Watch this video overview of module 2.

**Statistics** is a body of techniques and procedures dealing with the collection, organization, analysis, interpretation, and presentation of information than can be stated numerically. Clinicians need a basic understanding of data, how it’s analyzed, and how to interpret the numerical and graphical representations of study results. Certifying examinations do not expect clinicians to know details about specific statistical tests or even which statistical tests are used for what type of data.

In this module you will learn about different types of data and how it's organized, how data is described, and basic information of using statistical tests to explore relationships (correlation, regression) and compare groups (t-tests, chi square).

The basic approach to performing a statistical analysis is depicted in the figure.

I think it's useful to see how data is analyzed to get a sense of when certain analyses are conducted on the data.

In step four, measures of central tendency and spread are used to explore & better understand the data. At this step, the data is checked to see if its distribution is normal or not (an assumption required for the most commonly used statistical tests). If the data are not normally distributed then transformation is often undertaken (step 5) to make it normally distributed so that statistical tests with greater power can be run (step 6).
Try to answer these questions as you work through this module:

- What are the best ways to summarize skewed and non-skewed data?
- What are the 4 possible explanations for a study finding?
- How is the role of chance assessed in a study?
- Does correlation mean causation?
- Can a finding be statistically significant but not clinically significant?

**Types of Data**

- **Lecture notes:** read page 1 through top of page 2 of these lecture notes to get an overview of how data is organized.

- **Videos:** watch these videos for an overview of how data is organized.
  - Types of variables and scales of measurement (6:43)
  - Independent, dependent, and confounding variables (7:47)

- **Readings:** read these for an overview of how data is organized.
  - Fletcher pgs 32-33 (types of data)
  - What are variables?

**Describing Data**

- **Lecture notes:** read page 2 through top of page 4 of these lecture notes to understand measures of central tendency and spread.

- **Videos:** watch these videos to understand measures of central tendency and spread.
  - Distributions (watch to 3:53)
  - Mean, median, and mode (6:18)
  - Measures of spread (5:21)

- **Readings:** read these for an to understand measures of central tendency and spread.
  - Fletcher pgs 38-39 (describing distributions)
  - Fletcher pgs 40-41 (the normal distribution)
  - Fletcher pg 39 Table 3.4
  - Measures of central tendency
  - Measures of spread
  - Measures of shape
Exploring Relationships and Comparing Groups

- **Lecture notes:** read page 4 through end of these lecture notes to get an overview hypothesis testing and common statistical tests.

- **Videos:** watch these videos for an overview hypothesis testing and common statistical tests.
  - P-values and type I error (5:19)
  - Power, Type II error and Sample Size (5:27)
  - Statistics Corner: confidence intervals (5:27)
  - Populations and samples (4:37)
  - Choosing a statistical test (12:31)
  - Overview of regression analysis (11:01)

- **Readings:** read these for an overview hypothesis testing and common statistical tests.
  - Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, 3rd ed Chapter 12.1: Hypothesis testing
  - Fletcher pgs 175-178 (2 approaches to chance...end at statistical tests)
  - What do the terms parametric & nonparametric mean?
  - Fletcher pgs 181-183 (statistical power & estimating sample size requirements)
  - Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, 3rd ed Chapter 10: Confidence intervals
  - Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, 3rd ed Chapter 12.3: What determines the width of the confidence interval?
  - Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, 3rd ed: Chapter 15.1: Correlation and Regression
  - Fletcher pgs 183-184 (Point estimates and confidence intervals)
  - Fletcher pgs 178-179 (statistical tests)
  - Fletcher pgs 189-190 (multivariable methods)
  - Correlation and causation or primer on correlation
  - Tips for teachers of evidence-based medicine: 2. Confidence intervals and p-values
• Why the $P$-value culture is bad and confidence intervals a better alternative