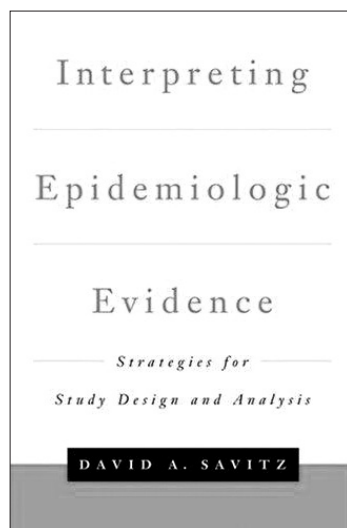**HIR**
Healthcare Informatics Research

Interpreting Epidemiologic Evidence: Strategy for Study Design and Analysis

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By David A. Savitz
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Bias and confounding are the most notorious obstacles to overcome for researchers who are exploring the truth in medicine. Fortunately, a random clinical trial (RCT) study design is available, which enables bias minimization and reduction of confounding problems. However, advantages of RCT are rarely given to medical informaticians because RCT can be applied to prospective studies with prior hypotheses and structured study designs before experimentation.

Finding something important and meaningful from existing massive data collections are frequent and overwhelming tasks given to medical informaticians. We can easily extract something significant from existing data by using all the various analytical tools available. However, many statistically significant findings drawn from existing data may be hard to be generalize even after obsessive control of available covariates. A study should be well-designed to control all the biases and confounding before analysis. Those who are exploring the existing data should be skeptical of given data, drawn results, and even themselves before verification of postulated results, so that they are reproducible elsewhere. Manuscripts with full consideration of bias and confounding are rarely seen in medical informatics area. Studies with only cursory evidence may not be accepted by the clinical society at large.

There seem to be only rare opportunities for informaticians to learn how to design a study and how to interpret results. For young student in medical informatics, only one or two classes of epidemiology in postgraduate school may be the only opportunities given to them. However, several such classes usually introduce only basic concepts, terms, and principles of study design on epidemiology. Of course, there are numerous books on epidemiology; however, these are generally full of symbols and detailed, complicated equations that usually make the readers, who are not familiar with statistics, disappointed and close the book before the second

chapter.

In this point, "Interpreting Epidemiologic Evidence: Strategy for Study Design and Analysis" written by Savitz [1] is a good book for readers who are not familiar with statistics. All the information in this book is presented without even a mathematical equation. Illustrative cases are quite helpful in understanding the underlying principles. The book includes the following topics: the nature of epidemiologic evidence; strategy for drawing inferences from epidemiologic evidence; selection bias in cohort studies; selection bias in case-control studies; bias due to loss of study participants; confounding; measurement and classification of exposure; measurement and classification of disease; random error; integration of evidence across studies; characterization of conclusions. Every chapter is worth reading. Readers who are not familiar with epidemiology should thoroughly read the first two chapters. These chapters also include specific illustrative examples of 'efficacy of breast cancer screening', 'alcohol and spontaneous abortion' and 'dichlorodiphenyltrichloroethane exposure and breast cancer' for the ease of readers' understanding on the inferences from epidemiologic evidence. The main reason to read this book exists in the five chapters on bias, confounding, and random error. In conclusion, this book is highly recommended to students and researchers who are involved in medical informatics but not familiar with epidemiology. For more understanding, "Bias and Causation" by Weisberg [2] or "Statistics for Epidemiology" by Jewell [3] may be helpful.

References

1. Savitz DA. Interpreting epidemiologic evidence: strategies for study design and analysis. Oxford, NY: Oxford University Press; 2003.
2. Weisberg HI. Bias and causation: models and judgment for valid comparisons. Hoboken, NJ: Wiley; 2010.
3. Jewell NP. Statistics for epidemiology. Boca Raton, FL: Chapman & Hall/CRC; 2004.