Guide to Calculating and Interpreting Epidemiologic Statistics

ClinCalc Academy Biostatistics Cheatsheet

This document is designed to assist clinicians in calculating and interpreting epidemiologic statistics. By design, this guide is non-comprehensive, meaning only the most common and relevant statistics have been included.

Biostatistics Rx

A practical guide to study design and evaluation for healthcare providers

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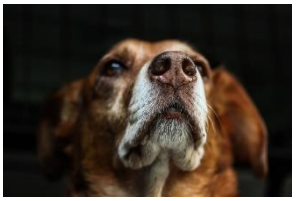
Expressing Diagnostic Test Performance

	Disease	No Disease
Positive Test	True Positive (TP)	False Positive (FP)
Negative Test	False Negative (FN)	True Negative (TN)

- **Accuracy:** Probability of the test being correct
  - True tests ÷ total tests
  - (TP+TN) ÷ (TP+FP+FN+TN)
- **Positive predictive value (PPV):** Probability of positive test being accurate
  - True positive ÷ total positive tests
  - TP ÷ (TP+FP)
- **Negative predictive value (NPV):** Probability of a negative test being accurate
  - True negative ÷ total negative tests
  - TN ÷ (TN+FN)
- **Sensitivity:** Probability of a positive test in someone WITH the disease
  - True positive ÷ total with the disease
  - TP ÷ (TP+FN)
- **Specificity:** Probability of a negative test in someone WITHOUT the disease

- True negative ÷ total without the disease
- TN ÷ (TN+FP)



A “sensitive” nose

High sensitivity means the test is likely to be negative if the disease is not present

A “specific” test for the disease

High specificity means that if the test is positive, it is likely to indicate the disease is present

Incidence vs. Prevalence

Incidence

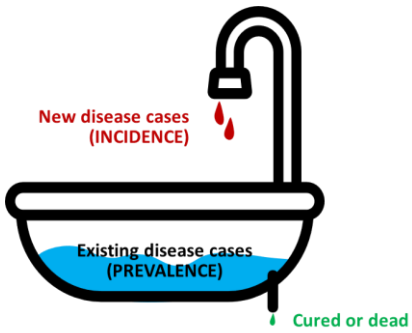
New cases of a disease over a specific time period

$$\text{Incidence} = \frac{(\#\text{ new cases over time period})}{(\#\text{ people at risk})}$$

Prevalence

Total cases of a disease at a specific time point (“snapshot”)

$$\text{Prevalence} = \frac{(\#\text{ total cases at one point})}{(\#\text{ total population})}$$



Expressing Risk or Treatment Effect

Absolute Risk Reduction (ARR)

Describes the number of percentage points between the intervention and control groups.

$$\text{ARR} = |(\%\text{ Intervention}) - (\%\text{ Control})|$$

Relative Risk Reduction (RRR)

Describes the relative difference between intervention and control groups as a percentage.

$$\text{RRR} = \frac{|(\%\text{ Intervention}) - (\%\text{ Control})|}{(\%\text{ Control})}$$

Relative Risk (RR)

Describes the ratio of the probability of an outcome between intervention and control groups. RR can best be interpreted as "times as likely". For example, a RR of 1.2 means that those receiving an intervention are "1.2 times as likely" (thus more likely) to experience an outcome compared to patients receiving control.

$$\text{RR} = \frac{\%\ \text{Intervention}}{\%\ \text{Control}}$$

Number Needed to Treat (NNT)

Describes the number of patients who need to receive an intervention (and not the control) for one additional patient to experience a beneficial effect or endpoint.

$$\text{NNT} = \frac{1}{|\ (\%\ \text{Intervention})\ -(\%\ \text{Control})|/100} = \frac{1}{(\text{ARR as decimal})}$$

Number Needed to Harm (NNH)

Describes the number of patients who need to receive an intervention (and not the control) for one additional patient to experience a harmful effect or endpoint. The calculation for NNH is identical to NNH; the only difference is that NNT describes a positive (good) outcome whereas NNH typically describes an adverse effect or negative (bad) outcome of a treatment.

Efficacy vs. Effectiveness

Efficacy

Beneficial effect of a therapy in ideal, controlled study conditions

"Does it work in a clinical trial?"

Effectiveness

Beneficial effect of a therapy in a real-world setting

"Does it work in clinical practice?"