MINI COMMENTARY

BJOG mini commentary on Systematic review of clinical prediction models for the risk of emergency caesarean births.

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The rising trend of Caesarean births (CBs) globally may be concerning but seems an inevitable reality that has be managed appropriately. While planned caesarean births (PCBs) are assessed to be a safe alternative to vaginal births (VB) (NICE 2024 [www.nice.org.uk/guidance/ng192](http://www.nice.org.uk/guidance/ng192)), emergency caesarean births (EmCBs) carry more risks to both mother and baby (Sandall J et al, Lancet 2018;392 (10155): 1349-1357). Therefore, several prediction models for EmCBs have been developed with the aim to reduce the EmCBs rates, and consequently the associated complications and risks.

In this BJOG issue, (Hunt et al. BJOG xxxx) systematically review primary studies developing and validating prognostic multivariable models predicting the risk of EmCBs, to understand the accuracy of their development, and whether they can be operationalized for use in routine clinical practice. The models identified in the review used logistic regression, linear or partial linear mixed modelling, and machine learning techniques.

The study draws from multiple databases, reviewing 63 studies involving over 4.4 million women globally. 56 studies reported the development of new prediction models, whilst seven reported the validation of an existing model that uses predictors which are usually cited during regular practice, such as maternal height, age, BMI, gestational age, and parity. However, only 33 of the models were identified as having low risk of bias, and just eight were externally validated. Among the externally validated models, six are easily accessible and could be useful in clinical settings, with some presented in user-friendly formats, like nomograms, websites, and applications. However, only one model offers predictions at 36 weeks, allowing sufficient time for women to consider caesarean birth as a planned option.

A Risk of bias assessment was done by the Prediction model; Risk of Bias Assessment Tool PROBAST, which has four domains; participants, predictors, outcome and analysis.

The PROBAST a domain analysis, examined the statistical methods used by the studies to measure: The *Model stability*, which examined if the studies presented methods to calculate the Number of Event per variable (EPV). *Handling of predictors,* examining the statistical method used to select predictors. *Performance measures,* which refers to how well the predicted probability aligns with the number of actual EmCBs. *Missing data,* and how this was handled, and *validation techniques* used by the studies.

The review highlights significant limitations in the current models; the presence of studies with high risk of bias, heterogeneity, and lack of recalibration and updates, which raises concerns about their relevance and generalizability.

The main significance of this review lies in its potential to support clinical practice, to generate recommendations and to set benchmarks for future research by identifying research gaps. The review's recommendations for the recalibration, validation, and personalization of models that accurately predicts a timely risk of an EmCB across diverse risk backgrounds offer a clear path forward for enhancing maternal healthcare.

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