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Risk prediction model for kidney function decline in living kidney donors: a model development and external validation study

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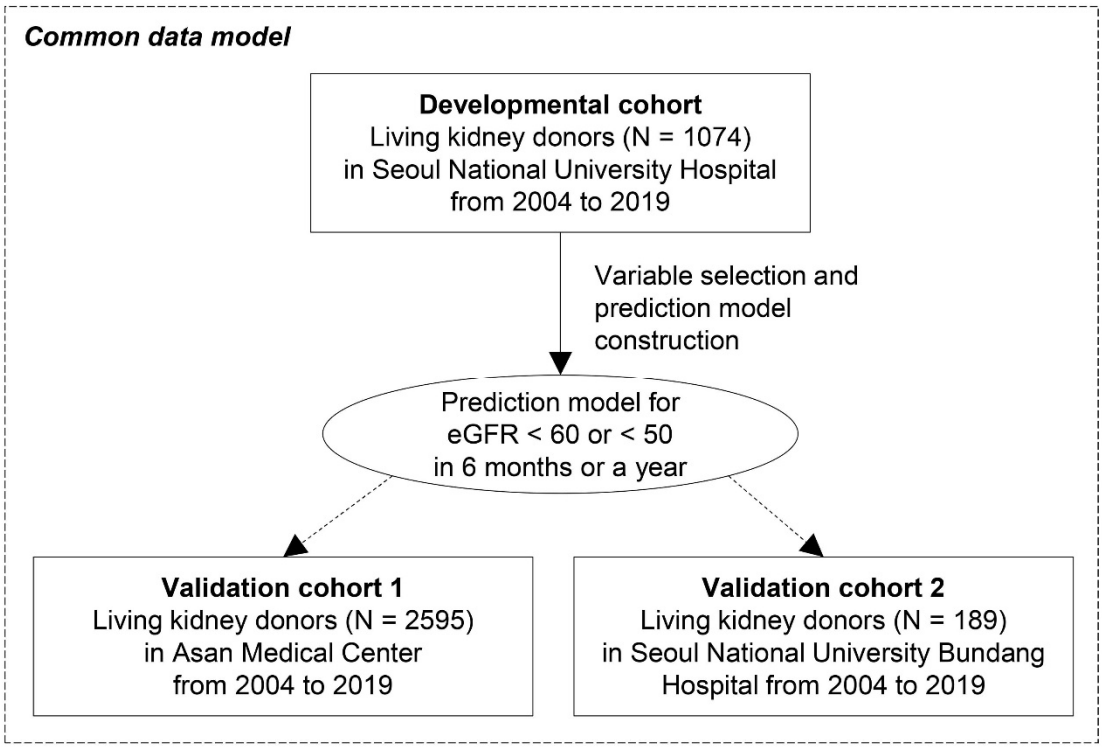
Objectives: Kidney prognosis of living kidney donor is important. Mid-to-long term kidney function decline is associated with higher risks of long-term prognosis. An additional prediction model for kidney function impairment for living kidney donor is warranted.

Methods: Common data model was implemented to include hospital data in a uniform manner in three tertiary hospitals in Korea. Development cohort consisted of the living kidney donors from Seoul National University Hospitals from 2004 to 2019 (N=1074), and two additional validation cohorts were constructed, including 2595 and 189 living kidney donors, respectively. Logistic regression analysis towards four study outcomes, including eGFR<60 within 6 months and a year, respectively and eGFR<50 mL/min/1.73 m^2 for the same time-window, was performed. Variables that showed the most common significance with the study outcomes were selected, and the multivariable logistic regression model consisted of the final prediction model. The discrimination and the calibration were reassessed in the validation cohorts.

Results: In the study hospitals, 10-28% of live kidney donors experienced eGFR < 60 and 3-9% had eGFR < 60 mL/min/1/73 m^2 in the outcome-assessment period, respectively. Higher age, male sex, higher body mass index, lower baseline eGFR, higher uric acid levels, and occurrence of postoperative acute kidney injury were included in the final prediction model. The developed model showed acceptable discrimination power (area under curve > 0.9) both in the development and two validation cohorts. The calibration was also acceptable as Hosmer-Lemeshow test P values ranged mostly > 0.05 in the study hospitals. The calibration was also acceptable as Hosmer-Lemeshow test P values ranged mostly > 0.05 in the study hospitals.

Conclusions: This prediction model development study using the common data model constructed an easy-accessible and useful risk prediction calculator towards eGFR decline in mid-to-long-term periods after kidney donation.

Figure 1. Study flow diagram


Common data model
Developmental cohort
Living kidney donors (N = 1074)
in Seoul National University Hospital
from 2004 to 2019
Variable selection and
prediction model
construction
Prediction model for
eGFR < 60 or < 50
in 6 months or a year
Validation cohort 1
Living kidney donors (N = 2595)
in Asan Medical Center
from 2004 to 2019
Validation cohort 2
Living kidney donors (N = 189)
in Seoul National University Bundang
Hospital from 2004 to 2019