

# External Validation of Models to Predict Unsuccessful Endometrial Ablation: A Retrospective Study

Kelly Yvonne Roger Stevens (✉ [kyr.stevens@gmail.com](mailto:kyr.stevens@gmail.com))

Catharina Ziekenhuis <https://orcid.org/0000-0003-3512-9181>

**Saskia Houterman**

Catharina Hospital: department of research and education

**Steven Weyers**

University Hospital Ghent: Universitair Ziekenhuis Gent

**Iris Muller**

ZGT: Ziekenhuisgroep Twente

**Benedictus Schoot**

Catharina Hospital: Catharina Ziekenhuis

---

## Original Article

**Keywords:** Endometrial ablation, external validation, prediction model

**Posted Date:** February 23rd, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-236814/v1>

**License:**   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

**Study Objective:** External validation of previously presented and locally established prediction models to help counsel patients for failure of endometrial ablation (EA) or surgical re-intervention within 2 years after EA, called 'Failure model' and 'Re-intervention model' respectively.

**Design:** Retrospective external validation study, minimal follow-up time of 2 years.

**Setting:** Two non-academic teaching hospitals in the Netherlands.

**Patients:** Pre-menopausal women (18+) who had undergone EA for abnormal uterine bleeding problems between January 2010 and November 2012. A total of 329 patients were eligible for analysis.

**Interventions:** Interventions used for EA were Novasure (Hologic, Marlborough, Massachusetts, US) and ThermaChoice III (Ethicon, Sommerville, US).

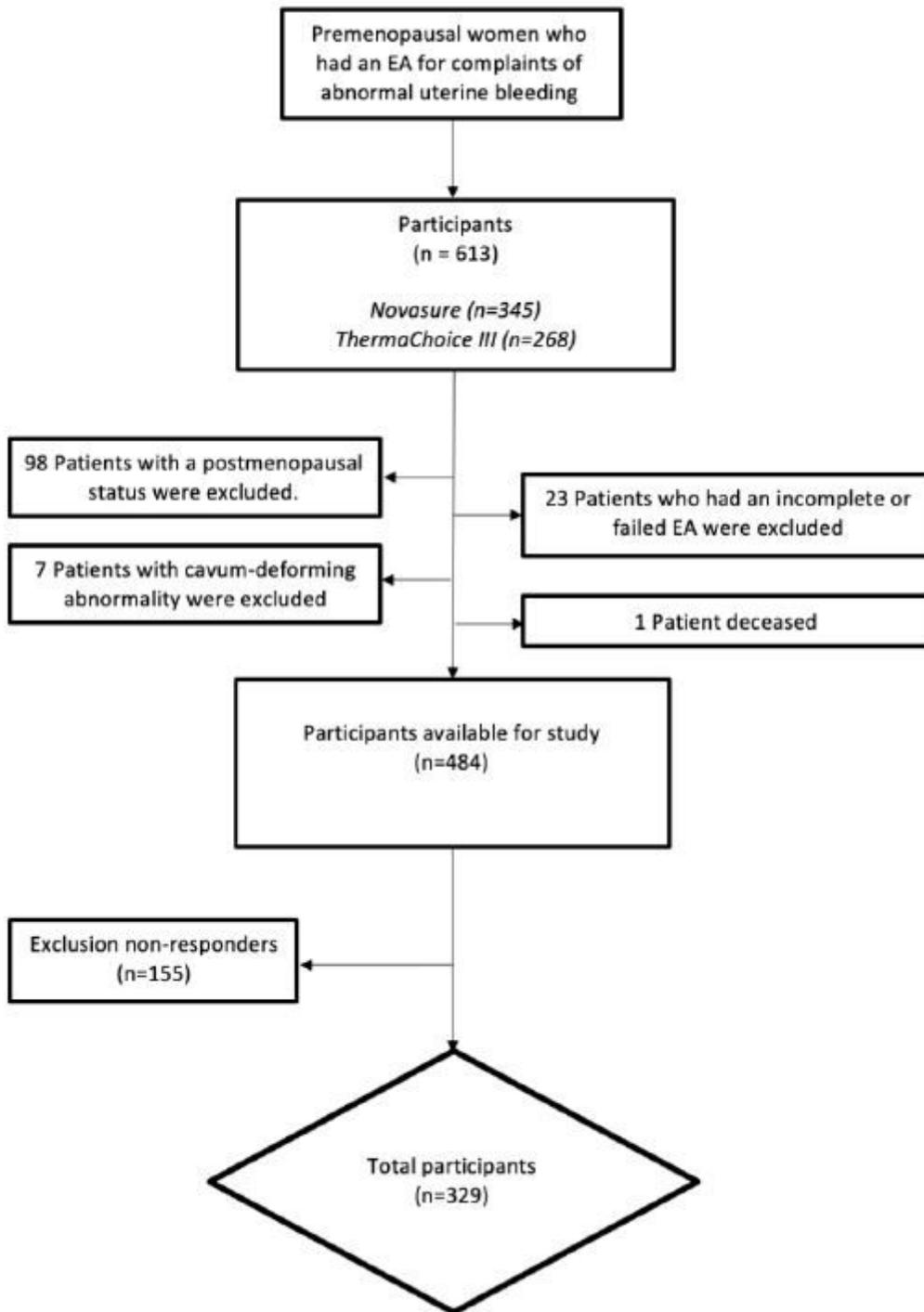
**Measurements and Main Results:** The Area Under the Receiver Operating characteristics Curve (AUROC) for the outcome parameter of failure within 2 years after EA was 0.59 (95% CI 0.53 – 0.65). Variables in this model were dysmenorrhea, age, parity  $\geq 5$  and preoperative menorrhagia. The Hosmer-Lemeshow test showed no significant difference between the observed and predicted outcome. (Chi-square: 4.62, P-value: .80) The AUROC for the outcome parameter surgical re-intervention within 2 years was 0.62 (95% CI 0.53 – 0.70) Variables in this model were dysmenorrhea, age, menstrual duration  $> 7$  days, parity  $\geq 5$  and a previous caesarean section. The Hosmer-Lemeshow test showed no significant difference between the observed and predicted outcome (Chi-square 11.34, P-value .18).

**Conclusion:** Both the failure model and the re-intervention model can be used to predict unsuccessful endometrial ablation in the general population within two years after the procedure. It can be used prior to surgery to facilitate tailor-made shared decision-making, and help counsel patients with regards to the potential outcome of their treatment with the use of a personally calculated percentage.

## Full Text

This preprint is available for [download as a PDF](#).

## Figures



**Figure 1**

enrolment and allocation of patients who have had an endometrial ablation for complaints of heavy menstrual bleeding

# Failure model

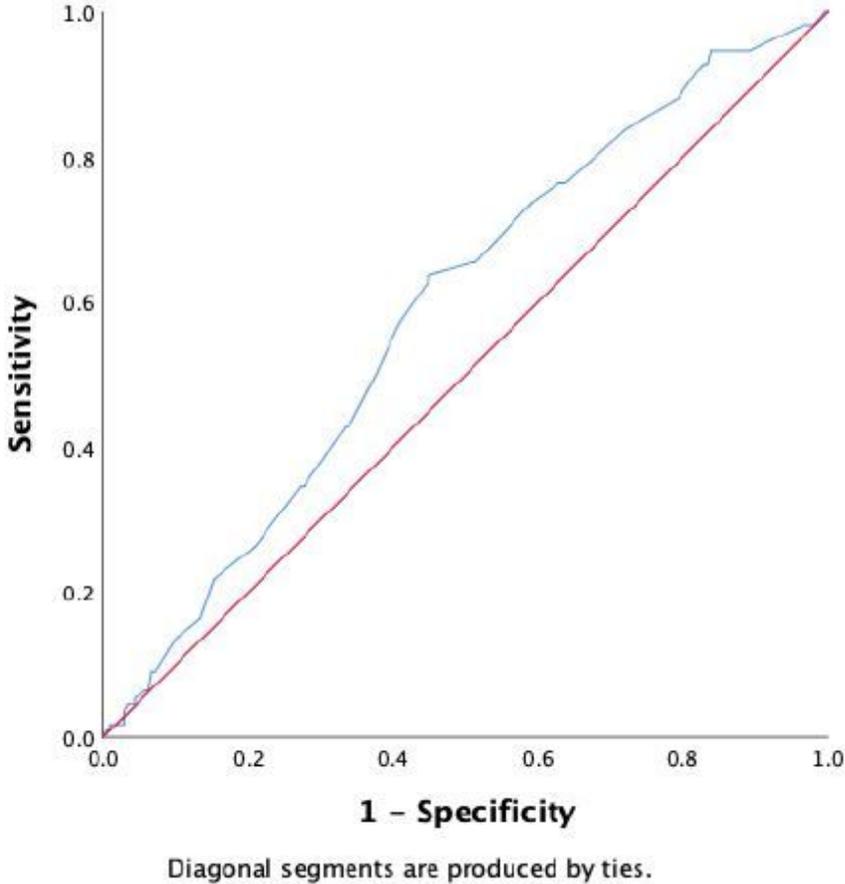
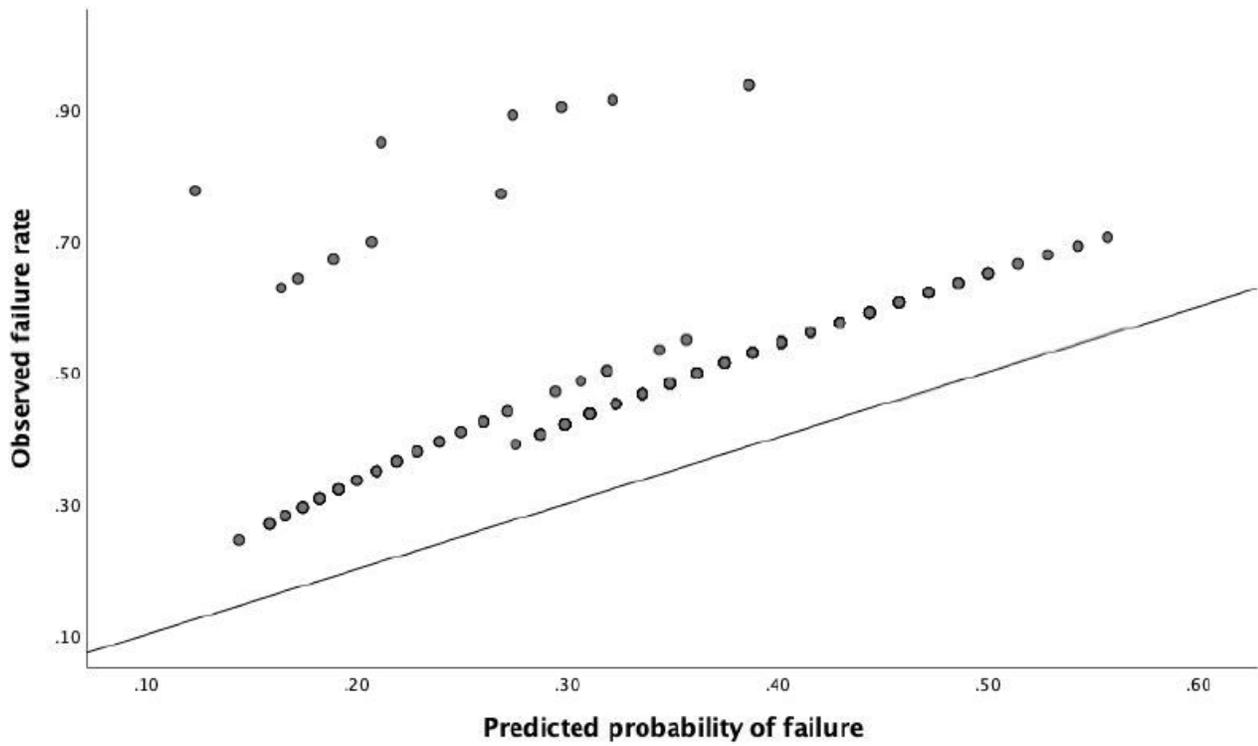


Figure 2

ROC-curve external validation of the failure model. The diagonal is the reference line, indicating an AUC of 0.50, which indicates that a model predicts the same as random chance.



**Figure 3**

Calibration plot, showing relationship between observed and predicted failure rate. When the points in the plot are in exact line with the diagonal reference line, the model predicts perfectly, because there is a perfect agreement between the predicted and the observed failure rates.

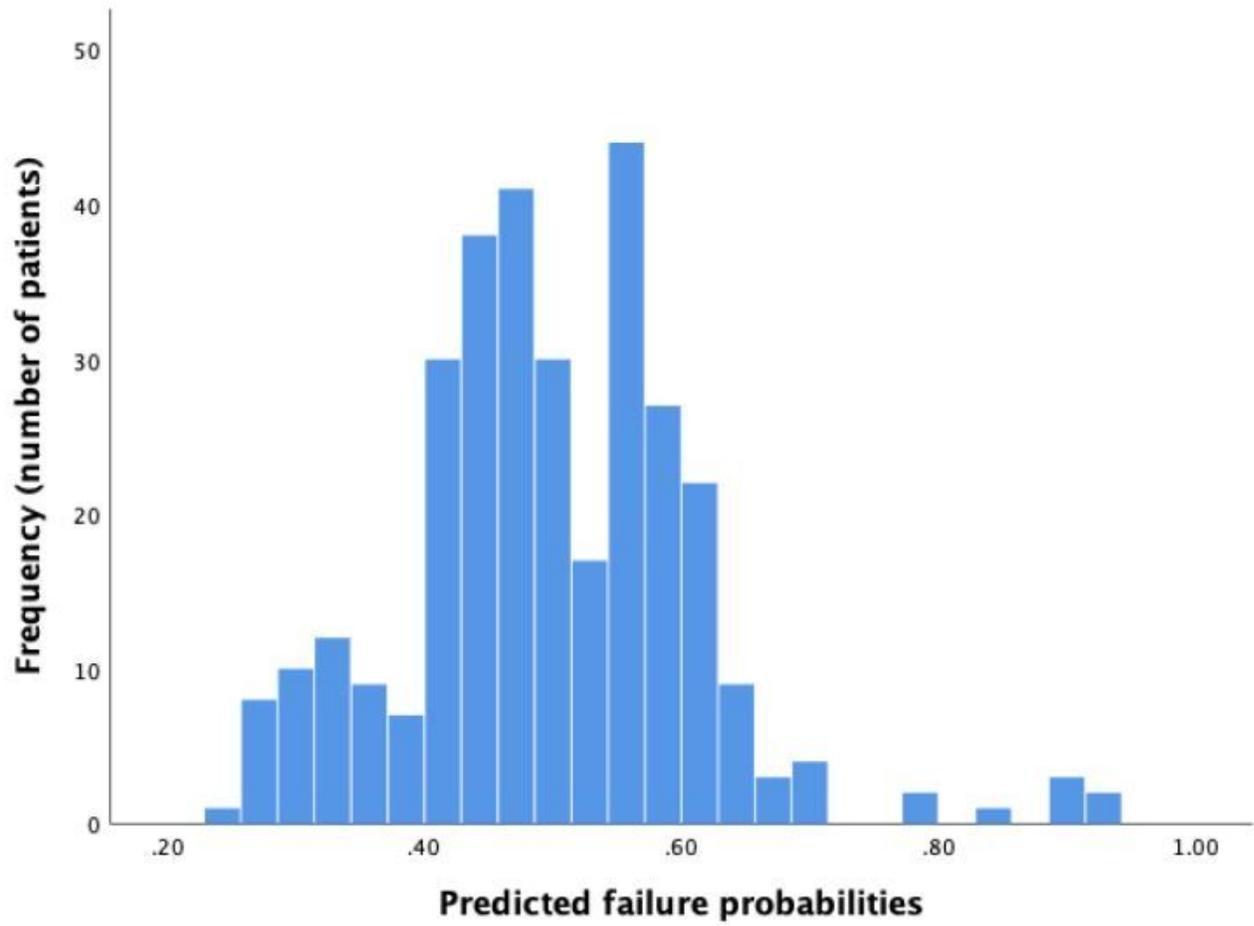
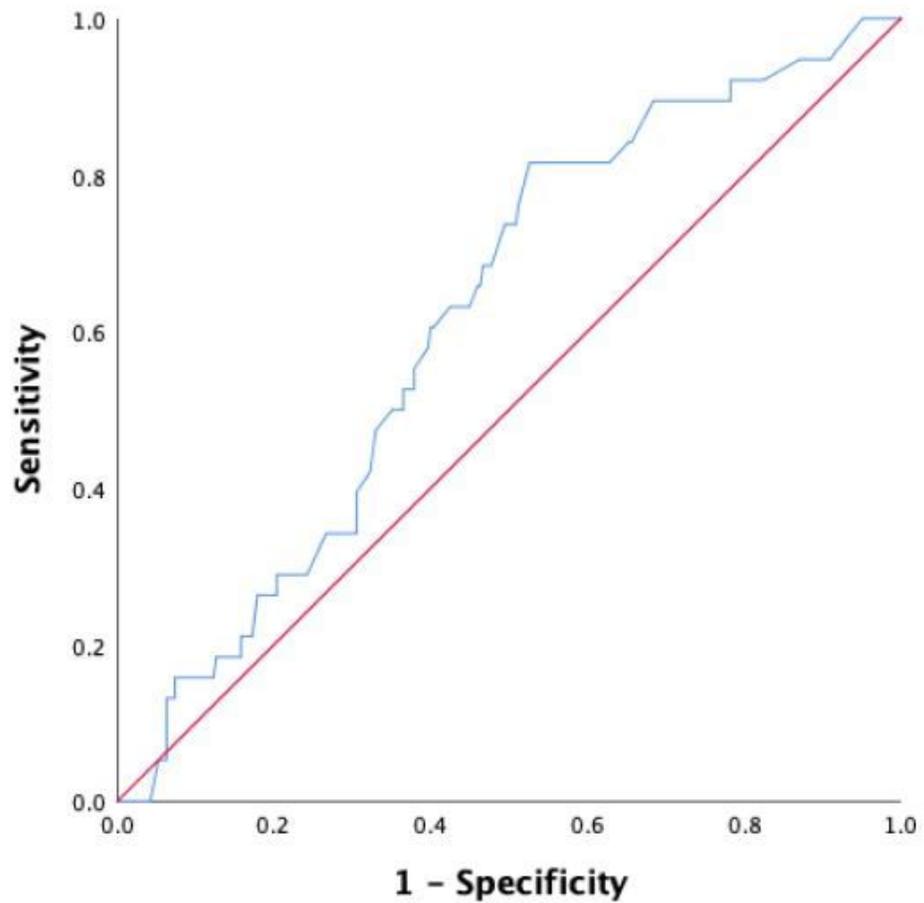


Figure 4

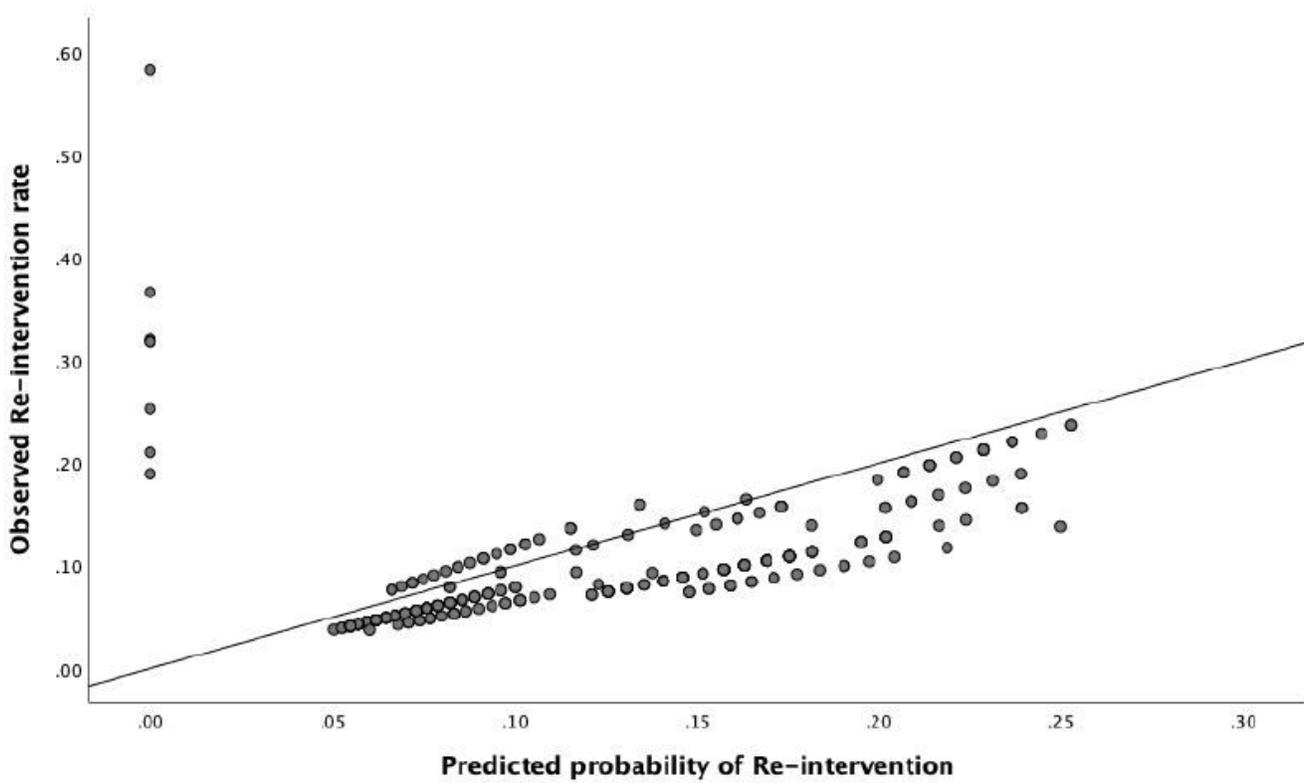
Distribution of predicted failure rates using the failure model.

## Re- intervention model



**Figure 5**

ROC-curve external validation of re-intervention model. The diagonal is the reference line, indicating an AUC of 0.50, which indicates that a model predicts the same as random chance.



**Figure 6**

Calibration plot, showing relationship between observed and predicted Re-intervention rate. When the points in the plot are in exact line with the diagonal reference line, the model predicts perfectly, because there is a perfect agreement between the predicted and the observed failure rates.

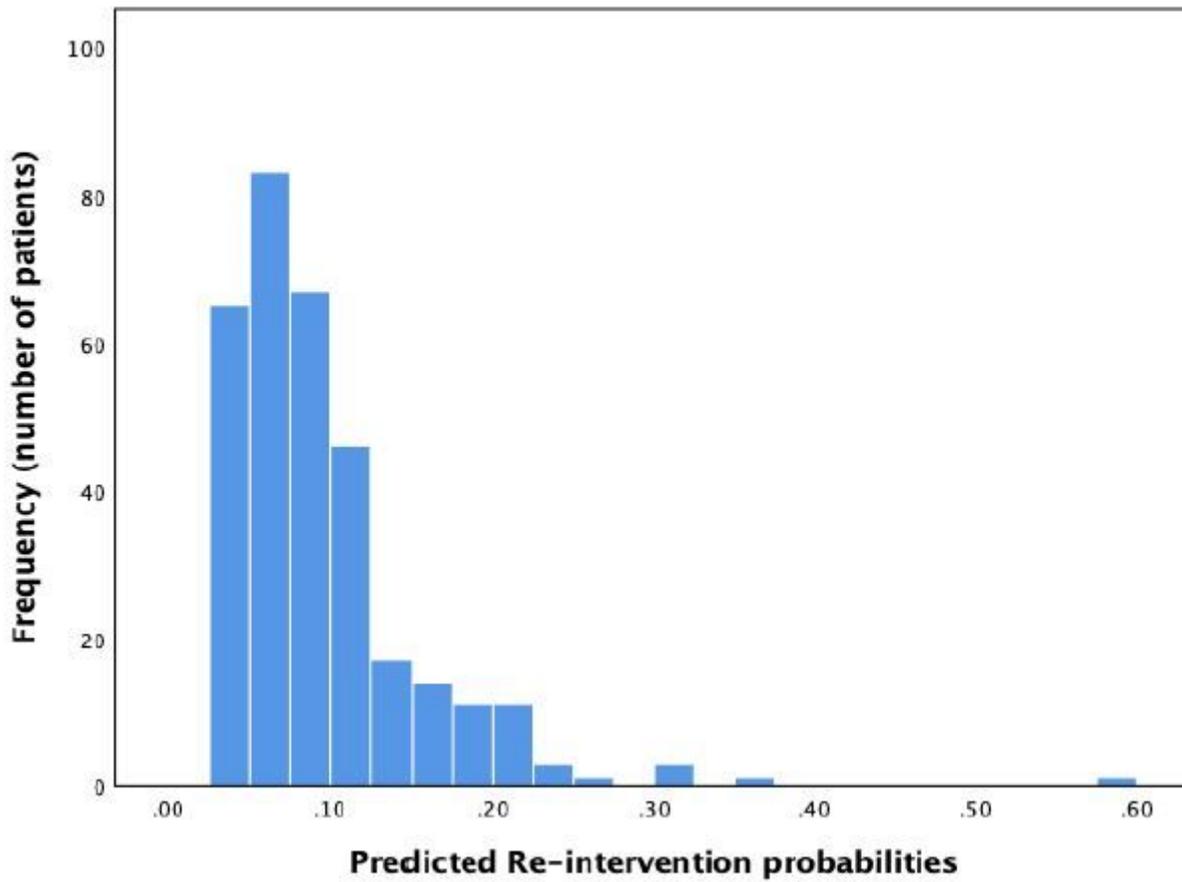


Figure 7

Distribution of predicted re-intervention rates using the re-intervention model.