

## Development of a simple and practical nomogram for predicting stone-free rate after flexible ureteroscopy or percutaneous nephrolithotomy for solitary medium sized renal stones in adults

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**Introduction & Objectives:** To develop a preoperative nomogram for predicting stone-free rate (SFR) in case of performing flexible ureteroscopy (FURS) or percutaneous nephrolithotomy (PCNL) for patients with solitary medium sized (ranging from 1 to 2 cm) renal stones in adults.

**Materials & Methods:** We retrospectively analyzed the data of 100 FURS and 100 PCNL procedures for removal of a solitary medium sized renal stone (1-2 cm) in adults performed starting from January 2015 till September 2018. All the patients were evaluated by ultrasound (1 month) and CT (6 months) after FURS and PCNL procedures to detect the stone free rate. The stone-free status was defined as absence of any gravel more than 2 mm on the follow-up radiology. Preoperative predictors, that were statistically significant ( $P < 0.05$ ) in the univariate logistic analysis, were included in the multivariate logistic regression analysis, which was performed to screen independent predictors for stone free status. Independent predictors ( $P < 0.05$ ) in the multivariate logistic regression analysis as well as clinical significant predictors were included in the nomogram construction. The nomogram was validated internally; the internal validation was performed by a calibration method and the area under the receiver operating characteristic (ROC) curve (AUC), the AUC indicate good concordance.

**Results:** Multivariate analyses identified stone site ( $p = 0.0146$ ), maximum density using Hounsfield unit ( $p = 0.0212$ ), skin to stone distance ( $p = 0.0375$ ), associated UTI ( $p = 0.0002$ ), comorbidities ( $p = 0.0029$ ) and age ( $p = 0.0403$ ) as independent predictive factors for the stone-free status after SWL. Based on these preoperative parameters, we developed a nomogram to predict SFR after FURS and PCNL. Total nomogram score (maximum 11) was derived from summing individual scores of each predictive variable; a high total score was predictive of successful outcome, whereas a low total score was predictive of unsuccessful outcome. The area under the receiver operating characteristics for nomogram predictions

was 0.72 for PCNL, 0.86 for FURS and 0.76 for both procedures.

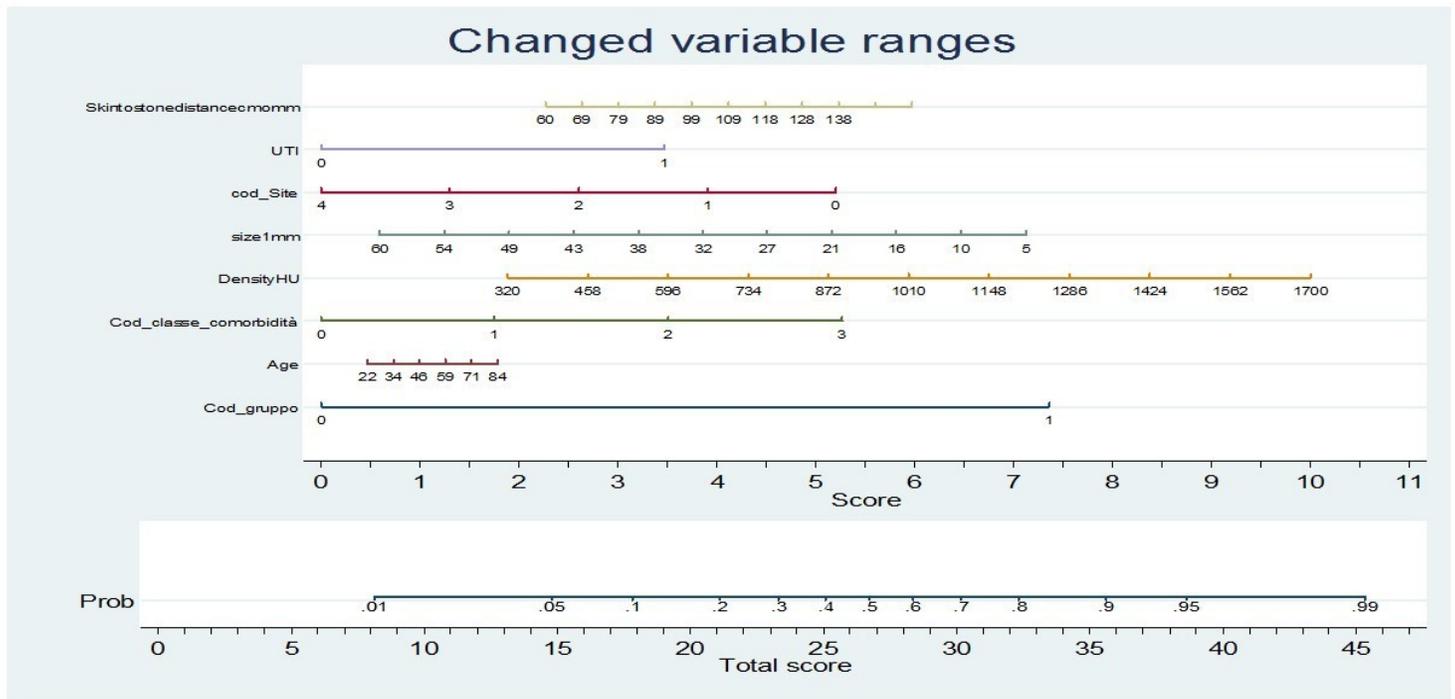


Figure 1: Graph of the developed Nomogram

**Conclusions:** We developed a feasible and user-friendly nomogram to predict SFR after FURS and PCNL of a solitary renal stone; further external validation studies are required to test its generalizability on datasets other than the development one.