DOES WEIGHTING THE PREDICTORS ENHANCE A VALIDATED GDM INSULIN PREDICTION MODEL?

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Background
In 2015 we developed and validated a Model for prediction of insulin therapy in women with gestational diabetes (GDM)(1). The Model, using seven readily available clinical items, identifies low and high risk women at GDM diagnosis who could be triaged into different models of care.

Aim
To enhance the Model using weighted predictor variables based upon their respective odds ratio [OR] for predicting insulin therapy.

Methods
In our multi-ethnic cohort, seven items were dichotomised and assessed for GDM therapy prediction. These were, [with their OR]: maternal age >30 years [1.214], family history of diabetes [1.423], previous GDM [1.474], pre-pregnancy obesity (BMI ≥30 kg/m^2) [1.777], HbA1c at GDM diagnosis ≥5.5% [1.878], fasting BGL ≥5.3 mmol/L [2.449] and early GDM diagnosis (<24 weeks gestation) [2.631]. The lowest OR was reset to 1.0 and all others adjusted by dividing the respective OR by 1.214. Resultant values were thence rounded to the nearest 0.5. Using weighted values, a total predictor number (0-10) was calculated for each individual. Cross tabulation was undertaken and a receiver operator curve (ROC) constructed based on predictor score (0-10) versus therapy outcome, with specificity and positive predictive value (PPV) determined.

Results
In 3317 women, compared to the original Model, the ROC Area Under the Curve (AUC)(95%CI) was only marginally higher [0.726 (0.707-0.744) versus 0.712 (0.693-0.731)], and there was no improvement in specificity and PPV, which were lower (see Table).

Table

		Prediction of Diet Rx	
Original Model 0-1 Predictors	Specificity	89.9%	
	PPV	86.6%	
Weighted Model 0-2.5 Predictors	Specificity	76.2%	
	PPV	83.4%	
			Prediction of Insulin Rx
Original Model 6-7 Predictors	Specificity		99.4%
	PPV		87.6%
Weighted Model 7.5-10 Predictors	Specificity		98.5%
	PPV		80.9%

PPV = positive predictive value

Conclusions
As in the original Model, increasing predictor score was associated with increasing insulin use, allowing identification of those with least and greatest likelihood of requiring insulin. However the weighted model was less predictive of therapy type. Weighting the predictors has not enhanced the original easy to use Model.

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References
1. Barnes R, Wong T, Ross G, Jalaludin B, Wong V, Collins C, MacDonald-Wicks L, Smart C, Flack J (2016) A Novel Validated Model For the Prediction of Insulin Therapy Initiation and Adverse Perinatal Outcomes in Women with Gestational Diabetes Mellitus. Diabetologia In Press.