

UNRAVELING THE DETERMINANTS OF MAJOR ADVERSE KIDNEY EVENTS AFTER ACUTE KIDNEY INJURY IN ADULT PATIENTS

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BACKGROUND:

Acute kidney injury (AKI) significantly impact critically ill patients, extending far beyond the initial insult. Acute kidney injury no more consider as totally reversible condition. The term MAKE (Major adverse kidney events) analogous to MACE (Major Adverse Cardiac Events) was introduced as consensus composite outcome for Acute kidney injury. The MAKE includes Death, new requirement of dialysis, progression to AKD and CKD. This study addresses the determinant of MAKE after AKI.

METHODS:

We include all patients with AKI as per KDIGO criteria. Various parameter eg age, sex, Charlson comorbidity index, stages of AKI, cause of AKI, recurrent AKI, underlying chronic kidney disease, mean SOFA and mean APACHE score for predicting the progression to CKD, dialysis dependency and mortality after AKI episode. Patient were followed up to 90 days post discharge. Data are represented as number, median, OR (95% CI), we used chi square test for categorical variable and logistic regression model for multivariate analysis to examine the prognostic effects of clinical indicator.

RESULTS:

Out of 315 patients, 138 (43.8%) completely recovered (creatinine came to baseline within 7 days), 39 (12.3%) patient had Acute Kidney Disease (AKD), 29 (9.2%) patient progressed to chronic kidney disease (who has normal baseline creatinine within normal range), 88 (27.9%) required dialysis, 20 (6.3%) being dialysis dependent and 92 (29.2%) had mortality. Among the predictors for progression of CKD most important being underlying diabetes OR 1.57 (1.23-2.1 95% CI) p value 0.05, stage of AKI (OR-AKI stage 1-0.33, stage 2-1.07, stage 3-3.03), causes of AKI, sepsis OR-1.33 (1.1-1.54 95% CI) p value 0.79 and cardiorenal OR-3.26 (2.9-5.44 95% CI) P value 0.08, low EF OR- 2.17 (1.9-4.4 95% CI) P value 0.02, HD requirement OR-5.94 (4.8-8.7 95% CI) P value 0.03 recurrent AKI OR-4.04 (3.8-6.6 95% CI) P value 0.03 being most common cause, in multivariate analysis regression model Diabetes HR- 1.15 (1-1.33 95% CI) P value, HD requirement HR-1.28 (1.07-1.53 95% CI) P value 0.008, low EF HR-1 (0.99-1 95% CI), P value 0.03 predicted the progression to CKD.

Among the predictors for mortality stage of AKI OR 2.2 (2.16-5.27 95% CI) P value 0.063, cause of AKI as sepsis OR 1.65 (0.93-2.93 95% CI), P value 0.0556, negative furosemide stress test OR 4.6 (2.05-10.32 95% CI) P value <0.0001, mean APACHE score OR 1.02 (1.01-1.028 95% CI), P value 0.0037 with multivariate regression model stage of AKI HR 1.059 (0.85-1.12 95% CI) P value 0.004, underlying chronic kidney disease HR 1.17 (1.10-1.24 95% CI), among the cause being cardiorenal HR 1.07 (1.008-1.14 95% CI) P value 0.03 are predictors of mortality.

Among the predictors of dialysis dependency stage of AKI OR 7.47 (2.41-23.15 95% CI), P value 0.001, negative furosemide stress test OR 7.8 (3.42-18.22 95% CI), P value <0.0001, mean APACHE score 1.02 (1.01-1.025 95% CI), P value 0.037, in multivariate regression model cardiorenal as cause of AKI HR 1.07 (0.98-1.16 95% CI), P value 0.05, underlying chronic kidney disease HR 1.17 (1.04-1.31 95% CI), P value 0.003, and recurrence of AKI HR 1.014 (0.9-1.08 95% CI) With P value 0.02 predict the dialysis dependency.

Table 1: Baseline characteristics

Characteristics	N=315	percentage
Mean age	63.0±15.59	
Sex (M:F)	206:109	63.3:34.6
Charlson comorbidity index	3.2±2.18	
Mean baseline creatinine	1.1±0.8	
Stage of AKI		
Stage 1	131	41.59
Stage 2	100	31.75
Stage 3	84	26.66
Comorbidities		
DM	202	64.12
HTN	178	56.5
COPD	20	6.3
CLD	37	11.7
CVA	26	8.2
IHD	93	29.5
Mean EF	50.5±15	
Setting of AKI		
Community acquired	248	78.7
Hospital acquired	67	21.2
Causes of AKI		
Multifactorial	181	57.4
Sepsis	133	42.2
Cardiorenal	95	30.1
Pigment related	12	3.8
Drugs	40	12.6
Hypercalcemia	12	3.8
Contrast induced	16	5.07
Cast nephropathy	6	1.9
Surgical	58	18.4

Table 2: Outcome

Outcome	Number of Patients	Percentage (%)
Complete Recovery	138	43.8
Acute Kidney Disease	39	12.3
Progression to CKD	29	9.2
Required Dialysis	88	27.9
Dialysis Dependent	20	6.3
Mortality	92	29.2

Table 3: factors predictors of progression to CKD

Predictor	Odds Ratio (OR)	p-value
Underlying Diabetes	1.57 (1.23-2.1)	0.05
Stage of AKI	Stage 1-0.33, Stage 2-1.07, Stage 3-3.03	0.05
Causes of AKI (Sepsis)	1.33 (1.1-1.54)	0.79
Cardiorenal	3.26 (2.9-5.44)	0.08
Low EF	2.17 (1.9-4.4)	0.02
HD Requirement	5.94 (4.8-8.7)	0.03
Recurrent AKI	4.04 (3.8-6.6)	0.03

CONCLUSION :

Our study reveals major determinant of MAKE out of all factors we have studied being underlying DM, requirement of dialysis, advanced stage of AKI, cardiovascular dysfunction, recurrent AKI, and negative furosemide stress test.

By identifying those at greatest risk for MAKE, we open new avenues for targeted interventions and personalized follow-up strategies.

Table 4: Factors predictors of dialysis dependency

Predictor	Odds Ratio (OR)	p-value
Stage of AKI	7.47 (2.41-23.15)	0.001
Negative Furosemide Stress Test	7.8 (3.42-18.22)	<0.0001
Mean APACHE Score	1.02 (1.01-1.025)	0.037

Table 5: Factors predictors of mortality

Predictor	Odds Ratio (OR)	p-value
Stage of AKI	2.2 (2.16-5.27)	0.063
Cause of AKI as Sepsis	1.65 (0.93-2.93)	0.0556
Negative Furosemide Stress Test	4.6 (2.05-10.32)	<0.0001
Mean APACHE Score	1.02 (1.01-1.028)	0.0037

Table 6: Multivariate analysis of CKD progression, dialysis dependency and mortality .

Outcome	Predictor	Hazard Ratio (95% CI)	p-value
CKD Progression	Diabetes	1.15 (1-1.33)	0.05
	HD requirement	1.28 (1.07-1.53)	0.008
	Low EF	1 (0.99-1)	0.03
Mortality	Stage of AKI	1.059 (0.85-1.12)	0.004
	Underlying Chronic Kidney Disease	1.17 (1.10-1.24)	0.002
	Cardiorenal Cause of AKI	1.07 (1.008-1.14)	0.03
Dialysis Dependency	Cardiorenal Cause of AKI	1.07 (0.98-1.16)	0.05
	Underlying Chronic Kidney Disease	1.17 (1.04-1.31)	0.003
	Recurrence of AKI	1.014 (0.9-1.08)	0.02

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