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Making Sense of the Dental Literature

Michael O'Sullivan
 RAMI
 3rd October 2019

Overview

- From dental science to clinical practice
- Information overload
- Evidence based dentistry
- Asking the question – can it be answered?
- What study type should I look for?
- Where do I search?

From Dental Science to Clinical Practice

- How do I evaluate the findings?
- Does research influence practice?
- Not an easy transition to practice
- From mindless to mindful practice

Information Overload



1986



Information Overload



Source Alvstor

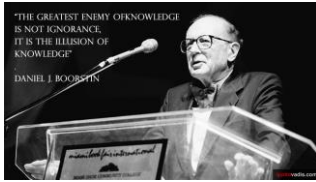


General Information Management

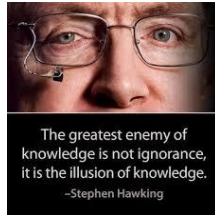
- Inability to differentiate information
- Consuming quality information at the wrong time
- Don't know where to stop
- Illusion of knowledge

Sakthi Tharan, 2018

Knowledge



Education is learning what you didn't even know you didn't know

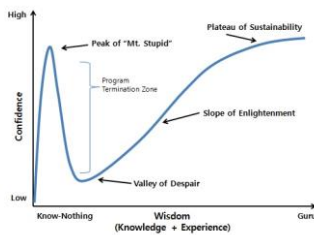


The Dunning-Kruger Effect

- The Dunning-Kruger effect is where people tend to overestimate their good points in comparison to others around them, while concurrently underestimating their negative points

Dunning and Kruger 1999

Dunning-Kruger Effect



The Dunning-Kruger Effect

- This overestimation occurs, in part, because people who are unskilled in these domains suffer a dual burden: Not only do these people reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the metacognitive ability to realise it

The Dunning-Kruger Effect

- Overestimate their own skill levels
- Fail to recognise the genuine skill and expertise of other people
- Fail to recognise their own mistakes and lack of skill


The Dunning Kruger Effect

- Keep learning and practicing
- Ask other people how you are doing
- Question what you know (confirmation bias)



The Problem

- Merely publishing in journals has been shown to be a largely ineffective strategy
- Impact factor driven
- Inaccessibility



NHS Centre for Reviews and Dissemination, 1999

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European Journal of Nutrition
https://doi.org/10.1007/s00194-019-02056-8

ORIGINAL CONTRIBUTION

Estimation and consumption pattern of free sugar intake in 3-year-old Irish preschool children

Michael Crowe¹ · Michael O'Sullivan¹ · Oscar Casasoli¹ · Ailish O'Sullivan²

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Abstract
Purpose: Dietary free sugars (FS) are the most important risk factor for dental caries and can contribute to excess energy intake. Measuring FS intake is limited by food composition databases and appropriate dietary assessment methods. The aim of this analysis was to estimate total sugar (TS) and FS intakes for Irish pre-schoolers and examine the proportion of dietary TS and FS captured using a short food questionnaire (SFQ).
Methods: This is a secondary analysis of 3-year-old children from two national surveys: Growing Up in Ireland (GUI), N=9793 of whom 4975 were girls and the National Preschool Nutrition Survey (NPN), N=126 and 525 were girls. GUI used SFQs and NPN used semi-weighted food diaries to collect dietary data from 3-year-old children. Dietary intake databases were linked using an established approach. Mean daily TS and FS intakes and frequency were calculated, and consumption patterns from foods and meals are presented. The proportion of foods that were covered or non-covered by the GUI SFQ was calculated by comparison with the NPN food diary.
Results: 75% of 3-year-olds had FS intake greater than the maximum recommended by WHO guidelines for free sugar intake, while 4% met the lower threshold. The median frequency of TS and FS consumption was 5.0 (4.0-6.0) and 4.0 (3.0-5.0) times/day. Less than one-quarter of TS intake (glyc) was non-covered by the GUI SFQ while less than one-third of FS intake was non-covered.
Conclusions: A large majority of 3-year-old Irish children do not meet the WHO recommended guidelines for FS intake and almost none meet the desired conditional recommendation. SFQs only capture two-thirds of FS intake at this early age.

Keywords: Free sugars · Dietary survey · WHO · Preschoolers

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The Problem

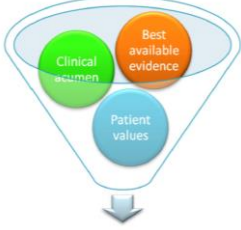
- Value of clinical guidelines and the relative merits are commonly produced informally using the GOBSAT method



Pitts 2004

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Evidence Based Dentistry



Evidence-based dentistry

Richards & Lawrence, 1995

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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.”

Younossi and Guyatt, 1999

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Evidence Based Dentistry

“the integration of science, clinician experience, and patient values serving as the foundation for clinical care.”



Niederman et al., 2011

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Five Steps

- Recognise the need for information and formulate a question
- Use electronic databases to find the best available evidence
- Critically appraise the evidence

Five Steps

- Integrate the appraisal within the scope of the clinician's expertise and patient's perceived need
- Evaluate the overall results



Five Steps

- Ask
- Acquire
- Appraise
- Apply
- Assess



Ask the Question

- PICO
 - Problem
 - Intervention
 - Comparison
 - Outcome and Time

Acquire - Electronic Databases

- Cochrane Database
- Pubmed etc.
- ADA-EBD Library



Optimised Systems

- www.thedentalelf.net
- www.tripdatabase.com
- www.ebnow.com
- <http://crownorfill.com>

Appraise

- www.cebm.net/ocebml-levels-of-evidence
- www.casp-uk.net

Source: ADA

Appraise

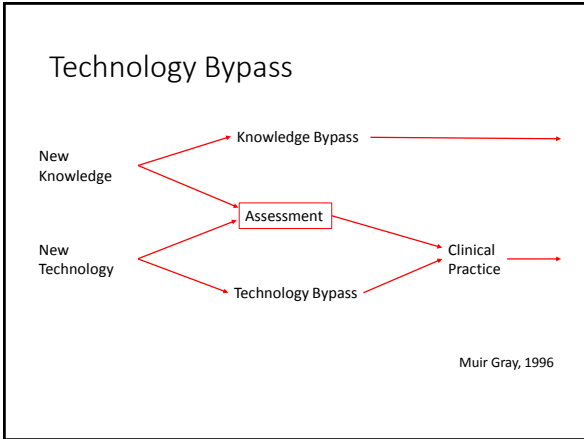
Afrashtehfar & Assery, 2017

Appraise

Pitfalls of Systematic Reviews

- More than half are unable to answer the key clinical question due to weak studies
- Inability to inform practitioners about new dental materials and techniques (what they want)

Bader & Ismail, 2004



Resin Bonded FPD Success Rates

- Systematic reviews put 5-year success rate at 65% (Pjetursson et al, 2008) However this was based on one study of 51 RBBs

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Complex Dental Topics – TMJ

- Difficulties with assessment
- Difficulties with diagnosis
- Unable to standardise patients
- Evaluation criteria poor

Common Symptoms

Pain: Intermittent or constant pain in the jaw joint or muscles of the jaw. Pain may be localized to the joint or radiate to the ear, temple, or neck.

Clicking: Intermittent or constant clicking or popping sounds when the jaw opens or closes.

Locking: Intermittent or constant locking of the jaw, making it difficult to open or close the mouth.

Headaches: Intermittent or constant headaches, often in the temple or forehead area.

Ear Problems: Intermittent or constant ringing, fullness, or pain in the ear.

Neck Pain: Intermittent or constant pain in the neck, often in the upper neck area.

Difficulty Chewing: Intermittent or constant difficulty chewing, often due to pain or locking of the jaw.

Changes in Bite: Intermittent or constant changes in the way the teeth fit together.

Changes in Speech: Intermittent or constant changes in the way the mouth feels when speaking.

Changes in Appearance: Intermittent or constant changes in the appearance of the face, such as asymmetry or a sunken appearance.

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True Effects of Bruxism in Prosthodontics

- No detailed studies in fixed prosthodontics
- Difficulty in determining who is a bruxer
- Vagueness of diagnosis
- Clinician agreement poor
- Phasic nature
- Short follow up time

Pergamalian (2003)
Marbach (2003)

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Apply and Assess

Evidence-based dentistry

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Appraise

- Guides as mentioned
- What is the level of evidence you are reading?

Martins & Buschang, 2015

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Evidence-based Orthodontics

What is the level of evidence of what you are reading?

Renato Parisekian Martins¹, Peter H. Buschang²

Dental Press J Orthod. 2015 July-Aug;20(4):22-5.
DOI: <http://dx.doi.org/10.1590/2176-9451.20.4.022-025.ebo>

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Checklist

ARTICLE REVIEW GUIDELINES Total point count ___/___

Title _____
Authors _____
Journal _____

AIMS

1. Was the problem stated and aims specific? Yes ___(1) No ___(0)
2. Were the research aims specific? Yes ___(1) No ___(0)
3. External validity: Sample characteristics
 - A. Can we generalize the results; was there random sampling? Yes ___(1) No ___(0)
 - B. Was the sample representative? Yes ___(1) No ___(0)
 - C. Was the sample size adequate? Yes ___(1) No ___(0)
4. Construct validity
 - A. Were the outcomes measured independently? Yes ___(1) No ___(0)
 - B. Was the intervention implemented independently? Yes ___(1) No ___(0)

VALIDITY

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5. Experimental design/internal validity
 - A. Control: Prospective
 - B. Repeated measures
 - C. What type of study was it? Literature review/expert ___(1)
 - D. Bias (accuracy of the design)
 - a. Within subject control: Yes ___(3) No ___(0)
 - b. Selection bias controlled? (randomized allocation): Yes ___(3) No ___(0)

DESIGN

BIAS & RELIABILITY

Very much ___(2) Somewhat ___(1) None ___(0)
02. Procedure(s)/operator(s) standardized? Yes ___(1) No ___(0)
03. Examiners standardized/calibrated (inter- & intra-examiner reliability)?
Yes ___(1) No ___(0)

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RESULTS & CONCLUSIONS

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Sample Characteristics - Validity

- Random sample from a larger population
- Specific criteria to limit variation and increase study reliability
- Sample size

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Wrong Population

- Ambien (zolpidem tartrate) is indicated for the short-term treatment of insomnia
- Women appear to be more susceptible to this risk because they eliminate zolpidem from their bodies more slowly than men.



FDA, 2013

FDA Drug Safety Communication: FDA approves new label changes and dosing for zolpidem products and a recommendation to avoid driving the day after using Ambien CR



Randomisation

- Selection bias
- Operator bias
- Procedural bias
- Detection bias
- Selection /rejection criteria
- Standardisation



Bias Detection

- Jadad Scores
- Risk of Bias Tables



www.comereason.org

Jadad Scores

- The Jadad scale assesses the quality of published clinical trials based methods relevant to random assignment, double blinding, and the flow of patients. There are 7 items. The last 2 attract a negative score, which means that the range of possible scores is 0 (bad) to 5 (good)
- No Allocation concealment

Jadad et al., 1996

Jadad Scores

1. Was the study described as randomised? (+1)
2. Was the method used to generate the sequence of randomisation described and appropriate ? (+1)
3. Was the study described as double blind? (+1)
4. Was the method of double blinding described and appropriate? (+1)
5. Was there a description of withdrawals and dropouts? (+1)

Jadad Scores

6. Deduct one point if the method used to generate the sequence of randomisation was described and it was inappropriate
7. Deduct one point if the study was described as double blind but the method of blinding was inappropriate

Jadad Scores

Jadad Score (1 – 5)	No of Studies
1	16
2	9
3	6
4	2
5	0
TOTAL	33

Risk of Bias Table

- Random sequence generation
- Allocation concealment
- Blinding of participants
- Blinding of personnel
- Blinding of outcome assessment
- Incomplete outcome data
- Selective reporting

	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting
Abrab, 2011	Green	Yellow	Red	Red	Red	Red
Bambhani, 2014	Yellow	Yellow	Red	Red	Red	Red
Campbell, 2008	Green	Green	Yellow	Yellow	Red	Red
Croza, 2008	Green	Yellow	Red	Red	Red	Red
Dali-Fabrizio, 2014	Yellow	Yellow	Red	Red	Red	Red
Deane, 2008	Yellow	Yellow	Red	Red	Red	Red
de Birto Teles, 2013	Green	Yellow	Red	Red	Red	Red
Diab, 2013	Green	Yellow	Red	Red	Red	Red
Diab, 2013	Green	Yellow	Red	Red	Red	Red
Duran-Cambria, 2015	Green	Yellow	Red	Red	Red	Red
Ei-Salah, 2017	Green	Yellow	Red	Red	Red	Red
Frustman, 2010	Green	Yellow	Red	Red	Red	Red
Gagnadoux, 2008	Green	Yellow	Red	Red	Red	Red
Gagnadoux, 2017	Green	Yellow	Red	Red	Red	Red
Ghazal, 2008	Green	Yellow	Red	Red	Red	Red
Ghazal, 2013	Green	Yellow	Red	Red	Red	Red
Onela, 2016	Green	Yellow	Red	Red	Red	Red

Risk of Bias Table for the studies included in this review.

Colour coding:
Red = high risk
Yellow = unclear risk
Green = low risk

Errors and Conclusions


- Systematic errors
- Random errors
- Quality of statistical tests
- Probabilities of false positive and false negative errors
- Do the conclusions match the question proposed?
- Is there evidence of fishing?

Does Research Influence Practice?

- Less than 10% of dental care is based on validated dental research
- When provided with solid evidence it can take 15 years to considerably modify practice

Barriers

- Awareness and familiarity with evidence
- Limited number of reviews
- Practice inertia
- Patient desire
- Insurance benefits
- Information voids



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Why are We Resistant?


- Do not like change
- Lack trust in evidence and research
- Access to information sources
- Intimidated?



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Caries Removal

- In a systematic review nearly 50% of sampled dentists chose an invasive approach to management of Deep Carious Lesions as opposed to evidence-based strategies to treatment.



Schwendicke and Gostemeyer, 2016



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Occlusal Equilibration

- The experimental evidence reviewed was neither convincing nor powerful enough to support the performance of occlusal therapy as a general method for treating a non-acute temporomandibular disorder, bruxism, or headache.

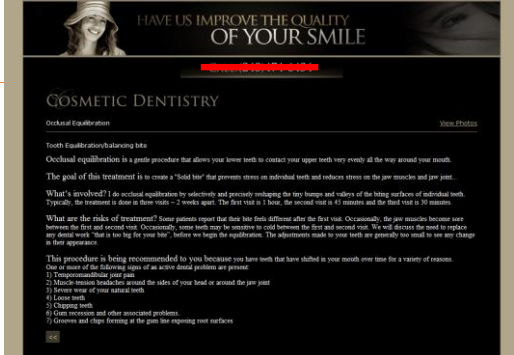
Tsukiyama, Baba & Clark (2001)

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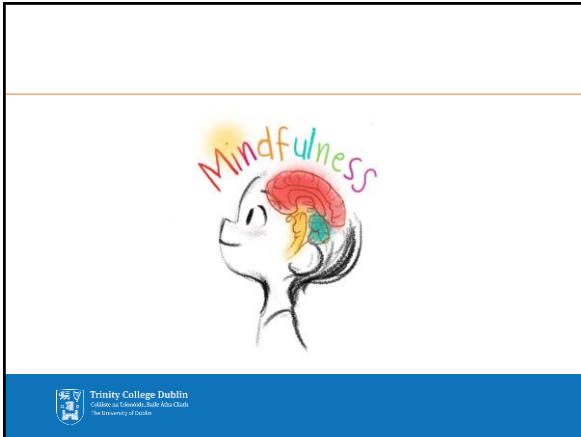



- Avoid treatments that cause permanent changes in the bite or jaw. Such treatments include crown and bridge work to balance the bite, orthodontics to change the bite, grinding down teeth to bring the bite into balance (occlusal adjustment), and repositioning splints, which permanently change the bite.

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From Mindless to Mindful Practice

- The diagnostic failure rate in medicine is estimated to be 10 to 15%
- Many errors caused by cognitive processing
- More than 100 biases affecting medical clinical decision making have been described

Berner & Graber, 2008

From Mindless to Mindful Practice

- The two principle modes, automatic and controlled, are colloquially referred to as “intuitive” and “analytic”
- Intuitive Type 1 processing - it is largely reflexive and autonomous
- Analytic Type 2 processing is conscious, deliberate, slower, and generally reliable.

Intuitive and Analytic

	Advantages	Disadvantages
Analytical style	<ul style="list-style-type: none"> Structured and stepwise Objective Allows team participation on a level playing field 	<ul style="list-style-type: none"> Can breakdown in the face of complex, multifaceted matters Often requires specialist knowledge Can be very time- and resource-intensive
Intuitive style	<ul style="list-style-type: none"> Time and resource efficient Can tackle complex matters 	<ul style="list-style-type: none"> Subjective – and open to individual biases Would normally require broad experience for dependable results May require persuasion to convince key stakeholders

llevbare, <https://www.rndtoday.co.uk/theme-editor-blog/analytical-or-intuitive/>

Analytic

- Becoming alert to the influence of bias requires maintaining keen vigilance and mindfulness of one’s own thinking
- When a bias is identified by a decision maker, a deliberate decoupling from the intuitive mode is required so that corrective “mindware” can be engaged from the analytic mode.

Crosskerry 2013

Review

- From dental science to clinical practice
- Evidence based dentistry
- Asking the question and appropriate study type
- Information evaluation
- Translation to clinical practice

Take Home Message

- Challenging yourself
- Question what you know



Thank You

