One scoring system does not fit all health care settings

By: Magnus Rasmussen¹²*, Helena Lindberg and Fredrik Kahn¹²

¹Skåne University Hospital, Lund, Sweden
²Division of Infection Medicine, Department of Clinical Sciences Lund, Lund University, Lund, Sweden
³The hospital of Halland, Halmstad, Sweden

*Corresponding author: Magnus Rasmussen, Division of Infection Medicine Diseases, Department of Clinical Sciences Lund, Lund University, BMC B14, SE-223 63 Lund, Sweden. Phone: +46 46 171130. E-mail: magnus.rasmussen@med.lu.se
Dear Editor,

We read with interest the article by Peinado-Acevedo and coworkers describing the validation of the PREDICT and VIRSTA scores in a large Colombian cohort of patients with *Staphylococcus aureus* bacteremia (SAB) (1). PREDICT and VIRSTA are scoring systems intended to guide the use of echocardiography in patients with SAB to detect infective endocarditis (IE) (2, 3).

External validation of scoring systems is essential to evaluate their clinical usefulness. Therefore, this study is of interest. Importantly, it is performed in a different health care system than the PREDICT and VIRSTA studies (2, 3). The composition of the cohort of the present study, is very different from the cohorts used to generate the PREDICT and VIRSTA scores (2, 3). Most importantly, SAB is mainly a nosocomial complication to the use of central-venous accesses and community acquired infection constituted only 16 % of patients.

The main finding is that the VIRSTA score has high sensitivity (97 %) whereas the PREDICT score has relatively low sensitivity (52 %). The conclusion was therefore that in the VIRSTA-negative patients, TEE could be omitted but that PREDICT was not safe for this purpose. The conclusion is reasonable given the conditions in the Colombian cohort.

Different factors likely contribute to the low sensitivity of PREDICT in this study. Firstly, PREDICT uses community acquisition as one of the variables in the score and the low proportion of such patients should explain parts of the sensitivity problem (2). Secondly, a very large proportion of patients with IE were on hemodialysis and among these patients PREDICT had an even lower sensitivity. Thus, PREDICT might be unsuited to detect IE.
especially in this subgroup. The sensitivity of PREDICT among non-hemodialysis patients was higher (65 %).

Peinado-Acevedo and coworkers claim that there is no external validation of PREDICT and VIRSTA but recently Abu Saleh et al. and Kahn et al. performed external validations of PREDICT (4, 5). The studies were from the US and Sweden and demonstrated a sensitivity of 100 % and 81-95 % respectively. VIRSTA was also validated in the Swedish cohort, rendering a high sensitivity (85-100 %) but moderate specificity (44-55 %) (5).

Time to blood culture positivity (TTP) is a feature readily available using automated blood culturing systems. A low TTP, indicative of a high bacterial concentration in blood, is a feature of intravascular infections (5-7). We recently demonstrated that TTP could be included in a scoring system denoted POSITIVE which had a high sensitivity and specificity to detect IE in a cohort of patients with SAB separate from the generation cohort (5). It would be very interesting to evaluate the performance of POSITIVE in a different cohort of patient with SAB such as the one presented by Peinado-Acevedo and coworkers.

The results of this study clearly demonstrate that scoring systems cannot be universally applied and that the performance of a given system needs to be validated before implemented. The performance of PREDICT is likely better in other clinical settings than the one described here.

None of the authors has any potential conflicts of interest to disclose.
References

1. Peinado-Acevedo JS, Hurtado-Guerra JJ, Hincapie-Osorno C, Mesa-Abad J, Uribe-Delgado JR, Giraldo-Ramirez S, et al. Validation of VIRSTA and PREDICT scores to determine the priority of echocardiography in patients with *Staphylococcus aureus* bacteremia. Clin Infect Dis. 2021.
2. Palraj BR, Baddour LM, Hess EP, Steckelberg JM, Wilson WR, Lahr BD, et al. Predicting Risk of Endocarditis Using a Clinical Tool (PREDICT): Scoring system to guide use of echocardiography in the management of *Staphylococcus aureus* bacteremia. Clin Infect Dis. 2015;61(1):18-28.
3. Tubiana S, Duval X, Alla F, Selton-Suty C, Tattevin P, Delahaye F, et al. The VIRSTA score, a prediction score to estimate risk of infective endocarditis and determine priority for echocardiography in patients with *Staphylococcus aureus* bacteremia. J Infect. 2016;72(5):544-53.
4. Abu Saleh O, Fida M, Asbury K, Narichania A, Sotello D, Bosch W, et al. Prospective validation of PREDICT and its impact on the transesophageal echocardiography use in management of *Staphylococcus aureus* bacteremia. Clin Infect Dis. 2020.
5. Kahn F, Resman F, Bergmark S, Filiptsev P, Nilson B, Gilje P, et al. Time to blood culture positivity in *Staphylococcus aureus* bacteraemia to determine risk of infective endocarditis. Clin Microbiol Infect. 2020.
6. Khatib R, Riederer K, Saeed S, Johnson LB, Fakih MG, Sharma M, et al. Time to positivity in *Staphylococcus aureus* bacteremia: possible correlation with the source and outcome of infection. Clin Infect Dis. 2005;41(5):594-8.
7. Simeon S, Le Moing V, Tubiana S, Duval X, Fournier D, Lavigne JP, et al. Time to blood culture positivity: An independent predictor of infective endocarditis and mortality in patients with *Staphylococcus aureus* bacteraemia. Clin Microbiol Infect. 2019;25(4):481-8.