The language of evidence

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What is ‘evidence’?

- Dictionary:
  - Grounds for belief
  - That which tends to prove or disprove something.
- Legal:
  - Juries are directed that unless the evidence is ‘beyond all reasonable doubt’, their verdict must be one of not guilty.

Reporting uncertain results

- Much of the ‘evidence’ presented at the experimental cutting edge of science is:
  - a work in progress (ie only partially understood)
  - open to debate and revision
  - inconsistent across studies
  - rarely ‘beyond all reasonable doubt’.

‘Evidence’ we don’t know about…

‘Reports that say that something hasn't happened are always interesting to me because, as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know.’

Donald Rumsfeld on Iraq

Language can help or hinder: two problems in reporting science

- Misleading use of adjectives (How much evidence is enough?)
- Use of biased language (How does the language used affect your perception?)

Problem 1

How much evidence is enough?

What does it mean?

- There is **good evidence** that polyjuice potion reduces nonspecific low back pain.
- There is **no evidence** that mudweed lotion improves acne.

The great evidence auction

Roll up roll up … place your bids !!

- No evidence?
- Weak evidence?

- Sensational evidence!

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Roll up...roll up...place your bids !!

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How much is enough?

Conclusion 1:

There was strong evidence in favour of exercise therapy, compared to no therapy, for improving muscle function and mobility.

Studies:

6 well-designed randomised controlled trials (RCTs)
Exercise therapy is better than no therapy.

Actual meaning:

There have been several well-designed clinical trials that show a positive effect of exercise therapy.

How little can you get away with?

Conclusion 2:

We conclude that there appears to be little scientific evidence for the effectiveness of multidisciplinary biopsychosocial rehabilitation compared with other rehabilitation facilities for neck and shoulder pain.

Studies:

1 RCT (low quality) and 1 controlled trial (low quality). Abstract does not state the results (beyond statement above).

Actual meaning:

There has been some research on this issue but the results are inconclusive? Further studies are needed.

When ‘no’ means ‘no’

Conclusion:

There is no evidence to support the benefits of bright light therapy for sleep problems in adults aged 60+.

Studies:

No trials have been done.

Actual meaning:

There has been no research on this issue.
(i.e. ‘We don’t know whether bright light affects sleep or not’.)

When ‘no’ means ‘yes’

Conclusion:

There is currently no evidence to suggest that increased dietary fibre intake will reduce the incidence or recurrence of adenomatous polyps.

Studies:

5 RCTs (4349 subjects) and a meta-analysis.
No significant association between dietary fibre intake and polyps

Actual meaning:

There is plenty of evidence, but no significant effect!

When ‘no’ means ‘maybe’

Conclusion:

There is no evidence to date that people without age-related macular degeneration should take antioxidant vitamin and mineral supplements to prevent or delay the onset of the disease.

Studies:

2 RCTs. No statistically significant association of ARMD and treatment. Studies were underpowered.

Actual meaning: Two studies did not show significant effects. However, the incidence of disease was low and the studies were not big enough to be able to measure an effect. Further research is needed.

When ‘no’ means ??

There is no evidence from randomised controlled trials to support any drug treatment for facioscapulohumeral muscular dystrophy but only two randomised controlled trials have been published.

Types of evidence

- Evidence of benefit
  (well-designed studies that show a beneficial effect)
- Evidence of harm
  (well-designed studies that show an adverse effect)
- Evidence of ‘no effect’
  (well-designed studies that show no significant effect)
- Inconclusive evidence (few or poorly designed studies that show some effect; i.e. further research needed).
- No evidence (i.e. no studies)

Problem 2

Use of biased language

Spot the bias

1. There is no evidence to support a beneficial effect of polyjuice potion for restoring memory loss.

   Implies benefits (even though there is no evidence/no studies)

… and this one

2. …long-term trials are needed to establish the safety of prolonged use of mudweed lotion.

   Assumes outcome of trials (that the lotion will be safe)

… and this one

3. The available evidence suggests that advice to stay active has small beneficial effects for patients with acute simple low back pain, and little or no effect for patients with sciatica.

   Implies that unavailable evidence may say something different?

Have a go — edit this conclusion

- There is an absence of evidence from RCTs that occlusal adjustment treats or prevents TMD. Occlusal adjustment cannot be recommended for the management or prevention of TMD.
- Several RCTs have shown that occusal adjustment has no statistically significant effect on TMD.

... and these statements

- There is not enough evidence to favour bypass surgery over angioplasty for the treatment of chronic limb ischaemia (inadequate blood flow to the legs)...
- [Several small studies have shown inconclusive results.] Further research is needed to determine whether bypass surgery is more or less effective than angioplasty for the treatment of...
- There were no clear differences between bypass surgery and angioplasty.
- There was no significant difference between... (but there may be a trend...)
- There is limited evidence for the effectiveness of bypass surgery to treat chronic limb ischaemia.
- Further research is needed to determine whether or not bypass surgery is effective for the treatment of...

Summary

When reporting evidence...

Beware of adjectives

- Don’t use unnecessary adjectives to describe evidence.
- Instead use adjectives to describe the studies or the effect, not the ‘evidence’:
  - well-designed trials, large effect

Make sure ‘no’ means ‘no’

- Avoid the term ‘no evidence’ — say what you mean:
  - no studies
  - no significant effect
  - inconclusive evidence
- Similarly, take care with terms like ‘little evidence’. (Is it a few studies or a small effect?)

Avoid biased language

- Just because you hope that further research will give a positive result, it doesn’t mean it will!
- Reread what you write — are you leading people towards a conclusion that can’t be justified? If so, reword to avoid the bias

And finally…