

Table S1. Characteristics of the dataset for estimating the reference change value of serum creatinine (dataset 1).

	Initial eGFR\geq60 ml/min N=317,391	Initial eGFR<60 ml/min N=27,303
Age, year	52.4 (15.8)	66.1 (15.8)
18 to 40	71,673 (22.6)	2,075 (7.6)
41 to 60	134,734 (42.5)	6,167 (22.6)
61 to 80	100,763 (31.7)	13,709 (50.2)
81 to 100	10,221 (3.2)	5,352 (19.6)
Males	159,935 (50.4)	16,072 (58.9)
Initial eGFR, ml/min/1.73 m ²	100.8 (17.6)	43.5 (12.2)
15 to 29	0	4,680 (17.1)
30 to 59	0	22,623 (82.9)
60 to 89	83,009 (26.2)	0
\geq 90	234,382 (73.8)	0
Charlson's comorbidity index	3 (1, 4)	4 (3, 5)
Creatinine test interval (day)		
\leq 2	61,221 (19.3)	8,949 (32.8)
3 to 7	151,732 (47.8)	13,119 (48.0)
8 to 14	66,744 (21.0)	3,978 (14.6)
15 to 30	37,694 (11.9)	1,257 (4.6)

Age and the estimated glomerular filtration rate (eGFR) are presented as mean (SD); Charlson's comorbidity index as median (25th, 75th percentile); all others as N (%).

Table S2. Percentage of ACKI events that cROCK detected earlier than KDIGO stratified by the number of serum creatinine testing

SCr testing ^a	N	Number of days that detected ACKI earlier ^b			
		1 day	2 days	3 or more days	1 or more days
1	990	0 (0)	0 (0)	0 (0)	0 (0)
2	921	35 (3.8)	30 (3.3)	32 (3.5)	97 (10.5)
3	495	21 (4.2)	14 (2.8)	26 (5.3)	61 (12.3)
4 or more	739	38 (5.1)	32 (4.3)	123 (16.6)	193 (26.1)
Total samples	3145	94 (3.0)	76 (2.4)	181 (5.8)	351 (11.2)

^a the number of SCr testing available before detection of acute-on-chronic kidney injury (ACKI) by KDIGO.

^b calculated as the detection date of ACKI by KDIGO minus the detection date by cROCK in days. Data was presented as N (%).

Table S3. Risk of in-hospital mortality by ACKI definitions and need for intensive care

AKI status ^a	Patients, N	Dead, N	Person year ^b	Death Rate ^a	HR ^c (95% CI)
with intensive care^d					
R-K-	698	14	28.3	49.5	—
R+K-	103	6	6.1	98.5	3.81 (1.41 – 10.31)
R-K+	32	0	1.2	0	ND ^e
R+K+	804	155	46.3	334.6	9.32 (5.78 - 15.0)
without intensive care^d					
R-K-	16,085	70	661.8	10.6	—
R+K-	1,409	42	66.3	63.4	5.37 (3.50 – 8.23)
R-K+	189	4	9.7	41.3	2.81 (0.85 – 9.34)
R+K+	2,341	250	126.3	197.9	9.86 (6.84 -14.21)

^a denotes absence (-) and presence (+) of acute-on-chronic kidney injury (ACKI) by ROCK (R) and KDIGO (K) criterion, respectively.

^b Per 100 person years.

^c HR, hazard ratio; 95% CI, 95% confidence interval.

^d Cox model was adjusted for age, gender, eGFR, and Charlson's comorbidity score and stratified by study center and need for intensive care. eGFR and AKI status were coded as time-dependent variables.

^e not determined due to small sample size and no death events.

Table S4. Characteristics of the dataset for analysis of mortality after discharge (dataset 3)

	R-K ^{-a} N=8,611	R+K- N=702	R-K+ N=113	R+K+ N=1,438	Total N=10,864
Age ^b , year	66.4 (14.6)	68.0 (14.6)	63.6 (14.5)	65.3 (14.6)	66.3 (14.6)
Males	5,379 (62.5)	417 (59.4)	97 (85.8)	911 (63.4)	6,804 (62.6)
Baseline eGFR, ml/min/1.73 m ²	44.6 (8.2)	45.8 (8.2)	39.0 (7.3)	44.3 (8.7)	44.6 (8.3)
Follow-up years	2.8 (2.3, 3.4)	2.7 (2.2, 3.4)	2.8 (2.4, 3.4)	2.7 (2.2, 3.4)	2.8 (2.3, 3.4)
Diabetes	1,524 (17.7)	135 (19.2)	22 (19.5)	248 (17.2)	1,929 (17.8)
Hypertension	3,136 (36.4)	269 (38.3)	52 (46.0)	508 (35.3)	3,965 (36.5)
Charlson's comorbidity index	4 (3, 5)	4 (3, 6)	4 (3, 5))	4 (3, 5)	4 (3, 5)
Need for intensive care	342 (4.0)	45 (6.4)	22 (19.5)	368 (25.6)	777 (7.2)
Death after discharge	1,010 (11.7)	117 (16.7)	14 (12.4)	274 (19.1)	1,415 (13.0)

^a denotes absence (-) and presence (+) of acute-on-chronic kidney injury (ACKI) by ROCK (R) and KDIGO (K) criterion, respectively.

^b Age and eGFR are presented as mean (SD); Charlson's comorbidity index, length of stay and testing number as median (25th, 75th percentile); all others as N (%).

Table S5. Characteristics of the dataset for analysis of CKD progression (dataset 4)

	R-/K- N=1,973	R+/K- N=167	R-/K+ N=17	R+/K+ N=226	Total N=2,383
Age, year	70.6 (14.8)	69.8 (16.1)	61.3 (17.7)	69.0 (14.1)	70.3 (14.8)
Males	1,314 (66.6)	90 (53.9)	15 (88.2)	153 (67.7)	1,572 (66.0)
Baseline eGFR, ml/min/1.73 m ²	44.4 (8.1)	45.2 (8.1)	41.8 (8.6)	43.2 (8.4)	44.3 (8.1)
Diabetes	458 (23.2)	37 (22.2)	5 (29.4)	45 (19.9)	545 (22.9)
Hypertension	782 (39.6)	76 (45.5)	7 (41.2)	81 (35.8)	946 (39.7)
Charlson's comorbidity index	5 (4, 6)	5 (3, 6)	4 (2, 5)	5 (4, 6)	5 (4, 6)
Need for intensive care	59 (3.0)	6 (3.6)	2 (11.8)	25 (11.1)	92 (3.9)

Age and eGFR are presented as mean (SD); Charlson's comorbidity index as median (25th,75th percentile); all others as N (%).

Figure S1. Density plots of log creatinine ratio by strata of initial creatinine value and measurement interval

