

# Predicting Length of Stay after Nephrectomy



Medisch Spectrum Twente  
een santeon ziekenhuis

R.F.H. Krom; R. Bretveld; J. van der Palen; M. Asselman; A.B.G. Kwast  
Medisch Spectrum Twente, Enschede, the Netherlands

## Introduction

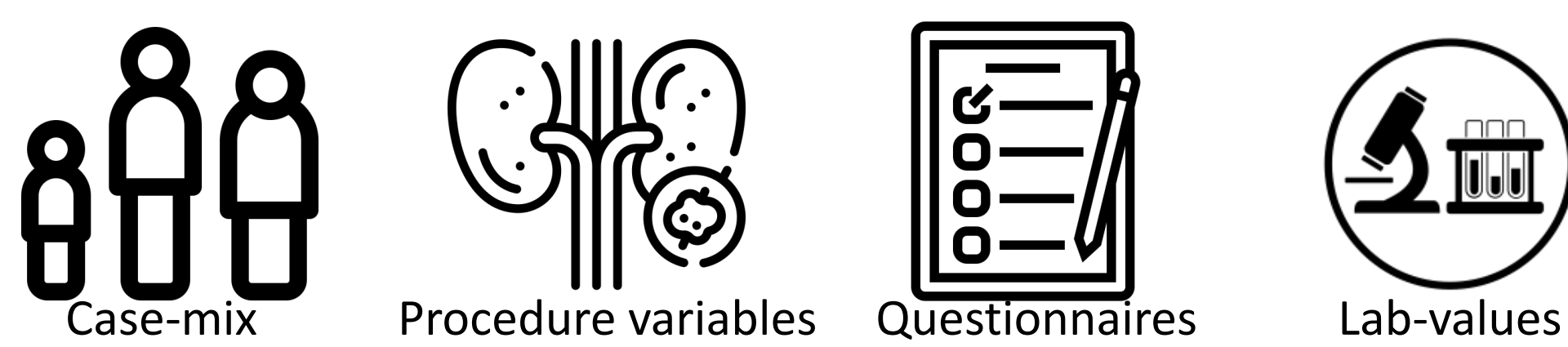
Since March 2020, Medisch Spectrum Twente (MST) has implemented the Enhanced Recovery After Surgery (ERAS) program to improve recovery after major surgeries. With the rising incidence of renal cancer, this study aims to identify preoperative factors that predict the length of stay (LOS) for renal surgery patients within the ERAS program. Building on previous research showing reduced LOS with ERAS, the study seeks to develop a predictive model to guide preoperative counseling and improve patient outcomes, ultimately optimizing care and enhancing patient engagement.

## Methods

### Quantitative retrospective patient record study:

- **ERAS group:** 210 patients between April 2021 and March 2023 with a robotic-assisted nephrectomy.

### Preoperative predictive variables:



### Analysis:

1. Univariate Analysis
2. Multivariate Regression
3. Model Testing
4. Validation

This streamlined process ensures a reliable LOS prediction model.

## Results

The study found that the average LOS for patients was 1.95 nights, with 93 patients having a short stay ( $\leq 1$  night) and 117 having a longer stay ( $>1$  night). Key factors associated with prolonged LOS include **procedure**, **larger lesion sizes**, **severe pulmonary disease**, **Dyspnoea**, **MET-score** and poor **Glomerular Filtration Rate (GFR)**. Conversely, **smokers** had lower odds of a prolonged LOS. The logistic regression model showed good predictive power, with an Area Under the Curve (AUC) of 0.79. The model demonstrated excellent calibration. The Hosmer-Lemeshow test confirmed a good fit, and cross-validation showed an average accuracy of 67.8%, with a Cohen's kappa of 0.34.

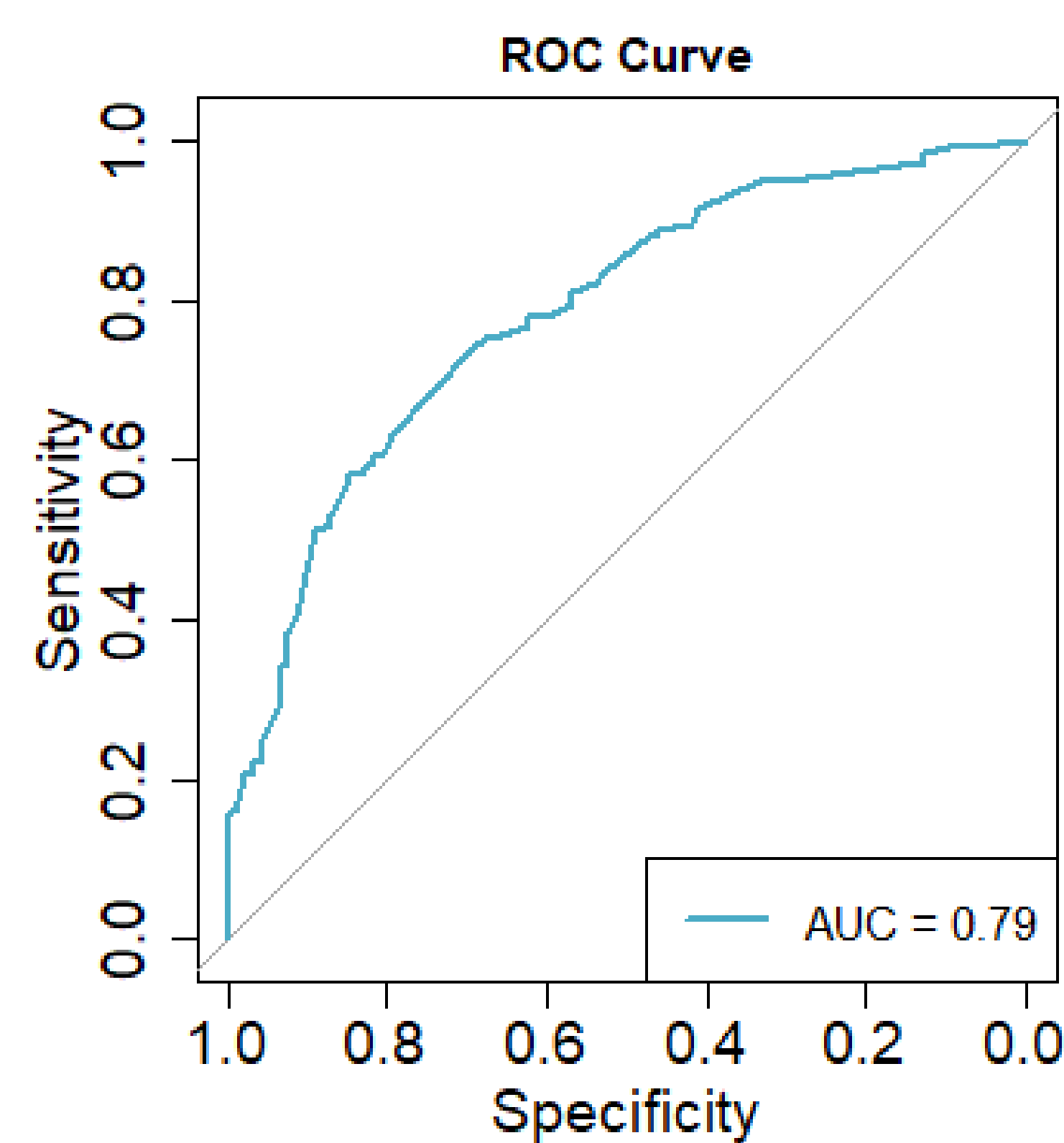


Figure 1: ROC-Curve logistic regression model

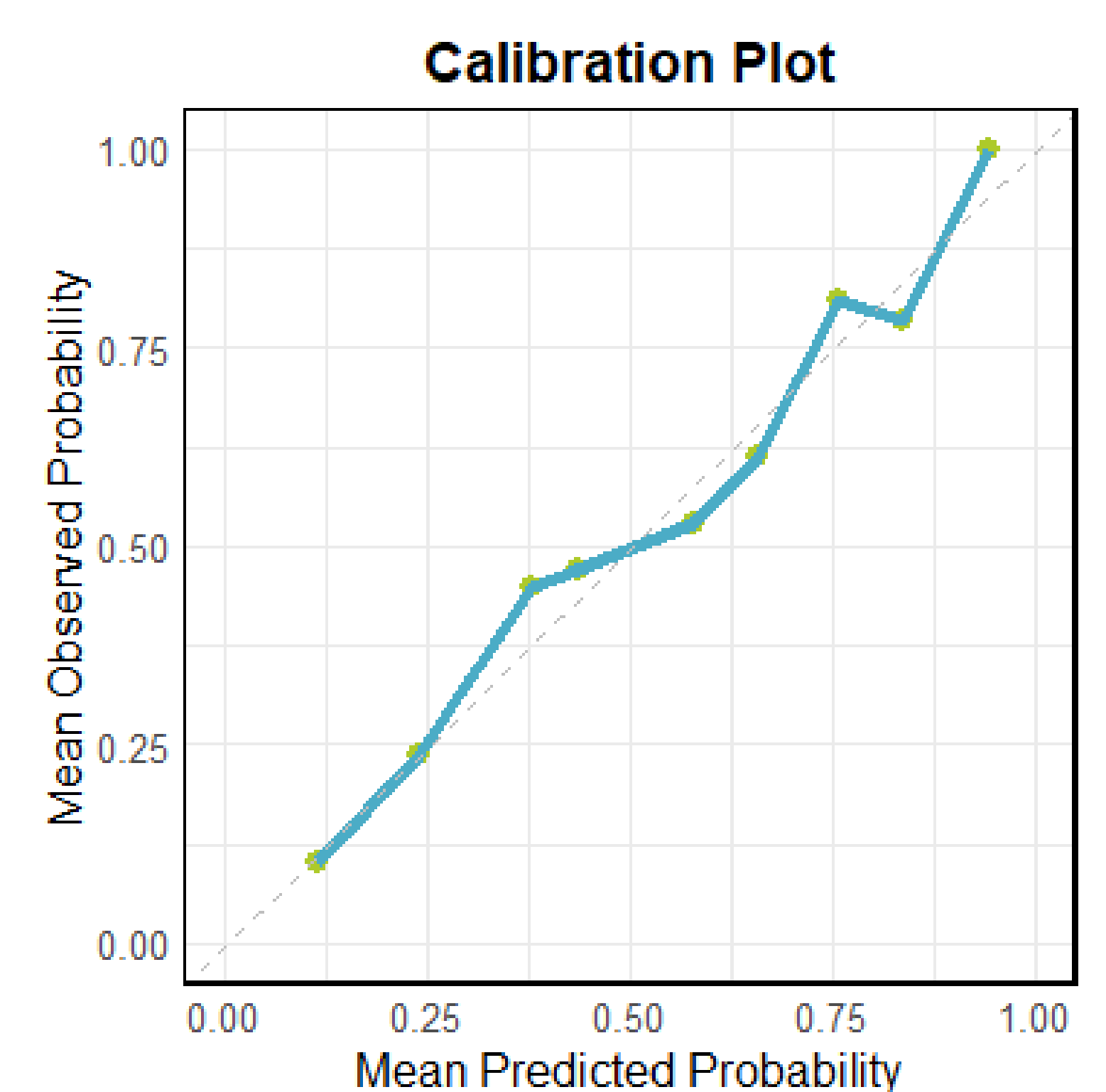


Figure 2: Calibration Plot

## Conclusions

This study develops a predictive model to estimate the LOS for patients undergoing nephrectomy surgeries. Integrated into a dashboard for use in patient consultations, the model helps patients prepare for recovery and allows healthcare professionals to identify risk factors and tailor care plans. Preoperative strategies, such as pulmonary rehabilitation and improving MET-scores, are recommended to enhance recovery. The study emphasizes shorter hospital stays to reduce complications and suggests that findings can guide hospital policies during high demand.

However, the omission of factors like patient attitudes or home situations may limit its accuracy. Additionally, further validation, both internally and across different settings, is necessary to confirm the model's reliability and generalizability.

## Example decision dashboard

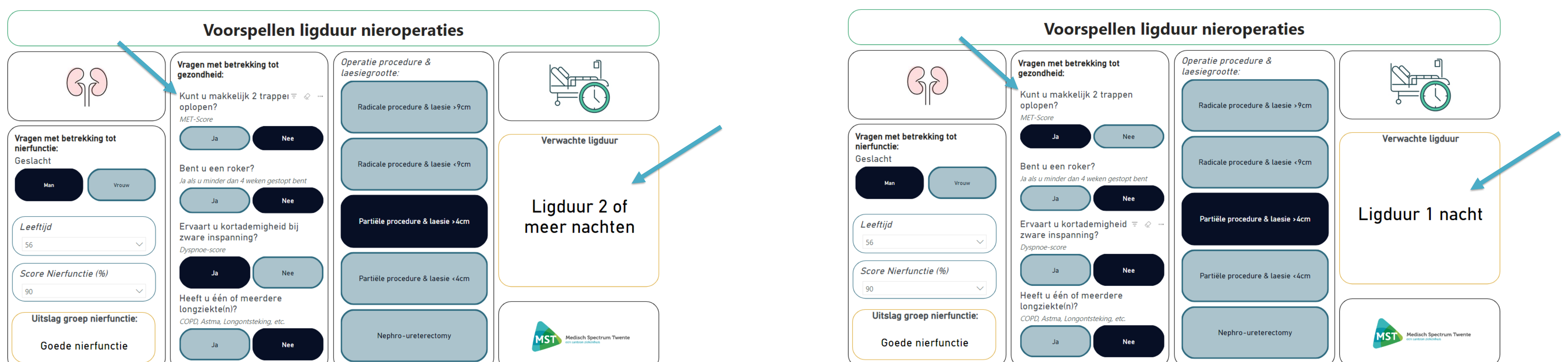


Figure 3 & 4: decision dashboard (Dutch)

