Room for methodological improvement in gait speed study for COPD patients

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To the Editor:

We read with great interest the article by Walsh *et al*. [1], who investigated whether slower gait speed is an independent risk factor for readmission and mortality in patients hospitalised with COPD exacerbation. This study included 213 patients hospitalised with COPD exacerbation. The Cox proportional hazards model and the Fine and Grey model revealed that 4-m gait speed (4MGS) within 24 h before hospital discharge was associated with both readmission and mortality within 12 months. Considering that 4MGS is a simple and potentially ameliorable measurement, 4MGS could be an important predictor; however, there are some concerns regarding the methodology of this study.

First, we believe that internal validation should have been performed to avoid estimation bias and optimism in model performance [2]. In this study, there were 35 deaths out of 213 patients, while six predictors were selected using a backward stepwise method in a mortality prediction model. Although the authors stated that 5–9 events per variable are comparable to 10–16 events per variable, recent studies have emphasised that 10 events per variable could be insufficient [3, 4]. The predictive performance of 4MGS could be evaluated in a future dataset using the same dataset using either the bootstrap resampling or split-data sampling method.

Secondly, we are concerned with the model performance comparison methodology. They concluded that a multivariate Cox proportional model incorporating 4MGS was superior to univariate models of either age or forced expiratory volume in 1 s (FEV_1). However, we cannot conclude this simply because the univariate model ignored the effect of another covariate (age in the univariate FEV_1 model, and FEV_1 in the univariate age model), overestimating the model performance of the multivariate model. Moreover, to compare discrimination capability, we cannot simply conclude based on the point estimate of the concordance statics of each model. The authors should present a 95% confidence interval for each concordance statistic and test whether the difference in concordance statistics is statistically significant from zero.

Thirdly, we are concerned regarding how competing risks in the Fine and Grey model were handled, which was used to incorporate the effects of competing events. Dead patients cannot be readmitted in the future, and readmission is a competing risk of death. However, patients who experience readmission can still be observed dead after hospitalisation; thus, presenting a sub-distribution hazard of death considering readmission as a competing risk could be misleading.

Shareable abstract (@ERSpublications)
Regarding the gait speed study for COPD patients reported by J.A. Walsh and co-workers, there are 3 concerns: 1) lack of internal validation; 2) methodology of comparing model performance; and 3) a way of handling competing risks in the Fine and Gray model https://bit.ly/3g6I8BN

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Naoto Kuroda[1,2], Akihiro Shiroshita[3,4] and Yasushi Tsujimoto[4,5,6]

[1]Dept of Pediatrics, Wayne State University, Detroit, MI, USA. [2]Dept of Epileptology, Tohoku University Graduate School of Medicine, Sendai, Japan. [3]Dept of Respiratory Medicine, Ichinomiyanishi Hospital, Aichi, Japan. [4]Systematic Review Workshop Peer Support Group (SRWS-PSG), Osaka, Japan. [5]Dept of Nephrology and Dialysis, Kyoritsu Hospital, Kawanishi, Japan. [6]Dept of Health Promotion and Human Behavior, Kyoto University Graduate School of Medicine/School of Public Health, Kyoto, Japan.

Corresponding author: Naoto Kuroda (naoto.kuroda@wayne.edu)

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References

1 Walsh JA, Barker RE, Kon SSC, *et al.* Gait speed and adverse outcomes following hospitalised exacerbation of COPD. *Eur Respir J* 2021; 58: 2004047.
2 Steyerberg EW, Harrell FE Jr. Prediction models need appropriate internal, internal-external, and external validation. *J Clin Epidemiol* 2016; 69: 245–247.
3 Riley RD, Ensor J, Snell KIE, *et al.* Calculating the sample size required for developing a clinical prediction model. *BMJ* 2020; 368: m441.
4 Collins SD, Peek N, Riley RD, *et al.* Sample sizes of prediction model studies in prostate cancer were rarely justified and often insufficient. *J Clin Epidemiol* 2021; 133: 53–60.