

Numbers needed to treat (NNT)

What is the number needed to treat?

See also the separate [Therapies and Theories Outside Traditional Medicine](#) article.

The number needed to treat (NNT) is the number of patients who need a specific treatment to prevent one additional bad outcome (eg, myocardial infarction, stroke). The number needed to treat specifies the treatment, its duration and the adverse outcome being prevented. Therefore, if a drug has an NNT of 10, it means you have to treat 10 people with the drug to prevent one additional bad outcome.

The number needed to harm (NNH) is similar to number needed to treat and indicates how many patients need to be exposed to a risk factor to cause harm in one patient who would not otherwise have been harmed. The lower the number needed to harm, the worse the risk factor.

Calculation^[1]

- The number needed to treat is the inverse of the absolute risk reduction (ARR).
- The ARR is the absolute difference in the rates of events between a given activity or treatment relative to a control activity or treatment, ie control event rate (CER) minus the experimental event rate (EER), or $ARR = CER - EER$.
- NNTs are always rounded up to the nearest whole number and accompanied as standard by the 95% confidence interval^[2].
- Example: if a drug reduces the risk of a bad outcome from 50% to 40%, the $ARR = 0.5 - 0.4 = 0.1$. Therefore, the $NNT = 1/ARR = 10$.

- The ideal number needed to treat would be 1 - ie all patients treated will benefit.

It has been argued that the number needed to treat and number needed to harm are not the best way to report and assess the results of randomised clinical trials and that the ARR is preferable^[3].

Benefits of numbers needed to treat

- NNTs can be used either for summarising the results of a therapeutic trial or for medical decision-making about an individual.
- The number needed to treat provides a more clinically useful measure of the relative benefit of an active treatment over a control than the use of the relative risk, the relative risk reduction (RRR) or the odds ratio (the ratio of the odds of an event occurring in one group to the odds of it occurring in another group).
- NNT allows a simple explanation of the likelihood of benefit, which may be used in helping patients reach a decision about whether to start a medication. It is used to inform patient decision aids, such as the National Institute for Health and Care Excellence (NICE) decision aid "Taking a statin to reduce the risk of coronary heart disease"^[4].

Disadvantages of number needed to treat

- Although NNTs are easy to interpret, they cannot be used for performing a meta-analysis. Pooled NNTs derived from meta-analyses can be seriously misleading because the baseline risk often varies appreciably between the trials.
- NNTs cannot be used to calculate the risk:benefit ratio for an individual person. It gives the information for the population as a whole.
- The concept expresses the number of individuals who must be treated for one to benefit but not the degree of benefit, which will vary across conditions and circumstances.

Further reading

- [The NNT, explained](#); The NNT.com
- [Sedgwick P](#); Measuring the benefit of treatment: number needed to treat. BMJ. 2015 Apr 27;350:h2206. doi: 10.1136/bmj.h2206.
- [Therapy - NNT Reviews](#); reviews organised by specialty

References

1. [Number Needed to Treat \(NNT\)](#); Centre for evidence based medicine (CEBM) University of Oxford
2. [Sedgwick P](#); Understanding confidence intervals. BMJ. 2014 Oct 7;349:g6051. doi: 10.1136/bmj.g6051.
3. [Hutton JL](#); Number needed to treat and number needed to harm are not the best way to report and assess the results of randomised clinical trials. Br J Haematol. 2009 Jun;146(1):27-30. Epub 2009 Apr 27.
4. [Taking a statin to reduce the risk of coronary heart disease and stroke](#); NICE Patient Decision Aid, November 2014

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