The relationship between duration of heart failure, serum potassium concentration and adverse clinical outcomes

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Topic(s):
Chronic Heart Failure – Epidemiology, Prognosis, Outcome

Background: Hyper- and hypokalaemia are frequent complications in patients with heart failure (HF). The association between all-cause mortality (ACM), major adverse cardiovascular events (MACE) and serum potassium (K+) has previously been characterised in a UK incident HF population, with hypo- and hyperkalaemic patients being at increased risk of adverse clinical outcomes.

Purpose: This study aimed to assess the generalisability and findings of previously published risk equations in a broader HF population, spanning both incident and prevalent HF cases regardless of chronic kidney disease (CKD), and to explore the relationship between duration of HF and elevated risk associated with hypo- or hyperkalaemia.

Methods: A retrospective cohort study was conducted using linked UK Clinical Practice Research Datalink (CPRD) GOLD and Hospital Episode Statistics (HES) data. Eligible patients included individuals ≥18 years with HF (identified using READ codes) during the study period (January 2008 to June 2018) or five-year lookback period (2003 to 2007). Patients’ index date was set to 1st January 2008 for prevalent patients or date of HF diagnosis for incident patients. Adverse clinical outcomes included ACM and MACE, a composite of arrhythmia, HF, myocardial infarction and stroke. Published risk equations for ACM and MACE for incident HF without CKD were refitted to this broader study population using original covariates and model forms. Coefficient values were adjusted for the inclusion of HF duration (≤ 5 and > 5 years). Incidence rate ratios (IRRs) were recalculated with K+ concentration 4.5 to <5.0 mmol/L as the reference category.

Results: The HF cohort consisted of 84,210 patients with a mean follow-up of 5.01 years. The cohort was predominantly male (53.0%), with a mean age of 77.3 years at index. Ischaemic heart disease, hypertension, atrial fibrillation and type 2 diabetes were present in 42.24%, 61.39%, 40.89% and 20.38% of the population, respectively. CKD stage 3+ was present in 39.13% of patients, with a cohort mean estimated glomerular filtration rate of 56.9 mL/min/1.73m² at index. Crude ACM and MACE event rates were 159.5 (95% confidence interval (CI): 157.9-161.0) and 575.8 (95% CI: 572.8-578.7) per 1,000 patient years, respectively. Hypo- and hyperkalaemia were generally associated with increased risk of ACM and MACE in comparison with patients with K+ concentrations of 4.5 to <5.0 mmol/L (figure 1); these associations were maintained irrespective of the duration of HF.

Conclusion: A real-world analysis of UK patients suggests that previously published associations between hypo- and hyperkalaemia and increased risk of adverse clinical outcomes in an incident HF population are generalisable to a cohort of incident and prevalent HF patients, irrespective of HF duration and the presence of comorbid CKD. Improved monitoring and management of K+ may have the potential to improve outcomes in these patients.
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