Interpretable ML software to support discharge decisions at the ICU

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RESULTS SO FAR

– **Aim**: predict unexpected readmission or mortality after ICU discharge

– **Data** on 17k ICU patients (2010–2018) of VUmc Amsterdam

– Interpretable **feature extraction** from time series of signals

– **Gradient Boosting** classifier with cross-validated AUC of 0.82

– **Software** developed in close collaboration with VUmc, User studies: software tested with 20 intensivists

NEXT STEPS 2019/2020
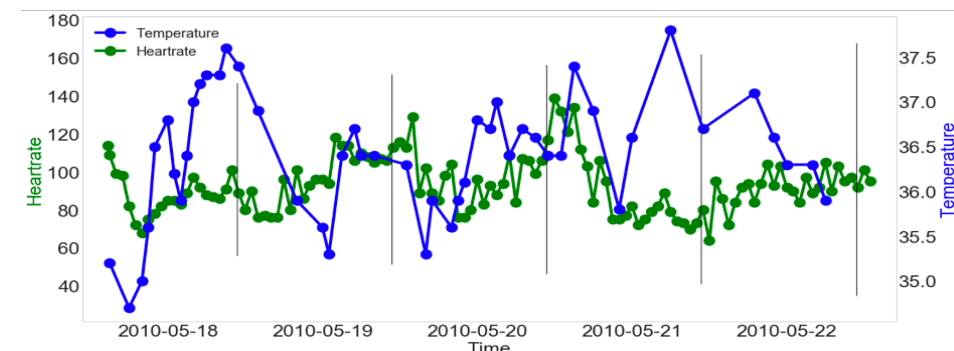
– **CE**-marking and Academic publication

– **External validation** at 3 hospitals and **prospective validation** at VUmc
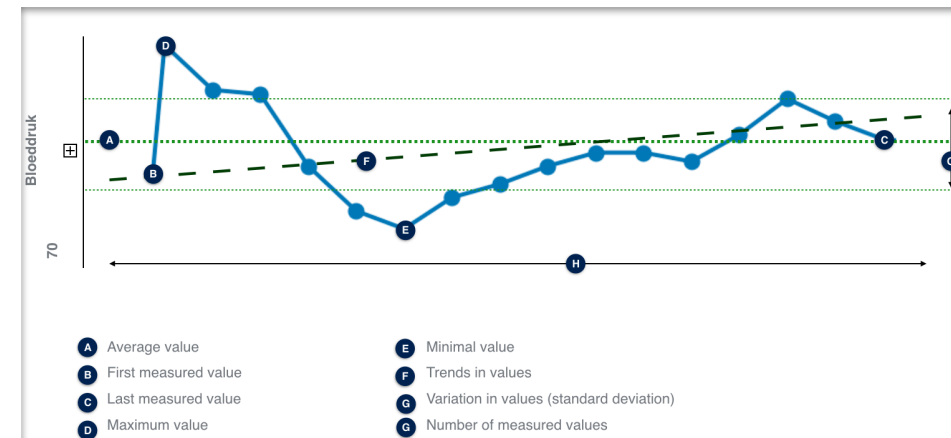
– **Implementation** and scaling

The journey from data to decision support
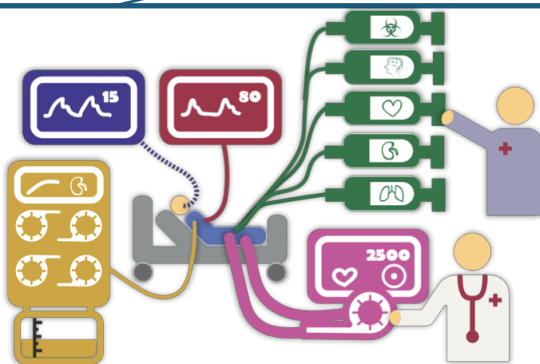
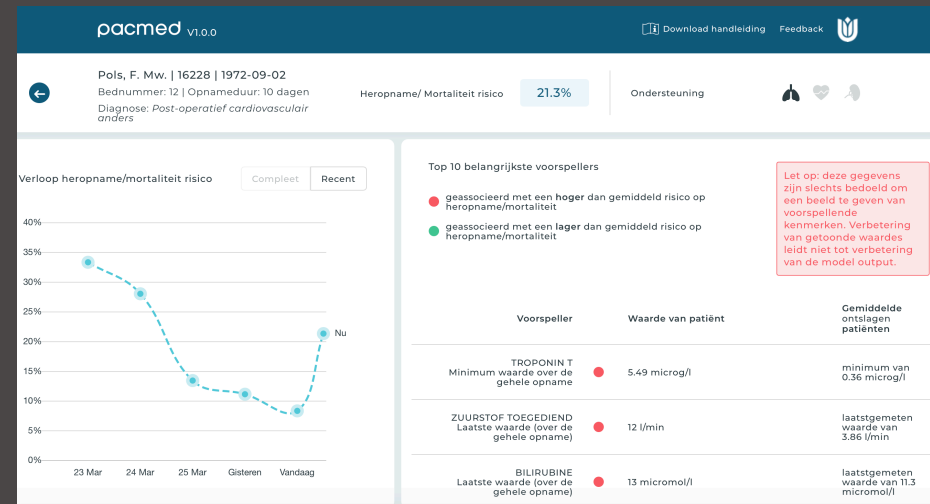**1** A huge amount of patient characteristics are measured continuously at the ICU

2 Deciding if a patient is eligible for discharge is complex 5–7% of discharges lead to readmission or mortality

3 We translate all patient measurements into statistics that are predictive of unsuccessfull discharge

- A Average value
- B First measured value
- C Last measured value
- D Maximum value
- E Minimal value
- F Trends in values
- G Variation in values (standard deviation)
- G Number of measured values

4 SHAP is used to open the black box of a Gradient Boosting model that predicts outcome of discharge

5 Patients that potentially could have been discharged earlier or later can be identified

Avg. readmission prob. five days before discharge untill moment of discharge
patient groups made based on rate of improvement

6 The prediction and most important features are presented within a decision support tool