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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:

	TREATMENT DRUG (100 adults)	**CONTROL** Placebo (100 adults)
Died	10	30

Measure	Definition	Example
Absolute risk Analogy: Risk → Price Absolute risk (*control*) → *regular* price. Absolute risk (*treatment*) → *sales* price.	**Number who had outcome** / **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** (treatment)	**Absolute risk reduction** = 30% - 10% = 20% = **20 in 100** DRUG lowered the chance of dying over 5 years by **20 percentage points** compared to placebo: 10% vs. 30. For **every 100 people** who take DRUG instead of placebo for 5 years, **20 fewer** would die.
Number needed to treat (NNT)	**1** / **Absolute risk reduction**	**Number needed to treat** = 1 / 20% = 1 / 0.20 = **5** **5 adults** would have to take DRUG for 5 years to prevent **1 death**.
Relative risk (RR)	**Absolute risk** (treatment) / **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 percent** 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).

Statistics Glossary

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Measure	**Explanation**	**Example**

Statistics

p value

A way of gauging whether an observed result might reflect the play of chance: formally, the probability (ranging from 0 to 1) of seeing this result (or even more extreme results) if the treatment really had no effect.

By tradition, p-values are interpreted according to an arbitrary cutoff, typically:

- p < 0.05 is "statistically significant
- p ≥ 0.05 is "not statistically significant"

Remember, even a very low p value does not mean the results are true (the study may be biased or confounded) or important (patients may not notice the difference).

Example: Relative risk reduction = 0.67, **p=0.0004**

The observed difference in the 5-year risk of death between the DRUG and placebo groups is **statistically significant** (p=0.0004). There is a **4 in 10,000** chance of seeing differences this big or bigger if DRUG actually had no effect.

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.

Example: Relative Risk Reduction **(95% CI)** = 0.67 **(0.36 - 0.83)**

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

$$\frac{\text{Number alive at a specified time after Cancer X diagnosis (typically 5 or 10 years)}}{\text{Number diagnosed with Cancer X}}$$

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.

Example: 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 the benefit of screening.

Mortality

$$\frac{\text{Number of Cancer X deaths over a specified time}}{\text{Total No. of people in study or population (i.e. with \& without Cancer X diagnosis)}}$$

Reduced mortality in a randomized trial is the only reliable evidence of the benefit of screening.

Example: 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.