

Improvement of a novel image-only deep learning model for **delivery timing** and **preterm birth prediction**

[EP] Pregnancy complications: primarily fetal

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AI that sees what we see
and predicts what comes next.

No clinical data. No biometry.
Ultrasound **images only**.



OBJECTIVE

To demonstrate improvement of a deep-learning AI algorithm for **delivery timing** and **preterm birth (PTB)** prediction across model iterations and independent cohorts.



METHODS

Image-only deep learning
Analyzes standard 2D grayscale ultrasound images (≥3 per study).

No clinical, biometric or demographic inputs.

Outcomes: delivery timing (MAE, R²) and preterm birth (<37th weeks, AUC).

Includes both **spontaneous** and **iatrogenic** deliveries.

Ethics approval
Ref. 219/2025.

STUDY COHORTS



TOTAL: 23,675 SCANS

PROGRESSIVE IMPROVEMENT ACROSS ITERATIONS

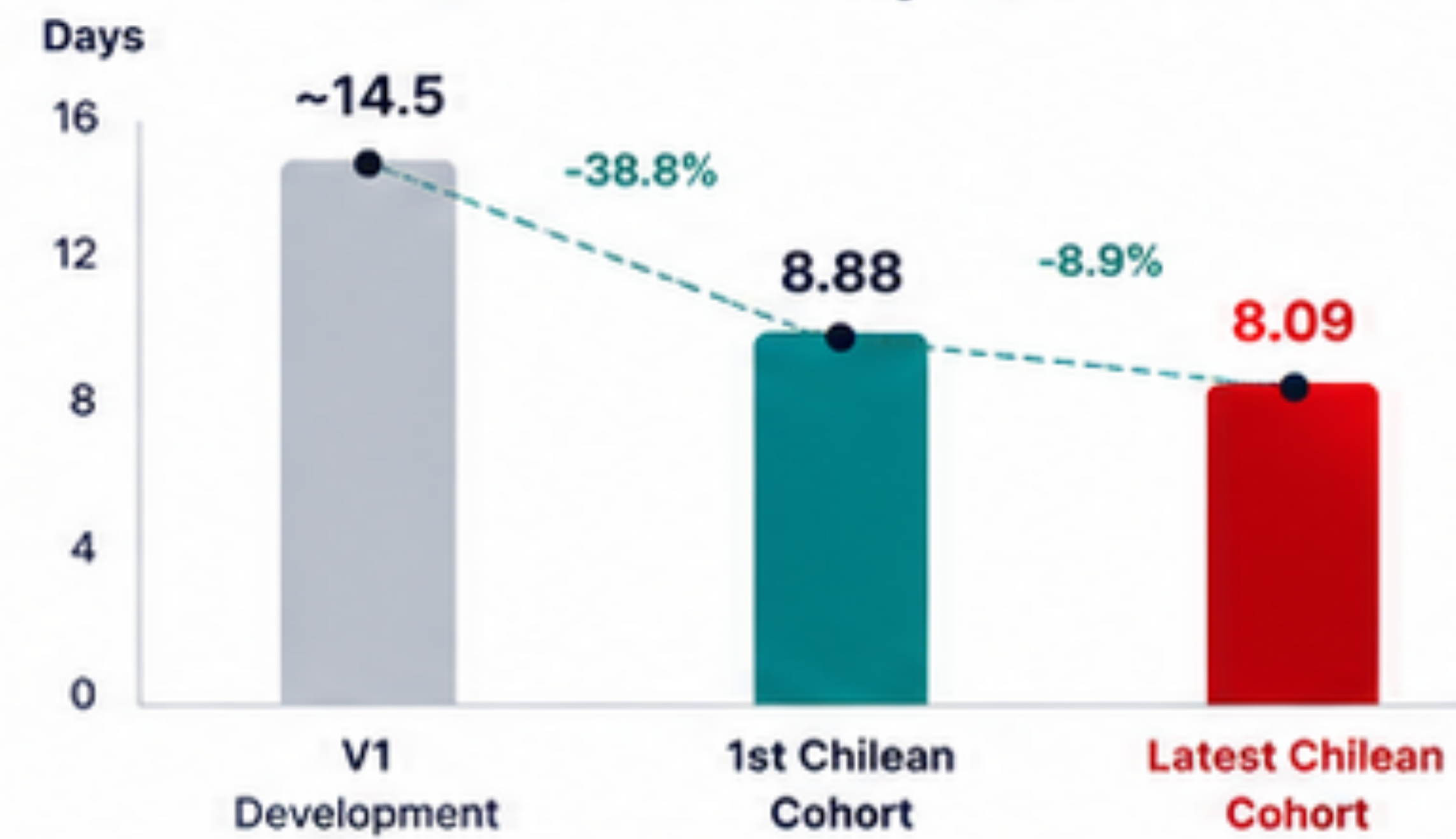


DELIVERY TIMING

Mean Absolute Error (MAE) – days

↓44.2%

reduction in delivery-date error



R² (Coefficient of determination)

0.85 → 0.78 → 0.94 ↑ 10.9%



PRETERM BIRTH PREDICTION

Area Under the Curve (AUC)

↑17.6%

improvement in discrimination



AT ROC-OPTIMIZED THRESHOLD (LATEST CHILEAN COHORT)



Sensitivity
70.5%
↑ 80.8%



Specificity
95.2%
↑ 2.4%



PPV
68.5%
↑ 22.3%



NPV
95.8%
↑ 10.1%



Accuracy
89.5%
↑ 10.1%

CLINICAL IMPLICATIONS



Accurate **delivery dating**
when first-trimester
ultrasound is unavailable.



A promising **complement**
to cervical length measurement
for PTB risk stratification.



Fully automated.
Works with
**routine ultrasound
images only**.

CONCLUSIONS

- ✓ This novel image-only deep learning algorithm achieved substantial improvement across iterations and independent cohorts.
- ✓ Provides accurate delivery timing and high-performance PTB risk prediction without clinical inputs or biometry.
- ✓ Prospective multicentre validation is warranted.

