

Clinical Inference from Inferential Statistics

Phil Page PhD, PT - Franciscan University DPT Program

Background

- **Inferential Statistics** are 'inferred' on a population from a representative sample
- **2 main uses:**
 - Probability of Type 1 error in Null Hypothesis Testing (NHT)
 - Estimate a parameter of a population with a confidence interval (CI)
- **Inferential stats must meet assumptions**
 - Normal distribution, Homogeneity of Variance, Independent measures
- **NHT is of little clinical value (p-value)**
 - Dichotomous, arbitrary
 - No magnitude or direction

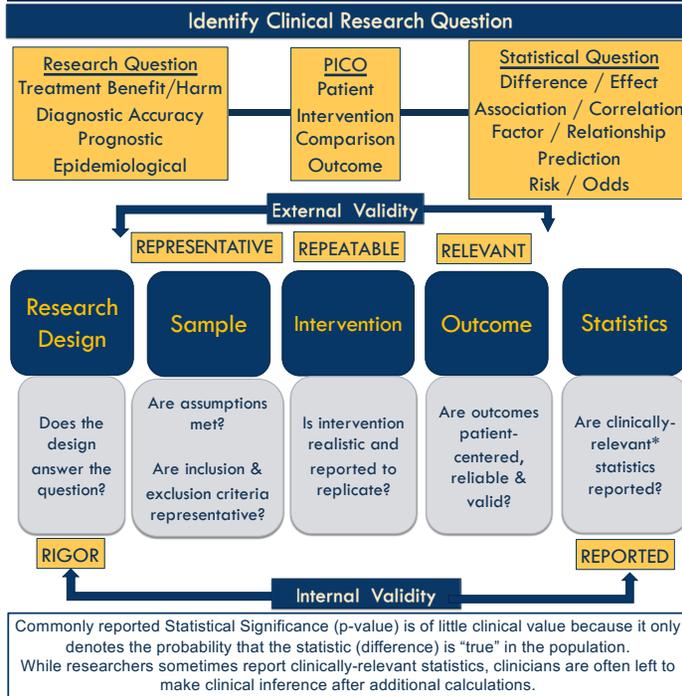
Problem

Clinicians must appraise and apply clinical research to make evidence-informed decisions. Researchers sometimes use non-clinical statistics (NHT) to answer clinical questions, leaving clinicians to interpret and apply statistical results to their patients.

Purpose

This presentation will educate clinicians on interpreting research statistics to facilitate clinical inference: applying statistical evidence in clinical decisions for individual patients. Ultimately, the goal is to bridge the gap between researchers and clinicians to provide clinically relevant statistics.

Clinical Inference Process



Apply Clinically Relevant Statistics to Patient

Effect Sizes: Magnitude of the relationship of variables

- Search for "Effect Size Calculator"

- A statistically significant outcome may have a small effect size
- Information on magnitude & direction
- Effect sizes are less impacted by sample size

Statistical Question	Null Value	Effect statistic	Interpretation		
			Small	Medium	Large
Difference	0	d	0.2	0.5	0.8
Variance (ANOVA)	0	η^2	0.01	0.06	0.14
Correlation	0	r	0.1	0.3	0.5
Prediction (Regression)	0	R ²	0.2	0.13	0.26
Relationship	0	χ^2	0.1	0.3	0.5
Odds Ratio	1	OR	1.7	3.5	6.7

Minimal Clinically Important Difference: smallest worthwhile change

- Search for "outcome measure MCID"

- MCID is specific to the outcome measure and the patient population

Confidence Intervals: Range of the 'true' value in a population

- Search for "confidence interval calculator"

- Estimating 'true' value in a population by inferring sample data with a 'point estimate' and a range of probabilities (usually 95% confidence)
- CI are used for critical values, effect sizes and means. If the CI contains the 'null value', the relationship is not significant
- CI Width is related to sample size

