

Messages that exaggerate effects

From: [Key Concepts for assessing claims about treatment effects and making well-informed treatment choices \(Version 2022\)](#)

1.1b Do not assume that treatments have large, dramatic effects.

Explanation

Large effects (where everyone or nearly everyone who is treated experiences a benefit or a harm) are easy to detect without fair comparisons. However, few treatments have effects that are so large that fair comparisons (designed to minimise the risk of being misled by systematic errors ([biases](#)) or the play of [chance](#)) are not needed. Treatments that do not have large, dramatic effects may be helpful, but fair comparisons are needed to determine how safe and helpful they are.

Some treatments have obvious effects. For example, if someone is bleeding and losing lots of blood, it is obvious that it is a good idea to stop the bleeding. However, most effective treatments do not have such obvious effects. For example, any effects of exercise or changes in diet on heart disease or cancer may occur only after many years. Some medicines and medical procedures have immediate and obvious effects, such as giving adrenaline to someone with a severe allergic reaction; transfusing blood to someone who has lost a lot of blood; or draining pus from a painful abscess. However, like changes in exercise or diet, any effects of most medicines and medical procedures do not have such easily observed or experienced effects by everyone who receives the medicine or procedure. This includes common medications used to prevent heart disease or strokes, such as medicines for high blood pressure or high cholesterol, which help some people but not everyone who takes them [[Leucht 2015 \(SR\)](#)]. It also includes treatments for cancer and pain, and complementary and alternative medicines, such as herbal remedies, public health measures (such as closing schools to reduce the spread of Covid-19), and changes in the ways healthcare is delivered or financed.

Basis for this concept

It has been suggested that carefully designed evaluations are not needed when the size of the treatment effect (the signal) is more than 10 times larger than the noise (what happens to people without treatment) [[Glasziou 2007](#)]. However, an analysis of drugs licensed despite a lack of evidence from randomized trials has suggested that it is not possible to identify a threshold above which beneficial effects are “dramatic”, and that carefully designed evaluations are therefore not needed [[Hozo 2022 \(RS\)](#)]. Other factors need to be considered when deciding whether carefully designed evaluations are needed. Nonetheless, very large effects (more than ten-fold improvement or a 90% reduction in a bad [outcome](#)) are very uncommon. Even effects that are large, but not that large (a two-fold improvement or a 50% reduction in a bad outcome) are uncommon, and most of the time are found to be much smaller when assessed in subsequent evaluations [[Nagendran 2016 \(SR\)](#), [Oxman 2012a](#), [Pereira 2012 \(SR\)](#)].

Implications

Claims of large treatment effects are likely to be wrong. Expect treatments to have moderate, small, or trivial effects (wanted or unwanted), rather than dramatic effects. If estimates of treatment effects are not based on [systematic reviews](#) of fair comparisons of treatments, be sceptical about claims of small or moderate effects of treatments.

References

Systematic reviews

- Leucht S, Helfer B, Gartlehner G, Davis JM. How effective are common medications: a perspective based on meta-analyses of major drugs. *BMC Med.* 2015;13:253. <https://doi.org/10.1186/s12916-015-0494-1>
- Nagendran M, Pereira TV, Kiew G, Altman DG, Maruthappu M, Ioannidis JP, et al. Very large treatment effects in randomised trials as an empirical marker to indicate whether subsequent trials are necessary: meta-epidemiological assessment. *BMJ.* 2016;355:i5432. <https://doi.org/10.1136/bmj.i5432>
- Pereira TV, Horwitz RI, Ioannidis JP. Empirical evaluation of very large treatment effects of medical interventions. *JAMA.* 2012;308(16):1676-84. <https://doi.org/10.1001/jama.2012.13444>

Research studies

- Hozo I, Djulbegovic B, Parish AJ, Ioannidis JP. Identification of threshold for large (dramatic) effects that would obviate randomized trials is not possible. *J Clin Epidemiol.* 2022 (In Press, Journal Pre-proof, Available online 25 January). <https://doi.org/10.1016/j.jclinepi.2022.01.016>

Other references

- Glasziou P, Chalmers I, Rawlins M, McCulloch P. When are randomised trials unnecessary? Picking signal from noise. *BMJ.* 2007;334(7589):349-51. <https://doi.org/10.1136/bmj.39070.527986.68>
- Oxman AD. Improving the health of patients and populations requires humility, uncertainty, and collaboration. *JAMA.* 2012a;308(16):1691-2. <https://doi.org/10.1001/jama.2012.14477>