

# Cardiac-Associated Acute Kidney Injury in Resource-Limited Settings: A Multicenter Cohort Study of Long-Term Outcomes in Southeast Asia and India



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## Background

- Acute kidney injury (AKI) affects 10-15% of hospitalized patients and over 50% in ICUs, with higher incidence in low- and middle-income countries.
- Cardiac-associated AKI is common—occurring in 5-43% of cardiac surgery patients and ~33% with heart failure.
- Long-term data from resource-limited settings are scarce.
- We compared epidemiology and outcomes of severe cardiac-associated versus non-cardiac AKI in Southeast Asia and India.

## Methods

- A secondary analysis using data from the prospective, multicenter, observational study "Epidemiology and Long-Term Outcomes of Critically Ill Patients with Severe AKI in India and Southeast Asia."
- Enrolling adults with KDIGO stage 3 AKI from 24 ICUs across Thailand, Laos, Vietnam, Malaysia, Indonesia, and India
- From Apr 2019-Dec 2023
- Patients with pre-hospital kidney failure or stage 5 CKD were excluded.
- Primary outcome: 2-year major adverse kidney events (MAKE: persistent kidney dysfunction, chronic dialysis, kidney transplant, or death)
- Secondary outcomes: mortality, new CKD, and CKD progression
- Multivariable multilevel mixed-effects survival models were used to account for within-country clustering.

## Results

### Renal Trajectory and Acute Management

Among 1,145 AKI survivors, 281 (24.5%) had cardiac-associated AKI. They were older (median 65 vs. 58 years), with more hypertension, dyslipidemia, CKD, and ischemic heart disease (all  $P<0.001$ ). Baseline eGFR was higher, but dialysis dependence at discharge was greater (29.3% vs. 17.7%,  $P<0.001$ ).

### Primary Outcome: 2-year Major Adverse Kidney Events

2yr-MAKE occurred in 65.6% of cardiac-AKI vs. 46.5% of non-cardiac AKI ( $P<0.001$ ).

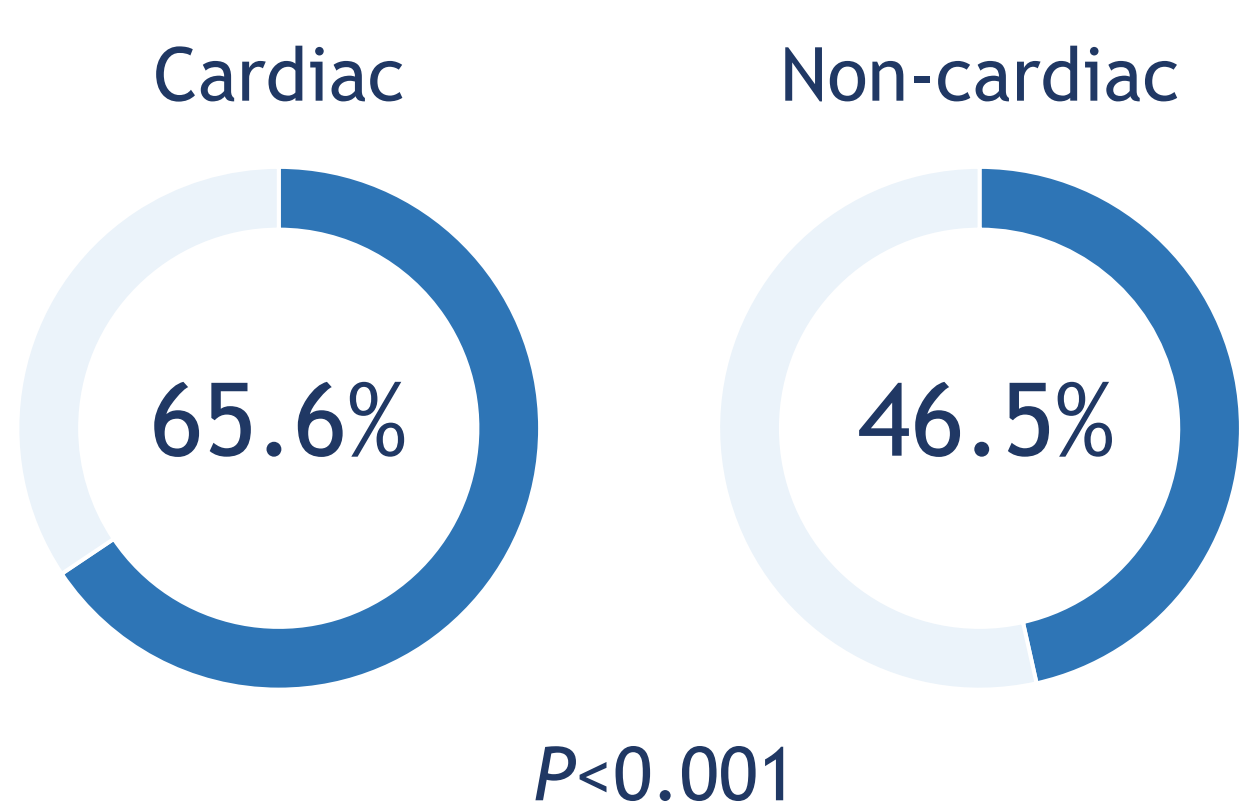
### Secondary Outcomes

Mortality was 45.8% vs. 32.7% ( $P<0.001$ ); kidney failure requiring treatment (KFRT), 23.4% vs. 12.4% ( $P<0.001$ ); and new CKD, 61.9% vs. 43.9% ( $P=0.001$ ), respectively. CKD progression rates were similar in both groups.

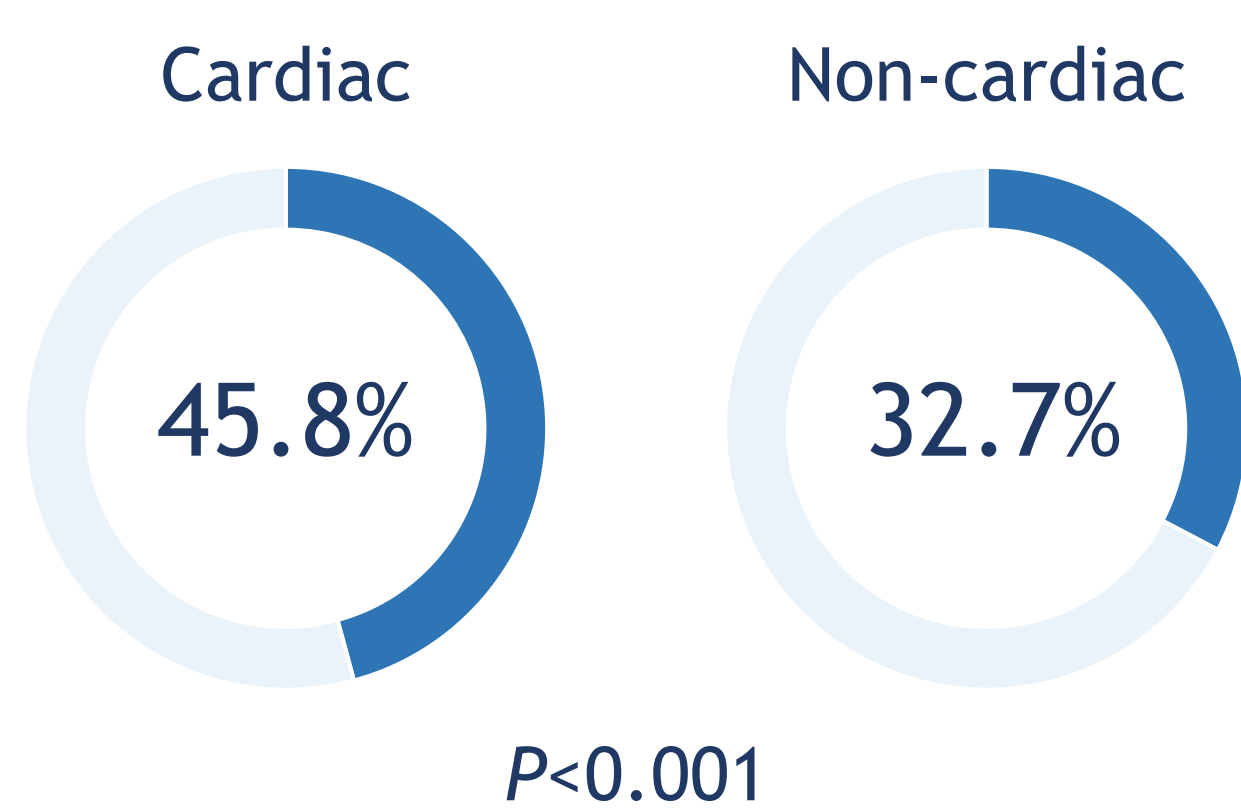
### Risk factors for 2-year MAKES

Independent predictors of 2yr-MAKE included admission to mixed/other ICUs (aHR 5.45), pre-existing CKD (aHR 1.75), ischemic heart disease (aHR 1.44), and failure to recover renal function by 28 days/discharge (aHR 5.56; all  $P<0.05$ ). Initial RRT type and post-discharge use of ACEI/ARBs or beta-blockers were not associated with risk.

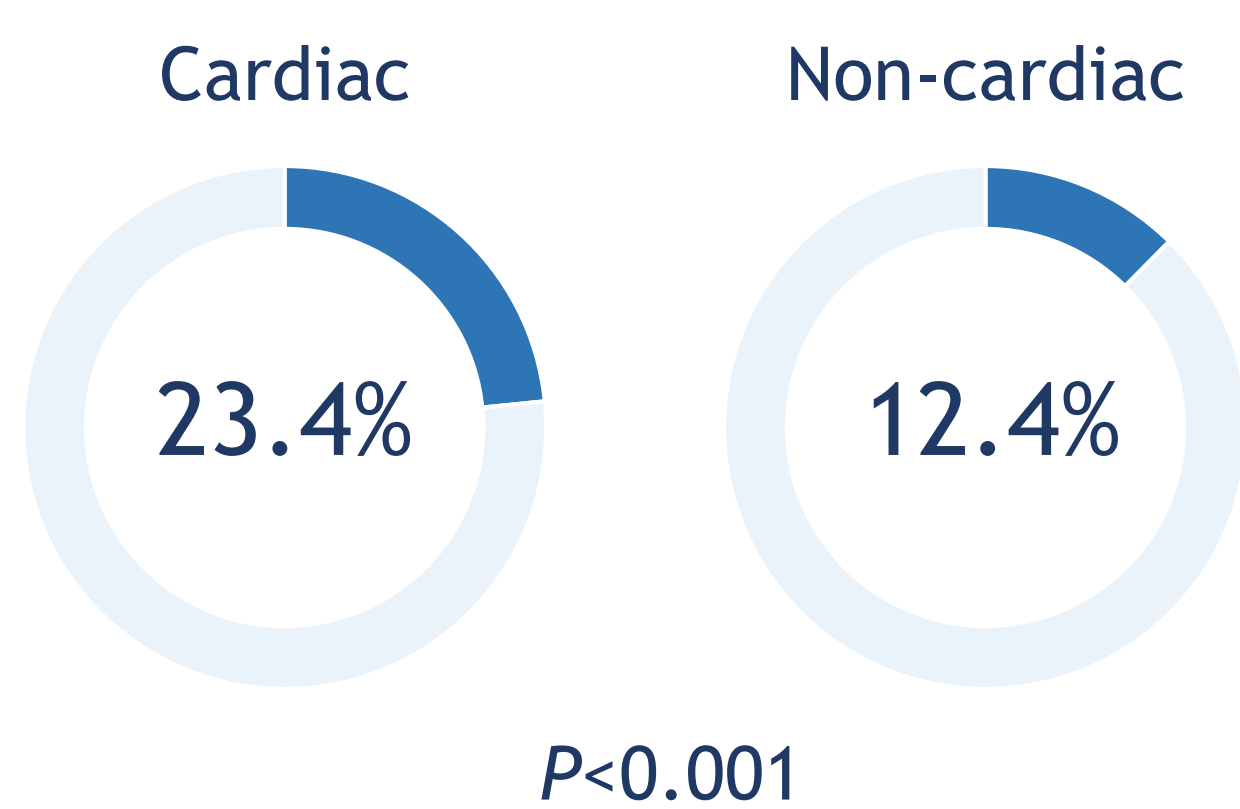
### 2-yr MAKE



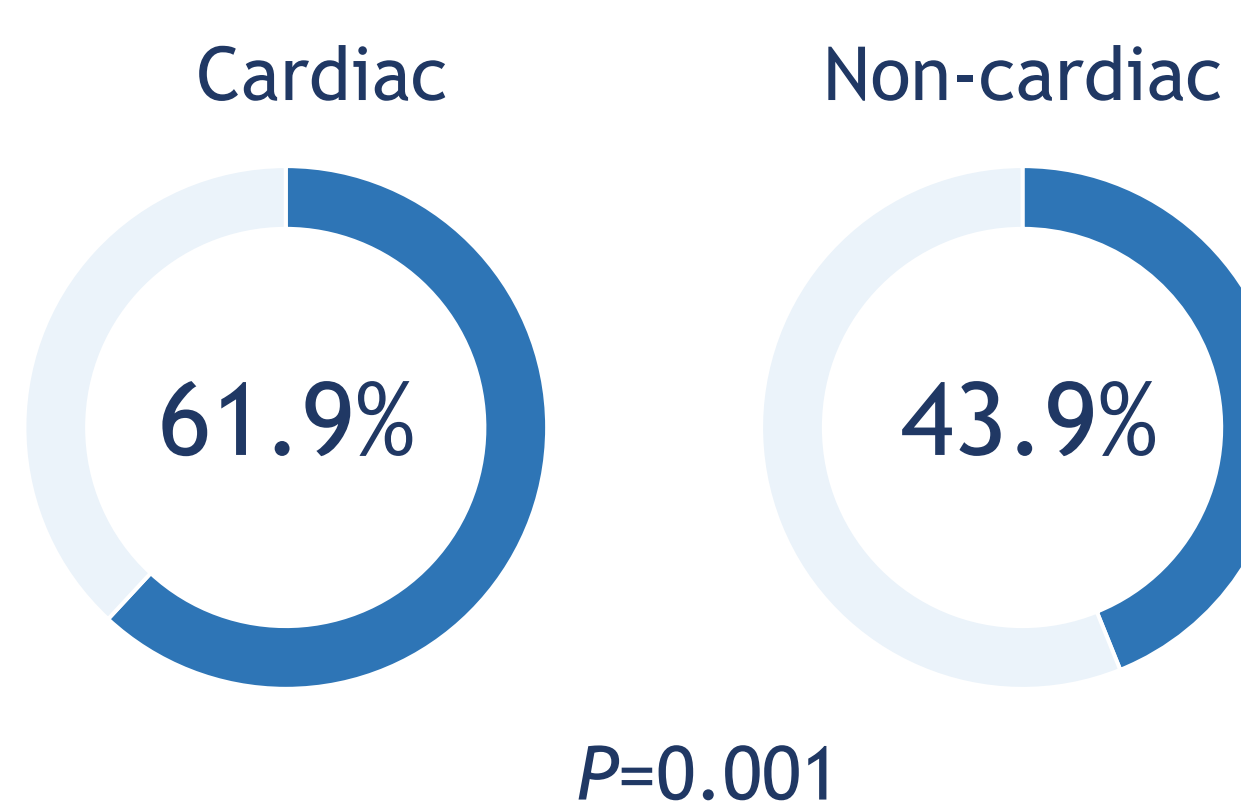
### All-cause mortality



### KFRT



### New CKD



### Potential risk factors for 2-year MAKES

Variable	Multivariable analysis	
	Adjusted HR (95% CI)	P-value
ICU type		
• Mixed/other	5.45 (2.3-12.93)	<0.001
Underlying disease		
• Preexisting CKD	1.75 (1.21-2.52)	0.003
• IHD	1.44 (1.02-2.04)	0.037
Non-recovery of kidney function at 28 days or hospital discharge	5.56 (3.89-7.96)	<0.001

## Conclusion

Severe cardiac-associated AKI in resource-limited settings confers markedly worse 2-year kidney and survival outcomes than non-cardiac AKI. Lack of early renal recovery is the strongest predictor of poor prognosis, highlighting the need for targeted monitoring and cardiorenal protection strategies in high-risk patients.

