

Frequency and consequences of acute kidney injury in patients with chronic kidney disease in public nephrology practices in Queensland, Australia.

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Background and Aim

It is recognised that acute kidney injury (AKI) contributes to, and complicates, chronic kidney disease (CKD) and can exacerbate its progression. We describe AKI documented in hospital episodes in patients enrolled in the CKD.QLD Registry, which is based in the adult public nephrology sector in Queensland, Australia.

Method

- Queensland Health supplied data on CKD.QLD patients on admissions to all Queensland hospitals, public and private, as well as associated costs, and deaths, from May 2011 to June 2016.
- We describe the frequency of AKI and associated conditions, recognised by ICD codes.

Results

- Among 6,365 CKD.QLD patients, 2,199 (34.5%) had a total of 4,711 hospital encounters with an AKI diagnosis.
- 550 (25%) people with AKI had three or more AKI-related admissions.
- Of the 4,711 AKI admissions, 782 (16.6%) had AKI recorded as the “principal diagnosis”.
- 88.1% of AKI admissions were through the emergency department (Figure 1).
- People with AKI were somewhat older (68.2 vs 63.5 yr) and more often male (57.1% vs 42.9%), than those without AKI, $p < 0.001$ for both.
- Leading diagnoses associated with AKI were congestive heart failure, urinary tract infection, myocardial infarction, dehydration, pneumonia and COPD, gastroenteritis/colitis, and sepsis (Table 1), and diabetic nephropathy (30.2%) and renovascular disease (32.0%) were the leading underlying renal conditions.
- Of those with AKI, 553 (25.2%) subsequently died in the 5 year interval and 238 (10.8%) started renal replacement therapy (RRT), compared with 282 (12.8%) who died and 295 (13.4%) who started RRT among those who did not have AKI, $p < 0.001$ for each.
- The crude incidence rates of death without renal replacement therapy (RRT) and of RRT increased by the number of AKI admissions per patient (Figure 2 and Figure 3).
- Adjusted for all other significant factors, the hazard ratio (95%CI) of AKI patients relative to those without AKI for death without RRT was 3.32 (CI 2.8-3.9), $p < 0.001$, and for RRT was 1.21 (CI 1-1.5), $p = 0.06$.
- Excluding RRT, the mean total of hospitalization costs was 3-fold for admissions inclusive of AKI vs those without (Figure 4). The mean hospitalization costs per patient also increased in line with number of AKIs (Figure 5).

Conclusion

AKI that comes to clinical attention was very common among these patients with CKD. Patients with an AKI episode overwhelmingly presented through unplanned, emergency admissions. Patients with AKI also had more admissions and stayed longer in hospital. AKI was associated with strikingly increased rates of death but only marginally increased rates of RRT.

Preventable causes of AKI should be better understood and addressed.

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Figure 1: Admission type (elective vs emergency) by AKI diagnosis.

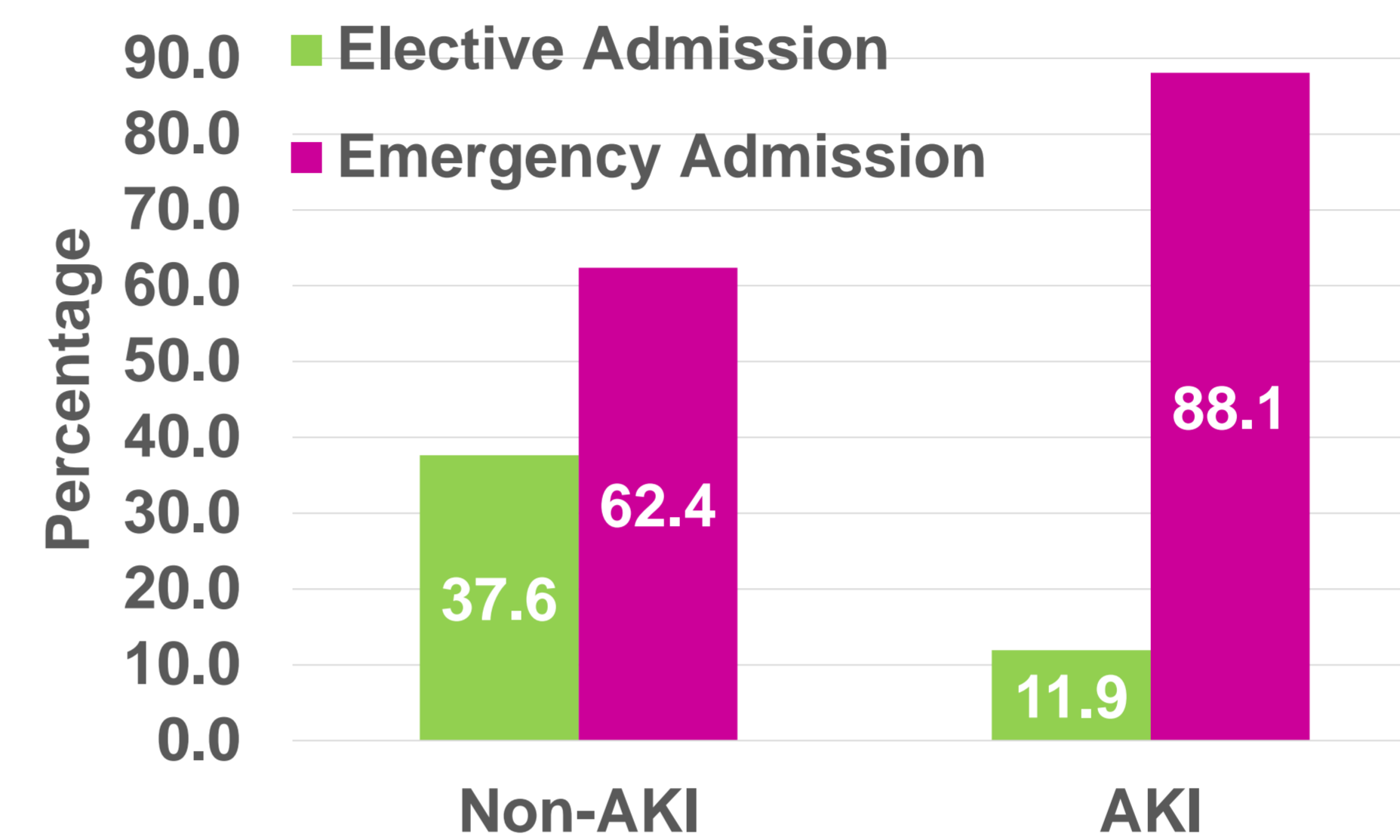


Figure 2: Crude incidence rate of death without renal replacement therapy by number of AKI episodes.

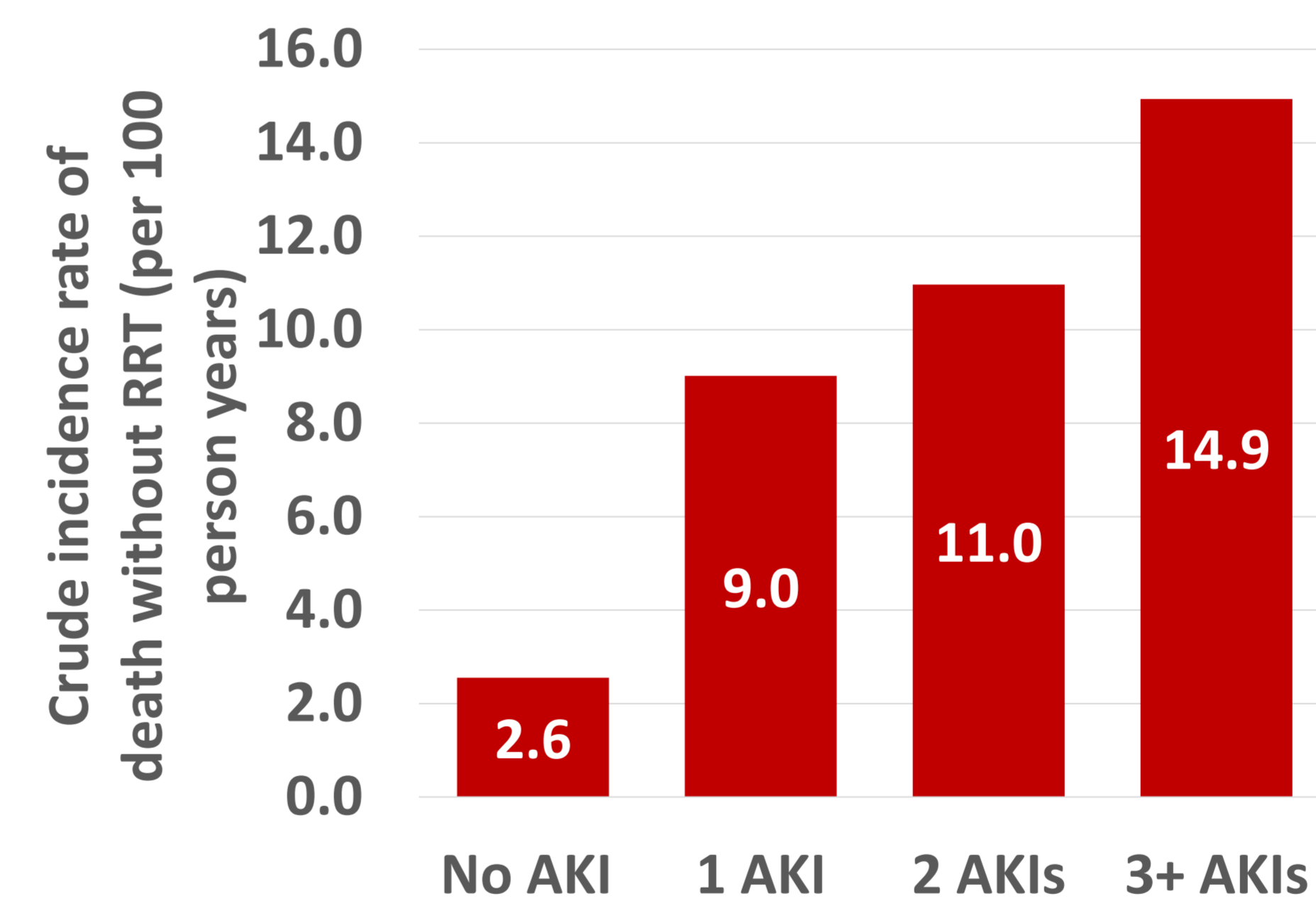


Figure 4: Mean of hospitalisation total costs (AU\$) by AKI, excluding RRT.

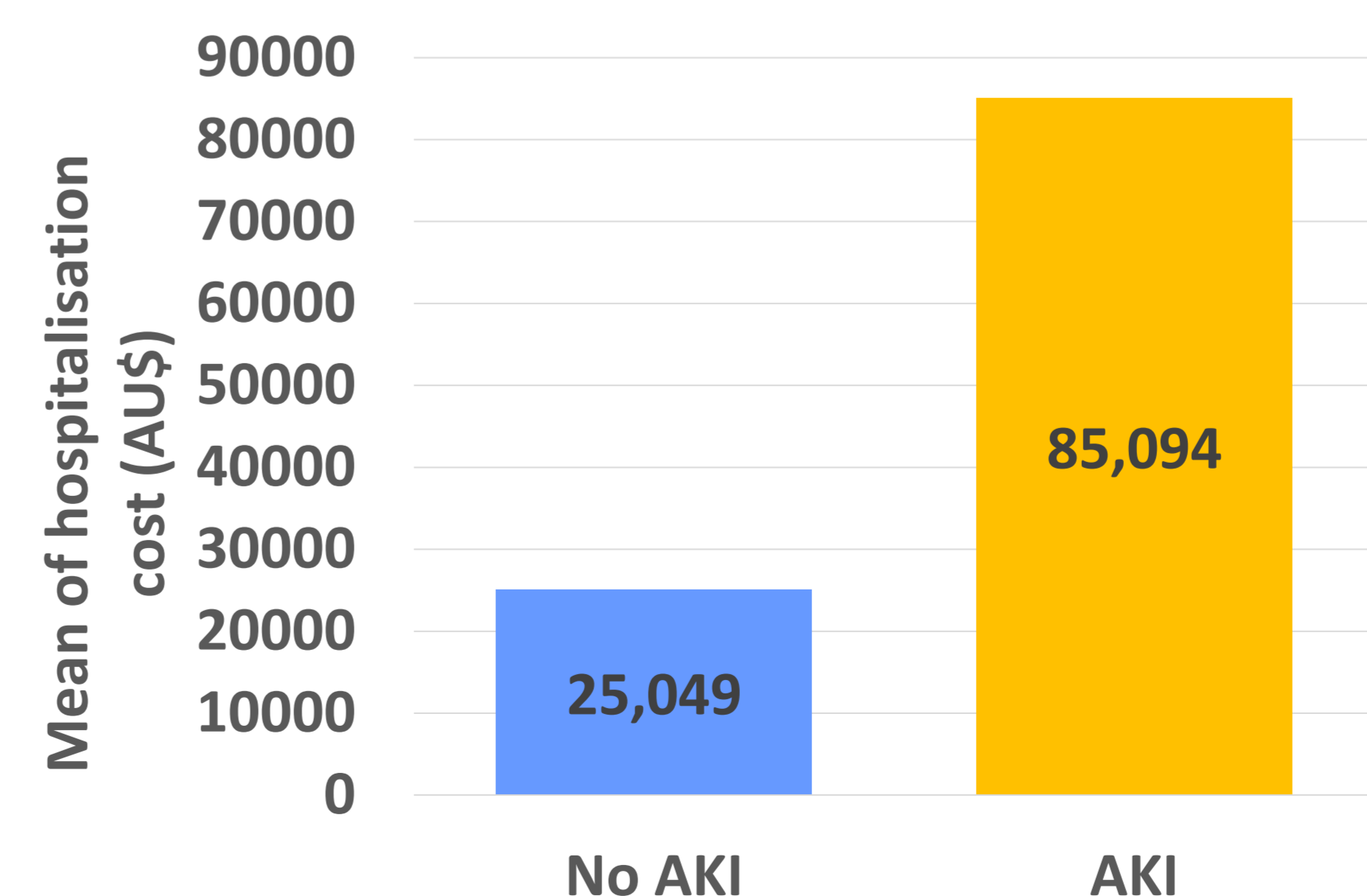


Table 1: Top 10 “additional admission diagnoses” when AKI is the principal admission diagnosis.

- Congestive heart failure
- Urinary tract infection
- Pneumonia
- Care involving rehabilitation procedures
- Acute sub-endocardial myocardial infarction
- Extracorporeal dialysis (due to their AKI)
- Cellulitis of lower limb
- Chronic lung disease with infection
- Gastroenteritis and colitis
- Sepsis

Figure 3: Crude incidence rate of renal replacement therapy by number of AKI episodes.

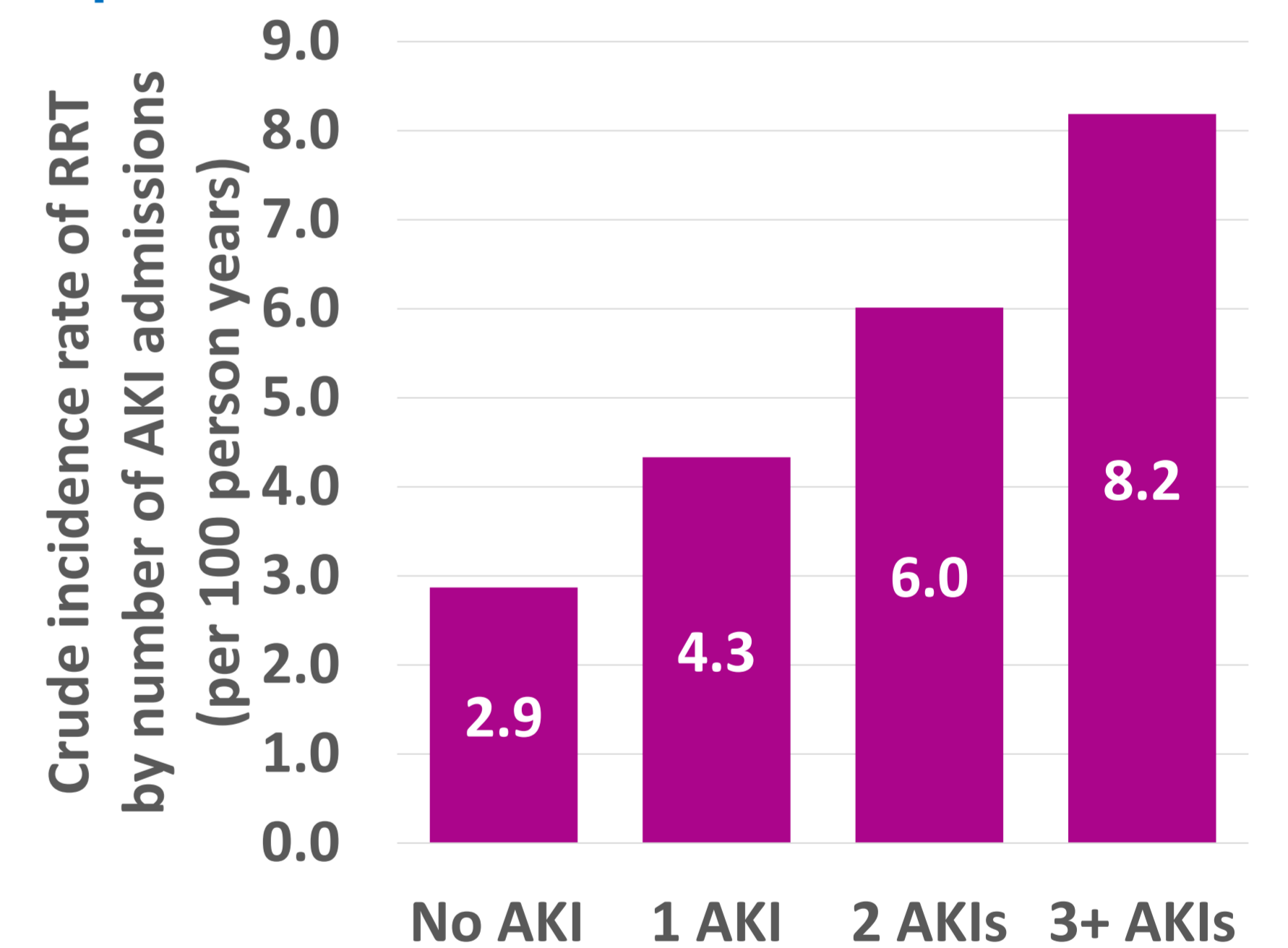


Figure 5: Mean of hospitalisation costs (AU\$) by number of AKI admissions, excluding RRT.

