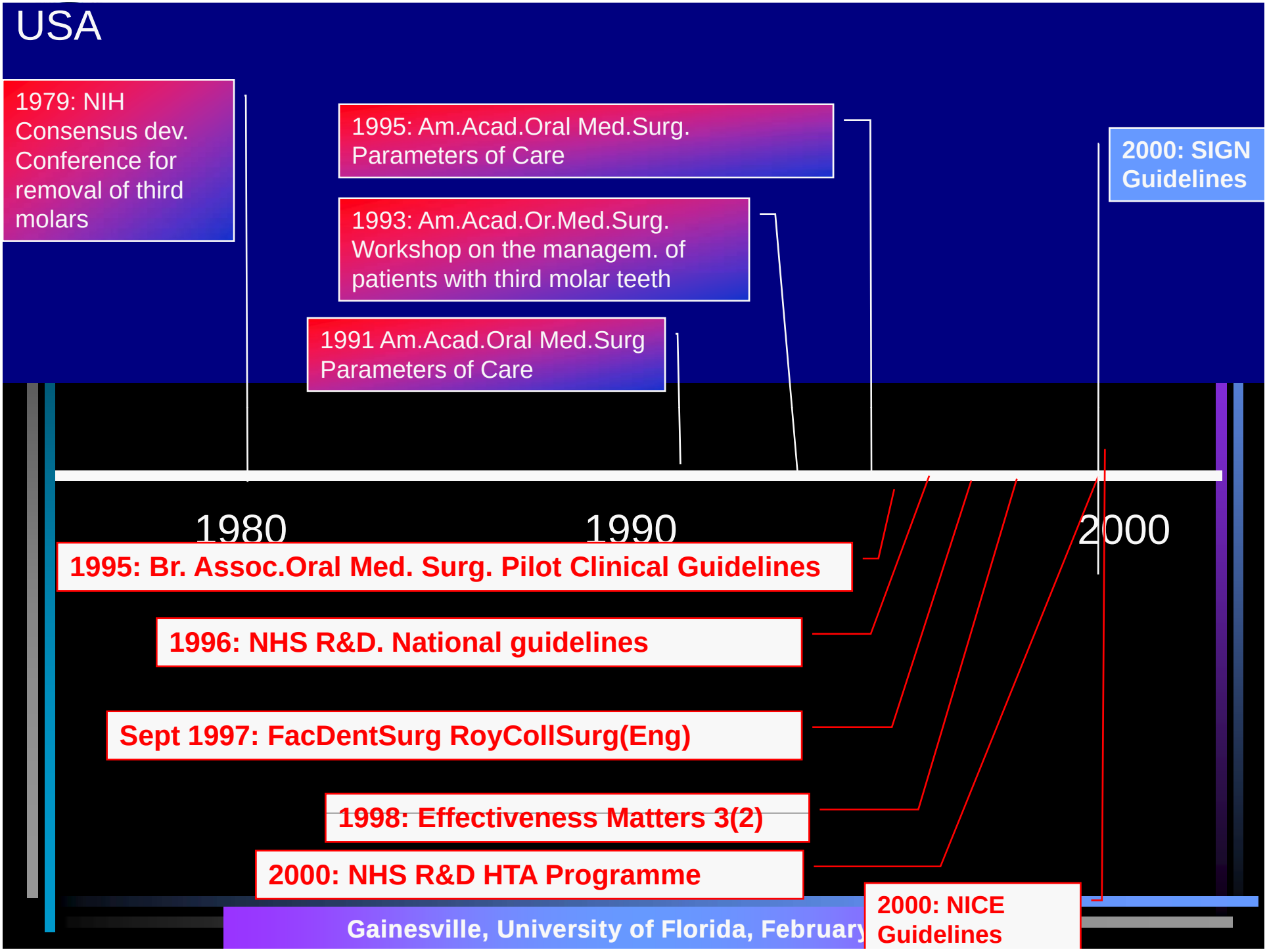


Cookbook dentistry?





Publications in Dentistry


USA
1979: NIH Consensus dev. Conference for removal of third molars
1995: Am.Acad.Oral Med.Surg. Parameters of Care
1993: Am.Acad.Or.Med.Surg. Workshop on the managem. of patients with third molar teeth
1991 Am.Acad.Oral Med.Surg Parameters of Care
2000: SIGN Guidelines
1980
1990
2000
1995: Br. Assoc.Oral Med. Surg. Pilot Clinical Guidelines
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
Gainesville, University of Florida, February

Community Dent Oral Epidemiol 2001; 29: 308–14
Printed in Denmark . All rights reserved

COMMUNITY DENTISTRY AND ORAL EPIDEMIOLOGY
ISSN 0301-5661

Dentists' decisions on prophylactic removal of mandibular third molars: a 10-year follow-up study

Kerstin Knutsson[1], Leif Lysell[2] and Madeleine Rohlin[1]
[1]Department of Oral Radiology, Faculty of Odontology, Malmö University, Malmö, [2]Department of Oral Surgery, Central Hospital, Kristianstad, Sweden

Knutsson K, Lysell L, Rohlin M: Dentists' decisions on prophylactic removal of mandibular third molars: a 10-year follow-up study. Community Dent Oral Epidemiol 2001; 29: 308–14. © Munksgaard, 2001

Abstract – *Objectives:* In recent years, several critical outcome studies concerning the prophylactic removal of mandibular third molars have been published. These

"...studies ....appear to motivate a more restrictive approach today compared with 10 years ago"

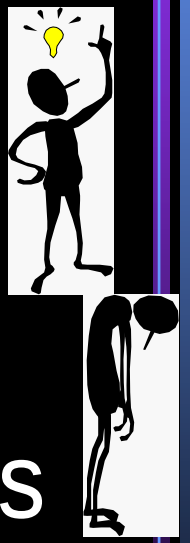
accepted 8 November 2000

Even if we have new research

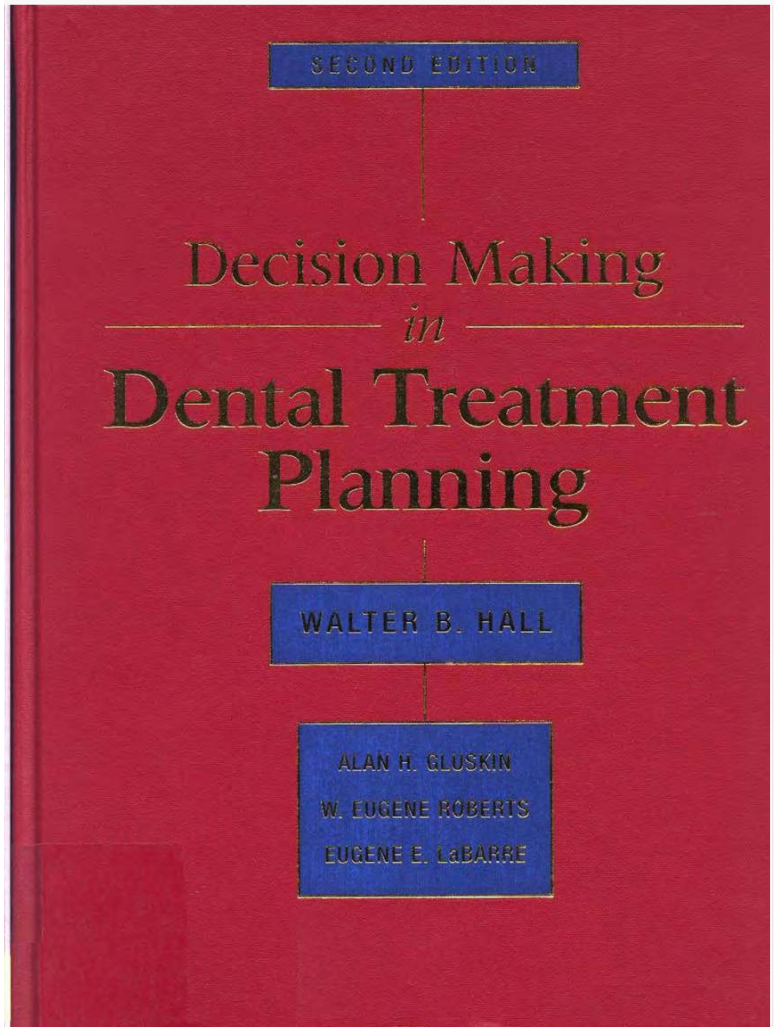
1. This is not necessarily known amongst the dental clinical practitioners

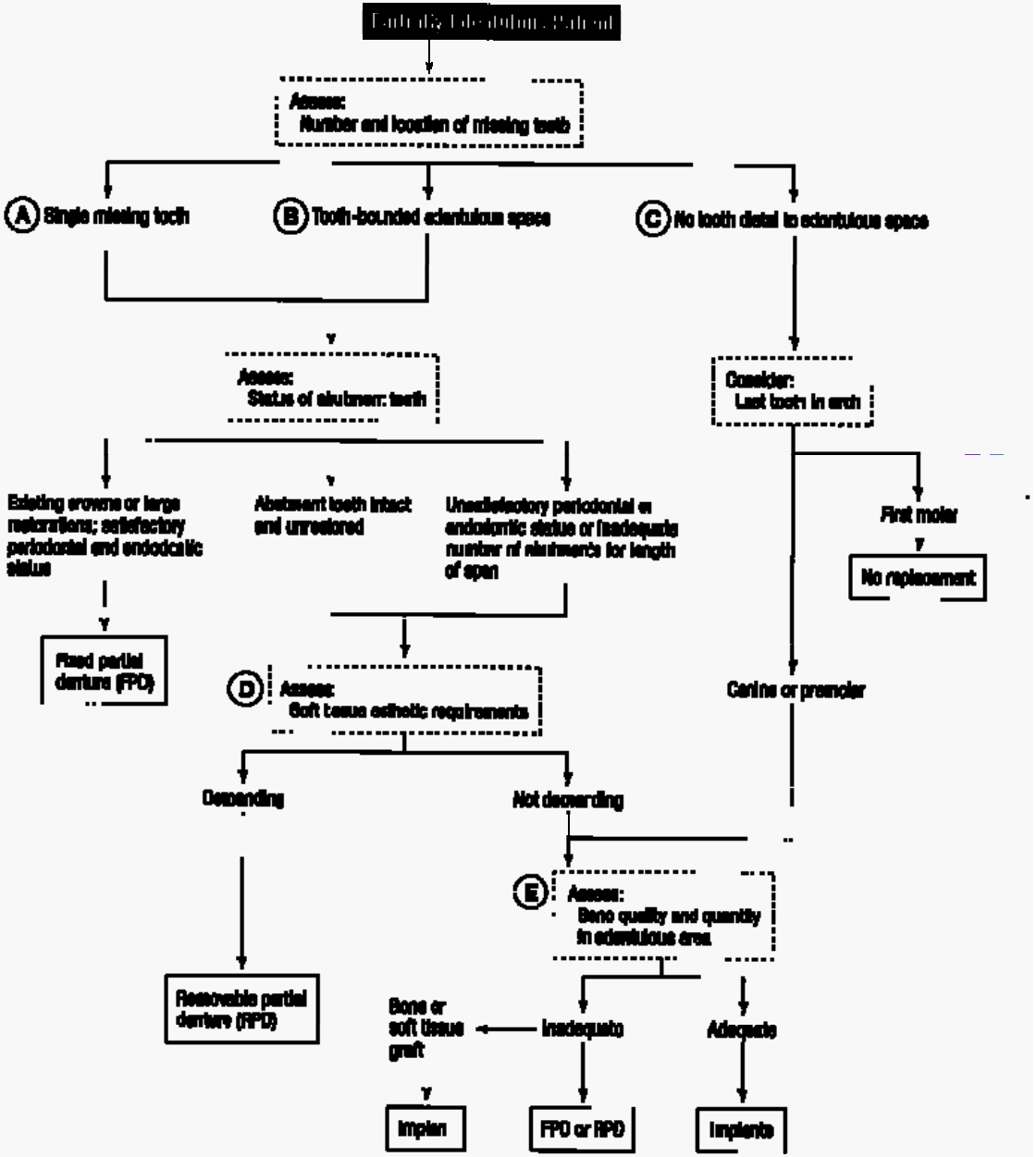
Even if we have new research

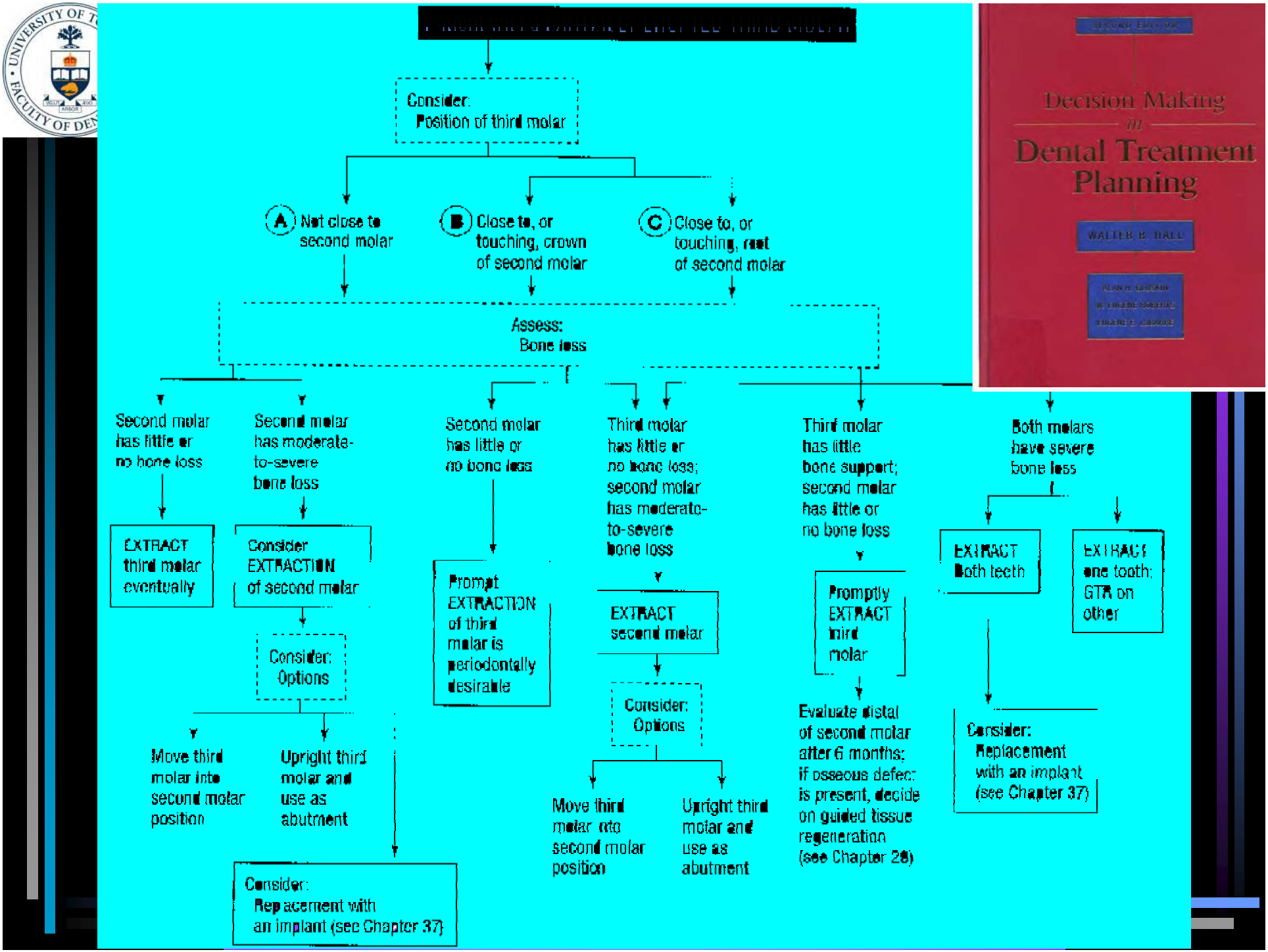
1. This is not necessarily known amongst the dental clinical practitioners
2. Do educators ensure that they adequately prepare our future health professionals to change behavior, attitude and techniques rapidly in light of new knowledge?



Useful, or just cookbook dentistry?






Consider:
Position of third molar
A Not close to second molar
B Close to, or touching, crown of second molar
C Close to, or touching, root of second molar
Assess:
Bone loss
Second molar has little or no bone loss
Second molar has moderate-to-severe bone loss
Second molar has little or no bone loss
Third molar has little or no bone loss; second molar has moderate-to-severe bone loss
Third molar has little bone support; second molar has little or no bone loss
Both molars have severe bone loss
EXTRACT third molar eventually
Consider EXTRACTION of second molar
Consider: Options
Move third molar into second molar position
Upright third molar and use as abutment
Consider: Replacement with an implant (see Chapter 37)
Prompt EXTRACTION of third molar is periodontally desirable
EXTRACT second molar
Consider: Options
Move third molar into second molar position
Upright third molar and use as abutment
Promptly EXTRACT third molar
Evaluate distal of second molar after 6 months; if osseous defect is present, decide on guided tissue regeneration (see Chapter 28)
EXTRACT both teeth
EXTRACT one tooth; GTR on other
Consider: Replacement with an implant (see Chapter 37)

Decision Making in Dental Treatment Planning
WALTER B. HALL

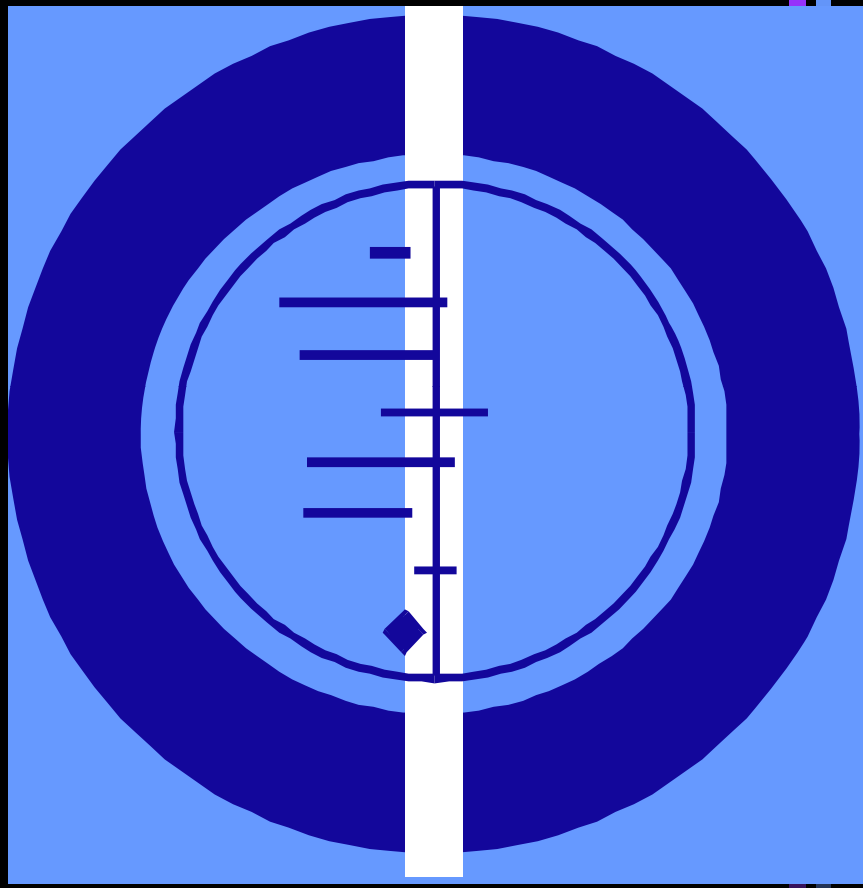
Are dentists worse or better than other health professions?

The Cochrane Collaboration

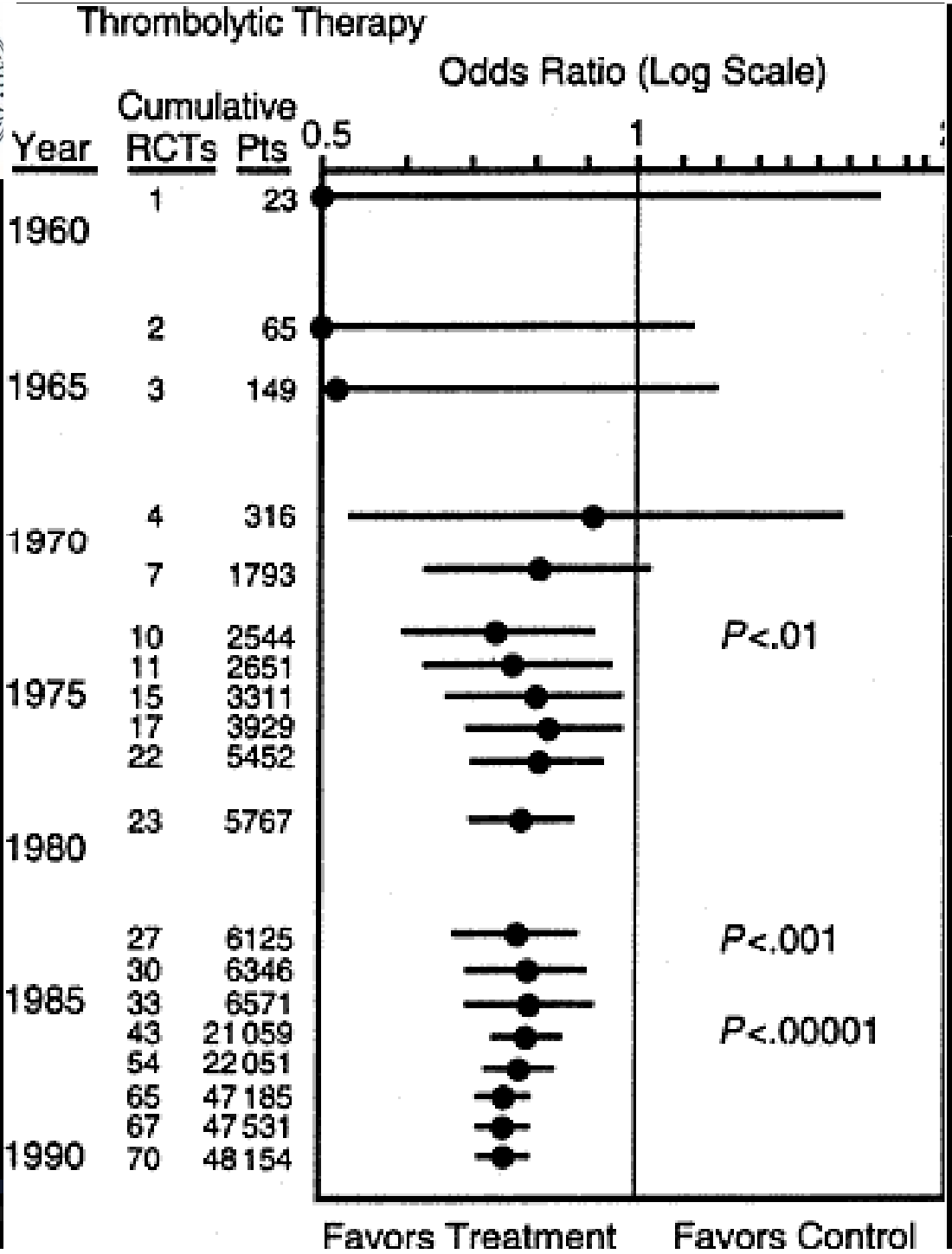
- 1972: 1st trial
- 1972-1987: +6 trials
- 1989: 1st SR

From 1992

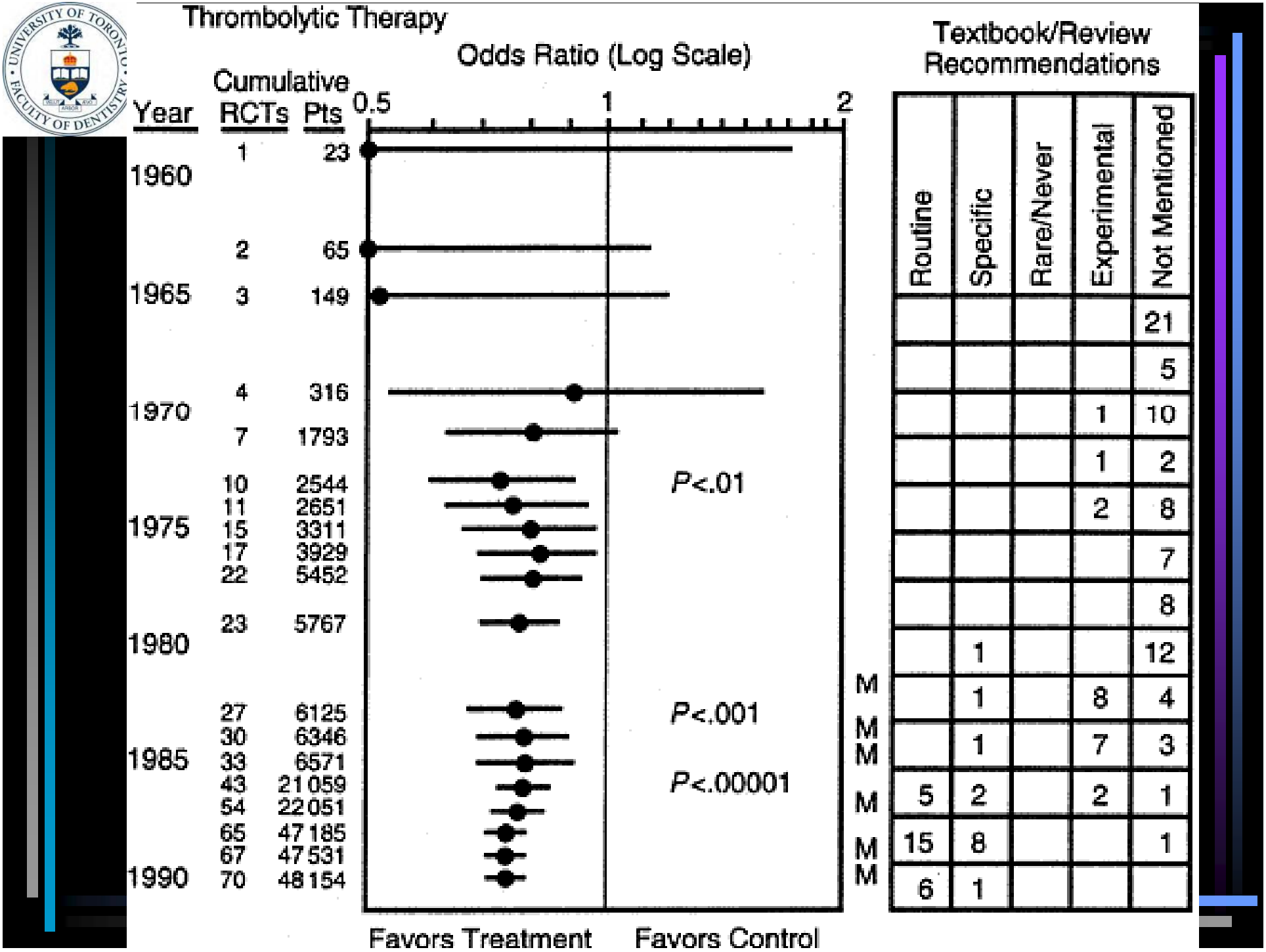
1
2
3
4
5
6
7



Logo



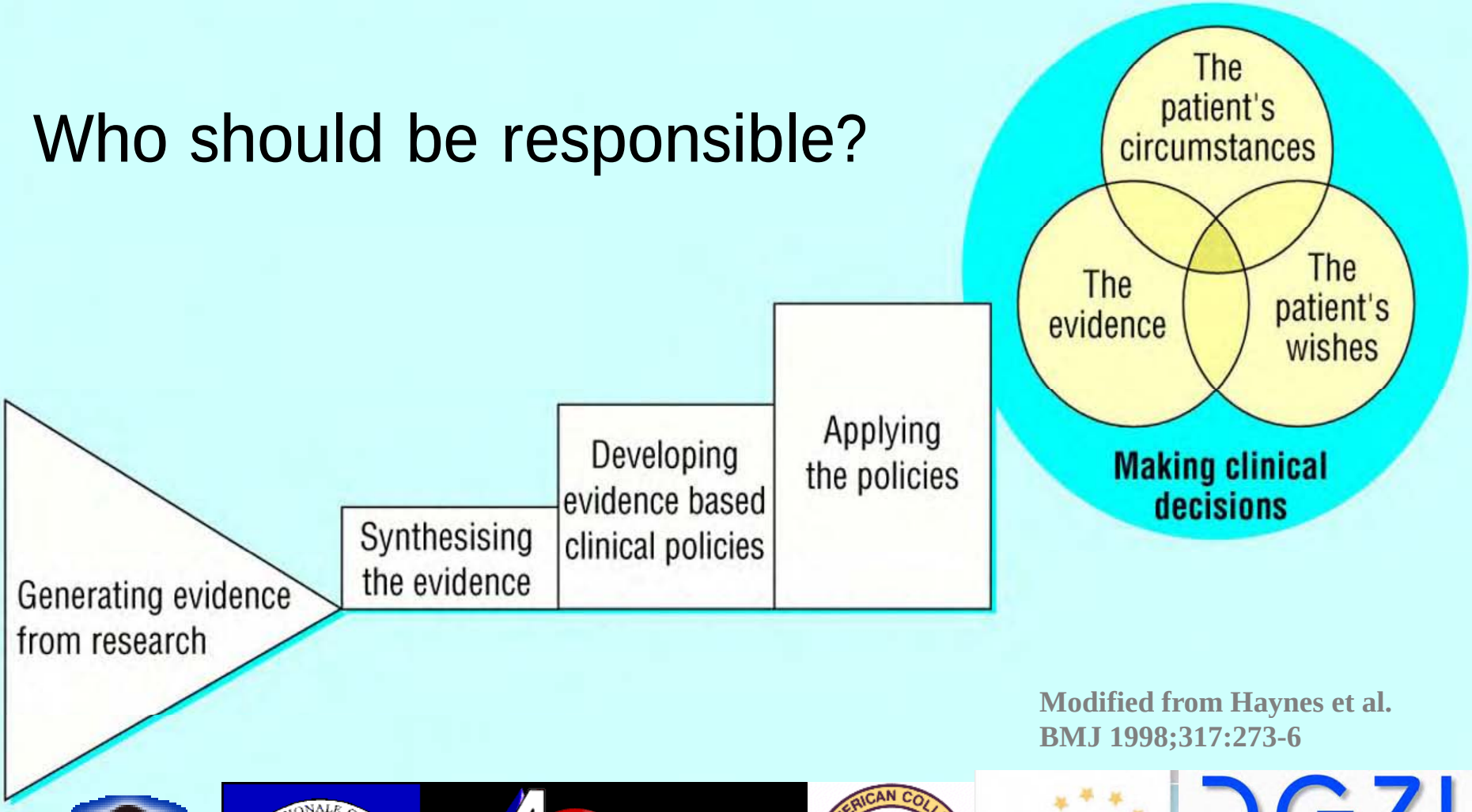
Cumulative meta-analysis of RCTs


Thrombolytic Therapy
Odds Ratio (Log Scale)
0.5
1
2
Year
Cumulative RCTs
Pts
1960
1965
1970
1975
1980
1985
1990
1 23
2 65
3 149
4 316
7 1793
10 2544
11 2651
15 3311
17 3929
22 5452
23 5767
27 6125
30 6346
33 6571
43 21 059
54 22 051
65 47 185
67 47 531
70 48 154
P<.01
P<.001
P<.00001
Favors Treatment
Favors Control
Textbook/Review Recommendations
Routine
Specific
Rare/Never
Experimental
Not Mentioned
21
5
1 10
1 2
2 8
7
8
1 12
M 1 8 4
M 1 7 3
M 5 2 2 1
M 15 8 1
M 6 1

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?



Modified from Haynes et al.
BMJ 1998;317:273-6

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

www.torontoimplantconference.ca