Post-Acute Kidney Injury Clinic: Two-year Achievement and Outcomes

Pongpon Suttiruk MD[1,2] , Nuttha Lumlertgul MD PhD[1,2,3], Sasipha Tachaboon[2], Janejira Dinhuzen[2], Rungarun Nata[2], Khanittha Yimsangyad[1,2], Akarathep Leewongworasingh[1,2], Nattachai Srisawat MD PhD[1,2,3]

[1]Division of Nephrology, Department of Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand
[2]Center of Excellence in Critical Care Nephrology, Chulalongkorn University, Bangkok, Thailand
[3]Excellence Center for Critical Care Nephrology, King Chulalongkorn Memorial Hospital, Bangkok, Thailand

Introduction

Acute kidney injury (AKI) is associated with increased risks of short-term and long-term morbidity and mortality. The risks are higher with increased AKI staging. Long-term consequences include renal complications such as chronic kidney disease (CKD) and end-stage kidney disease (ESKD) and non-renal complications e.g. hypertension, congestive heart failure, and type 2 diabetes.

Therefore, the treatment of AKI does not end at hospital discharge, but post-acute kidney injury care plays an important role. Post-acute kidney injury clinic has received much interest due to its potential benefits for specifically designed monitoring and treatment bundles for AKI survivors. This study aimed to evaluate the processes of care and outcomes of patients who were followed up at the post-AKI clinic at King Chulalongkorn Memorial Hospital, Bangkok, Thailand after 2 years of operation.

Methods and Materials

We retrospectively collected the data of the patients more than 18 years old with history of AKI during admission and attended the Post-AKI clinic at King Chulalongkorn Memorial Hospital between 2020 and 2022. Patients who were enrolled to other clinical trials were excluded.

The Post-AKI clinic pathway includes comprehensive care from multidisciplinary care team (MDCT), which consisted of:
- Nephrologist: Post-AKI transition care, medical condition and referral to relevant sub-speciality
- Pharmacist: Drug reconciliation, nephrotoxic drugs advice, guidance on renal dosage and sick day protocol advice
- Nutritionist: Nutrition assessment and dietary counseling
- Nurse: Follow up by phone and quality of life assessment

The primary outcome was major adverse kidney events at 1 year comprising death, new kidney replacement therapy (KRT) and 30% decline in estimated glomerular filtration rate (eGFR).

Secondary outcomes included serial serum creatinine (SCr) concentrations, urine albumin/creatinine ratio (uACR), rate of readmission, and receipt of reno-protective drugs at 1 year.

Variables		Number	95%CI/IQR	Percent/SD
Serum Creatinine measurement		69		100
UACR measurement (%)		49		71.8
Creatinine (mg/dL):	Month: 0 - 3	1.25	[0.96,2.57]	
	Month: 4 - 6	1.1	[0.75,2.54]	
	Month: 6 - 9	1.36	[1.17,2.38]	
	Month: 9 - 12	1.3	[0.98,1.99]	
Urine albumin/creatinine ratio (mg/g): Month: 0 - 3		114.7	[10.67,224.38]	
	Month: 4 - 6	109.67	[26.15,611.83]	
	Month: 6 - 9	21.24	[9.56,225.6]	
	Month: 9 - 12	57.4	[10.11,120.39]	
Medication:	ACEIs/ARBs	22		31.9
	Statins	34		49.3
	SGLT2s	2		2.9
Major adverse kidney events (MAKE-365)		34		49
	30% GFR decline	23		33
	ESRD	7		7.1
	Death	4		5.8

Table1: Processes of care and outcomes of post-AKI survivors in the cohort

Results

A total of 121 patients were followed up at the post-AKI clinic, of which 69 patients were included in the final analysis. The mean age was 65.43 ± 2.05. 54.9% were male and 37% had chronic kidney disease. 52% of patients were admitted in intensive care units. There were 13%, 7.24% and 79% of AKI-KDIGO stage 1, 2 and 3, respectively. 91.18% received KRT during admission. At discharge, 20% were KRT-dependent and 55.07% had complete kidney recovery. The mean days from discharge to first visit was 55 ± 7 days. Within 1 year, 94.2% had SCr measurement and 76.8% had uACR measured at least once. The trends of creatinine and uACR in patient who received and did not receive ACEIs/ARBs are shown in figure1.

During follow-up, 31.9% received renin-angiotensin aldosterone inhibitors; 49.3% received statins; and 2.9% received sodium glucose cotransporters (SGLT2s) inhibitors. The incidence of MAKE365 was 49.3%, consisting of 5.80% death, 10.14% ESKD and 33.3% eGFR decline. There was a 22% readmission rate (mostly cardiovascular cause and 0.4% from recurrent AKI). The prevalence of new CKD and CKD progression were 17.4% and 33.3%, respectively.

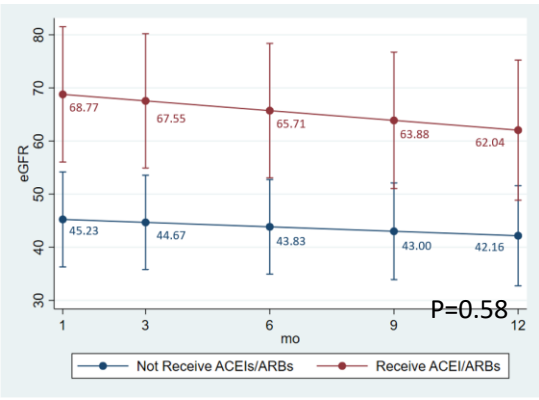

Figure1a. Trend of serum creatinine

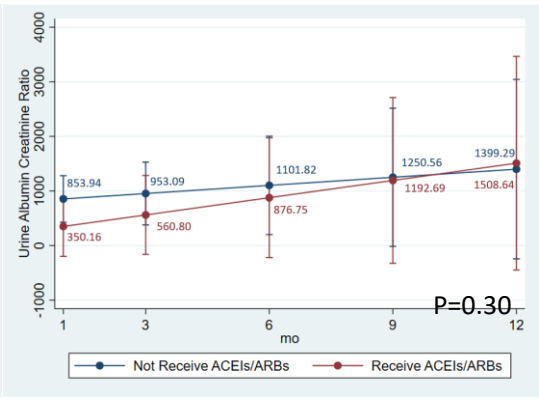

Figure1b. Trend of urine ACR

Discussion

In this cohort, we showed similar renal recovery rates and dialysis independence after hospital discharge with other studies from the Western world, but lower rates than the study from the same region (SEA-AKI study). Owing to high proportion of AKI stage 3, this study show slightly higher MAKE-365 than other studies.

This study also revealed similar rates of statin and ACEIs/ARBs prescription with previous studies. However, only 1/3 of AKI survivors received ACEIs/ARBs. The main reason could be the reluctance of physicians to start the medications in patients with lower eGFR. However, rate of creatinine and urine ACR test did not change with time in this study, possibly explained by short follow-up time and small sample size.

There are potential rooms of improvement in our clinic. First, the drug monitoring and reno-protective drug administration protocol should be established and implemented. Second, monitoring of non-renal complications should be added. Lastly, we aim to involve patients and relatives in our process of care to improve their knowledge and satisfaction.

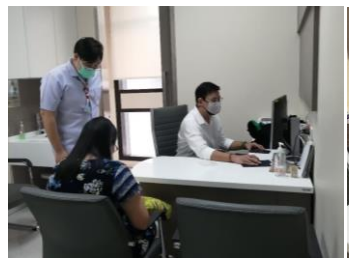

Figure 2a. Patients follow up with pharmacist

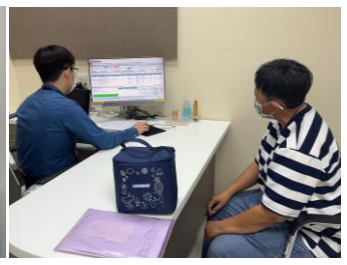

Figure 2b. Patients follow up with doctor

Figure 2c. Patients follow up with dietitian

Conclusions

There was a high prevalence of MAKE365 in AKI survivors. Our study shows high proportions of SCr and uACR monitoring in post-AKI survivors. There are rooms for quality improvement projects in our post-AKI clinic to improve outcomes in this high-risk cohort.

References:
1. Ortiz-Soriano V, Singh G, Chang A, Ruiz EF, Wald R, Silver SA, et al. Processes of Care in Survivors of Acute Kidney Injury followed in Specialized Postdischarge Clinics. CJASN. 2022 Nov;17(11):1669–72.
2. Silver SA, Adhikari NK, Jeyakumar N, Luo B, Harel Z, Dixon SN, et al. Association of an Acute Kidney Injury Follow-up Clinic With Patient Outcomes and Care Processes: A Cohort Study. American Journal of Kidney Diseases. 2022 Dec;S0272638622010526.
3. Singh G, Hu Y, Jacobs S, Brown J, George J, Bermudez M, et al. Post-Discharge Mortality and Rehospitalization among Participants in a Comprehensive Acute Kidney Injury Rehabilitation Program. Kidney360. 2021 Sep 30;2(9):1424–33.
4. Srisawat N, Kulvichit W, Mahamitra N, Hurst C, Praditpornsilpa K, Lumlertgul N, et al. The epidemiology and characteristics of acute kidney injury in the Southeast Asia intensive care unit: a prospective multicentre study. Nephrology Dialysis Transplantation. 2020 Oct 1;35(10):1729–38.