

Supplementary Table 1 – Risk factors for developing end-stage kidney disease following surgical management of kidney cancer with all-cause mortality considered as a competing risk ($N = 2,739$)

	Crude HR (95% CI)	Adjusted HR (95% CI)	Crude SHR (95% CI)	Adjusted SHR (95% CI)
Patient Characteristics				
Age at diagnosis—years				
<65	1	1	1	1
≥65	2.0 (1.2-3.2)	2.0 (1.2-3.2)	1.9 (1.2-3.1)	1.9 (1.2-3.1)
Per 5 years	1.2 (1.1-1.3)	1.2 (1.1-1.3)	1.2 (1.1-1.3)	1.2 (1.1-1.3)
<i>P</i> value	0.005	0.005	0.007	0.007
Sex				
Female	1	1	1	1
Male	2.3 (1.3-4.2)	2.3 (1.3-4.3)	2.3 (1.2-4.2)	2.3 (1.2-4.2)
<i>P</i> value	0.006	0.006	0.008	0.007
Preoperative kidney disease ^a				
No	1	1	1	1
Yes	17.0 (9.9-31.0)	15.0 (8.3-27.0)	18.0 (10.0-32.0)	16.0 (8.4-29.0)
<i>P</i> value	<0.001	<0.001	<0.001	<0.001
Preoperative diabetes mellitus ^b				
No	1	1	1	1
Yes	2.0 (1.1-3.6)	1.8 (1.0-3.3)	2.0 (1.1-3.6)	1.8 (1.0-3.3)
<i>P</i> value	0.02	0.05	0.02	0.05
ASA classification (Score) ^{b, c}				
1-2	1	1	1	1
≥3	4.7 (2.6-8.5)	4.0 (2.2-7.4)	4.5 (2.5-8.1)	3.9 (2.1-7.2)
<i>P</i> value	<0.001	<0.001	<0.001	<0.001
Socioeconomic status ^a				
Middle/Advantaged	1	1	1	1
Disadvantaged	1.6 (0.9-2.7)	1.6 (0.9-2.7)	1.6 (1.0-2.7)	1.6 (1.0-2.7)
<i>P</i> value	0.06	0.06	0.06	0.06
Place of residence ^a				
Major city	1	1	1	1
Inner regional	1.0 (0.6-1.8)	1.0 (0.6-1.8)	1.0 (0.6-1.8)	1.0 (0.6-1.8)
Rural	1.0 (0.5-2.0)	1.0 (0.5-2.0)	1.0 (0.5-2.0)	1.0 (0.5-2.0)
<i>P</i> value	0.90	0.99	0.90	0.99
Health-Service Characteristics				
Nephrectomy type ^d				
Partial	1	1	1	1
Radical	1.4 (0.9-2.2)	1.3 (0.8-2.0)	1.4 (0.9-2.1)	1.2 (0.8-1.9)
<i>P</i> value	0.08	0.26	0.13	0.38
Surgical approach ^e				
Open	1	1	1	1
Laparoscopic	0.8 (0.5-1.3)	0.7 (0.4-1.4)	0.8 (0.5-1.4)	0.8 (0.4-1.5)
<i>P</i> value	0.32	0.37	0.42	0.50
Hospital type ^f				
Private	1	1	1	1
Public	1.2 (0.8-1.7)	1.3 (0.9-1.9)	1.2 (0.8-1.7)	1.3 (0.9-1.8)
<i>P</i> value	0.38	0.13	0.40	0.16
Hospital location				
Major city	1	1	1	1
Inner regional	1.3 (0.7-2.1)	1.2 (0.7-2.0)	1.3 (0.7-2.1)	1.2 (0.7-2.0)
Outer regional	1.1 (0.7-1.7)	1.0 (0.6-1.6)	1.1 (0.7-1.7)	1.0 (0.7-1.7)
<i>P</i> value	0.67	0.86	0.76	0.32
Hospital volume—resections/year ^g				
<20	1	1	1	1
≥20	0.9 (0.6-1.4)	1.0 (0.6-1.6)	0.9 (0.6-1.3)	1.0 (0.6-1.6)
<i>P</i> value	0.59	0.93	0.60	0.95
Postoperative length of stay ^h				
1-5 days	1	1	1	1
≥6 days	2.5 (1.6-4.0)	2.1 (1.4-3.0)	2.4 (1.5-3.8)	1.9 (1.3-2.8)
Per day	1.07 (1.03-1.10)	1.04 (1.01-1.07)	1.06 (1.04-1.08)	1.01 (1.00-1.05)
<i>P</i> value	<0.001	0.002	<0.001	0.03

Hazard ratio (HR) and 95% confidence interval (CI) estimated using a Cox proportional hazards model; Subhazard ratio (SHR) and 95% CI estimated using a competing risks regression, with death considered a competing risk. All adjusted estimates are adjusted for age and sex, additional adjustment variables are included as footnotes. For all health-service characteristics, clustering by hospital code was accounted for using robust sandwich estimators.

^a Additionally adjusted for diabetes mellitus and place of residence.

^b Additionally adjusted place of residence

^c There were missing data for 369 observations.

^d Additionally adjusted for hospital location and hospital volume.

^e Additionally adjusted for nephrectomy type, hospital location, and hospital volume.

^f Additionally adjusted for socioeconomic status.

^g Additionally adjusted for hospital location.

^h Additionally adjusted for preoperative diabetes and kidney disease, ASA classification, nephrectomy type, and surgical approach.

ASA, American Society of Anesthesiologists.

Supplementary Table 2 – Potential risk factors for developing end-stage kidney disease following surgical management of kidney cancer excluding patients who underwent multiple surgeries (*N* = 2,673)

	Crude HR (95% CI)	Adjusted HR (95% CI)
Patient Characteristics		
Age at diagnosis—years ^a		
<65	1	1
≥65	2.0 (1.2-3.2)	2.2 (1.3-3.7)
Per 5 years	1.2 (1.1-1.4)	1.2 (1.1-1.4)
<i>P</i> value	0.004	0.004
Sex ^a		
Female	1	1
Male	2.1 (1.1-4.0)	2.2 (1.1-4.1)
<i>P</i> value	0.02	0.02
Preoperative kidney disease ^b		
No	1	1
Yes	21.0 (10.0-43.0)	19.0 (9.2-40.0)
<i>P</i> value	<0.001	<0.001
Preoperative diabetes mellitus ^c		
No	1	1
Yes	2.4 (1.3-4.4)	2.1 (1.2-3.9)
<i>P</i> value	0.004	0.01
ASA classification (Score) ^b		
1-2	1	1
≥3	5.5 (2.9-10.0)	4.4 (2.3-8.7)
<i>P</i> value	<0.001	<0.001
Socioeconomic status ^a		
Middle/Advantaged	1	1
Disadvantaged	1.6 (0.9-2.8)	1.5 (0.9-2.7)
<i>P</i> value	0.08	0.09
Place of residence ^a		
Major city	1	1
Inner regional	1.0 (0.5-1.8)	1.0 (0.5-1.7)
Rural	1.0 (0.5-2.0)	1.0 (0.5-2.1)
<i>P</i> value	0.94	0.99
Health-Service Characteristics		
Nephrectomy type ^d		
Partial	1	1
Radical	1.3 (0.6-2.4)	1.1 (0.7-1.7)
<i>P</i> value	0.50	0.80
Surgical approach ^e		
Open	1	1
Laparoscopic	0.7 (0.4-1.2)	0.7 (0.4-1.3)
<i>P</i> value	0.16	0.25
Hospital type ^f		
Private	1	1
Public	1.1 (0.6-1.8)	1.2 (0.7-2.0)
<i>P</i> value	0.74	0.13
Hospital location ^g		
Major city	1	1
Inner regional	1.3 (0.7-2.6)	1.2 (0.6-2.4)
Outer regional	1.2 (0.4-3.4)	1.2 (0.4-3.2)
<i>P</i> value	0.44	0.60
Hospital volume—resections/year ^h		
<20	1	1
≥20	0.9 (0.5-1.5)	1.0 (0.6-1.7)
<i>P</i> value	0.61	0.98
Hazard ratio (HR) and 95% confidence interval (CI) estimated using a Cox proportional hazards model.		
^a Adjusted for age and sex.		
^b Adjusted for age, sex, diabetes mellitus, and place of residence.		
^c Adjusted for age, sex, and place of residence		
^d Adjusted for age, sex, hospital location, hospital volume; clustering accounted for using robust sandwich estimators.		
^e Adjusted for age, sex, nephrectomy type, hospital location, and hospital volume; clustering accounted for using robust sandwich estimators.		
^f Adjusted for age, sex, and socioeconomic status.		
^g Adjusted for age; not adjusted for patient place of residence due to collinearity; clustering accounted for using robust sandwich estimators.		
^h Adjusted for age, and hospital location; clustering accounted for using robust sandwich estimators.		
ASA, American Society of Anesthesiologists.		

Supplementary Table 3 – Sensitivity analysis evaluating potential predictors of end-stage kidney disease using logistic regression (*N* = 2,739)

	Model 1 aOR (95% CI) ^a	Model 2 aOR (95% CI) ^a
Patient Characteristics		
Age at diagnosis—years		
Per 5 years	1.2 (1.0-1.3)	1.1 (0.9-1.3)
<i>P</i> value	0.01	0.09
Sex		
Female	1	1
Male	1.9 (1.1-3.4)	1.3 (0.7-2.5)
<i>P</i> value	0.02	0.35
Preoperative kidney disease		
No	-	1
Yes	-	19.0 (9.0-40.0)
<i>P</i> value		<0.001
Preoperative diabetes mellitus		
No	-	1
Yes	-	1.0 (0.5-2.1)
<i>P</i> value		0.97
Charlson comorbidity index (Score)		
0-1	1	-
≥2	6.6 (3.6-12.0)	-
<i>P</i> value	<0.001	
ASA classification ^b		
1-2	-	1
≥3	-	3.1 (1.6-5.9)
<i>P</i> value		<0.001
Socioeconomic status		
Advantaged	1.4 (0.8-2.4)	1.4 (0.8-2.6)
Middle	1	1
Disadvantaged	0.6 (0.2-1.6)	0.9 (0.3-2.4)
<i>P</i> value	0.07	0.25
Health-Service Characteristics		
Nephrectomy type		
Partial	1	1
Radical	1.6 (0.8-3.1)	1.4 (0.6-3.1)
<i>P</i> value	0.18	0.39
C Statistic	0.73	0.77

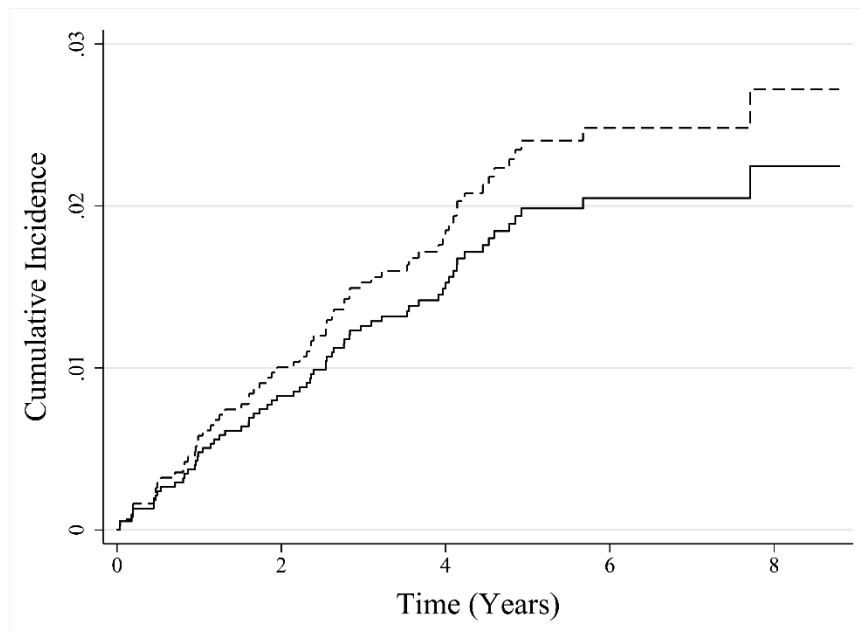
As a sensitivity analysis, multivariable logistic regression analysis was used to evaluate model fit for two models – one which included the calculated Charlson comorbidity index (Model 1), and one which included two components of the Charlson comorbidity index and ASA classification (Model 2). Model 2 was found to have superior fit compared with Model 1, as determined by the C-statistic, calculated from the area under the receiver operator characteristics curve.

^a aOR and 95% CI estimated using logistic regression

^b There were 369 missing observations

aOR, adjusted odds ratio; ASA, American Society of Anesthesiologists; CI, confidence interval.

Supplementary Table 4 – Additional comorbidities compared on postoperative ESKD		
	Postoperative ESKD	
	No (<i>N</i> = 2,671)	Yes (<i>N</i> = 68)
Comorbidity		
Cardiovascular Disease ^a		
No	2,579 (97)	65 (96)
Yes	92 (3)	3 (4)
Chronic Obstructive Pulmonary Disease		
No	2,590 (97)	66 (97)
Yes	81 (3)	2 (3)
Liver Disease (Any)		
No	2,631 (99)	68 (100)
Yes	43 (1)	-
Dementia		
No	2,661 (100)	68 (100)
Yes	10 (<1)	-
Peptic Ulcer Disease		
No	2,653 (99)	68 (100)
Yes	18 (1)	-
Connective Tissue Disease		
No	2,669 (100)	68 (100)
Yes	2 (<1)	-
Hemiplegia/Paraplegia		
No	2,660 (100)	68 (100)
Yes	11 (<1)	-
Comorbidities included in the calculation of the Charlson comorbidity index.		
^a Cardiovascular disease included peripheral vascular disease, congestive heart failure, and cerebrovascular disease. Data presented as count (%).		
ESKD, end-stage kidney disease		



Supplementary Figure 1

Cumulative incidence curve for competing risk regression considering death as a competing risk. Solid line indicates partial nephrectomy, dotted line indicates radical nephrectomy. The difference did not reach conventional levels of statistical significance ($P=0.38$).