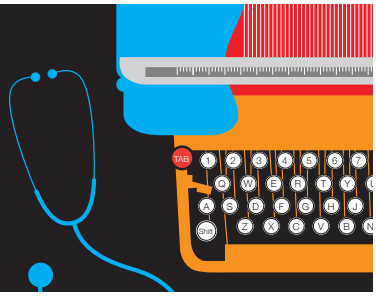
Medicine in the Media

The Challenge of Reporting on Medical Research

Numbers Glossary



All examples are based on the following scenario:

In a randomized trial, 200 adults were given either DRUG or placebo for 5 years. Here's what happened:

	EXPOSED DRUG (100 adults)	CONTROL Placebo (100 adults)
Died during study	10 people	30 people

Measure	Definition	Example
Absolute risk Analogy: Price Absolute risk (*control*) is the regular price. Absolute risk (*exposed*) is the *sales* price.	$\frac{\text{Number who had outcome}}{\text{Number who could have had outcome}}$	**Absolute risk** (DRUG group) = 10/100=0.10=**10%** **Absolute risk** (Placebo group) = 30/100=0.30=**30%** Over 5 years, **10%** of the DRUG group died compared to **30%** of the placebo group. DRUG lowered the chance of dying compared to placebo: **10%** vs. **30%** died over 5 years.
Absolute risk reduction (ARR) "percentage points lower" Analogy: Savings from a sale. Subtract the sales price from the regular price.	Absolute risk (control) – Absolute risk (exposed)	**Absolute risk reduction** = 30% - 10% = **20% = 20 in 100** **For every 100 people** who take DRUG instead of placebo for 5 years, **20 fewer** people would die. DRUG lowered the chance of dying over 5 years by **20 percentage points** compared to placebo: 10% vs 30%.
Number needed to treat (NNT)	$\frac{1}{\text{Absolute risk reduction}}$	**Number needed to treat** = 1 / 20% = 1/0.20 = **5** **5 adults** would have to take DRUG for five years to prevent **1 death**.
Relative risk (RR)	$\frac{\text{Absolute risk (exposed)}}{\text{Absolute risk (control)}}$	**Relative Risk** = 10% / 30% = 0.1/0.3 = **0.33** The DRUG group had **0.33** times the chance of dying compared to placebo: 10% vs 30% died over 5 years. The DRUG group had **one third** the deaths of the placebo group: 10% vs 30% died over 5 years.
Relative risk reduction (RRR) "% lower" Analogy: "% off" for the sale ("67% off regular price")	1 – Relative Risk	**Relative risk reduction** = 1 - 0.33 = 0.67 or **67%** DRUG reduced the chance of dying by **67%** compared to placebo: 10% vs 30% died over 5 years. DRUG lowered deaths by **two thirds** compared to placebo: 10% vs 30% died over 5 years.

Bottom Line Always report absolute risks for each group (no matter what other numbers are used).

For all risks, you need to be clear about 3 things: exactly what the outcome is (e.g. having a heart attack), over what time period the outcome occurred (e.g. 5 years) and in whom (e.g. adults with diabetes).

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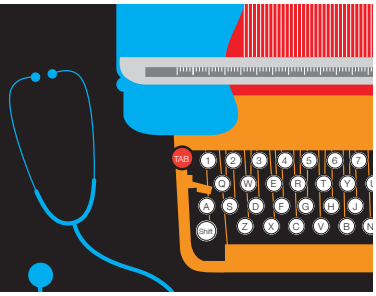
Statistics Glossary



The p value and confidence interval are based on the following scenario

In a randomized trial, 200 adults were given either DRUG or placebo for 5 years. Here's what happened:

	EXPOSED DRUG (100 adults)	CONTROL Placebo (100 adults)
Died during study	10 people	30 people

Measure	Definition	Example
p value	Probability that an observed effect size is due to chance *alone* if p > 0.05, we say "likely due to chance", "not statistically significant" if p < 0.05, we say "unlikely due to chance", "statistically significant" Remember, even with a very low p value ("highly statistically significant"), results can still be very wrong: the study may be biased or confounded.	Relative risk reduction = 67%, **p=0.0004** The observed differences in the 5 year risk of death between the DRUG and placebo group is not consistent with chance alone (i.e. p=0.0004–there is only a **4 in 10,000** chance of seeing differences this big or bigger if DRUG and placebo were the same). These results are very unlikely to be due to chance.
Confidence interval (95% CI)	Because the observed value is only an estimate of the truth, we know it has a "margin of error". The range of plausible values around the observed value that will contain the truth 95% of the time.	Relative risk reduction **(95% CI) =** 67%(**36%– 83%**) While our best estimate is that DRUG lowers the 5 year risk of death by 67%, the results of this study say it is possible that DRUG may lower the risk **by as little as 36% or as much as 83%**

Early Detection Statistics

Survival	Number alive at a specfied time after Cancer X diagnosis (typically 5 or 10 years) / Number diagnosed with Cancer X Comparing survival of patients diagnosed by different methods tells you nothing about the benefit of early detection. Consequently, comparing survival across time (e.g. 1970 vs. 2008) or place (e.g. UK vs. US) – when patterns of testing are different – is misleading. They cannot tell you whether anyone is living longer.	10-year lung cancer survival was: **29%** for patients diagnosed by screening chest x-rays **14%** for patients diagnosed by symptoms Lung cancer patients diagnosed by screening chest x-rays have a 10-year survival of 29% compared to **14%** of lung cancer patients diagnosed by symptoms, like cough or weight loss. Warning: This statement is misleading. It tells you nothing about about the benefit of screening.
Mortality	Number of Cancer X deaths over a specified time / Total No. of people in study or population (i.e. with & without Cancer X diagnosis) Reduced mortality in a randomized trial is the only reliable evidence for the benefit of screening.	In a randomized trial of chest x-ray screening, **10 year lung cancer mortality** was: **4%** for the chest x-ray screening group **4%** for the control group (not screened) The **10-year lung cancer mortality** among the chest x-ray screening group was **4%** versus **4%** in the control group.

THE DARTMOUTH INSTITUTE FOR HEALTH POLICY & CLINICAL PRACTICE

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