

Reliability refers to reproducibility

Accuracy the degree to which the measurement matches that of gold standard (must be given)
"The true-ness of the test" = Validity

Precision consistency and reproducibility (reliability)

Selection Bias Non-random assignment

Recall Bias affected by time and presence of Disease

Sampling Bias Samples aren't reflective of population

Late-look info gathered after most patients died

Confounding occurs with 2 closely affected factors. 1 factor affects the other.
i.e. when comparing Shoe size to IQ in Elementary School Students

But wait, what about "Age"?
Does age affect the outcome of study? Yes
b/c older kids have larger shoe size and most likely a high IQ
Age is a **Confounder**.
(it affects both exposure & outcome)

Note we can control confounding in a Case Control Study by Matching when we are in design stage. Equal Distribution of Ages etc.

Note we control confounding also by "Stratified Analysis"

Summary
Confounding = affects both groups (outcome and exposure)
effect modulation: when something affects only one of the groups.
stratified analysis: differentiates b/w confounding and effect modulation

STEP 1 You just need to know basic definition!!

Lead time bias when early detection is confused with survival.

Pygmalion effect when researcher's belief changes the outcome.

Hawthorne Effect when the group being studied changes their behavior (i.e. they could start eating better if the study was to give them vitamins)

Berkson Bias using only sick pts. (i.e. Hospital pts)

Control Bias

- 1 Double-Blind studies
- 2 Placebo responses
- 3 Cross-over (each subject acts as their own control)
- 4 Randomization (Selection Bias, Confounding Bias)

Dx = Disease



Quantifying Risks

ODD's Ratio = odds of having Dx in exposed divided by having Dx in unexposed group.

Relative Risk (Cohort Study) probability of getting Dx in exposed vs. unexposed group.

RR (Relative Risk)
If RR is > 1 , then Dx is more likely in exposed group.
(i.e. if RR is 1.5, then you are more likely (1.5x) to get cancer from smoking etc.)
If RR = 1, then no risk (no difference b/w exposure and not)
If RR < 1 , then less likely to have Dx with exposure.

Attributable Risk The difference (means subtract) b/w exposed and unexposed groups.

Absolute Risk Reduction (ARR) Reduction in risk q/w Tx vs. Placebo

We need these for formulas:
 $NNT = \frac{1}{ARR}$ (number needed to treat)
and $NNT_H = \frac{1}{ARR_H}$ (number needed to harm)

Important facts

p-value: needs to be ≤ 0.05 .
Did something occur by "chance"?
If p-value is > 0.05 then not a good study.
(maybe it was poor sample size)

Confidence Interval (CI)

Cannot contain 1.0 *
if it does then it means RR has No significance (bad study)
if CI = 1.7 - 2.1 (good)
if CI = 0.8 - 1.3 (bad) contains 1.0
Note: They will give you a CI.

Meta-Analysis = Pools from multiple sources

t-test = checks means b/w 2 groups

ANOVA = compares means b/w 3 or more groups

Chi-Square = uses 2x2 table

Likelihood Ratios > 1 that Test result is also presence of Dx
 < 1 that Test result is also absence of Dx

Miscellaneous

Sensitivity = 1 - False Neg Rate

Specificity = 1 - False Pos Rate

ARP = $\frac{RR-1}{RR}$ (Risk % of exposure)

Prevalence vs Incidence

Prevalence = Total # of persons with Dx

Incidence = # of new cases over a given time

Prevalence $>$ Incidence in chronic Diseases.
Prevalence = Incidence in Acute Dx (colds)



Reality
Test (exposure)

a	b
c	d

RR does not account for chance that is covered by Confidence Interval (CI).

$ARR = ER_{control} - ER_{Tx}$
(Event Rate control) (Event Rate Tx)

Statistical Distribution

Standard deviation = calculated how far (S.D.) from the group they are.

1 S.D. = 68%
2 S.D. = 95%
3 S.D. = 99.7%
Be able to calculate % of a group or if they say > 2 S.D., what does that mean?

Statistical Hypothesis

H_0 = No Association exists (Null)

H_1 = There is an association

Note: You ↑ Power by ↑ sample size.



Reality

H_1	H_0
Power (1-β)	α
H_0	β

Type I error (α-error) = States there is an effect when there isn't (i.e. p-value) (chance)

Type II error (β) = States no association exists when it really does.

(STEP I exam will ask you to write backwards. Give you p in words when ask for Power)