Evidence-Based Medicine Glossary

Absolute risk reduction (ARR): (also called RD or risk difference) The absolute difference between control/relative event rates often looks less impressive if the baseline risk is a small reduction. Used to calculate number needed to treat. ARR = CER – EER (e.g., 10% – 14% = -4%).
The lower the event rate in the control group, the larger the difference between the RRR and RD.

Case control studies: This type of study compares groups of people who are as similar as possible aside from the difference of interest (e.g., having a certain medical condition). They then attempt to work backward to determine whether risk factors in the past may have contributed to the present difference. This can be challenging and is prone to problems with recall and lack of records.

Case report: This is a study attempting to describe a patient, event, or case. It can be used to provide specific details in a specific case; however, it may describe a rare occurrence and is not very generalizable.

Clinical practice guidelines: These are guidelines based on the body of literature from expert bodies that attempt to give the best possible advice on optimal clinical practice.

Confidence intervals: Data are usually presented as a 95% confidence interval, meaning that if the study is repeated multiple times, 95% of the studies will have result within that range. A narrow or tight confidence interval represents a precise estimate. These are usually found in studies with a large number of participants.

Control event rate (CER)/Experimental event rate (EER): The rate at which events occur in the control group or experimental group, respectively. It may be represented by a percentage (10%) or as a proportion (0.1).

Cross sectional study: This is a one-time survey of a random group of people. For example, this could be useful for determining what proportion of a population has had cancer screening.

Event rate: The number who experience an event (e.g., stroke as a proportion of the number of people in the population or clinical cure).

GRADE (Grading of Recommendations, Assessment, Development, and Evaluation): A common way to evaluate studies. Essentially, RCTs start as high quality evidence, and observational studies start as lower quality of evidence. The study quality can be adjusted based on a variety of factors.

Study Design	Quality of Evidence	Lower if	Higher if
RCT	High	**Risk of bias** -1 Serious -2 Very serious **Inconsistency** -1 Serious -2 Very serious **Indirectness** -1 Serious -2 Very serious **Imprecision** -1 Serious -2 Very serious **Publication bias** -1 Likely -2 Very likely	**Large effect** + Large +2 Very large **Dose response** +1 Evidence of a gradient **All plausible Confounding** +1 Would reduce a demonstrated effect or +1 Would suggest a spurious effect when results show no effect
	Moderate		
Observational study	Low		
	Very low		

Hazard ratio: This is similar to odds ratio but is a snapshot at a point in time looking at the difference between two groups (e.g., a certain point on a survivorship curve). It will only look at a single point in time so it may not be that useful if the wrong time point is picked. This may make a treatment seem falsely ineffective.

Incidence: The percentage of the population that will develop a disease during an interval (e.g., the incidence of diabetes is 0.2% per year, referring only to new cases).

I^2: This is a measure of heterogeneity. Usually it is used in the setting of a meta analysis to explore heterogeneity between studies. It is expressed as a percentage with 0% meaning no heterogeneity and 100% meaning extreme heterogeneity.

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Incidence rate (IR): The rate at which an outcome will occur over a period of time in a specific group. (e.g., two people from the study group will develop diabetes per 1,000 person years).

Incidence rate ratio (IRR): This compares the IR between different groups. For example, the IR of diabetes for BMI > 30 is three per 1,000 person years and the IR for BMI < 30 is one per 1,000 person years. Therefore, the IRR is three.

Intention to treat: Participants are analyzed in the group to which they were randomized, whether or not they completed the intervention of that group. The advantage of this approach is that it makes it more difficult for study runners to bias the results by selecting for patients who are likely to do the best.

Interquartile range (IQR): This is a measure of the variation in data. It is the difference between the 3rd quartile (75th percentile) and the 1st quartile (25th percentile).

It can be calculated as:
IQR = Q3 (median of the 3rd quartile) – Q1 (median of the 1st quartile)

Likelihood ratio (LR): Positive likelihood ratio (LR of a positive test)
= Sensitivity ÷ 1 – Specificity
= a/(a + c) ÷ b/(b + d)

Negative likelihood ratio (LR of a negative test)
= 1 – Sensitivity / Specificity
= c/(a + c) ÷ d/(b + d)

The larger the positive likelihood ratio, the greater likelihood of disease. The smaller the negative likelihood ratio, the less likelihood of disease. This is useful for clinicians. It can be applied to a nomogram to calculate probability of disease.

+ LR (likelihood ratio of a positive)		- LR (likelihood ratio of a negative)	
2–1 (or less)	Poor	0.5 – 1 (or >)	Poor
5–2	Small/moderate	0.5 – 0.2	Small/moderate
10–5	Good	0.2 – 0.1	Good
> 10	Excellent (rule in)	< 0.1	Excellent (rule out)

Meta-analysis: This is a type of study that incorporates multiple similar RCTs to attempt to unify their data to function as one large RCT, to have the greatest possible statistical power.

Number needed to treat (NNT)/Number needed to harm (NNH): The number of patients who would have to receive the treatment in order for one of them to benefit or be harmed.
NNT = 1 ÷ ARR
NNH = 1 ÷ (EER – CER)

		Disease		
		Positive	**Negative**	
Test	**Positive**	True Positive **a**	False Positive **b**	All Positive tests **a + b**
	Negative	False Negative **c**	True Negative **d**	All Negative tests **c + d**
		All with Disease a + c	**All without Disease b + d**	

Odds ratio (OR): Measure of association between exposure and outcome. Odds the outcome will occur with exposure, compared to odds it will occur without the exposure. Often used in case-control studies. This is odds in exposed group/odds in non-exposed group.
OR = (exposed cases ÷ unexposed cases)
(exposed non-cases ÷ unexposed non-cases)

OR = 1 means no effect; OR >1 exposure increases odds of outcome; OR <1 exposure decreases odds of outcome.
In some cases this can be weighted with each value multiplied by its weight.

Other diagnosis calculations:
Positive predictive value = a ÷ (a + b)
If a test is positive, what is the chance the person has disease.
Negative predictive value = d ÷ (d + c)
If a test is negative, what is the chance the person does not have disease.

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***P* value:** A measure of probability that a difference between groups during an experiment would happen by chance if there was not a true difference between groups. For example, a *P* value of 0.05 means if there was no true difference between groups (the null hypothesis was true) then you would see the amount of difference between groups in your experiment one of every 20 times. By convention, a *P* value of 0.05 or less is considered to be statistically significant.

Per protocol analysis: Patients are analyzed based on which treatment they receive. May be vulnerable to manipulation if non-random patients are excluded.

Power: This means the likelihood that your study will be able to detect an actual effect between groups based on your study size. If power is too low then a real difference may be missed. If it is too high then statistically significant but clinically meaningless differences may be found.

Prevalence: The probability of disease in the entire population at any point in time (e.g., 2% of the United States' population has diabetes).

Prospective cohort study: This type of study follows groups forward in time to see what happens based on a difference of interest. For example, exercisers versus sedentary people could be followed to determine differences in cardiovascular disease.

Qualitative study/Quantitative study: A qualitative study looks at what a narrative experience has been like.
For example, someone's experience with a specific disease or a specific procedure.
A quantitative study attempts to compare with actual numbers.

Randomized control trial (RCT): This is a study where randomly divided but similar groups have an intervention or control applied to the groups. This lets us see what the difference in outcome is based on the intervention. An example is a medication compared to a placebo (which is an inactive dummy drug). This can be blinded where the group members don't know which group they are in or double blinded where neither the study runners nor group members know which group they are in. If everyone knows what group they are in it is called an open label trial.

Relative risk (RR): Risk in the experimental group compared to the control group.
RR = EER ÷ CER.

Relative risk reduction (RRR): Change in risk relative to the overall population (often looks more impressive as it will be a percentage of the population).
RRR = (EER – CER) ÷ CER
For example: (10% – 14%) ÷ 10% = -0.4

Risk ratio: This is similar to odds ratio but instead is the ratio of event to total outcomes. For example, treatment success/(treatment success + treatment failure).

Sensitivity = a ÷ (a + c): The probability of a positive test among patients with disease.

SNOut: Sensitive tests when **N**egative help rule **Out** disease

Specificity = d ÷ (d + b): The probability of a negative test among patients without disease.

SPIn: Specific tests, when **P**ositive, rules **In** disease

Statistical dependency: This is a statistical measure that means the odds of one event will influence the odds of another event.

Survivorship curve: This is a graph showing the proportion of a given population that continues to survive over time. This could mean actual survival over death, but it could also mean time without being diagnosed with a given disease or complication. Curves for different populations (e.g., treatment vs control) can be compared easily.

Systematic review: This is a type of study that starts with a clear question and uses systematic methods to attempt to identify and critically appraise all relevant research.