Towards evidence based medicine for paediatricians

Edited by Bob Phillips

I-squared

No, not −1, the self-multiplication of that fancy imaginary number that helps aircraft designers make wings work properly, but a (semi) quantitative assessment of how much heterogeneity there is in a meta-analysis: I^2.

You will recall that the idea of heterogeneity (mixed-up-ness) comes in both statistical and clinical flavours.[1] This measure—(I^2)—assesses the statistical aspect. It is often to be found at the bottom of a forest plot, near some other numbers (τ^2 and χ^2).

The principle of I^2 is straightforward. It gives you an idea of the 'percentage of variation which is beyond that you'd expect by chance alone'. It can be interpreted, approximately, like this:

- 0%–25%: just chance, really,
- 25%–50%: bit more than just chance, but unless clinically odd, probably acceptable. With a grain of salt.
- 51% plus: Woah! Really, quite different. Should you be doing a summary estimate here at all?

(Flashback again: the underlying assumption of fixed-effect meta-analysis is that the only variation between the studies is chance. Random effects gives you an average effect over an average population in an average trial with the average outcome measure.[2])

There are problems with I^2; if there are very few studies (<5), it probably underestimates heterogeneity, and if there are lots of studies (>40 or so) then it certainly overestimates it. And it is actually a point estimate in itself (and should be given with its own CI… but that is just too complicated to try…). And it is not really giving you a value you can assess the absolute amount of 'extra', to try to assess how clinically meaningful that 'beyond chance'ness would be. But frankly, if those sorts of things really bother you then you will probably be able to interpret τ^2 directly and calculate your own prediction intervals.[3]

Bob Phillips

Correspondence to Dr Bob Phillips, Centre for Reviews and Dissemination, University of York, York YO10 5DD, UK; bob.phillips@doctors.org.uk

Competing interests None declared.

Provenance and peer review Commissioned; internally peer reviewed.

Accepted 17 April 2015

Arch Dis Child 2015;**100**:594. doi:10.1136/archdischild-2015-308813

REFERENCES

1 Phillips B. What about mixedupness? *Arch Dis Child* 2015;100:505.
2 Phillips B. It's how mixed up? Meta-analysis models, step 1. *Arch Dis Child* 2011;96:602.
3 Phillips B. Confident in predicting. Meta-analysis models, step 2. *Arch Dis Child* 2011;96:1199.