

## LETTERS

## Methodological issues on analysis of prediction tools in evaluating febrile young infants at risk for serious infections

Dear Editor,

We read with great interest the *EMJ* article by Yao *et al* entitled 'Analysis of emergency department prediction tools in evaluating febrile young infants at risk for serious infections (SIs)' which was published in November 2019.<sup>1</sup> The authors' goals of conducting this study included: first, evaluation of the performance of two clinical tools including the National Institute for Health and Care Excellence (NICE) Traffic Light System and Severity Index Score in predicting SI in all febrile infants and second, to evaluate the performance of three low-risk criteria including Rochester criteria (RC), Philadelphia criteria and Boston criteria among well-looking febrile infants.<sup>1</sup> Clinical characteristics of 1057 infants for SI outcome were retrospectively evaluated in this study. The study reported sensitivity, specificity, positive predictive value, negative predictive value (NPV), positive and negative likelihood ratios for predicting SI. The authors concluded that NICE guideline was highly sensitive in the study population and RC showed the highest sensitivity in predicting SI among febrile infants.

We raise several methodological and statistical points. First, to develop and validate a prediction model, it is strongly recommended to use two different groups or at least one cohort divided into two sets of data and if the model developed in the first group is not validated in the other the results of the study are not sufficiently generalisable.<sup>2-4</sup> Different methods are usually applied for validation of a prediction model, such as the split file, jackknife and bootstrap by multiple sampling or other well-known validation methods. Second, interactions between important variables should be evaluated; especially when there are qualitative interactions, the final results will be significantly affected.<sup>2,4</sup>

Another problem is the use of NPV, positive predictive value, sensitivity and specificity for an estimate of prediction.<sup>1</sup> These are estimates to assess validity (accuracy) of a diagnostic test and have nothing to do with prediction.<sup>2,5</sup> In prediction studies, it is preferable to provide a model, index or

score applicable to an individual (patient). Finally, associations, even those that are statistically significant, do not guarantee prediction.<sup>2-5</sup>

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