JOURNAL OF CLINICAL RESEARCH BEST PRACTICES

Vol. 14, No. 7, July 2018 "Happy Trials to You"

"Research Methods in Radiology"

By Andrea S. Doria, George Tomlinson, Joseph Beyene, and Rahim Moineddin, editors, 2018, 328 pages, Thieme, $99.99

Review by Norman M. Goldfarb

"Research Methods in Radiology" provides a solid introduction to study design, conduct, statistical analysis, and publication for academic and other researchers.

The four common designs of diagnostic studies are cross-sectional, cohort, prospective cohort, and retrospective cohort. The book's introduction to the cross-sectional design is as follows:

> **Cross-Sectional Design**
>
> A cross-sectional study takes place at one point (cross-section) in time. The researcher identifies a sample (study participants) from a population of interest. All study maneuvers are carried out at one point in time: disease and exposure are measured simultaneously. This is perhaps the most commonly used design in establishing the basic properties of a diagnostic test: reliability and validity. During evaluation, we determine how well a novel diagnostic test (index test) performs by comparing its results against an established test (reference standard). The results from the two tests are compared at one point in time (cross-section), and statistical measures of diagnostic accuracy of the index test are calculated.
>
> Example: In infants who undergo operative treatment to reduce a dislocated hip, we want to determine whether ultrasound is a good enough diagnostic tool in determining the position of the femoral head in the acetabulum, which indicates a successful operation. MRI can visualize the infant hip and can provide this information with a high degree of accuracy. However, MRI is expensive, warrants sedation of the patient, and is not easily available. In conducting the study, we include all infants who undergo the operation in a certain period. Each infant obtains, according to a standardized protocol, ultrasound and MRI tests in a consecutive sequence at the same time. When all patients have been included, we compare if the ultrasound results provided the same information as MRI about the location of the femoral head. That is, we are interested if ultrasound is as accurate as MRI in determining the position of the femoral head in the acetabulum after the operation.

The book includes 16 chapters by 29 contributors:

- Overview of Research Designs Applied to Radiology
- Descriptive Statistics
- Diagnostic Tests
- Measurements: Validity, Reliability and Responsiveness
- Observational Designs
- Randomized Controlled Trials
- Systematic Reviews, Evidence-Based Imaging, and Knowledge Translation
- Decision Analysis
- Costs and Consequences: Economic Evaluation in Radiology
- Conducting and Publishing Research

- Obtaining Ethics Approval, Data Management, and Budget Formulation
- Steps for Using Research as a Success Tool in Academia
- Statistical Inference: Point Estimation, Confidence Intervals, and Hypothesis Testing
- Linear and Logistic Regression
- Sample Size Estimation
- Meta-Analysis

Most of the chapters include exercises.

Reviewer

Norman M. Goldfarb is Managing Director of First Clinical Research LLC, a provider of clinical research best practices information, consulting and training services. Contact him at 1.650.465.0119 or ngoldfarb@firstclinical.com.