Critical Reading

"The test of literature is, I suppose, whether we ourselves live more intensely for the reading of it."

Elizabeth Drew

Graeme van der Meer

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EBM

Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.

Questions to be asked....

- **What is the evidence?**
- **How reliable is the methodology?** Bad methodology is rarely obvious from reading the paper or it would not have been published.
- **How convincing is the result?** P-values / Sample size
- **Are there alternative explanations?** Association and causation are not the same.
- **Is there selective publication?**
- **Is there a conflict of interest?**

Some Pitfalls

- **The more data is pooled the less relevant it becomes to individual patients. Metanalysis has its limits.**
- **Medical journals cannot always prevent papers from being ghostwritten by pharmaceutical companies.**
- **Lack of evidence of efficacy is not the same as evidence of lack of efficacy.**

Making decisions...

- Is the evidence valid?
- Is it important?
- Is it applicable to the patient in front of me?

Levels of Evidence
Oxford Centre for EBM (May 2001)

- 1a: SR with homogeneity of RCT's
- 1b: RCT with narrow confidence interval
- 1c: “All or none”

Levels of Evidence
Oxford Centre for EBM (May 2001)

- 2a: SR with homogeneity of cohort studies
- 2b: Individual cohort study eg: low quality RCT
- 2c: Outcomes research

Levels of Evidence
Oxford Centre for EBM (May 2001)

- 3a: SR of case control studies
- 3b: Individual case-control study
- 4: Case series

  (and poor quality cohort and case-control studies)
- 5: Expert opinion without critical appraisal.

Grading of Recommendations (British)

- **Level A:** Based on hierarchy I evidence.
- **Level B:** Based on hierarchy II evidence or extrapolated from hierarchy I evidence.
- **Level C:** Based on hierarchy III evidence or extrapolated from hierarchy I or II evidence
- **Level D:** Directly based on hierarchy IV evidence or extrapolated from hierarchy I, II or III evidence

The US version...

A: Requires at least one RCT as part of the body of evidence.

B: Requires availability of well-conducted clinical studies but no RCTs in the body of evidence.

C: Requires evidence from expert committee reports or opinions and/ or clinical experience. Indicates absence of directly applicable studies of good quality.

Is it important?

Depends upon the significance of the event and the level of risk.

Eg: 50% increase in risk from 4 in 10 to 6 in 10 is important, while 1000% increase from 1 in 1000000 to 10 in 1000000 is not.

Is it relevant?

Can a study on obese children in the UK be extrapolated to marasmic children in Kenya?

Types of Trials – RCT's

- Gold standard, especially in placebo controlled DBRCT guise.
- Only 17% of RCT's in 2001 BMJ had placebos!
- Potential shortcomings:
  - Hawthorne Effect.
  - Failure to randomise.
  - Failure to analyse by intention to treat.
  - Ethics approval for “sham” surgeries?

Meta-analysis

- **Combines trials.**
- **A large, well conducted trial is far more valuable than a meta-analysis.**
- **Fraught with pitfalls**
  - **Variances in individual study methodology**
  - **SELECTIVE PUBLICATION (A good meta-analysis should have funnel plotting with cut and fill to assess the completeness of publication.)**

Longtitudinal / Cohort Trials

- Prospective or retrospective trials over a period of time.
- Sample size?
- Reliability of data extraction. (Eg: AIDS as a cause of death in SA)
- Lost to follow up?

Qualitative research

- No hard and fast outcomes (Eg: Pain on FNA)
- Important to validate qualitative tools.
  - Unvalidated work unlikely to appear in peer-reviewed journals
  - Use of a previously validated scoring system is recommended.

Association and causation

- Is there evidence from true experiments in humans?
- Is the association strong?
- Is the association consistent from study to study?
- Is the temporal relationship appropriate?
- Is there a dose-response gradient?
- Does the association make epidemiological sense?
- Does the association make biological sense?
- Is the association specific?
- Is the association analogous to a previously proven causal association?

Further reading...

- Greenhalgh T, How to read a paper series in the BMJ.
- Basic & Clinical Biostatistics 2nd edition, Saunders and Trapp, LANGE Publishing.