

Impact of acute kidney disease on the incidence of acute kidney injury in the intensive care unit

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Introduction

Acute kidney disease (AKD) is a kidney dysfunction sustained more than seven days and less than 90 days, and chronic kidney disease (CKD) is a kidney dysfunction sustained more than 90 days. From the previous studies, CKD was studied as a risk factor for acute kidney injury (AKI) in intensive care unit (ICU). However, the impact of AKD on the incidence of AKI was not fully studied.

Methods and Materials

This is a single-center retrospective cohort study of critically ill patients admitted to ICU at the Pusan National University Hospital.

We included adult (age ≥ 18 years) ICU admitted patients from January 2011 to December 2020. Patients without serum creatinine data before hospital admission and those having end-stage kidney disease were excluded.

We divided patients into three groups based on the estimated glomerular filtration rate (eGFR) value between 1 year and 90 days before admission, and eGFR within 90 days of hospital admission; no kidney disease (NKD) as eGFR consistently higher than 60ml/min, AKD as eGFR ≥ 60 ml/min between 1 year and 90days but decreased to <60 mL/min within 90 days of hospital admission, and CKD as eGFR consistently lower than 60ml/min.

We defined AKI by KDIGO serum creatinine criteria. We compared the incidence of AKI in ICU by baseline kidney status.

Results

During the study period, 27,285 were admitted to ICU. A total of 4,066 were included in the study, excluding 679 patients who were younger than 18 years old, 22,463 patients without baseline creatinine, and 77 ESKD patients.

The population was all Asian, median age of 67 (18-110) years, and 57.6% were male. At baseline, 2,690 (66.2%) had NKD, 405(10.0%) had AKD, and 971(23.8%) had CKD.

In ICU, AKI was observed in 635(15.6%) out of 4066 patients. The incidence of AKI was the highest in AKD (17.2%, 70/405) followed by CKD (16.2%, 157/971) and NKD (15.2%, 408/2690). Among the 635 AKI patients, stage 3 AKI was more common in AKD (5.4%, 22/70) or CKD (5.3%, 51/157) compared to NKD (3.8%, 101/408).

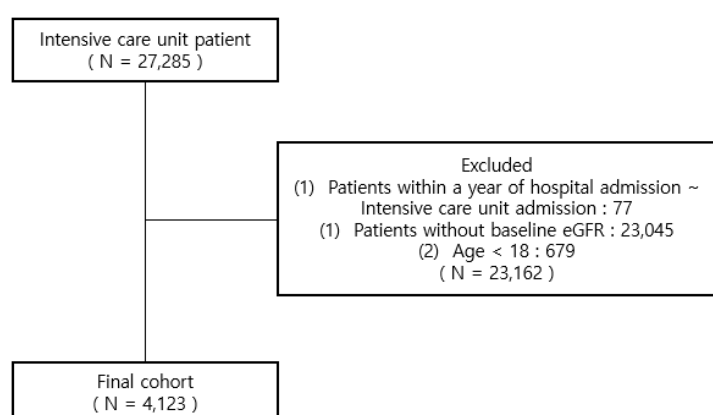


Figure 1. A flow diagram of study population.

Table 2. Incidence of AKI at ICU by baseline kidney function

		NKD (N/%)	CKD (N/%)	AKD (N/%)
AKI	stage1	164 (6.1)	68 (7)	30 (7.4)
	stage2	143 (5.3)	38 (3.9)	18 (4.5)
	stage3	101 (3.8)	51 (5.3)	22 (5.4)
AKI		408 (15.2)	157(16.2)	70(17.3)
Non-AKI		2,282 (84.8)	814 (83.8)	335(82.7)
Total		2,690	971	405

Table 2. Demographics

	Intensive care unit patient N=27,285(%)	Final cohort N=4,066 (%)
Age		
0 - 10	353 (1.29)	0 (0)
11 - 20	605 (2.22)	14 (0.34)
21 - 30	1,136 (4.16)	73 (1.80)
31 - 40	1,772 (6.49)	152 (3.74)
41 - 50	3,134 (11.49)	341 (8.39)
51 - 60	5,687 (20.84)	739 (18.18)
60 - 70	6,662 (24.42)	1188 (29.22)
70 <	7,936 (29.09)	1559 (38.34)
Gender		
Male	17,038 (62.44)	2,342 (57.60)
Female	10,247 (37.56)	1,724 (42.40)

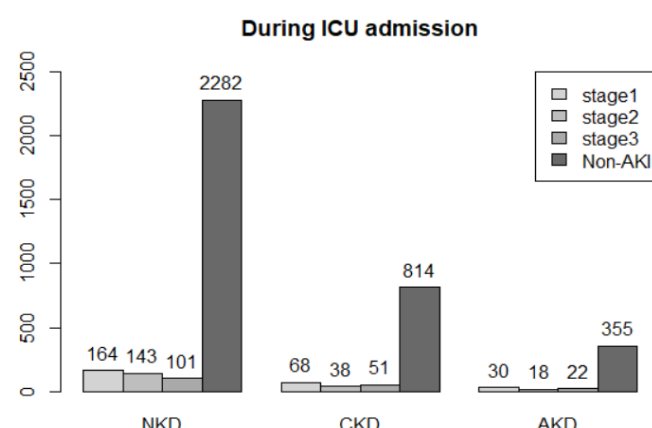


Figure 2. Numbers of AKI at ICU by baseline kidney function

Conclusions

We investigated the AKI incidence among patients admitted to ICU retrospectively. In summary, similar to CKD, AKI was more common and severe in AKD than NKD in patients admitted to ICU.



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