The NNT is a statistic that summarizes the effectiveness of a therapy, or a preventive measure, in achieving a desired outcome. It is one way to indicate the clinical significance of an intervention. The simple idea is that no treatment works for everybody, so how many do you need to treat to benefit one case?

* The number needed to treat (NNT) is the number of patients with a condition who must follow a treatment regimen over a specified time in order to achieve the desired outcome for one person.

**Why does a treatment not benefit everyone?**

Take the example of prescribing Coumadin as a blood thinner to prevent stroke in people with atrial fibrillation.

First, because of biological variability, not all people who take the drug will benefit from it. But *we don't know which ones* will benefit, so we have to take a 'shotgun' approach.  
Second, and more important, only a small fraction of people who *don’t* take the drug will actually ever develop a stroke.  While we know that atrial fibrillation statistically increases the risk of a stroke, we don't yet know how to identify those who will actually get a stroke (we don't even know whether it's a matter of pure chance).  So, among those who *did* take the Coumadin only a small number were actually at risk and so could potentially benefit from it.

**NNT:**

* The NNT can be presented in negative terms, where the goal is to avoid a negative outcome such as taking medication to prevent a stroke; but it can also apply to achieving a cure.

How is it calculated? Let's work from an example:

|  |
| --- |
| Researchers tested a new drug that aims to decrease the chance of stroke in men who experience atrial fibrillation. The study included 1,000 who took the new drug for 5 years, and 1,000 were given the standard therapy. At the end of the trial, 6% of the men in the standard therapy group experienced a stroke, compared to only 2% in the group taking the new drug. |

* A simple way to express the benefit of the new drug would be the **relative risk reduction** (RRR), which compares the *reduction* in strokes with the rate in the standard therapy group: 6% − 2% divided by 6%, giving 0.66, or a two-thirds risk reduction.   
  **RRR**= Control Event Rate − Experimental Event Rate ÷ Control Event Rate
* This sounds impressive, but *relative* calculations can be misleading because they omit the risk of no treatment (the 'absolute risk'). An alternative statistic, the **absolute risk reduction** (ARR), is calculated by subtracting 2% from 6%, which gives a more modest (and less misleading) description of the benefit. 4% implies that only one 4 men in 100 actually benefit from the new drug.

**ARR**= Control Event Rate – Experimental Event Rate

* The **NNT** is the reciprocal of the absolute risk reduction, or 1 / ARR. This gives 25, meaning that 25 men had to receive the new drug for 5 years in order for one man to benefit (i.e. one less stroke to occur).
* Now consider a study with the same parameters at the outset, but 20% of men suffered a stroke on the conventional therapy compared with 10% on the new drug. The RRR is 50% (less good than before), but the NNT is now just 10, suggesting a much greater advantage of the new drug. This presentation of the absolute benefit of therapy is probably what patients are most interested in, so it more useful than the relative risk reduction.
* Cast in positive terms, if a medication cures 35% of people who take it, while 20% improve using a placebo, the absolute improvement is 15%. So the NNT is 1 / 0.15 = 7. So on average you would need to treat 7 people to achieve 1 cure.

**Some cautions in interpreting the NNT.**

* You cannot use NNT figures from different studies to compare two or more therapies. For the comparison to be meaningful, the therapies must have been tested in similar population samples with the same condition, using the same comparator, time period, and outcomes.
* The NNT always has to include a time frame (5 years, 10 years, etc).
* The NNT should also be interpreted very carefully with patients who experience the same event numerous times, such as repeated asthma attacks, as it can lead doctors to over-estimate the benefit of therapy and even over-prescribe.
* Relying solely on NNT ignores other helpful sources of information. Information on side-effects, costs, cost-effectiveness, and patient preferences are also important for making informed health and health care decisions. And using NNT alone also doesn’t give patients an idea of their baseline risks.