Editorial: The Evolving Practice of Epidemiology

Bianca L. De Stavola* and Stephen R. Cole

* Correspondence to Dr. Bianca L. De Stavola, Department of Medical Statistics, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, United Kingdom (e-mail: bianca.destavola@lshtm.ac.uk).

The Practice of Epidemiology section of the American Journal of Epidemiology has existed since 2000 (1). The original intent was to provide practical advice about the conduct of epidemiologic research. Our goal here is 2-fold: first, to provide a summary of Practice of Epidemiology submissions and publications, and second, to discuss the meaning of “practice” in the section’s title.

PRACTICE OF EPIDEMIOLOGY SUBMISSIONS

The AJE classified 1,775 submitted papers as Practice of Epidemiology during the 5 years from 2008 to 2012. For comparison, over the same period, 4,995 original contributions were submitted. Twenty-one percent (n = 380) of the Practice of Epidemiology submissions were accepted, and 21% (n = 1,045) of the original contributions were accepted. We observed no notable variation in these percentages during this 5-year period.

PRACTICE OF EPIDEMIOLOGY PUBLICATIONS

Practice of Epidemiology papers cover topics of current importance, are educational or instructive in nature, and are innovative. Since the inception of the Practice of Epidemiology section, published papers have covered a broad set of topics, including but not limited to study design (and participant recruitment), questionnaire development and validation, measurement and measurement errors (including test operating characteristics), correlated data, missing data, methods for observed confounder control (e.g., propensity score and inverse probability weighting), flexible modeling of covariates (e.g., splines), and the modeling of genetics and infectious disease data. Practice of Epidemiology papers typically have provided detailed discussion of particular problems encountered in the practice of epidemiologic research using interesting and topical applications. Some have provided guidelines for future studies. Commentaries have also greatly contributed to the goals of the Practice of Epidemiology section.

There are too many important contributions to the Practice of Epidemiology to cite or discuss them all (e.g. (2–23)). For example, 3 Practice of Epidemiology papers published between 2008 and 2012 have been cited more than 100 times in that time period (5, 10, 14). These papers concerned methods to control for confounding, immortal time bias in pharmacoepidemiology studies, and selection bias in Mendelian randomization studies. Other influential contributions to the Practice of Epidemiology section are worth mentioning. Here we detail 4 examples.

Brookhart et al. (4) presented both tabular and graphical results from simulation studies designed to inform variable selection when using propensity scores (24). Key findings that have been replicated in subsequent work (25, 26) are that the optimal propensity model for efficient control of confounding is not necessarily a model that optimizes prediction of exposure, and that the propensity model should include correctly specified confounders, as well as determinants of the outcome that are not causally related to the exposure.

Benowitz et al. (27) used data from the nationally representative National Health and Nutrition Examination Survey (1999–2004) to reassess the optimal serum cotinine value to discriminate between smokers and nonsmokers for epidemiologic studies in the general population. The generally accepted value of 14 ng/mL was derived more than 30 years ago, during an era when exposure to secondhand smoke was more common than presently. Benowitz et al. (27) found that the optimal cutpoint to distinguish smokers from nonsmokers is 3 ng/mL, and that it differs by self-reported race and ethnicity.

Stuart et al. (16) used an illustrative example to show the application of multiple imputation to account for missing data (see also (18, 19)). Key points included discussion of the necessity of missing-data methods in epidemiologic studies (while accepting the costs incurred to epidemiologists in terms of time), attention to evolving imputation diagnostics, and a discussion of some needed methodological work. This contribution facilitates the practical application of principled methods to deal with missing data in epidemiologic research.

Glymour et al. (22) discussed the assumptions required when estimating causal effects using instrumental variables. The authors were motivated by the increasing use of Mendelian randomization studies of particular phenotypes in which
associated genotypes are used as instruments. Their contribution to the debate surrounding Mendelian randomization studies is educational (by detailing the strength of the necessary assumptions) and practical (by suggesting how to combine theory with empirical data to assess the plausibility of these assumptions).

**THE PRACTICE IN “PRACTICE OF EPIDEMIOLOGY”**

The editorial that launched *Practice of Epidemiology* (1) invited submission of papers that would facilitate the sharing of “best practice” in epidemiologic research. This aim has certainly been met since the inception of the section. The needs of the epidemiologic community, however, continue to evolve, and this is reflected by the expanding topics covered by recent publications. The practice of epidemiology requires practical knowledge of the following: 1) modern study designs that sample from (possibly implicit) cohorts, such as the case-cohort, case-crossover, and other designs; 2) cutting-edge data acquisition, management, and storage systems; 3) state-of-the-art statistical methods to deal with complex, longitudinal, missing, high-dimensional, or clustered data; and 4) innovative approaches to sensitivity analysis and evidence synthesis. In addition, the practice of epidemiology requires clear understanding of the assumptions necessary to estimate causal effects in epidemiologic studies. Opportunities to develop these skills should be offered to “practicing” researchers via the *Practice of Epidemiology* section of the *Journal*. Thus, we ascribe a broad meaning to the term “practice” used in the section’s title to reflect the problems faced when dealing with modern epidemiologic studies. In addition to papers addressing practicalities of conducting epidemiologic research, the term should also encompass “practice,” as in “knowledge (needed) to practice.”

**ACKNOWLEDGMENTS**

Author affiliations: Department of Medical Statistics, London School of Hygiene and Tropical Medicine, London, United Kingdom (Bianca L. De Stavola); and Department of Epidemiology, University of North Carolina Gillings School of Global Public Health, Chapel Hill, North Carolina (Stephen R. Cole).

We thank Clarice Weinberg, Harriett Telljohann, and members of the *American Journal of Epidemiology* editorial board for expert advice.

Conflict of interest: none declared.

**REFERENCES**

23. Mukherjee B, Ahn J, Gruber SB, et al. Testing gene-environment interaction in large-scale case-control...


