MP80-12

# A SIMPLIFIED EQUATION TO ESTIMATE NEW BASELINE RENAL FUNCTION AFTER RADICAL OR PARTIAL NEPHRECTOMY: DEVELOPMENT AND VALIDATION

Diego Aguilar Palacios MD[a], Brigid Wilson PhD[b,c], Mustafa Ascha PhD[b], Sunah Song MS[b,c], Molly E. DeWitt-Foy MD[a], Steven C. Campbell MD,PhD[a] and Robert Abouassaly MD[a,b]

[a] Glickman Urological and Kidney Institute, Cleveland Clinic, Cleveland, OH
[b] Louis Stokes VA Medical Center, Cleveland, OH
[c] Case Western Reserve University School of Medicine, Cleveland, OH

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## INTRODUCTION AND OBJECTIVE

- Preoperative estimation of new baseline glomerular filtration rate (**NB-GFR**) after renal surgery has important clinical implications[1]
- Most predictive models for estimation **NB-GFR** are either complex, require additional studies or lack external validity
- **In this study we develop and externally validate a user-friendly equation to estimate postoperative NB-GFR**

## METHODS

- **8080** kidney cancer patients managed with PN or RN (2005 -2015) at the VANHS were identified
- All patients had both preoperative and postoperative NB-GFR values estimated by CKD-EPI formula
- Patients with preoperative ESRD were excluded
- NB-GFR was defined as the final GFR value within 1 month (>30days) to 12 months (<365 days) postopertively[1]
- Multivariable linear regression analysis was used to create the equation using two-thirds of the VA cohort
- **The simplest model with highest coefficient of determination ($R^2$) was selected and tested**
- Correlation, bias, accuracy and precision was examined
- The equation was then **internally validated** in the remaining third of the RCC-VA cohort
- For **external validation**, a similar cohort of **3514** patients from an outside tertiary-care center was used

1. Lane BR, Demirjian S, Derweesh IH, et a. Eur Urol. 2015;68:996-1003

## Table1. Evaluation and selection of final model to predict NB-GFR

| Variable | Models | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5** | 6 |
| Preoperative eGFR* | 0.76 | 0.71 | 0.68 | 0.67 | 0.67 | 0.67 |
| Radical Nephrectomy | | -17.83 | -17.49 | -17.52 | -18.18 | -18.26 |
| Age* | | | -0.23 | -0.22 | -0.21 | -0.23 |
| Diabetes | | | | -2.17 | -2.15 | -1.52 |
| Tumor Size > 7cm | | | | | 2.29 | 2.23 |
| Female | | | | | | 0.61 |
| Caucasian | | | | | | 1.88 |
| BMI* | | | | | | -0.12 |
| Hypertension | | | | | | -0.12 |
| Proteinuria | | | | | | -0.99 |
| Model Intercept | 1.22 | 15.22 | 31.94 | 32.54 | 31.99 | 36.18 |
| R-squared | 0.503 | 0.653 | 0.66 | 0.662 | 0.663 | 0.665 |

*Per unit of variable. Age (in years), BMI (in kg/m$^2$), preoperative eGFR (in ml/min/1.73m$^2$) represent continuous variables

**Model 5 was selected as the final model since the aim was to minimize model-size without loss of predictive power

## Table 2. Performance of new equation to predict NB-GFR

| | Internal Validation | External Validation |
|---|---|---|
| Correlation (R)* | 0.81 | 0.81 |
| Bias (ml/min/1.73m$^2$)** | -0.77 | -1.66 |
| Accuracy (%)*** | 81 | 80 |
| Precision (IQR)**** | 15.7 (-8.41 – 7.29) | 17.03 (-9.92 – 7.11) |

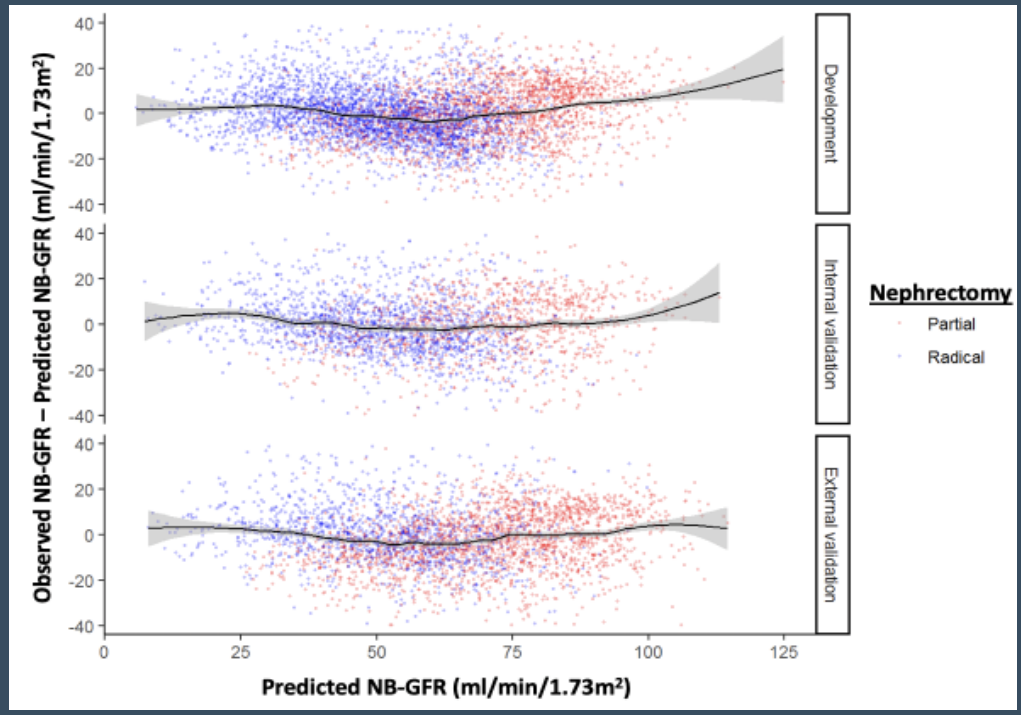
* Correlation between observed NB-GFR vs predicted NB-GFR

** Bias = Median of residuals (observed NB-GFR – predicted NB-GFR)

*** Accuracy = percentage of predicted NB-GFR values within 30% of observed NB-GFR

**** Precision = interquartile range of bias

## Figure 1. Scatterplot to compare the predicted NB-GFR and the difference between the observed and predicted NB-GFR values




*The solid line represents the Loess regression-line and the gray area represents its 95% confidence interval

**NB-GFR= 32 + preoperative GFR (x0.67) –18 (if RN) – age (x0.21) – 2 (if diabetes) + 2 (if tumor-size >7cm)**

## CONCLUSION

- Our analysis provides an equation to estimate postoperative NB-GFR in patients being considered for PN or RN
- This equation is highly accurate and externally validated
- It can be easily implemented in daily clinical practice to facilitate patient counseling and management decisions