Impact of cardiovascular events on mortality and decline of renal function in patients with chronic kidney disease.

Andrew S Jeyaruban[1,2], Andrew J Mallett[1,2,3], Anne Cameron[1,2,3], Jianzhen (Jenny) Zhang[2,3], Helen G Healy[1,2,3] and Wendy E Hoy[2,3] on behalf of the NHMRC CKD.CRE and CKD.QLD Collaborative

1. Kidney Health Service, Metro North Hospital and Health Service, Brisbane, Queensland, Australia.
2. CKD.QLD and the NHMRC CKD.CRE, The University of Queensland, Brisbane, Queensland, Australia.
3. Faculty of Medicine, The University of Queensland, Brisbane, Queensland, Australia.

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Background

Cardiovascular events (CVE) are both common and significant complications amongst patients with chronic kidney disease (CKD). The association of CKD and CVE is well publicised, however the impact of CVE on subsequent kidney survival is not well described.

Aim

Our aim was to study the impact of new cardiovascular events (CVE) on mortality and deterioration of kidney function in a prevalent chronic kidney disease (CKD) patient cohort.

Method

- This is a retrospective cohort study of 1,123 patients of a tertiary teaching hospital who were enrolled in the CKD.QLD Registry between January 2011 and August 2017.
- Each participant included had a minimum of 2 years survival from date of consent.
- CVE data (ischemic heart disease (IHD), stroke and peripheral vascular disease (PVD), renal function (eGFR CKD-EPI) and mortality events were extracted from integrated medical records.
- Patients who progressed to end stage kidney disease were imputed an eGFR 8mL/min/1.73m2 at the date of kidney replacement therapy (KRT). Delta eGFR (mL/min/1.73 m2/year, (CKD-EPI) was calculated as the difference between latest eGFR compared to at time of incident CVE.

Results

- 222 patients had a least one incident CVE which included ischaemic heart disease (IHD) (n=144), stroke (n=51), or peripheral vascular disease (PVD) (n=40).
- Of these 222 patients, 80 (36.0%) died without commencing kidney replacement therapy (KRT) and 23 (10.4%) commenced KRT.
- Kaplan-Meier analysis **(Figure 1)** shows survival was reduced by 700 days (2,867 [SE=67] vs 2,167 [SE=61]) in the CVE cohort (p<0.01).
- CV events had a significant (p<0.05) impact on mortality, even after adjusting for age, gender and/or history of prior IHD, stroke and/or PVD **(Table 1).**
- There was no significant change in the absolute mean delta eGFR in patients with or without a CVE, adjusted for age **(Table 2).** Nor was there a significant difference in progression to kidney replacement therapy, adjusting for age, gender and previous IHD, stoke and PVD.
- **Tables 3 and 4** summarise a multivariate analysis and bi-variate analysis of factors associated with delta eGFR and progression to kidney replacement therapy.

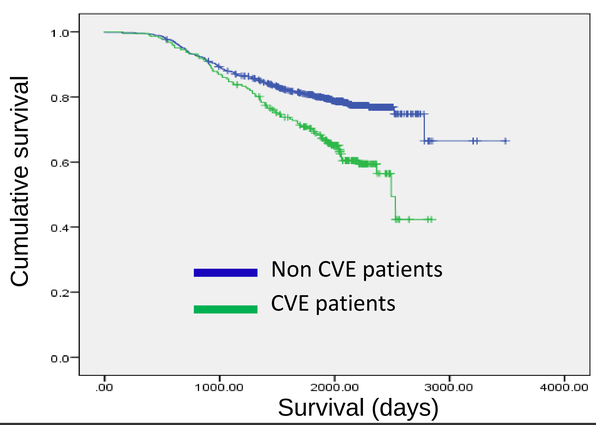

Figure 1: Kaplan-Meier survival of CKD patients according to occurrence of cardiovascular events (CVE).

Table 1: Cox regression analysis looking at the time to mortality in patients with and without cardiovascular events

	Estimate (Days)	Standard Error	95% Confidence Interval	
			Lower Bound	Upper Bound
No Cardiovascular Events	2,867.3	67.1	2,735.9	2,998.8
Cardiovascular Events	2,166.6	60.9	2,047.2	2,285.9

Table 2: Comparing the association between cardiovascular events and delta eGFR.

	N	Mean	SD	P value
No Cardiovascular Events	798	-2.3	17.9	0.99
Cardiovascular Events	199	-2.3	7.7	

Table 3: Multivariable analysis exploring factors associated with delta eGFR

Source	Mean Square	F	Sig.
Intercept	143,796,401.2	521.9	<0.05
Age	14,193,939.5	51.5	<0.05
Cardiovascular events	16,315.2	0.1	0.8
IHD	618,640.6	2.2	0.1
Heart failure	2,017.0	0.01	0.9
Stroke	29,211.4	0.1	0.7
Peripheral vascular disease	153,534.5	0.6	0.5
Hypertension	795,243.2	2.9	0.1
Diabetes	525,329.5	1.9	0.2

Table 4: Bi variate analysis exploring the factors associated with progression to KRT

	-2 Log Likelihood of Reduced Model	Chi-Square	Sig.
Intercept	575.3	0.000	
Age	621.9	46.6	<0.05
Hypertension	592.3	17.0	<0.05
Diabetes	577.8	2.5	0.1
Dyslipidaemia	576.5	1.2	0.3
Heart Failure	577.2	1.9	0.2
Cardiovascular events	575.3	0.01	0.9

Conclusion

New cardiovascular events are a a flag for premature mortality in this cohort of patients with chronic kidney disease, as they are for the general population. However, incident cardiovascular events do not seem to have a significant association with accelerated progression of renal dysfunction or transition to kidney replacement therapy. Limitations of this report include the exclusion of patients with the shortest survival (inclusion criteria: minimum 2 years survival in the CKD.QLD Registry).

Queries: *please contact the NHMRC CKD.CRE @* ***ckd.cre@uq.edu.au*** *or phone* ***+61 7 3346 4995.***
Primary Author contact details: *Dr Andrew Jeyaruban @ andrewjeyaruban@gmail.com*

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