

EP16.55

Machine-learning prediction of pre-eclampsia in the SPREBRA cohort: comparison with the FMF model

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Objectives

To evaluate the performance of a neural network machine-learning (ML) model for first-trimester pre-eclampsia (PE) prediction in the Screening for Pre-eclampsia in Brazil (SPREBRA) cohort.

Methods

- SPREBRA:
Prospective multicenter cohort (Brazil) for validation of the FMF PE screening algorithm (MF, MAP, UtA-PI, PAPP-A and PIGF)
Singleton pregnancies
11+0–13+6 weeks
- Secondary analysis applying the “**Bar-Ilan model**”, a previously developed neural-network ML model, with **no MoM normalization required**
- Performance for detection rates of preterm and overall PE using the Bar-Ilan model was compared with the FMF model

Results

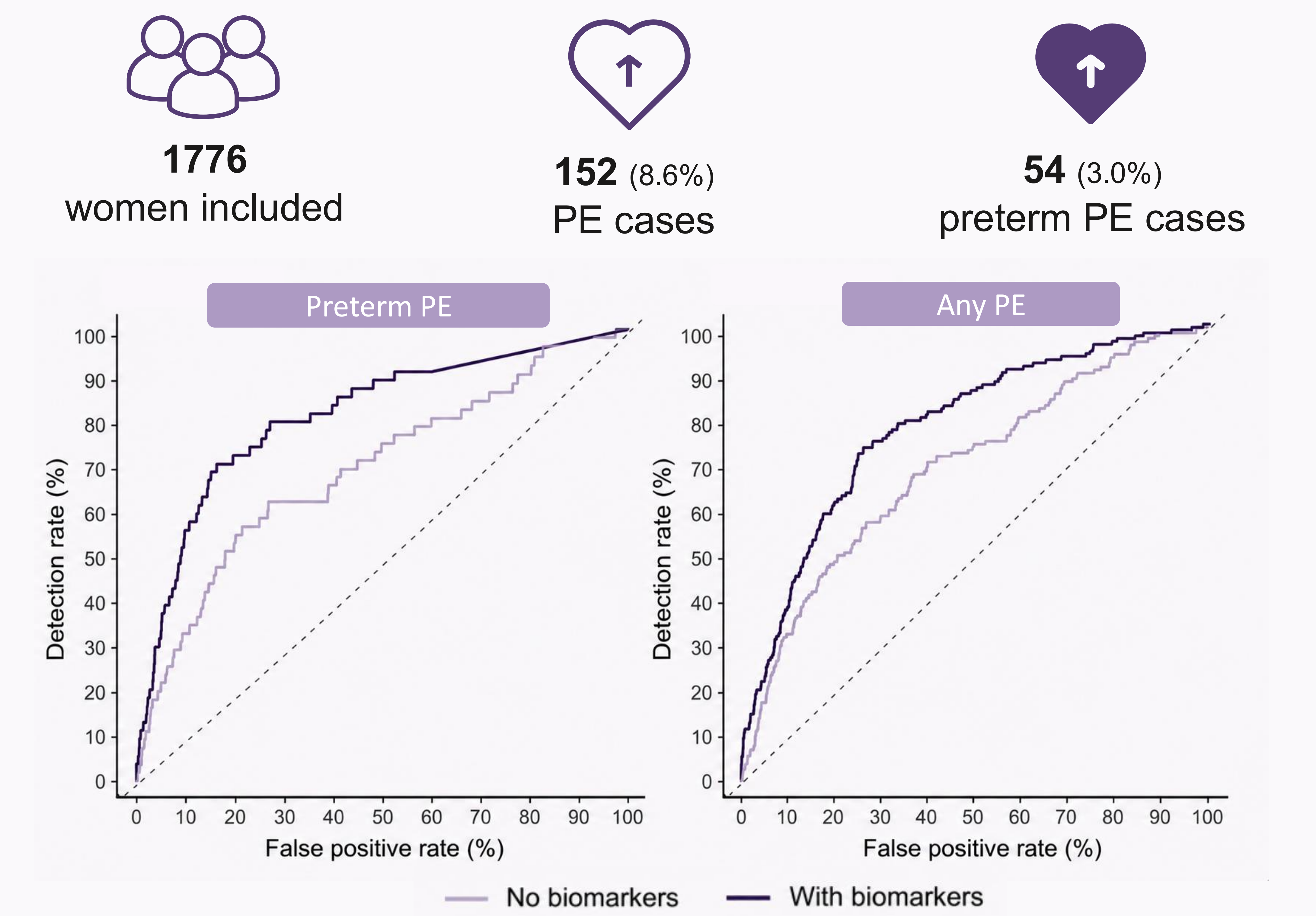


Figure 1. Receiver operating characteristic (ROC) curves of an ML model in the first trimester in the prediction of preterm (left) and overall pre-eclampsia (right) with maternal factors alone (light purple) and maternal factors combined with biomarkers (deep purple).

	Bar-Ilan MF alone	Bar-Ilan MF + biomarkers	FMF MF + MAP + UtA-PI + PIGF
Detection rates for preterm PE	10% FPR 33.3%	55.6%	61.1%
	15% FPR 44.4%	68.5%	74.1%
	20% FPR 55.6%	77.2%	77.8%
AUC	0.704	0.813	0.817

Conclusion

- The ML model provided effective first-trimester PE prediction without MoM normalization in this Brazilian cohort
- The FMF model remained the best-performing approach.

