

Disclosure statement

The author has indicated no financial support.

Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <http://dx.doi.org/10.1016/j.sleep.2014.05.031>.

References

- [1] Suh S, Yang HC, Fairholme CP, Kim H, Manber R, Shin C. Who is at risk for having persistent insomnia symptoms? A longitudinal study in the general population in Korea. *Sleep Med* 2014;15(2):180–6.
- [2] Hanley JA, McNeil BJ. A method of comparing the areas under receiver operating characteristic curves derived from the same cases. *Radiology* 1983;148(3):839–43.
- [3] DeLong ER, DeLong DM, Clarke-Pearson DL. Comparing areas under two or more correlated receiver operating characteristic curves: a nonparametric approach. *Biometrics* 1988;44(3):837–45.
- [4] Robbins J, Aragaki AK, Kooperberg C, Watts N, Wactawski-Wende J, Jackson RD, et al. Factors associated with 5-year risk of hip fracture in postmenopausal women. *JAMA* 2007;298(20):2389–98.

Tomoyuki Kawada *

Department of Hygiene and Public Health, Nippon Medical School,
Tokyo 113-8602, Japan

* Address: Department of Hygiene and Public Health,
Nippon Medical School, 1-1-5 Sendagi,
Bunkyo-Ku, Tokyo 113-8602, Japan.
Tel.: +81-3-3822-2131; fax: +81-3-5685-3065.
E-mail address: kawada@nms.ac.jp

<http://dx.doi.org/10.1016/j.sleep.2014.05.031>

1389-9457/© 2014 Elsevier B.V. All rights reserved.

Response to Kawada



To the Editor:

In response to Kawada's critique, we would like to clarify that we did use a multivariate signal detection approach. Rather than a single variable receiver operating characteristic (ROC) curve we simultaneously entered multiple variables as predictors. We would like to discuss the merit of this multivariate ROC. In clinical settings, it is often necessary to examine dichotomous outcomes to make explicit decisions and identify subgroups of individuals who are at high risk [1]. Logistic regression analysis and signal detection are two multivariate statistical methods that identify subgroups at risk and include an outcome variable. In our original study, we used the latter method. The signal detection analysis we performed utilizes the ROC procedure and creates a quality receiver operating characteristic (QROC) tree identifying the best predictors along with optimal cutoffs. This signal detection procedure identifies subgroups at risk using recursive partitioning based on an empirically driven iterative nonparametric process. This method has been used to identify Alzheimer patients who are at risk for rapid cognitive decline, find predictors of change for a heart disease intervention, or identify predictors of remission in chronic depressed patients in different modalities of treatment [2–4].

In a logistic regression “all in” procedure as suggested by the critique as an alternative, all variables are given weights; but the weights might be very close to zero for some. In the signal detection method, only a small number of variables (identified as the best predictors) are given weights. A variable that unreliably measures or that lacks predictive value to the outcome (thus probably a zero weight in the logistic regression model) would

not be picked up not the signal detection algorithm. Important to the above critique, in an “all in” logistic regression procedure, collinearity among the predictors can introduce both bias and loss of power. In contrast, once a variable is selected in the signal detection procedure, other variables that are highly correlated with it are unlikely to be subsequently chosen, thus avoiding collinearity.

From an ethical and medical policy points of view, the step-wise procedures are to be recommended in measure development. If one can achieve equal predictive value using only one scale as with four, there are considerable savings of time and effort in focusing only on the one scale. If there are costs involved in the use of the scales, the use of one scale would also reduce costs. The issue is not to “establish superiority” of one scale, but to provide the best prediction for each patient at the least cost. Clearly one should consider all options (multivariate) when making a decision, but the notion that one must use all options (simultaneous) is detrimental to patient care, and not even statistically sound [5].

Funding sources

This study was supported by grants from the Korean Center for Disease Control, Prevention and the Korean Ministry for Health and Welfare, and the National Research Foundation of Korea Grant funded by the Korean Government [Grant 2005-E71001-00, Grant 2006-E71005-00, Grant 2007-E71001-00, Grant 2008-E71001-00, Grant 2009-E71002-00, Grant 2010-E71001-00, Grant 2011-E71004-0, NRF-2012-S1A5BA01].

Conflict of interest

All authors have no conflict of interest.

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <http://dx.doi.org/10.1016/j.sleep.2014.05.032>.

References

- [1] Kraemer HC, Offord DR, Jensen PS, Kazdin AE, Kessler RC, Kupfer DJ. Measuring the potency of risk factors for clinical or policy significance. *Psychol Methods* 1999;4:257–71.
- [2] O'Hara R, Thompson JM, Kraemer HC, Fenn C, Taylor JL, Ross L, et al. Which Alzheimer patients are at risk for rapid cognitive decline? *J Geriatr Psychiatry Neurol* 2002;15(4):233–8.
- [3] Winkleby MA, Flora JA, Kraemer HC. A community-based heart disease intervention: predictors of change. *Am J Public Health* 1994;84(5):767–72.
- [4] Manber R, Kraemer HC, Arnow BA, Trivedi MH, Rush AJ, Thase ME, et al. Faster remission of chronic depression with combined psychotherapy and medication than with each therapy alone. *J Consult Clin Psychol* 2008;76:459–67.
- [5] Kiernan M, Kraemer HC, Winkleby MA, King AC, Taylor CB. Do logistic regression and signal detection identify different subgroups at risk? Implications of the design of tailored interventions. *Psychol Methods* 2001;6(1):35–48.

Sooyeon Suh

Department of Psychology, Sungshin Women's University, Seoul,
Republic of Korea
Department of Psychiatry, Stanford University, Palo Alto, CA, USA

Helena C. Kraemer

Department of Psychiatry, Stanford University, Palo Alto, CA, USA

Hae-Chung Yang

Yongmoon Graduate School of Counseling Psychology,
Seoul, Republic of Korea

Christopher P. Fairholme

Department of Psychiatry, Stanford University, Palo Alto, CA, USA

Rachel Manber ¹

Department of Psychiatry, Stanford University, Palo Alto, CA, USA

Chol Shin ^{*,1}

Korea University Ansan Hospital, Institute for Human Genomic Study, Ansan, Republic of Korea

Division of Pulmonary, Sleep and Critical Care Medicine, Department of Internal Medicine, Korea University Ansan Hospital, Ansan, Republic of Korea

^{*} Address: Division of Respiratory and Critical Care, Department of Internal Medicine, Ansan Hospital, Korea University, 516, Gojan-1-dong, Danwon-gu, Ansan-si, Gyeonggi-do, 425-707, Korea.
Tel.: +82 31 412 5603; fax: +82 31 412 5604.
E-mail address: chol-shin@korea.ac.kr

<http://dx.doi.org/10.1016/j.sleep.2014.05.032>
1389-9457/© 2014 Elsevier B.V. All rights reserved.

¹ These authors contributed equally to this manuscript.