



## Importance of the sick day rule: a case of prerenal acute kidney injury after COVID-19 vaccination in a patient with chronic kidney disease

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To the Editor:

Chronic kidney disease (CKD) patients have substantially increased risk of severe coronavirus disease 2019 (COVID-19) and should be prioritized for vaccination [1]. We report a case of prerenal acute kidney injury (AKI) after COVID-19 vaccination in a CKD patient using renin–angiotensin system inhibitor (RASi) and diuretics.

An 87-year-old woman was inoculated with a second dose of the BNT162b2 mRNA COVID-19 vaccine 1 week before admission. After the second vaccination, she experienced loss of appetite, but continued medication. Two days before admission, she had difficulty in walking. On admission, she was transferred to the emergency department because of disorder of consciousness. Her medical history included hypertension, hyperlipidemia, CKD G4, chronic heart failure, and aortic stenosis. She was on carvedilol (5 mg/day), nifedipine (40 mg/day), telmisartan (40 mg/day), allopurinol (200 mg/day), furosemide (20 mg/day), trichlormethiazide (1 mg/day), tolvaptan (7.5 mg/day), rosuvastatin (2.5 mg/day), lansoprazole (15 mg/day), and aspirin (100 mg/day). On admission, the Glasgow Coma Scale (GCS) score was 7/15. Her temperature was 35.9 °C; blood pressure, 78/38 mmHg; pulse, 49 beats/min; respiratory rate, 20 breaths/min; and oxygen saturation, 100% on administered oxygen (6 L/min, mask). Physical examination was unremarkable, except for systolic murmur and dry mouth. Her body weight was 37.2 kg. Laboratory findings are presented in Table 1. Electrocardiogram showed a tentorial T wave. Kidney ultrasound revealed renal atrophy and no renal pelvis dilation. She was

diagnosed with AKI, uremic encephalopathy, and bradycardia induced by hyperkalemia and carvedilol. Normal saline, 10-mL calcium gluconate 8.5% solution, and 10 U of regular insulin with 25 g of glucose (50 mL of a 50% solution) were administered. Hemodialysis was performed for 3 h on the day of admission and the following day. GCS scores of 14/15 and urine output were obtained, and dialysis was discontinued. Based on the history of loss of appetite, hypotension on admission, and reversible acute kidney injury, prerenal AKI was diagnosed. Three weeks after admission, her serum creatinine level and body weight were 1.15 mg/dL and 42.4 kg, respectively. At discharge, she was prescribed amlodipine (2.5 mg/day), furosemide (20 mg/day), rosuvastatin (2.5 mg/day), lansoprazole (15 mg/day), and aspirin (100 mg/day).

The strong temporal association with vaccination suggests that the loss of appetite was due to vaccination, which led to prerenal AKI and hyperkalemia.

Currently, more individuals are being inoculated with COVID-19 vaccine. The reported side effects of the BNT162b2 mRNA COVID-19 vaccine include fever (21.9%), nausea (15.9%), and decreased appetite (5.7%) [2].

Nephrologists often encounter AKI because of acute illness in CKD patients treated with RASi. The “sick day rule” was proposed in patients at risk of AKI [3]. Although evidence is weak, CKD patients are recommended to be checked on regular visits, to temporarily discontinue RASi, diuretics, nonsteroidal anti-inflammatory drugs, and metformin when they experience acute symptoms (e.g., vomiting, diarrhea, and fever) [4, 5].

Therefore, CKD patients on RASi or diuretics may be better advised before COVID-19 vaccination to temporarily discontinue such drugs and consult a hospital when they experience acute illness. Further studies are needed to clarify when RASi or diuretic drugs should be discontinued after COVID-19 vaccination.

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**Table 1** Laboratory findings

Serum biochemistry		Arterial blood gas analysis	
Urea, mg/dL	225	pH	7.179
Creatinine, mg/dL	8.2	pO <sub>2</sub> (oxygen 6 L/min, mask), mmHg	278
eGFR, mL/min/1.73 m <sup>2</sup>	4	pCO <sub>2</sub> , mmHg	25.4
Uric acid, mg/dL	7.4	HCO <sup>-</sup> , mmol/L	9.1
Sodium, mmol/L	137	Urinalysis	
Potassium, mmol/L	6.3	pH	5.0
Chloride, mmol/L	96	Urinary-specific gravity	1.016
AST, U/L	30	Protein	1+
ALT, U/L	9	Occult blood	Negative
CK, IU/L	617	Sodium, mEq/L	32.3
LDH, U/L	288	Potassium, mEq/L	33.7
Complete blood count		Chloride, mEq/L	17.4
WBC, /μL	5840	Urea, mg/dL	371.4
Hb, g/L	9.3	Creatinine, mg/dL	231.9
Plt, ×10 <sup>9</sup> /L	11.4		

*eGFR* estimated glomerular filtration rate, *AST* aspartate aminotransferase, *ALT* alanine transaminase, *CK* creatine kinase, *LDH* lactate dehydrogenase, *WBC* white blood cell, *Hb* hemoglobin, *Plt* platelet

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## Declarations

**Conflict of interest** All the authors have declared no competing interest.

**Ethics approval** This article does not contain any studies with human participants or animals performed by any of the authors.

**Informed consent** Written informed consent was obtained from the patient.

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