Understanding Treatment Results Series

Number Needed to Treat (NNT)

Number needed to treat is one way to communicate the effectiveness of a treatment. It is growing in popularity and is often reported in RCTs and systematic reviews on therapy. It signifies how many patients would need to be treated to get one additional patient better who *would not have gotten better without this particular treatment.*

Let's try an example.

An NNT of 9 for treating sinusitis with antibiotics indicates that 9 patients need to be given an antibiotic to get one more patient better than would have improved without the antibiotics. *It does not reflect how many patients get better in total.* The other eight are probably a combination of patients who would have gotten better *even without treatment* and perhaps some that did not get better despite the antibiotic (e.g., they may have had an allergic sinusitis).

This method offers one convenient way to think about how good a particular treatment is.

If a paper does not report the NNT, but does report the absolute risk (AR), the NNT can be easily calculated.

For example, if 80% of patients in the control group got better and 90% of patients in a treatment group got better, the absolute risk of not getting better if denied the more effective treatment is 10%.

To figure out the NNT, divided the absolute risk into 100.

$$\textbf{NNT} = \frac{100}{\text{AR (\% in treatment group - \% in control group)}}$$

So for this particular treatment, we divide 10 into 100.

$$\frac{100}{90 - 80} \quad \text{or} \quad \frac{\mathbf{100}}{\mathbf{10}} \quad = \mathbf{NNT\ 10}$$

For every 10 patients who get this treatment, 1 more would get better compared to the control group.

NNTs can mislead. What an NNT *doesn't* tell you…

An NNT tells you *how many* patients would benefit, but it doesn't tell you *how much* they may benefit or a number of other key factors. Beware of reading or citing NNTs without knowing the context. Here are some basic things that you need to know about the NNT to help you judge its worth:

- What defined treatment success? Complete cure? A 30% improvement (that probably *is* clinically significant)? A 5% improvement in pain (probably not considered clinically significant)?
- What was it compared to? (a placebo? another therapy that's known to be effective? no treatment?)
- How long did the results last (what was the length of follow up)?
- What phase was the injury in (acute, subacute? chronic?)
- How severe was the condition?

CASE Example: Comparing orthoses

A study (Landorf 2006) comparing two types of orthoses for the treatment of plantar fasciitis reported that at 3 months the cheaper prefabricated orthoses had an NNT of 6 and customized orthoses had an NNT of 4. The point they were making is that the two types were petty similar despite the cost difference. However, the NNT as an isolated number does not tell you how helpful either orhtosis was. NNTs of 4 and 6 both look pretty good. But NTTs without more context can create an over estimation of the therapeutic value. A closer read of the study reveals that a 30% improvement in function was the threshold for success (not full resolution of the symptoms)—now this is probably large enough to be clinically significant, but one would still need to decide whether making two additional patients 30% better is effective enough to justify the additional cost.

Figuring out the context is usually not too much of a problem in a single study or in a well written synopsis—but in systematic reviews, narrative reviews, or poorly written synopses, NNTs are often cited without context. This can be an issue.

 **Clinical Hint:** When reporting an NNT to your Attending (or writing a CAT) based on a study you read, try not to cite an NNT without providing context.

What is a good NNT?

A perfect NNT would be 1. That means that for very patient treated one got better in the study who would not have otherwise without that particular intervention. The larger the number, the fewer people will be helped.

What one considers a "good enough" NNT is going to be a judgment call based not only on the NNT itself but also on a carefully balanced consideration the following:

- how robust the treatment outcome is (does it completely cure the patient or just make them a small percentage better?)
- the cost (is it expensive?)
- the risk of treatment (are side effects common? serious?)
- is there a better treatment available?

For example, in the case of antibiotics for sinusitis the pediatric guidelines (Pichiero 2005) suggest that an NNT of 9 is not sufficient to recommend antibiotic's routinely for sinusitis because of the risk of creating antibiotic resistant strains. An NNT of 9, however, might be considered acceptable for a different treatment of a different condition.

Putting NNTs into perspective

As a general rule of thumb, an NNT of 5 or under for treating a symptomatic condition is usually considered to be acceptable and in some cases even NNTs below 10.

Below are some NNTs for routine medical interventions. Note that the various tables below offer additional context to the numbers.

NNTs for Some Common Medical Treatments

Condition	Treatment	Outcome	NNT
H. Pylori	Triple therapy	Eradication	1.1
Peptic Ulcer	H. Pylori tx vs. H_2 tx for 6-8 weeks	Ulcer cure at 1 year	1.8
Migraine	1 dose sumatriptan vs. placebo	Headache relief at 2 hours	2.6
Bacterial conjunctivitis	Topical abx vs. placebo	For early clinical remission (3-5 days)	5
Herpes Zoster	Acyclovir vs. placebo	Prevent PHN at 6 months	Not effective

NNTs for Some Common Musculoskeletal Treatments

(Hilton 2006)

	Treatment	Outcome	Follow up	NNT	CI
Knee OA (Bennell 2005)	Taping, exercises, mobilization vs sham US	Global pain improvement	24 weeks	4	2-10
Impingement syndrome (Dickens 2005)	Mob, exercise vs continue usual activities	Prevent surgery	6 months	4	2-9

NNTs for Prevention

NNTs for prevention can sometimes be bigger. Sometimes much bigger. It is not unusual for them to be double digits and sometimes triple digits.

Condition	Treatment	Outcome	NNT
Hypertension in patients with type 2 diabetes	HTN treatment	1 diabetes-related death over 10 years	15
DVT	Warfarin (target INR = 1.5-2.0) vs. placebo for 1 year	1 VTE over 1 year	22
Heart failure (NHYAI or II)	Enalapril vs. placebo	1 death at one year	100

Looking at statins, the NNT changes dramatically depending on the context (i.e., whether patients are at high risk or low, how long you track the patient):

Condition	Treatment	Outcome	NNT
MI low risk (0.9%)		At 1 year	427
Hyperlipidemia (primary prevention)	Simvastatin vs. no treatment	1 death over 1 year	163
MI higher risk (3.7%)		At 1 year	104
MI patients with hyperlipidemia (secondary prevention	Various statins vs. placebo	1 MI or CVA over 5 years	16

Ron LeFebvre, DC
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References

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Pichichero M, Casey J. Acute otitis media: Making sense of recent guidelines on antimicrobial treatment. J FamPrac 2005;54(4):313-22.