Estimated Glomerular Filtration Rate Equations: Do we need to use the ethnicity correction factor in the United Kingdom?

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Background: Estimated glomerular filtration rate (eGFR) equations are recommended for management of chronic kidney disease (CKD) in national and international guidelines. The most commonly used equations, Modified Diet and Renal Disease (MDRD) and CKD-EPI, were derived from large population studies in the United States and include use of a correction factor for Black ethnicity. However, recent studies from different African countries suggest eGFR equations are more accurate without the use of an ethnicity correction factor. In the UK, the rate of CKD in people of Afro-Caribbean ancestry is up to 3-5 times higher than Caucasians. Accurate assessment of GFR is important for early diagnosis and appropriate management. This study aimed to assess the accuracy of eGFR equations, with and without ethnicity correction factors compared with gold standard ^{51}Cr-ethylenediaminetetraacetic acid (^{51}Cr-EDTA) clearance assays.
Methods: All ^{51}Cr-EDTA studies were extracted from hospital databases from 2009-2019 and corrected for body surface area. Demographics including self-reported ethnicity, sex, age and referral specialty were recorded. Creatinine (IDMS traceable assay) and albumin concentrations taken within one week of ^{51}Cr-EDTA study were recorded. Patients with albumin <30g/dl, referrals from hepatology (due to possible reduced muscle mass and interference with creatinine assays), <18 years old, non-white or non-black and mixed ethnicities and those with incomplete data were excluded. The accuracy of CKD-EPI and MDRD equations for calculating eGFR, with and without the ethnicity correction factor, compared to gold standard ^{51}Cr-EDTA GFR was assessed using bias, precision and 30% accuracy. These were calculated overall, and in subgroups by ethnicity and GFR categories.
Results: After exclusions, 2776 ^{51}Cr-EDTA studies were identified. Mean age was 54 years, 43% were female, and 12% of self-reported Black ethnicity. Compared to the gold standard GFR, White patients had a bias of 14.3 and 14.6ml/min/1.73m² using the CKD-EPI and MDRD equations, respectively. In Black patients, the eGFR equations significantly overestimated GFR compared to White (bias 20.3 and 19.4ml/min/1.73m² respectively, p<0.001). Disregarding the ethnicity correction factor significantly improved GFR estimates for Black patients (bias 6.7 and 2.2ml/min/1.73m² for CKD-EPI and MDRD respectively, p<0.001). Accuracy was superior for GFR≥60ml/min/1.73m² compared to <60ml/min/1.73m² using CKD-EPI equation for both White and Black patients (p<0.001) and for MDRD equation for White patients (Table 1).
Discussion: To our knowledge this is the largest study to explore the use of eGFR equations in people of Black ethnicity living outside the US and Africa. The important finding of overestimation of true GFR with eGFR equations using ethnicity correction factors suggest that current UK practice may lead to reduced rates of CKD diagnosis and under-recognition of CKD severity in people of Black ethnicity in the UK. Limitations of the study include retrospective design, lack of information about hydration and fasting status, use of Jaffe assay, potential inclusion of patients with medical conditions which may affect muscle mass and creatinine excretion and number of black patients with CKD. These findings require validation in other centres and in a prospective study.