Effectiveness of Fetal Medicine Foundation prediction model (FMF2012) in screening for preeclampsia

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Objective
The aim of this study was to evaluate the effectiveness of preeclampsia (PE) prediction model of Fetal Medicine Foundation (FMF2012) by examining (1) the distribution of risk scores for PE development and (2) the performance of first trimester screening test based on maternal factors and biophysical markers when applied on a sample of Brazilian women.

Methods
This was a cross-sectional, observational study including pregnant women who underwent screening for preeclampsia in the first trimester of pregnancy at Maternidade Escola da Universidade Federal do Rio de Janeiro, between October 2010 and December 2015, by FMF2012 algorithm. Preeclampsia is defined according to the International Society for the Study of Hypertension in Pregnancy, and was stratified according to gestational age (GA) at delivery (PE <34; PE <37 and PE <42). We compared maternal factors between outcome groups by chi-square test for categorical variables and by Mann-Whitney U test for continuous variables. Risk score distribution was verified by Box-Plot graphs in the study groups: (a) eligible; (b) final sample; (c) normal and (d) PE. Sensitivity, specificity, predictive positive value (PPV) and negative predictive value (NPV), positive likelihood ratio (LR +), negative likelihood ratio (LR-) and area under receiver operator characteristic curve (AUC) were calculated for PE<34; PE<37 and PE<42. The test was considered positive when risk was: (PE<34) >1/200 ; (PE<37) >1/57 and (PE<42) >1/12.

Results
Eligible cases totaled 1934 and the final sample was 1531. There were 120 cases of PE (7.5%), of which 26 (1.56%) were PE <37 and 11 (0.65%) were PE <34. There were no different rates of PE related to ethnicity, smoking and family history of PE. The score values distribution was asymmetric with 15% of the sample classified as high risk. The performance of FMF2012 algorithm in prediction of outcomes was: (PE<34) sensitivity of 63.6%; VPP 3.2%; LR+ of 4.58; specificity of 86.1%; VPN 99.7%; and LR- of 0.42; AUC was 0.84; (PE<37): sensitivity of 46.1%; VPP 5.4%; LR+ of 3.33; specificity of 86.1%; VPN 98.9%; and LR- of 0.62; AUC was 0.77; (PE<42): 33.3%; VPP 16.9%; LR+ of 2.40; specificity of 85.8%; VPN 93.7%; and LR- of 0.77; AUC was 0.7155.

Conclusion
The distribution of score values for development of PE <34, PE <37 and PE <42 is asymmetrical, with a right tail, identifying most of the samples as low risk, and normal group showed significantly lower values than women who developed PE. The test shows good performance in ruling out preeclampsia, but in our sample it failed to satisfactorily identify cases that will develop it.