Analysis of Research: Significance, Variables, Data

B. K. Bulibek MD and W.H. Folger, MD. PhD
Albany Medical College

Learner Audience: Anesthesiology residents

Background: Statistics has been viewed as too complicated to understand and evaluate. Whatever is presented is accepted as valid. Statistics is thought to be about numbers; really it is about logical reasoning.

Needs Assessment: A specific teaching program is needed to help the resident analyze scientific publications. Organization of the research design and statistics will help in the evaluation of papers.

Hypothesis: Analyzing the data and appropriate statistic makes evaluation of scientific papers understandable.

Curriculum Design: *Data Analysis:* 1) **Significance vs Non-significance**: Any significance or non-significance reported in the Results section are analyzed for accuracy and sample size. 2) **Independent vs Dependent**: The independent (factor) and dependent variables (reponse) are identified to establish the objective of the study. 3) **Nominal vs Continuous**: The independent and dependent variables are labeled by whether they are names, such as alive or dead, or numbers, such as blood pressures. 4) **Null vs Research**: A null hypothesis statement is constructed to clarify the logic of the research.
Statistical Analysis: 5) **Parametric vs Non-parametric**: The dependent variable determines whether to use a parametric statistic for continuous data or non-parametric statistic for nominal data. Continuous data are normally distributed, equal in variance, and independently sampled. 6) **Independent statistic**: The number of levels of a single factor determines whether to use a t-test or ANOVA. The number of factors determines whether to use ANOVA or multiple regression. 7) **Dependent statistic**: The number of dependent variables determines whether to use ANOVA, MANOVA, or multiple regression. 8) **Correlation**: The statistics described in last paragraph of Methods section should correlate with the statistic suggested by analysis. Significant values of continuous data are verified substituting sample numbers, means, and standard deviations in Glantz's statistical program. For non-significant values, a sample size analysis is performed for each dependent variable.

Outcome: The resident will have a logical approach to analyzing a scientific paper. He will know how to break the data and statistic analysis steps into smaller components.