

Non-traditional Risk Factors for Cardiovascular Events in Chronic Kidney Disease: A Cohort Study

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Background

Chronic kidney disease (CKD) is a common condition affecting around 7% of the population. People with CKD have a greatly increased risk of cardiovascular disease, however the increased prevalence of traditional risk factors in people with CKD cannot fully account for this increase^{1,2}. Small scale studies have identified serum phosphate and anaemia as potential predictors of cardiovascular events in people with renal disease⁴.

Aim

This study investigates the role of these potential risk factors across all stages of CKD in a large community cohort.

Methods

A cohort of adults (N = 46,450), with CKD from the Quality Improvement in Chronic Kidney Disease (QICKD) trial⁵ has been followed up over a period of 2.5 years, using anonymised routinely collected GP data, to identify adverse cardiovascular outcomes. A combined outcome measure of all-cause mortality and cardiovascular events (myocardial infarction, advanced coronary artery disease, stroke, and TIA) was used. A multilevel logistic regression model was created to identify the contribution of each potential risk factor to adverse outcomes. Known cardiovascular risk factors were included and adjusted for.

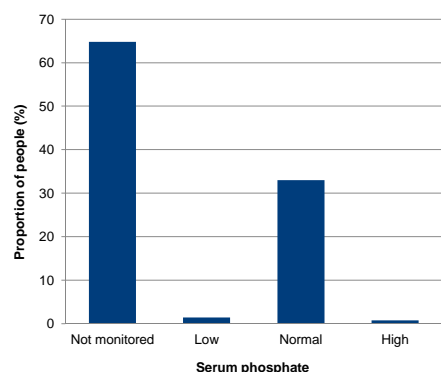


Figure 1. The outcomes of serum phosphate testing in people with CKD in primary care.

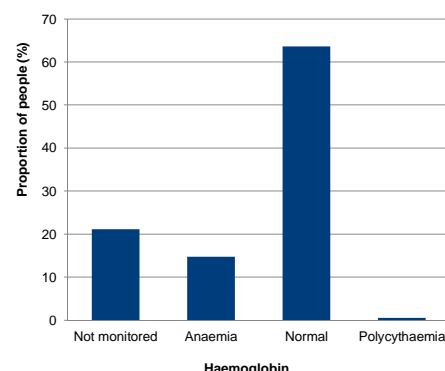


Figure 2. The outcomes of haemoglobin testing in people with CKD in primary care.

Results

There were 2,437 (5.2%) deaths in the cohort during the 30 month follow up period and 2273 (4.9%) non-fatal cardiovascular events.

Of the 16,350 (35.2%) people with CKD who had one or more phosphate measurements 345 (2.1%) had a level above 1.4mmol/l (figure 1). Phosphate above this level was found to be an independent predictor of adverse events: odds ratio (OR) 1.51 (95% CI 1.11-2.06; P = 0.009). From 36,644 (78.9%) of people with CKD who had a haemoglobin measurement 6,855 (18.7%) were found to be anaemic (figure 2). Anaemia was also an independent predictor of adverse events: OR 1.23 (95% CI 1.12 – 1.34; P < 0.001).

The impact of these effects is comparable to that of known risk factors for cardiovascular disease in this patient population such as proteinuria and CKD stage 3b or greater (figure 3).

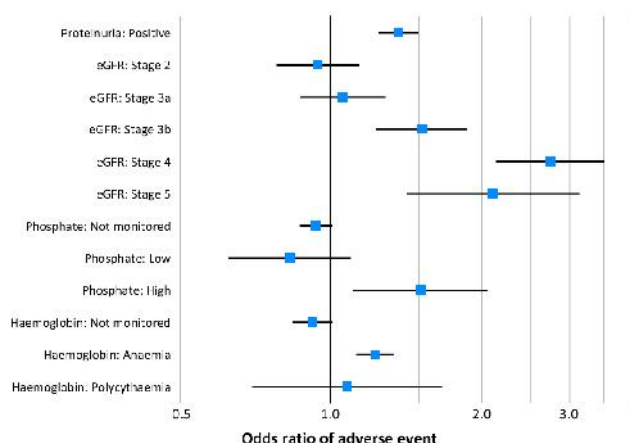


Figure 3. The odds of adverse events with 95% confidence intervals, by risk factor, for 46,450 people with chronic kidney disease.

Conclusions

Elevated serum phosphate and anaemia may represent important risk factors for cardiovascular events in people with all stages of CKD. The impact of intervention on these factors should be investigated.

References

- Go AS, Chertow GM, Fan D, McCulloch CE, Hsu CY. Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. *N Engl J Med* 2004;351(13):1296-305.
- Tonelli M, Wiebe N, Cullerton B, House A, Rabbat C, Fok M, et al. Chronic kidney disease and mortality risk: a systematic review. *J Am Soc Nephrol* 2006;17(7):2034-47.
- Dhingra R, Sullivan LM, Fox CS, Wang TJ, D'Agostino RB, Sr., Gaziano JM, et al. Relations of serum phosphorus and calcium levels to the incidence of cardiovascular disease in the community. *Arch Intern Med* 2007;167(9):879-85.
- Muntner P, He J, Astor BC, Folsom AR, Coresh J. Traditional and nontraditional risk factors predict coronary heart disease in chronic kidney disease: results from the atherosclerosis risk in communities study. *J Am Soc Nephrol* 2005;16(2):529-38.
- de Lusignan S, Gallagher H, Chan T, Thomas N, van Vlymen J, Nation M, et al. The QICKD study protocol: a cluster randomised trial to compare quality improvement interventions to lower systolic BP in chronic kidney disease (CKD) in primary care. *Implement Sci* 2009;4:39.