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Book Reviews

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Repeated Measures Design With Generalized Linear Mixed Models for Randomized Controlled Trials.

Toshiro Tango. Boca Raton, FL: Chapman & Hall/CRC Press, 2017, xv+359 pp., $93.95(H), ISBN: 978-1-49-874789-9.

This book provides a summary of generalized linear mixed models for the setting of randomized clinical trials (RCTs) with repeated measurements of outcomes. Toshiro Tango presents an S:T repeated measures design which can accommodate RCTs with more than one baseline measurement. Chapters 1–5 review naïve pre–post analysis, ANOVA models, and ANCOVA models. In Chapter 6, missing data in the context of longitudinal studies is discussed. Chapters 7–9 provide in-depth analysis and sample size calculation for continuous, logistic, and Poisson mixed models, including SAS code and output. The remaining chapters present special topics, including Bayesian analysis, latent profile models, and applications to other trial designs. The book would be a good resource for clinical trial statisticians and biostatisticians who work with randomized experimental data, and requires knowledge of both RCTs and basic statistical theory.

A major strength of this book is the inclusion of examples for linear, logistic, and Poisson mixed model analysis using SAS with clear interpretation of output. I found the description of each model parameter and its interpretation within the context of the example particularly useful. The data presented in the main examples (Beat the Blues, Respiratory Illness, and Epilepsy Data) have previously been analyzed using R software, so the analysis in this book is a nice contribution for SAS users. I think that RCTs should be moving in the direction of using mixed models for analysis of data, and Tango's book provides a good summary of how this type of analysis can be implemented and interpreted using SAS software.

Despite these strengths, I think this book has some weaknesses that may limit its overall impact in the field of RCTs. A discussion of how much missing data is acceptable would aid the reader in using the S:T design to handle missing data assumed to be ignorable missing at random. It also would have been beneficial to have included practical guidance on obtaining values needed for the sample size calculations. I would have liked to see comparisons between designs with the same number of total observations with different measurements pre- and post-treatment (e.g., 3:3, 2:4, and 1:5 design), instead of the ones shown in the book which compare 2:4 with 1:4, 1:2, and 1:1 (e.g., the plot on the cover).

In practice, the author "does not know of any real data on randomized controlled trials adopting an S:T design with S> 1" (page 3), which limits the impact of the book on the field. Most examples presented in the book are for a 1:T design (i.e., one baseline measurement with T repeated observations of outcomes post-treatment). For this type of design, there are other books which provide similar information and SAS code (e.g., Fitzmaurice, Laird, and Ware 2004).

References

Fitzmaurice, G. M., Laird, N. M., and Ware, J. H. (2004), *Applied Longitudinal Analysis*, Hoboken, NJ: Wiley. [1394]

Jaime Lynn Speiser
Wake Forest School of Medicine