EVIDENCE-BASED MEDICINE
IS IT WORKING?

Professor Paul Glasziou
University of Oxford
What is evidence-based medicine?

“Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values”
- Dave Sackett

1. Skeptical attitude
2. Favor knowledge from experiment
Some milestones in the history of EBM

Al-Rhazi
For I once saved one group by it, while I intentionally neglected another group. By doing that, I wished to reach a conclusion.

James Lind
publishes review & clinical trial in *Treatise on Scurvy*

Bradford-Hill
publishes *Principles of Medical Statistics* & MRC trial of streptomycin

900 AD        1780        1840        1937/48     1967        1970’s

Pierre Louis
Develops his “numerical method” and changes blood letting practice in France

Alvan Feinstein
publishes his book *Clinical Judgement*
“EBM” - birth of a term

Update of CMAJ series on how to read a paper

JAMA User guides 1991
authors seek a new term

Clinical epidemiology? Scientific medicine? Evidence-based medicine!
1993: Sackett moves to Oxford
An EBM Approach to Education

- Evidence cart on ward rounds - 1995
- Looked up 2-3 questions per patient
- Took 15-90 seconds to find
- Change about 1/3 decisions
- Rounds took longer!

Dave Sackett
The (metaphorical) evidence bookstore

1. The Books
   - Popular good
   - Popular trash
   - Unpopular good
   - Out of print
   - Never published

2. The Readers
   - Never
   - Fashion & Marketing
   - Idiosyncratic
   - Selective
The Growth of Medical Knowledge

- How much research?
- How much is valid?
- How much is relevant?
Rule 31 – Review the World Literature Fortnightly*

*Kill as Few Patients as Possible* - Oscar London

![Bar chart showing medical articles per year](chart.png)

- Biomedical: 5,000,000 per day
- MEDLINE: 1,500 per day
- Trials: 95 per day
- Diagnostic?: 0 per day
Coping with the growth in trials?

**MEDLINE 2006/day**

- 1,600 articles
- 95 trials
- 4 reviews*

*CDSR per day

- 1 new
- 1 update

Bastian, Glasziou, Chalmers, (under revision 2009)
The half-life of reviews

Of 100 systematic reviews
Median time to a change that would effect clinical decisions was 5.5 years.

How much of the research is valid?

It’s peer-reviewed, therefore it must be OK?
Validity: Most articles can be ignored

EBM Journal Process

- 140+ journals scanned
  - 60,000 articles
- Is it valid? (<5%)
  - Intervention: RCT
  - Prognosis: inception cohort
  - Etc
- Is it relevant?
  - 6-12 GPs & specialists asked: Relevant? Newsworthy?
- < 0.5% selected

Number Needed to Read
to find 1 valid is 20+

Number Needed to Read
to find 1 valid & relevant is 200+
Half of all articles EBM/ACP articles come from just the 5 top sources (and other half from 95!)

Dilks-Walker, EBM Journal, 2004
Do you use Salt (sodium) reduction for reducing high Blood Pressure?

- The paper’s description of sodium reduction
  - "Individual and weekly group counseling sessions were offered initially, with less intensive counseling and support thereafter, specific to sodium reduction."

- What would you say to a patient?

TOHP Study BMJ, Apr 2007; 334: 885
What is sodium reduction?

- The paper’s description
  - "Individual and weekly group counseling sessions were offered initially, with less intensive counseling and support thereafter, specific to sodium reduction."

- Previous reference
  - (i) an individual session followed by 10 weekly group 90 minute sessions with a nutritionist, followed by a transitional stage of some additional sessions
  - (ii) Topics in the weekly sessions included Getting Started, sodium basics, the morning meal, midday sources of sodium, the main meal, planning ahead, creative cooking, eating out, food cues, and social support,
  - (iii) the sessions included sampling of foods, discussion of articles on sodium reduction, and problem-solving,
  - (iv) patients kept diaries at least 6 days per week, and urine sodiums were measured.
Descriptions in 80 treatment studies selected for EBM were inadequate.

Avoidable waste in the production and reporting of research evidence

Iain Chalmers, Paul Glasziou

Lancet, 2009

Questions relevant to clinicians and patients?
- Low priority questions addressed
- Important outcomes not assessed
- Clinicians and patients not involved in setting research agendas

Appropriate design and methods?
- Over 50% of studies designed without reference to systematic reviews of existing evidence
- Over 50% of studies fail to take adequate steps to reduce biases—eg, unblinded treatment allocation

Accessible full publication?
- Over 50% of studies never published in full
- Biased under-reporting of studies with disappointing results

Unbiased and usable report?
- Over 30% of trial interventions not sufficiently described
- Over 50% of planned study outcomes not reported
- Most new research not interpreted in the context of systematic assessment of other relevant evidence

Research waste
Can readers cope with the mess?

1. The Books
   - Popular good
   - Popular trash
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2. The Readers
   - Never
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Figure 2. Distribution of study results relating physician age to clinical performance in various domains.

Worse with “duration in practice”
Do we know the right things?
GP beliefs about prevention for a 52 yr male

- Measure blood pressure: Effective
- Advise smokers to quit: Effective
- Advise heavy drinkers: Effective
- Measure glucose level: Probable
- Measure cholesterol: Effective
- Screen for prostate cancer: Ineffective
- Screen for lung cancer: Ineffective
- Tetanus immunisation: Probable
- Screen for colon cancer: Effective

Croatia Estonia Georgia Greece Ireland Malta Poland Slovakia Slovenia Spain Sweden
Is bed rest ever helpful?
A systematic review

- 10 trials of bed rest after spinal puncture
  - no change in headache
  - increase in back pain
- Protocols in UK neurology units recommend bed rest
- ...evidence of harm available for 17 years preceding...

Does bed rest after cervical or lumbar puncture prevent headache?
A systematic review and meta-analysis

<table>
<thead>
<tr>
<th>Trial</th>
<th>Short bed rest (Rate)</th>
<th>Long bed rest (Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thornberry et al</td>
<td>9/41 0.22</td>
<td>14/39 0.36</td>
</tr>
<tr>
<td>Fassoulaki et al</td>
<td>6/30 0.20</td>
<td>22/39 0.56</td>
</tr>
<tr>
<td>Frenkel et al</td>
<td>4/10 0.04</td>
<td>3/96 0.03</td>
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<tr>
<td>Cook et al</td>
<td>8/43 0.12</td>
<td>7/59 0.12</td>
</tr>
<tr>
<td>Andersen et al</td>
<td>6/55 0.11</td>
<td>8/57 0.14</td>
</tr>
<tr>
<td>Total</td>
<td>30/275 0.11</td>
<td>54/290 0.18</td>
</tr>
<tr>
<td>Myelography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jensen et al</td>
<td>9/17 0.24</td>
<td>22/40 0.55</td>
</tr>
<tr>
<td>Robertson et al</td>
<td>16/30 0.53</td>
<td>29/60 0.49</td>
</tr>
<tr>
<td>Teasdale et al</td>
<td>36/60 0.60</td>
<td>36/60 0.60</td>
</tr>
<tr>
<td>Macpherson et al</td>
<td>32/60 0.52</td>
<td>32/58 0.55</td>
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<tr>
<td>Macpherson et al</td>
<td>37/100 0.37</td>
<td>37/100 0.37</td>
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<tr>
<td>Macpherson et al</td>
<td>67/91 0.35</td>
<td>70/91 0.37</td>
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<tr>
<td>Total</td>
<td>197/479 0.41</td>
<td>226/509 0.44</td>
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<tr>
<td>Diagnostic</td>
<td></td>
<td></td>
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<tr>
<td>Johannsson et al</td>
<td>2/23 0.09</td>
<td>4/26 0.15</td>
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<tr>
<td>Sproggs et al</td>
<td>17/54 0.31</td>
<td>17/54 0.31</td>
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<tr>
<td>Dieterich et al</td>
<td>48/82 0.59</td>
<td>44/70 0.56</td>
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<tr>
<td>Congia et al</td>
<td>8/20 0.40</td>
<td>8/19 0.42</td>
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<tr>
<td>Vilming et al</td>
<td>35/150 0.23</td>
<td>39/150 0.26</td>
</tr>
<tr>
<td>Total</td>
<td>110/329 0.34</td>
<td>112/329 0.35</td>
</tr>
</tbody>
</table>

Fig. 2: Absolute and relative effect size for short bed rest versus long bed rest to prevent headache after lumbar or cervical puncture. (An expanded version of the figure, with relative risks and 95% confidence intervals, is available online at www.cma.ca/cmaj/vol-165/issue-10/pdf/thofig2.pdf.)

*Allen, Glasziou, Del Mar
Is the clinician on Mission Impossible?

- More than 11,000 diseases
- More than 90 new trials per day
- Poor synthesis & poor synthesis
Clinicians have many questions

1-2 Questions Per Consultation

Figure 1 The average number of questions asked per patient visit

K Davies, Health Information and Libraries Journal, 2007
Can we find good answers?
What should be the EBM curriculum?
Skills for each of the 4 steps*

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*Sicily statement on evidence-based practice.


The electronic version of this article is the complete one and can be found online at: http://www.biomedcentral.com/1472-6920/5/1

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EBM teaching in UK Medical Schools
(based on 20 replies from 32 schools)

Meats et al, Medical Teacher, 2009
Summary: optimist & pessimist

- Rapid growth in research & trials
  \textit{But much is poor, unsynthesised, or unusable}

- Search engines improving
  \textit{but clinicians may find bad information}

- Skills in EBM increasing
  \textit{but many medical schools still ignore}