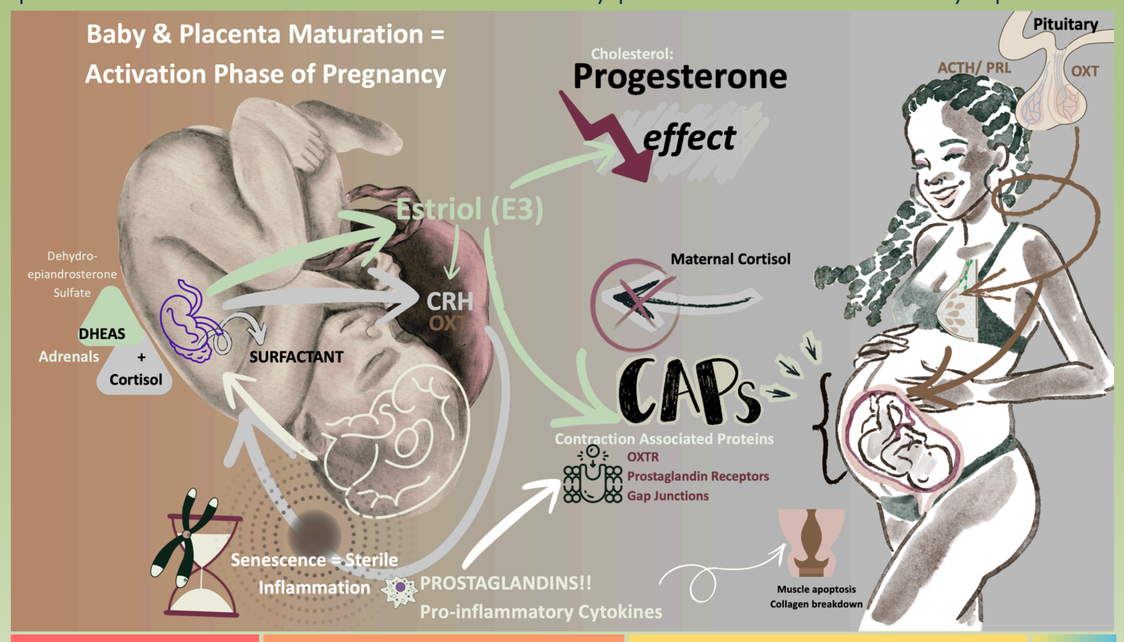
New Date. The First Accurate Due Date Predictor

Elise N Erickson PhD CNM FACNM[1]; Lily Woods MA[1]; Stefanie Boyles BSN, RN[1]; Chinmai Basavaraj PhD[2]; Shravan Aras PhD[3]

[1]DEPARTMENT OF PHYSIOLOGY, COLLEGE OF MEDICINE, [2] AMAHEALTH LLC, [3] MEL & ENID ZUCKERMAN COLLEGE OF PUBLIC HEALTH. UNIVERSITY OF ARIZONA , TUCSON.

The physiological phases of parturition are complex.

Problem: We have no tools to help us know when the body is 'activating' the parturition cascade. Labor cannot be reliably predicted in advance of symptoms.



1. Pregnancy is under the influence of **progesterone** to inhibit contractions and keep the cervix closed and long. But the body is not meant to be pregnant forever.
2. As the fetus and placenta mature they trigger hormonal and inflammatory signals that feedback on the mother's body to start to prepare for labor: this is dominated by **Estriol**, **Corticotrophin Releasing Hormone**, **Cortisol** & **Prostaglandin.**
3. As the uterine muscle expresses more "**contraction associated protein**" genes, it will become responsive to prostaglandin & oxytocin. The cervix will undergo muscle apoptosis & collagen remodeling.
4. "**Labor**" is the presence of progressive cervical dilation & regular uterine contractions, typically painful.

Birth & Recovery

Quiescence: 95% **Activation: 4.8%** **Stimulation: 0.2%**

Solution: Our team developed an AI model that reads the maternal pre-labor physiological signals from a wearable device.

Basavaraj *et al. BMC Pregnancy and Childbirth* (2024) 24:777
https://doi.org/10.1186/s12884-024-06862-9

BMC Pregnancy and Childbirth

RESEARCH Open Access

Deep learning model using continuous skin temperature data predicts labor onset

Chinmai Basavaraj[1†], Azure D. Grant[2†], Shravan G. Aras[3†] and Elise N. Erickson[4*†]

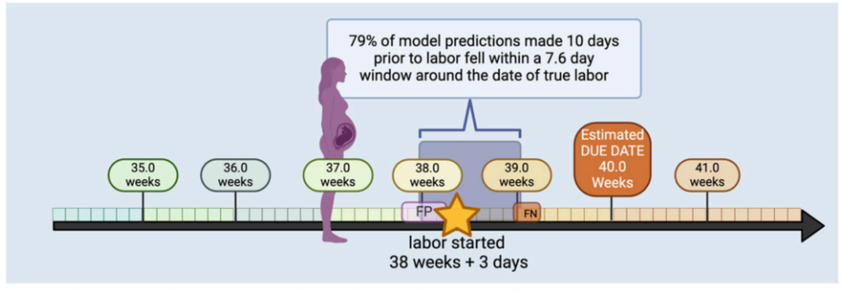


Fig. 7 Graphical Summary of AE-LSTM model with labor predictions in a future window of time relative to true labor onset. At 10 days prior to labor onset, the model predicts a window of 7.6 days that accurately included true labor date in 79% ($n=42$) of the sample. The window was before true labor 18.8% ($n=10$) of the time (False Positive, FP) with a mean (SD) of 0.6 (0.5) days away from labor onset. Conversely the predictions resulted in a false negative (FN) in 1.8% of cases ($n=1$) in that labor occurred prior to the predicted window to occur 0.9 days after labor started

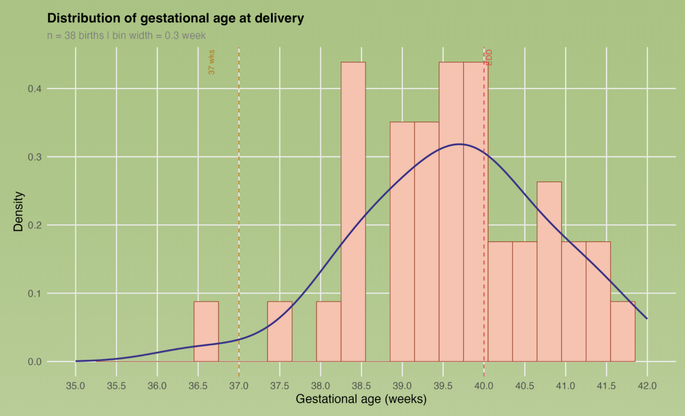
Funding 2023-2026

TECH LAUNCH ARIZONA · CORPS NSF Innovation Corps · NIH SEED · FLINN FOUNDATION · ARIZONA DEPARTMENT OF HEALTH SERVICES Arizona Biomedical Research Centre

Currently Enrolling

The Bio BAYB2 Study

NewDate Validation: New Cohort of Births

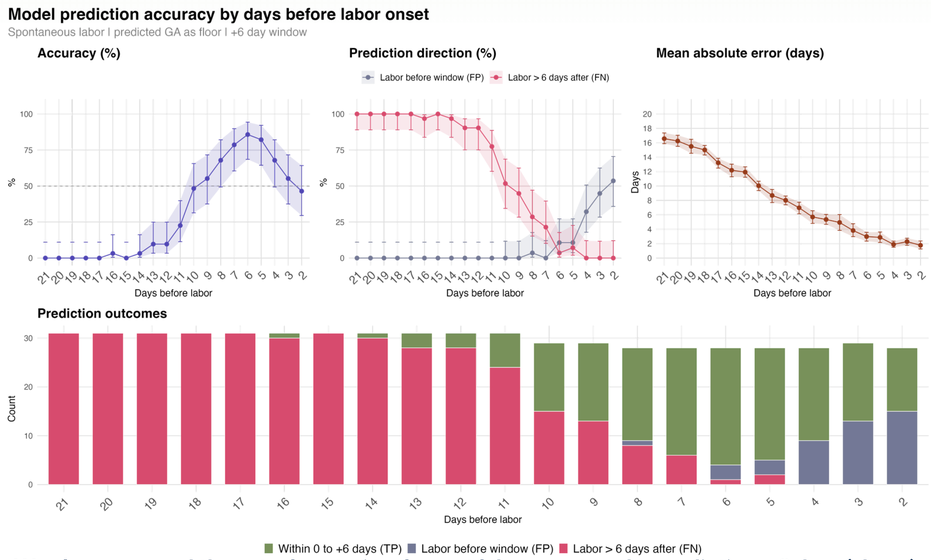


In this study we are validating 'NewDate', a Long Short-Term Memory (LSTM) model that improves upon the traditional estimated delivery date (EDD) by providing real time predictions of labor timing using continuous maternal skin temperature measurement. NewDate provides a real-time prediction of the gestational age (GA) at labor onset days in advance of labor symptoms from a wearable smart ring worn during pregnancy (left).

We present new data from n=38 births after spontaneous labor onset, labor started from 36.5-41.8 weeks. n= 31 of participants had adequate smart ring temperature data during the 2 weeks prior to spontaneous labor onset. The R2 ranged from 0.95-0.98 for the correlation between the participants' GA at labor onset and the NewDate predicted GA across the last 10 days of pregnancy, regardless of GA (right).

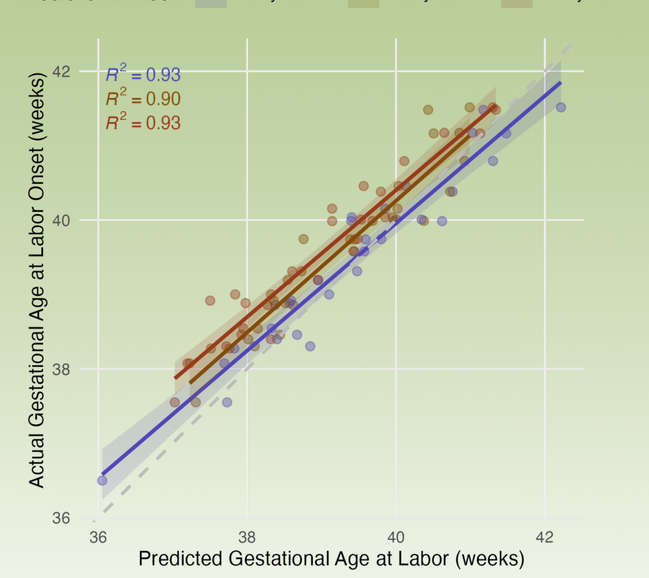
Days Before	n	TP	FP	FN	Accuracy (%)	PPV (%)	NPV (%)	AUC
2	28	21	3	4	75	87.5	84	0.844
3	29	21	5	3	72.4	80.8	87.5	0.81
4	28	22	5	1	78.6	81.5	95.7	0.591
5	28	16	11	1	57.1	59.3	94.1	0.875
6	28	15	13	0	53.6	53.6	100	0.61
7	28	12	16	0	42.9	42.9	100	0.807
8	28	11	17	0	39.3	39.3	100	0.738
9	29	9	20	0	31	31	100	0.9
10	29	7	22	0	24.1	24.1	100	0.857
11	31	3	28	0	9.68	9.68	100	0.869
12	31	1	30	0	3.23	3.23	100	0.9
13	31	3	28	0	9.68	9.68	100	1
14	31	0	31	0	0	0	NaN	NA

We tested overall accuracy of the model by comparing whether the predicted GA week (e.g., in the 38th week) was aligned with week when spontaneous labor began. We report True Positive/ False Positive/ False Negative and Positive Predictive Value/Negative Predictive Value and the AUC for the prediction day - relative to labor onset (right).



We also compared the actual gestational age at labor onset to the prediction + 6 days (above).

Predicted vs. Actual Gestation At Labor Onset



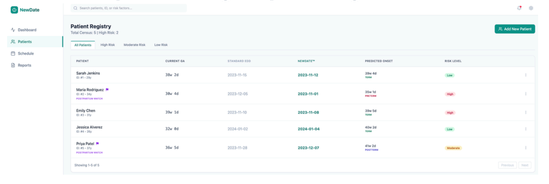
Developing Software (UX)

We also are developing software (UX) for communicating the model to potential end-users (pregnant patients or clinical staff) for testing and iterative design with interviews.

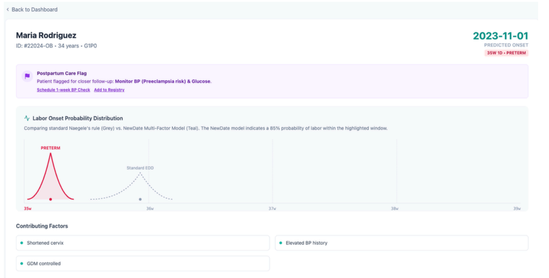
Clinical interface for capacity planning.



Dashboard patient registry- at-a-glance.



Individual patient labor risk and other obstetric concerns.



ama health.AI

Spin-off formed in 2025 'amahealth' (a.k.a.: *mother*health) to develop commercialization strategy and widen investment opportunities. Successfully competed for Phase 1 STTR (Erickson & Basavaraj as PIs).