Changing epidemiology and outcomes of acute kidney injury patients in teaching hospital from a developing country: a population-based cohort study

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Background

While considerable information is available on acute kidney injury (AKI) in North America and Europe, large comprehensive epidemiologic studies of AKI from Latin America and Asia are still lacking. The present study aimed to evaluate the epidemiology and outcome of AKI in patients evaluated by nephrologists in a teaching Brazilian hospital.

Methods

We performed a large retrospective cohort study on AKI patients that were consultated by nephrology team in wards and ICUs in the teaching hospitals of Botucatu School of Medicine (University of São Paulo State – UNESP), Brazil, from 2011 to 2018. Protocol of the study was approved by the local ethics committee. Patients who had CKD stages 3 to 5 based on CKD-EPI, kidney transplants or were under treatment with one of the renal replacement therapy (RRT) methods including blood or peritoneal dialysis and lower than 18 years old were excluded from the study. The primary outcome was in-hospital mortality. For comparison purposes, patients were divided into two groups according to the year of follow up: 2011-2014 and 2015-2018.

Results

We enrolled 7,976 AKI patients during the study period (8 years) and 5,428 AKI patients were included (68.6%).

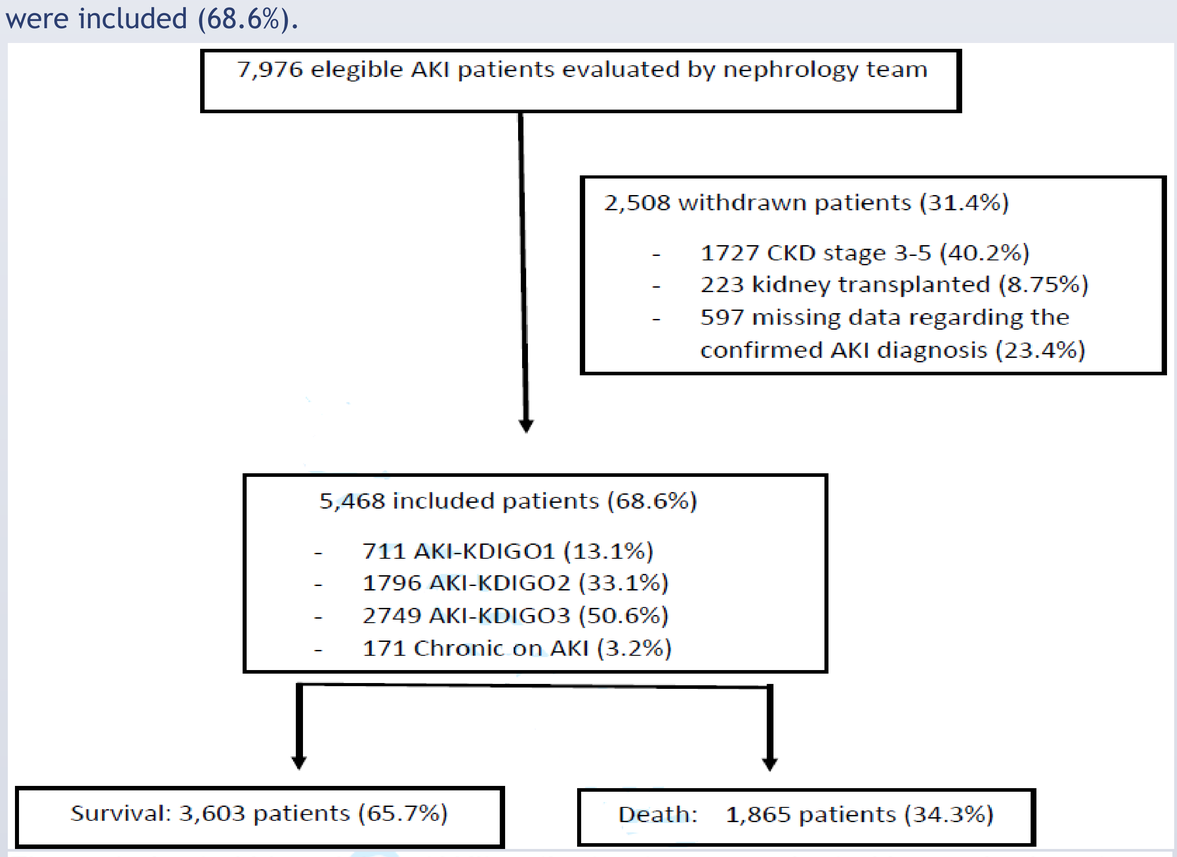

Figure 1. Acute kidney injury (AKI) patient outcome evaluated by nephrology team

The maximum AKI stage was 3 (50.6%) and mortality rate occurred in 1865 patients (34.3%). Dialysis treatment was indicated in 928 patients (17.1%). Metabolic and fluid demand to capacity imbalance was the main indication for dialysis (76.5%). The dialysis method more frequent was intermittent hemodialysis (33.5%).

In the first period, we evaluated 1,952 patients (36%) and in the second period, 3,476 patients (64% of total).The prevalence of septic AKI increased 6.7% over the years (p=0.04). There was also an increase in age, AKI-KDIGO 3, Chronic on AKI, admition to ICU, severity of patients, cardiovascular disease, infections and malignancy as main diagnosis, nephrotoxic ATN, mix and pos renal as etiology of AKI (p<0.001) and recurrent AKI episodes. In the second period, there was a decrease in AKI KDIGO 1 and 2, liver failure and neurologic disorders as main diagnosis, and pre renal as etiology of AKI (p<0.001). There was no difference in gender and mortality rate across the periods. Patient survival improved along study periods: patients treated at 2015-2018 had a relative risk death reduction of 0.89 (95% CI 0.81–0.98, p=0.02).

The main dialisys indications have changed during the periodos: there was an increase in metabolic and fluid demand to capacity imbalance and a decrease in refractory hyperkalemia and acidemia (p<0.01).

Table 1. Subdistribuition Hazard Ratio of Covariates for mortality.

Variables	HR (CI95%)	p
2011-2014	ref	
2015-2018	0.94 (0.89–0.99)	0.01
Age > 65 years	2.41 (1.25-2.97)	0.009
ATN-ISS > 0.65	1. 08 (1.02 –1.75)	0.04
Sepsis	1.36 (1.11- 1.75)	0.02
Cardiovascular disease	1.31 (0.98-2.21)	0.08
ICU admission	2.12 (1.73- 3.66)	0.003
AKI-KDIGO 3	1.18 (1.04- 1.97)	0.04
Recurrent AKI	1.54 (1.12-2.93)	0.009
Need for dialysis	1.37 (0.98-3.79)	0.09
no metabolic and fluid demand	**1.59 (1.13–3.01)**	**0.03**
to capacity imbalance		
Refractory acidosis/huperkalemia	1.31 (0.98–3.81)	0.09

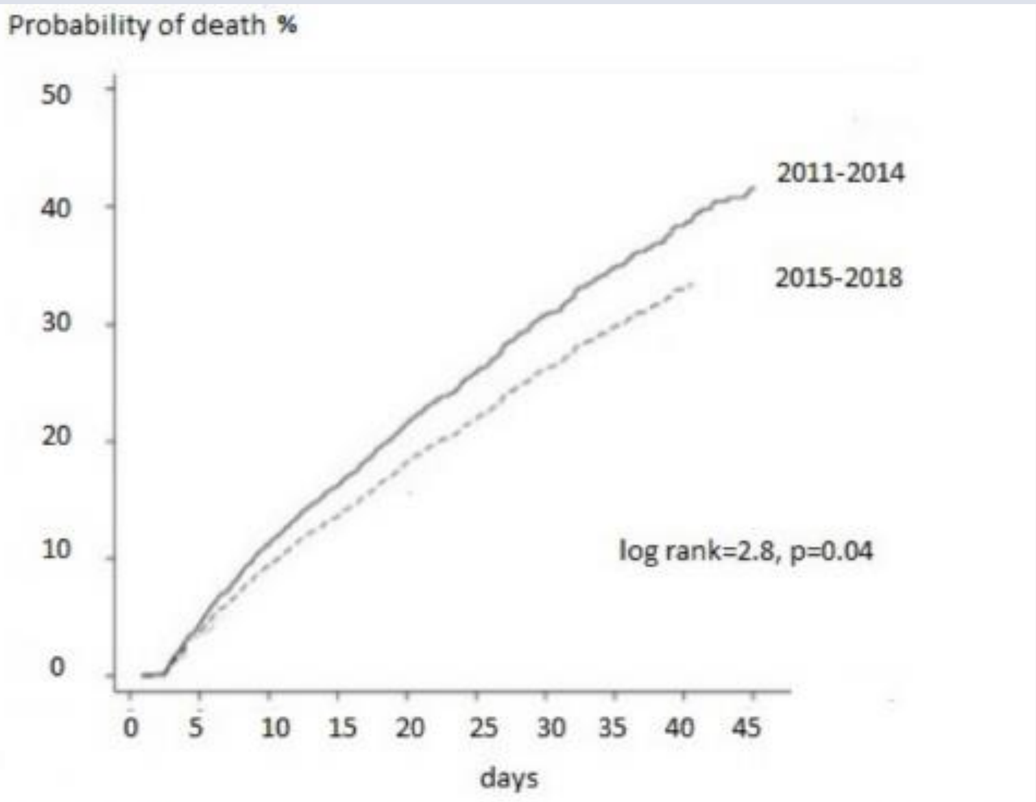

Figure 2. Probability of death according to time period (adjusted for age, AKI-KDIGO3, sepsis, ATN-ISS, ICU admission, recurrent AKI and AKI-KDIGO3)

Conclusion

We observed an improvement in AKI patient survival along the years even after correction for several confounders and using a competing risk approach. Identification of risk factors for mortality can help in decision making for timely intervention, leading to better clinical outcomes.