

Multimorbidity and adverse clinical outcomes in patients with chronic kidney disease: findings from the UK Biobank Cohort.

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Introduction

Multimorbidity (the presence of two or more long term conditions (LTCs)) is common in patients with Chronic Kidney Disease (CKD). The existing literature on multimorbidity in CKD focuses mostly on stage 5 CKD (which accounts for only 1% of the population with CKD). Here we study patients with stages 3 to 5 CKD in the UK Biobank Cohort and report the rates of mortality and cardiovascular events, exploring the associations with multimorbidity.

Methods

The UK Biobank Cohort is a prospective population-based study of around 500,000 adults aged 37–73 years at baseline (between 2006 and 2010). Information is partly self-reported and is validated by linked primary care and hospital records. Biochemistry data are available at baseline for 93% of patients and we calculated estimated glomerular filtration rates (eGFR) using the CKD-EPI equation. The patients with eGFRs of less than 60ml/min/1.73m² were divided by number of LTCs (0, 1, 2 and ≥3) in addition to CKD. Time-to-event analyses were performed for mortality and major adverse cardiovascular events (MACE; myocardial infarction, stroke and CV death). Hazard ratios (HRs) were calculated with adjustments for age, sex, ethnicity and body mass index (BMI) for all-cause mortality and age, sex, ethnicity, BMI, smoking status, deprivation status, eGFR and hypercholesterolaemia for MACE.

Results

10,062 of the patients in UK Biobank had an eGFR of less than 60ml/min/1.73m². During a median follow-up of 8.76 years (Interquartile range (IQR) 96–113 months), there were 1290 deaths and 951 MACEs. The median age was 64 years (IQR 60–67), 53.2% were female, 95.2% of white ethnicity, median eGFR was 54 (IQR 48–57) and the median number of prescribed medications was 4 (IQR 2–7). Rates of all-cause mortality rose with increasing condition count: 0 LTCs 8.0%, 1 LTC 13.1%, 2 LTCs 16.6% and ≥3 LTCs 22.2%. Rates of MACE rose with increasing condition count: 0 LTCs 5.5%, 1 LTC 9.7%, 2 LTCs 13.0% and ≥3 LTCs 16.5%. All-cause mortality risk for those with ≥3 LTCs was more than 2 times higher than those with 0 LTCs: HR 2.68 (95% confidence interval 2.28–3.14, p<0.001). Figure 1 shows the probability of all-cause mortality by number of LTCs. Risk of MACE for those with ≥3 LTCs was more than 2 times higher than those with 0 LTCs: HR 2.29 (1.88–2.79, p<0.001). Cause of death was more likely to be from cardiac disease in patients with more LTCs: 17.9% in patients with 0 LTCs versus 39.6% for patients with ≥3 LTCs (p<0.001).

Conclusions

This study identifies associations between multimorbidity and higher risks of all-cause mortality and cardiovascular events in patients with CKD stages 3 to 5. This advances the field by including a large sample size with predominantly mild to moderate CKD. Improving our understanding of why multimorbidity has such an effect on adverse events will inform the future care of patients with CKD.