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Journal of Clinical Epidemiology 66 (2013) 353–354

Journal of Clinical Epidemiology

EDITORIAL

How to write a research paper

It is not an easy task to perform and report a good study or review, and therefore quite a number of papers have been published on presenting and explaining guidelines on how to optimally do this. In line with this topic, it is also useful to pay attention to the craft of writing a scientific paper in general. Indeed, even if a study has been appropriately conducted and technically well presented, it may have been written in such a way that its message will not be recognized [1,2]. In this issue, after an introductory paper by Kotz et al, Kotz and Cals publish the first of a series of monthly compact one-page papers, each highlighting an essential step in preparing and writing a research paper. This series, containing a total of 12 one-pagers, originates from a PhD student course organized at Maastricht University, and is especially recommended to young investigators who would appreciate efficient guidance based on extensive practical teaching experience. But senior authors may also find useful writing tips in this series.

Diagnostic and prognostic research is a major topic in this issue. In a Commentary, Weiss analyzes the opportunities and challenges in studying the relationship between test results and the effectiveness of treatment. The author presents a broad methodologic overview, including both clinical epidemiological and ethical issues. Austin and his group compared the performance of conventional classification and regression trees, including logistic regression, with modern flexible tree-based methods from the data-mining and machine-learning literature, in predicting and classifying heart failure (HF) patients according to subtypes. It turned out that each of these two approaches had specific strong points in different classification tasks. Data-analytic work on diagnostic performance has also been conducted by Spruijt et al, who studied how vital signs such as heart and respiratory rates should be included in clinical prediction models for serious bacterial infections in febrile children. Using data from a large prospective observational study of febrile children, they compared various ways to handle these rates as predictors, and concluded that maintaining them as continuous variables results in a better predictive ability than dichotomization. Simel and co-authors present a simple method to calculate sensitivity, specificity, and likelihood ratios when, in studies of diagnostic tests, the odds ratios and marginal values in a 2×2 tables are given. This can help to retain studies in meta-analyses of characteristics of diagnostic tests when only the odds ratio is reported.

The role of observational and experimental studies in providing useful evidence for clinical practice is again addressed quite extensively. In a systematic review, Prasad and co-workers studied the extent to which authors of reports of observational studies make clinical recommendations based on their results. They found that, in many cases, authors of papers on observational studies in leading journals extrapolate their results to make recommendations for medical practice without first calling for a randomized controlled trial. Another systematic review, conducted by Glenton and colleagues from the Cochrane Effective Practice and Organisation of Care Group (EPOC), studied the degree to which reviews considered non-randomized studies. The conclusion is that EPOC reviews mostly identified non-randomized studies, but the proportion of non-randomized studies varied strongly with the review topic. The authors discuss possible implications of this finding in relation to risk of bias in various intervention types. Kim et al developed and tested the Risk of Bias Assessment Tool for Non-randomized Studies (RoBANS), and evaluated the validity of this instrument using non-randomized studies from various systematic reviews. RoBANS was shown to have moderate reliability and promising feasibility and validity. Further evaluation and refinement of the tool is recommended.

In view of the concern that noninferiority (NI) trials may pose a risk of degradation of the efficacy of available treatments, Gladstone and Vach reviewed data from registered trials to determine the fraction of positive true effects and the average true effect of current NI trials. Their findings suggest that the current practice of choosing NI designs makes degradation on average unlikely, but in some trials the newly tested treatments are distinctly inferior to standard treatments.

Two systemic reviews focus on issues related to drug interventions. Haidich et al evaluated the extent to which meta-analyses of drugs and biologics focused only on one specific agent. Indeed, they found that most meta-analyses did not consider all the available comparisons of tested interventions for a given condition, and that the scope of meta-analysis is frequently limited to particular agents. Industry sponsoring was an important determinant of such a narrow focus. More inclusive reviews and meta-analyses are encouraged. A review conducted by Sale and her team studied the methods applied to calculate reported medication initiation rates in fracture secondary prevention programs. It was

http://dx.doi.org/10.1016/j.jclinepi.2013.01.007

shown that reporting processes used heterogeneous standards that prevented useful comparison of the programs under study. Therefore, the authors propose a three-item guideline for reporting of medication initiation of postfracture interventions. At the other side of the medication spectrum, not initiation but cumulation of (chronic) drug use, that is, polypharmacy, is an important phenomenon to be studied. In two letters to the editors, Lai and Liao and Gnjidic et al, respectively, discuss the definition of polypharmacy also in relation to adverse outcomes.

In studying the impact of public health interventions, it is often important how effects that have been established in a study population can be extrapolated to other populations. Based on data from a hypertension intervention program study among elderly subjects, Charvat and co-authors describe a method to assess the impact of blood pressure reduction on the occurrence of stroke in another target population accounting for age, and they discuss the implications of this method.

The importance of choosing the appropriate level of study and analysis has been recognized for a long time [3], but evaluations of the extent of the actual difference in outcomes of studies using different levels are scarce. Marcucci et al compared the performance of aggregate data (AD)-based and individual patient data (IPD)-based meta-analyses of the same set of studies on the observed ability of D-dimer to detect recurrence risk in venous thromboembolism patients. It was concluded that both meta-analyses yielded similar results. However, the often more resource-intensive IPD approach can be justified by the need to investigate sources of heterogeneity. Multilevel analyses allow the evaluation of the effects of various determinants simultaneously working at different levels, as was studied by Rigal et al. The authors analyzed the participation of patients in a survey about prevention in relation to medical, social, and practice characteristics. This approach revealed interesting insights, especially in the impact of practice organizational aspects.

In another context, between-practice variation was also an important topic in a study by Carey et al. Based on a large retrospective primary care cohort study, they derived a simple nine-item QOF (Quality and Outcomes Framework) score from routinely recorded chronic conditions in primary care, and assessed its predictive performance as to 1-year mortality. The authors report that the QOF scores performed better than the Charlson Index in predicting mortality and explaining between practice variations, and suggest that it can be used for improving risk-adjusted comparisons of performance and outcomes between primary care providers.

For conducting a valid cohort study, attrition should be minimal and non-selective. Using data from a large chronic disease and risk factor cohort study, Taylor and co-workers show that weighing of data and analytical approaches may account for differences and help to overcome inadequate representativeness in a maturing prospective observational study.

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