



## Validation of risk prediction tools in elderly patients who initiate dialysis: methodological issues

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Editor,

We read with great interest the study by Hwang et al. The aim of the authors was to explore the best prognostic tool in predicting short-term mortality in elderly patients undergoing dialysis [1]. For this purpose, patients were extracted from three university hospitals in Seoul (capital), Gyeonggi-do (metropolitan area), and Chungcheongnam-do (urban and rural areas) in Korea, from January 2010 to December 2016. Authors applied two comorbidity-based score tools (Thamer and Wick, each consisting of seven variables) and the Clinical Frailty Scale (CFS, seven scales), which were validated for mortality prediction in elderly incident patients [1]. For comparison of the models, the area under the curve (AUC) was compared and analyzed. The authors reported the Receiver Operating Characteristic (ROC) curve analysis for both score systems and the CFS showed similar performance while predicting 3- and 6-month mortality [1].

To develop a prediction model, the interactions between important variables should be evaluated, and when qualitative interactions are present, the final results can be impacted dramatically [3]. It is strongly recommended to use prospective or longitudinal studies as a design of the study, since we need to incident cases instead of prevalence cases to predict

the whole spectrum of these including severe types. In addition, the other reason is the matter of generalizability, as an important term in prediction models, since the characteristic of people who are participating in the study should be represented by the target population. Clinical prediction model should be driven from a different data set than performance validation data set. It would be better to use an external separated data set for validating; however, sometimes it is not possible for researchers and they prefer to use the same data set but in a randomly split form of original cohort. That is ok but in the cost of losing external validity but gaining internal validity. In addition, there are some statistical methods such as the split file, Jackknife and bootstrap by multiple sampling, replacement and finally achieving an average estimated regression coefficient, and the scores which are adjusted [2–5]. AUC is an appropriate measure for assessing discrimination. Discrimination defines as the ability to distinguish events versus non-events. What we should always consider about AUC measure is that a high value of AUC means excellent discrimination, but also it can reflect the situation that is not relevant enough. Statistically significance of AUC does not guarantee prediction [3].

Author concluded that predicting short-term mortality and long-term survival time for elderly patients is possible using the Thamer and Wick scores and the CFS [1]. Briefly, in prediction studies, the main purpose is to provide a model, index, or score applicable to an individual (patient). Finally, associations, even those that are statistically significant, do not guarantee prediction [3, 4]. In this letter, we discussed methodological issues in the study and suggest that any prediction study should consider the above-mentioned methodological issues [2–5].

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## References

1. Hwang D, Lee E, Park S, Yoo BC, Park S, Choi KJ, Oh S, Kim MJ, Kim H, Jeon JS, Noh H, Han DC, Kwon SH (2019) Validation of risk prediction tools in elderly patients who initiate dialysis. *Int Urol Nephrol*. <https://doi.org/10.1007/s11255-019-02160-y> (**epub ahead of print**)
2. Moons KG, Royston P, Vergouwe Y, Grobbee DE, Altman DG (2009) Prognosis and prognostic research: what, why, and how? *BMJ* 338:b375. <https://doi.org/10.1136/bmj.b375>
3. Szklo M, Nieto FJ (2014) *Epidemiology beyond the basics*, 3rd edn. Jones and Bartlett Publisher, Manhattan
4. Sabour S (2013) Obesity predictors in people with chronic spinal cord injury: common mistake. *J Res Med Sci* 18(12):1118
5. Naderi M, Sabour S (2019) Prediction of trastuzumab-induced cardiotoxicity in breast cancer patients receiving anthracycline-based chemotherapy: methodological issues. *J Echocardiogr* 17(2):112–113. <https://doi.org/10.1007/s12574-019-00415-2>

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