Biomedical Statistics – Topic Discussion

Variables:

Dependent Variable	The outcome that the study is attempting to explain/effect
Independent Variable	The factors that may influence the dependent variable
Confounding Variable	A factor that could influence the outcome on the dependent variable but is not measured in the study

Data:

Nominal	Data that falls into a single subset no numerical significance (categories (blonde, brunette, grey)
Ordinal	Data is portrayed in a finite ranked system (ex: pain scale)
Interval	Data that comes with an infinite number of numerical data points within two endpoints (temperature) – known space between any two points w/o an absolute zero
Ratio	Data that falls within an infinite number of evenly spaced values between points where there is an absolute zero

Equations:

$\boldsymbol{incidence\ rate = \frac{\#new\ cases\ per\ unit\ of\ time}{total\ population\ at\ risk}}$	**# of healthy patients at risk of developing disease**
$\boldsymbol{Prevalence = \frac{\#existing\ patients}{population}}$	**# that have the disease at a time**
$\boldsymbol{Relative\ Risk = \frac{incidence\ rate\ in\ patients\ exposed\ to\ specific\ factor}{incidence\ rate\ in\ patients\ not\ exposed\ to\ factor}}$	**Measure of a disease in a specific population that is presented with specific risks**
RR> 1.0 : greater risk in exposed group; RR=1.0 : equal risk; RR<1.0 : greater risk in those not exposed	
$\boldsymbol{Odds\ Ratio = \frac{Cases\ with\ exposure\ *\ controls\ without\ exposure}{Cases\ without\ exposure * control\ with\ exposure}}$	**Estimating equation for RR – used in retrospective studies because prospective studies are impossible**
$\boldsymbol{Number\ needed\ to\ treat = \frac{1}{ARR}}$	**# of patients needed to treat for 1 patient to benefit**
$\boldsymbol{Number\ needed\ to\ harm = \frac{1}{ARI}}$	**# of patients needed to treat for one patient to be harmed**

Relative Risk Reduction/Increase difference in event rates between two groups as a proportion of the unaffected groups
Absolute Risk Reduction: The absolute difference in rates between two treatment groups

Types of Error/Alpha/Beta/Power/Confidence Interval

Type 1 False positive	When studies state a difference exists when there actually is no difference (α-error) Alpha is the chance of making type 1 error (must be a priori) ***p < 0.05 = There is < 5% chance that the results are due to chance alone; p < 0.01 = There is < 1% chance that the results are due to chance alone; p < 0.001= There is a <0.1% chance that results are due to chance alone*** Correlates with the CI (0.05 alpha = 95% CI)
Type 2 False negative	When the study suggests a difference does not exist when it does (β-error) – related to Power which is the probability that the study will determine a significant result ***If β=0.1 → 90% Power*** As power increases the chance for a type 2 error decreases

Tests – see RX Prep Book – Extreme Area of confusion