P01

Artificial intelligence to predict spontaneous preterm birth based only on demographic data

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1. Introduction and aims

- Current predictive machine learning techniques for preterm birth heavily rely on a history of previous preterm birth and/or costly techniques such as fetal fibronectin and cervical length to the disadvantage of nulliparous women.
- We aimed to determine the predictive performance for preterm birth (<37 weeks) of local demographic data readily available from the booking consultation.

2. Methods

- We developed a logistic regression model based on 917 spontaneous preterm births with 100 matched term controls from Sheffield NHS Teaching Hospitals (2018-2021).
- A three-fold cross-validation technique was applied with subsets for data training and testing in Python with only variables with significant p-values included.
- The performance of the risk assessment model was compared to the validated QUiPP app tool.

3. Results

- The retrospective model showed an **AUC of 0.76** (95% CI: 0.71-0.83) to predict spontaneous preterm birth, with a sensitivity and specificity of 0.71 and 0.78 respectively based on 7 variables: maternal age, BMI, ethnicity, smoking, gestational type, substance misuse and parity/obstetric history [Figure 1], with an AUC similar to QUiPP [Table 1].

4. Future research

- Our observation from local hospital data is consistent with published literature that suggest that maternal demographic features, incorporated into a model, has modest predictive utility for spontaneous preterm birth.

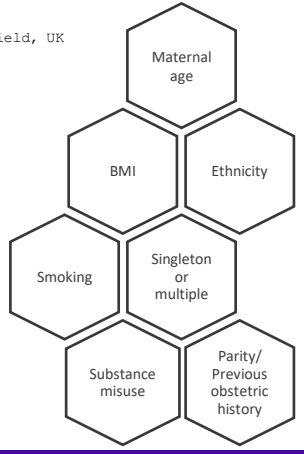

Figure 1. Variables included in the final model

	Model proposed	QUiPP[1] (asymptomatic)
AUC	0.76 (0.71-0.83)	0.75
Sensitivity	0.71	0.75
Specificity	0.78	0.64

Table 1. Predictive performance for spontaneous preterm birth (<37 weeks)

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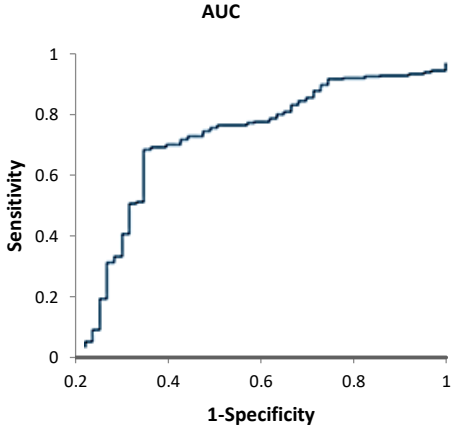
The model could predict spontaneous preterm birth just based on demographic data without cervical length and/or fetal fibronectin, even in asymptomatic nulliparous women



Reference: 1. Watson, H. et al, BMC Pregnancy Childbirth 2020.