

# DEVELOPMENT AND PROSPECTIVE VALIDATION OF A PREDICTION MODEL TO IDENTIFY CLINICALLY RELEVANT MEDICATION DISCREPANCIES AT THE EMERGENCY DEPARTMENT

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## BACKGROUND AND IMPORTANCE

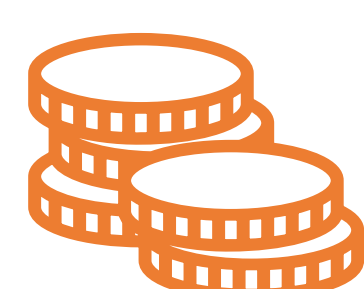
Medication discrepancies → avoidable harm

Accurate medication history = essential

Medication reconciliation (MED-REC)

→ labor-intensive

→ prone to many errors



many patients do **not receive** a complete MED-REC due to **limited resources**

→ Need for approach to **identify patients at risk**

## AIM

Develop and validate a prediction model to identify patients at risk for at least one **clinically relevant medication discrepancy** at the time of emergency department presentation

“The MED-REC predictor”



## RESULTS

### DEVELOPMENT

(Figure 1)

At least one clinically relevant discrepancy observed in 35% (A), 37% (B) and 49% (C)

Final model → 8 predictors

### VALIDATION

#### DISCRIMINATION

(Figure 2)

Moderate: AUC 0.66

Retained in all datasets

Better than at random selection

#### CALIBRATION

(Figure 3)

Excellent calibration (A and B)

Slight underestimation (C)

## CONCLUSION AND RELEVANCE

Prediction model → more **efficient** than selection at random

→ **guide** rational use of **limited resources**

Depending on available resources

→ **customization** of probability threshold and alert rate to ↑ specificity or sensitivity

## METHODS

Prospective multicenter study

- MED-REC at emergency department
- Identifying clinically relevant discrepancies

Three datasets

- 824 patients → development of model
- 350 patients → temporal validation
- 119 patients → geographic validation

Development and validation

- Multivariable logistic regression  
*outcome = at least one clinically relevant discrepancy*
- Discrimination and calibration

$$\log\left(\frac{\text{probability of discrepancy}}{1-\text{probability of discrepancy}}\right) = \text{linear predictor} =$$
$$-1.82 + 0.01 \cdot \text{age} - 0.96 \cdot \text{residence(nursing home)} - 0.79 \cdot \text{residence(other)} - 0.09 \cdot \text{n drugs} + 0.28 \cdot \text{n ATC A drugs} + 0.17 \cdot \text{n ATC C drugs} + 0.21 \cdot \text{n ATC N drugs} + 1.7 \cdot \text{n ATC P drugs} + 0.27 \cdot \text{n ATC R drugs}$$
$$\text{Probability of discrepancy} = \frac{1}{1 + e^{-\text{linear predictor}}}$$

Figure 1. Formula of the prediction model to calculate the probability of having at least one clinically relevant discrepancy

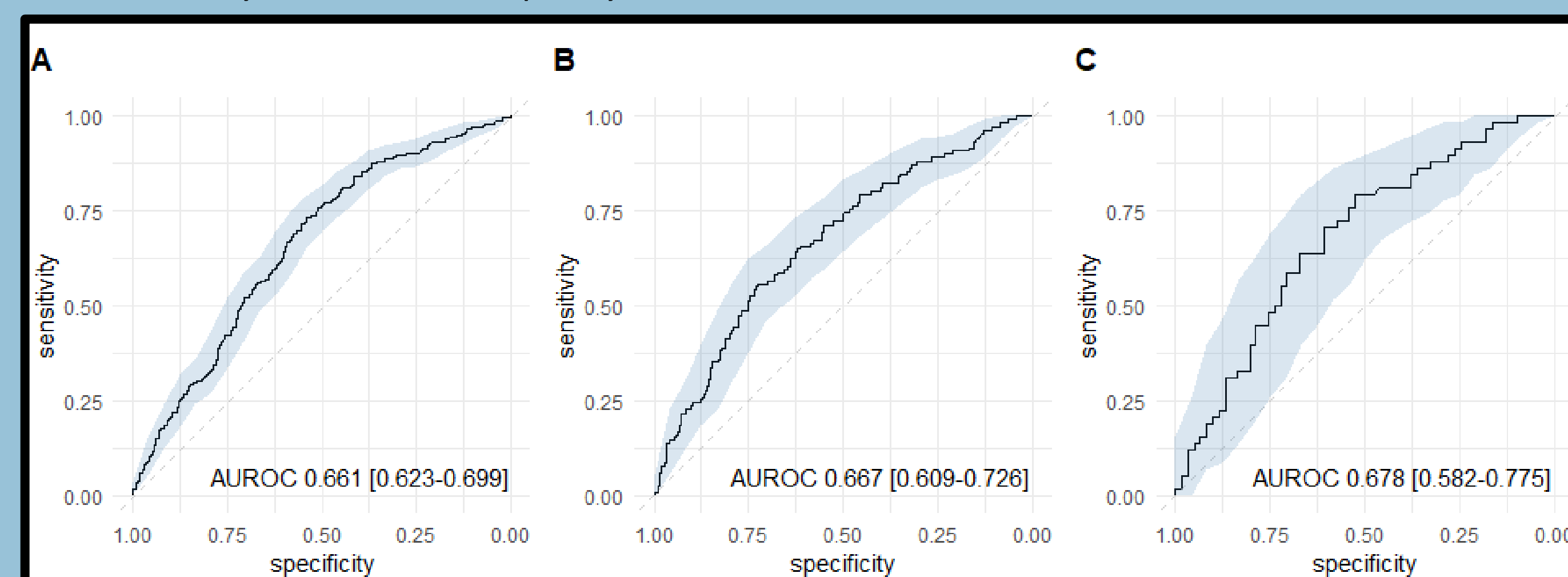


Figure 2. AUROC curves for the MED-RED predictor in the development (A), temporal validation (B) and geographic validation (C) dataset

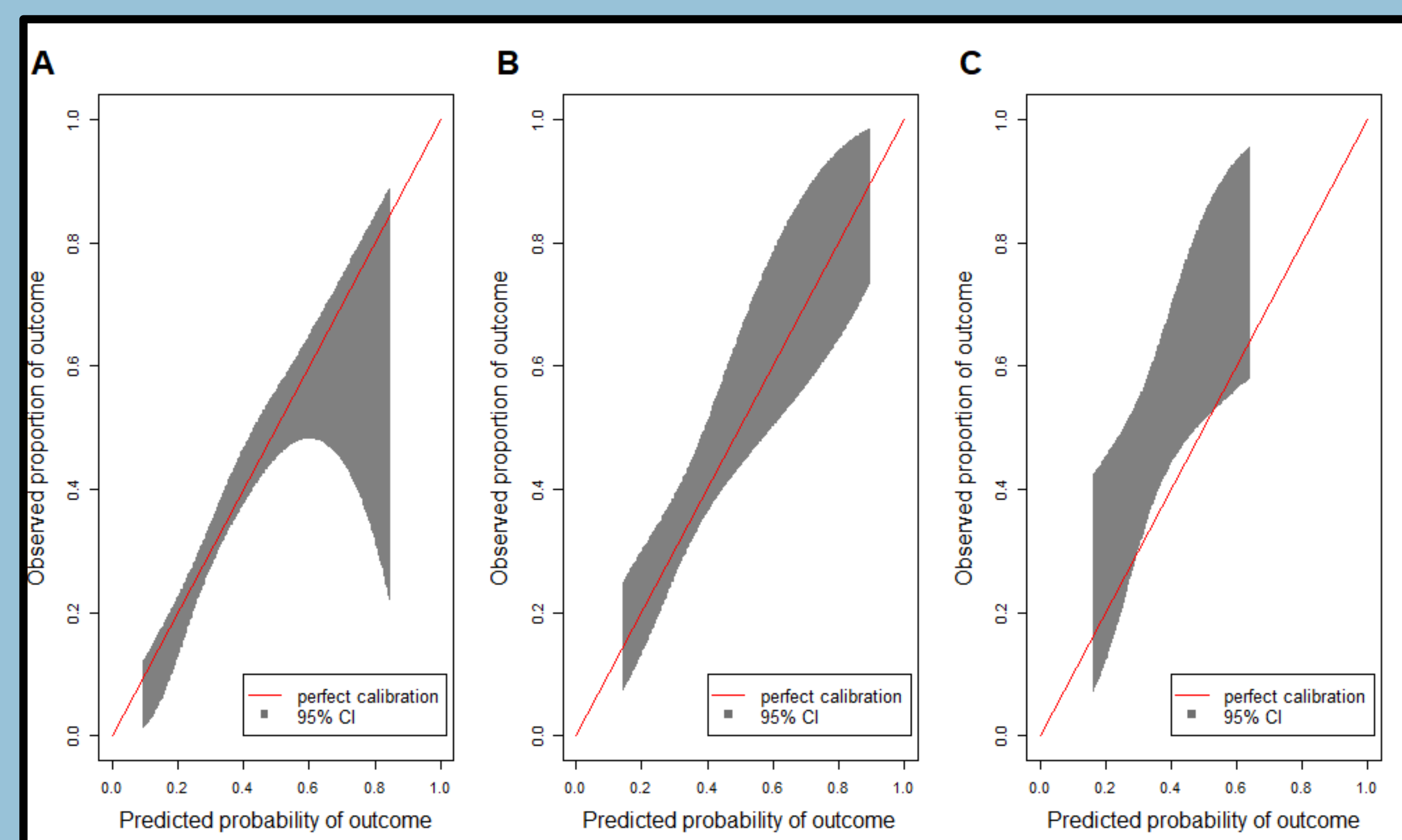


Figure 3. Calibration plots for the MED-RED predictor in the development (A), temporal validation (B) and geographic validation (C) dataset

## IN PRACTICE

- Model incorporated in electronic health record
- Runs in real-time
- Alerts on structured worklist
- MED-REC of high risk patients by pharmacist or pharmacy technicians

