How to critically review a research article

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What we will cover

- Understand the principles of EBP
- Critical appraisal of
  - research studies
  - clinical practice guidelines
  - Websites
- Resources you can use

- What do you think Evidence Based Practice is?

EBP

- Integrating individual clinical expertise

WITH

- Best available external clinical evidence from systematic research

AND

- ‘‘The […] compassionate use of individual patients’ predicaments, rights and preferences in making decisions about their care’’

Sackett, D. L., Rosenberg, W. M. C., Gray, J. A. M., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine: what it is and what it isn't. British Medical Journal, 312(7023), 71-72.

EBP is NOT the reliance purely on RCT's

It requires integrating your own experiences, WITH the patients preferences WITH the best available evidence.

This is very important.

Why EBP?

1. Health care knowledge:
   - grows so rapidly that you will be out of date by the time you ‘memorise the textbook’.
   - is now too vast to keep up to date with all the key publications, even in just your field.
2. Today’s information environment allows you to get information ‘just in time’ rather than ‘just in case’.
3. EBP allows you to individualise the information for your patient’s situation.

5. EBP teaches you to integrate:
   - the best available information WITH
   - clinical expertise,
   - patient values, AND
   - your health care environment.
6. EBP helps you to challenge dogma and avoids uncritical acceptance of ‘usual practice’.
7. EBP can be simple, quick, and will give you skills for lifelong learning and up to date practice.

Ultimately:

To get the best, most appropriate and effective care to your patients, so that the best outcomes can be achieved.

Best outcomes can be:

- speedy healing
- pain reduction
- improved quality of life

Depends on your patient's priorities.

Research studies

- Quantitative types of research studies
  - Experimental – you are intervening
    - RCT's
  - Observational
    - Cohort studies
    - Cross sectional studies
    - Case controlled studies
- Descriptive research
  - Survey
  - Qualitative

Multiple resources on line to explain these eg:
http://www.cebm.net/index.aspx?o=1039

Grading of studies:
Not all studies are created equal

- Within each of these studies, are differences in quality
  - AND: Just because its published doesn't mean it's good.
- Each study can be graded to ensure that what is included to make decisions is the best quality possible

NHMRC levels of evidence

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
I	A systematic review of level II studies				
II	An RCT	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation	A prospective cohort study		An RCT

NHMRC levels of evidence

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
III-1	A pseudo-randomized trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation	All or none		A pseudo-randomized trial

NHMRC levels of evidence

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
III-2	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study ▪ Interrupted time series with a control group	A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial	A retrospective cohort study	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study

NHMRC levels of evidence

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
III-3	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study ▪ Interrupted time series without a parallel control group	Diagnostic case-control study	A retrospective cohort study	A case-control study	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study

NHMRC levels of evidence

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
IV	Case series with either post-test or pre-test/post-test outcomes	Study of diagnostic yield (with no reference standard)	Case series, or cohort study of persons at different stages of disease	A cross-sectional study or case series	Case series

NHMRC Body of Evidence Matrix

http://www.nhmrc.gov.au/_files_nhmrc/file/guidelines/stage_2_consultation_levels_and_grades.pdf

Component	A	B	C	D
	Excellent	Good	Satisfactory	Poor
Evidence base	Several level I or II studies with low risk of bias	One or two level I or II studies with low risk of bias or a SR/multiple	Level III studies with low risk of bias, or level I or II studies with moderate risk of bias	Level IV studies, or level I to III studies with high risk of bias
Consistency	All studies consistent	Most studies consistent and inconsistency may be explained	Some inconsistency reflecting genuine uncertainty around clinical question	Evidence is inconsistent
Clinical impact	Very large	substantial	moderate	Slight or restricted
Generalisability	Population/s studied in body of evidence are the same as the target population for the guideline	Population/s studied in body of evidence are similar to the target population for the guideline	population/s studied in body of evidence differ to target population for guideline but it is clinically sensible to apply this evidence to target population	population/s studied in body of evidence differ to target population and hard to judgewhether it is sensible to generalise to target population
Applicability	Directly applicable to the Australian healthcare context	Applicable to the Australian healthcare context with few caveats	Probably applicable to Australian healthcare context with some caveats	Not applicable to Australian healthcare context

- Eg. Clinical guideline –use this grading system for the studies it bases its recommendations on....

Assess all people with diabetes and stratify their risk of developing foot complications	**Grade C**
Any suitably trained healthcare professional may perform the risk assessment	EO
Assess risk stratifi cation by **inquiring about previous foot ulceration and amputation, visually inspecting the feet** for structural abnormalities and ulceration, **assessing for neuropathy using either the Neuropathy Disability Score or a 10g monofi lament and palpating foot pulses.**	Grade C
Stratify foot risk in the following manner: • "low risk"- people with no risk factors and no previous history of foot ulcer/amputation • "intermediate risk"- people with one risk factor (neuropathy, peripheral arterial disease or foot deformity) and no previous history of foot ulcer/amputation • "high risk" - people with two or more risk factors (neuropathy, peripheral arterial disease or foot deformity) and/or a previous history of foot ulcer/amputation	Grade C

Baker Institute & International Diabetes Institute (2011). *National Evidence-Based Guideline on Prevention, Identification and Management of Foot Complications in Diabetes (Part of the Guidelines on Management of Type 2 Diabetes) Melbourne Australia.*

Critical Appraisal

- Not all evidence is equal
  - even at the same level of the Evidence Pyramid.
- Basic critical appraisal skills can be applied to a research paper in a few minutes.
- More advanced critical appraisal skills can be used for journal club presentations or EBP reviews.
- The aim of critical appraisal is to understand the strengths, weaknesses, and potential for bias in clinical research before you apply it to your patient.

Common themes in critical appraisal

- Should address:
  - Validity,
  - applicability, and
  - clinical importance

Validity

Validity: The extent to which study results are likely to be true and free from bias

- Internal validity:
  - does the study minimise the risk of bias?
- External validity:
  - can the study results be applied to patient populations which were not included?

Applicability

- How results from a clinical trial or meta-analysis apply to a specific individual or clinical setting
- Patients' individual characteristics may affect how results from the literature may apply to them

- Even if research evidence has internal validity, it often applies to the ‘ideal’ patient who has been selected for a clinical trial, and estimates an ‘average’ benefit for that patient.
- To decide whether you can apply that evidence to your patient, you must consider:
  - that individual’s characteristics, preferences, values
  - the environment in which you practice
  - the practitioner’s expertise and familiarity with an intervention

Before extrapolating beyond the trial, ask yourself these questions:

1. Are the results clinically important?
2. Do the results apply to my patient?
3. What are my patients' values and preferences?
4. Can this practice be implemented in this healthcare setting?
5. How can I help my patient make a decision?

Consider the point of view of your patient

- Health professionals can make recommendations in line with the evidence, but patients also have views on their healthcare which affect their choices and compliance.
- Failure to consider the patient's viewpoint may compromise treatment as well as relationships.

Evaluating research

A number of tools available: A favourite = CRAP tool:

The Critical Review of Abstract Presentations

- 10 item checklist to quickly review abstract.

McNaughton, V., Woodbury, G., & Houghton, P. E. (2005). The Critical Review of Abstract Presentations (CRAP) Tool. Wound Care Canada, 3(2), 28-31.

Questions to Ask about the Abstract	Clinical or Laboratory Research	Clinical Case Studies	Clinical/Instructional Educational Report	Health Care Policy and Delivery
① Does the title reflect the objectives?	+	+	+	+
② Does the background information provide good rationale for doing the study and lead to the purpose?	+	+	+	+
• Does it allow the reader to understand usage or potential application?	+	+	+	+
③ Are the objectives of the study clearly stated in terms of the population, intervention, and outcome?	+	+	+	+
• Are the objectives stated in terms of the control group?	+	–	–	–
• Are the study objectives of importance and of interest to this audience?	+	+	+	+
*④ Are the methods clear and complete?	+	+	+	+
Do they include the following:				
• study design	+	+	+	–
• patient population well-defined (criteria)	+	+	–	–
• appropriate control included (standard treatment vs. placebo)	+	–	–	–
• confounding variables have been considered	+	–	–	–
• randomization of subjects	+	–	–	–
• sample size justified	+	–	–	–
• outcome assessments non-biased (blind assessment)	+	+	–	–
• outcome measures valid and reliable	+	+	–	–
• drop-outs accounted for (intention to treat)	+	–	–	–

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Questions to Ask about the Abstract	Clinical or Laboratory Research	Clinical Case Studies	Clinical/Instructional Educational Report	Health Care Policy and Delivery
⑤ Is the intervention				
• appropriate to produce desired physiological/sociological effects?	+	+	+	+
• clearly explained with sufficient detail to be reproducible?	+	+	+	+
• clinically feasible?	+	+	+	+
*⑥ Do the results correspond with the study objectives and are the details specified?	+	+	+	+
• is a between group comparison stated in statistical terms including significance level, e.g., (p=0.001)?	+	+	+	+
⑦ Are the conclusions appropriate, given the study limitations?	+	+	+	+
• Do they relate back to the study objective(s)?	+	+	+	+
⑧ Are the study results generalized appropriately, e.g., to patient populations and clinical situations?	+	+	+	+
⑨ Are the project outcomes and benefits clearly stated and pertinent?	+	+	+	+
• is the information current and relevant to the target audience?	+	+	+	+
⑩ Have conflict of interest and/or study sponsorship been disclosed?	+	+	+	+
• is there a conflict?	+	+	+	+

*Required items that are frequently missing

- Other tools available

http://bestbets.org/links/BET-CA-worksheets.php

Appraising clinical practice guidelines

Valid and reliable tools have been developed

- Eg. AGREE- **A**ppraisal of **G**uidelines **R**esearch & **E**valuation
- Developed to assess
  - Quality of the reporting
  - Quality of some aspects of recommendations
  - Ie. likelihood that it will achieve its intended outcome

AGREE (2001). The Appraisal of Guidelines for Research & Evaluation (AGREE) Instrument. London: The AGREE Research Trust.

Eg.

- Diabetes Related Foot complication guidelines
  - Much is based on Expert Opinion because research evidence isn't available.
    - **IWGDF Guidelines**: included all those involved in the research of the area from around the world.
      - Expert opinion from this group
    - **RNAO Guidelines** from Canada: included local Canadian experts, with no reference to international guidelines.
    - **NHMRC Guidelines** from Aust: used local experts AND IWGDF and other International guidelines and related them to an Australian setting.

- Keep in mind that just because the research has been published, or it says its a clinical guideline doesn't mean it's of high quality.
- Meta-analyses and Systematic Reviews are the safest bet.
  - Eg. Cochrane Systematic Reviews.
- Clinical Practice Guidelines SHOULD be of good quality
  - but worthwhile to check.

Critical appraisal tools

- http://www.cebm.net/index.aspx?o=1913
  - Critical appraisal sheets to assess
    - Systematic reviews
    - Single studies

Critiquing Web pages

- Follow the fundamental criteria to judge any source of information:
  - Author, Date of Publication, Edition or Revision, Publisher, Intended Audience, Objective Reasoning, Coverage, Writing Style
- Websites require a second level of scrutiny:
  - What can the URL tell you?
  - Who wrote the page? Is he, she, or the authoring institution a qualified authority?
  - Is it dated? Current, timely?
  - Is information cited authentic?
  - Does the page have overall integrity and reliability as a source?
  - What's the bias?
  - Could the page or site be ironic, like a satire or a spoof?
  - If you have questions or reservations, how can you satisfy them?

Taken from: http://udc.libguides.com/content.php?pid=164509&sid=1388054

More info:
http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Evaluate.html or
http://www.xavier.edu/library/xututor/evaluating/index.cfm

Some resources providing articles/CPG's/reviews:

- Cochrane collaboration

http://handbook.cochrane.org/

- Cochrane library

http://www.thecochranelibrary.com/view/0/index.html

- Clinical Evidence

http://clinicalevidence.bmj.com/x/index.html

- Australian Clinical Guidelines

http://www.clinicalguidelines.gov.au/

- Evidence Based Medicine resources

http://ebm.bmj.com/

- List of web resources – clinical utility

http://www.columbia.edu/cu/musher/Website/Website/EBP_Resources_Web%20EBP%20Master%20Guide.htm

- Evidence Based Practice Centres - International

http://www.columbia.edu/cu/musher/Website/Website/EBP_Resources_WebEBPP.htm

- List of multiple resources

http://bestbets.org/links/Evidence-Based-Learning-links.php

Good luck!

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