TVÆRSPOR

AI for prediction of caesarean birth after labor induction

Sidsel Boie[1], Niels Uldbjerg[2], Rasmus Guldborg Hundahl[3], Anders Hammerich Riis[3], Pinar Bor[2,4]
[1]Kvindesygdomme og Fødsler - Regionshospitalet Randers, [2]Aarhus Universitet, [3]Enversion A/S, [4]Kvindesygdomme og Fødsler - Aarhus Universitetshospital

Background

Each year, approximately 60,000 women give birth in Denmark. One of every fourth birth involves labor induction. Labor induction frequently requires stimulation of uterine contractions using oxytocin. The current standard of care is to continue oxytocin stimulation until delivery. However, managing oxytocin requires a delicate balance between promoting effective contractions to ensure labor progresses and minimizing the risk of hyperstimulation, which poses risks to both mother and baby.
Building on our previous research, we have developed an AI-algorithm that distinguished between women who will benefit from a high dose of oxytocin and those who will benefit from a low dose. The algorithm incorporates variables available before labor induction as well as variables that emerge during labor. The algorithm was developed based on data from 1200 laboring women.

Aim

This study aims to evaluate data extraction, data availability and data quality of the variables for the AI algorithm using CROSS-TRACK (TVÆRSPOR).
Furthermore, this study aims to test our pilot algorithm on a larger material applying the CROSS-TRACK cohort in order to explore whether it is feasible to develop a midwife friendly decision support tool integrated within Midt-EPJ.
Lastly the study aims to evaluate if the AI algorithm could be further improved by including other variables that can enhance decision making regarding oxytocin stimulation during labor induction to reduce the risk of caesarean delivery.

Methods

The project is carried out in the following time period: January 2025 – June 2026.
Initially, we plan to conduct an observational study using the CROSS-TRACK system to assess data extraction, availability, and quality. To predict the risk of a caesarean birth following labor induction, we will use data from all births at the labor departments in the Central Denmark Region. Our team has developed a pilot AI prediction model based on data from 1200 laboring women. This model will be tested on the large CROSS-TRACK population to evaluate whether the AI prediction algorithm can be applied to routine data obtainable from Midt-EPJ.
Furthermore, the AI prediction model will be further developed using all other available data from extern data sources within the CROSS-TRACK cohort. Extreme gradient boosting (WG Boost) will be used to further build the prediction model. To explain the impact of the predictors on the risk of caesarean birth, including interactions between predictors, we will calculate Shapley additive explanation (SHAP) values.

Expected impact in clinical practice

Data from CROSS-TRACKS enables us to evaluate whether variables from extern data sources outside the EPJ are important predictors that should be included in a prediction model, or if variables obtained solely from the EPJ are sufficient to develop a midwife-friendly decision support tool.

regionmidtjylland midt