Nomogram for estimating glomerular filtration rate in elderly people

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Abstract
After the second decade of life, the glomerular filtration rate (GFR) decreases progressively. There is still considerable debate about the importance of this "physiological decrease" in GFR with age in many situations attributed to the effects of concomitant hypertension, atherosclerosis, cardiovascular diseases (among others) observed in the elderly. The GFR is considered the best indicator of renal function and its estimate has been suggested in the guidelines of chronic kidney disease (CKD). However, in the most commonly equations used, the elderly subjects were not included or were underrepresented. The purpose of this is to describe a nomogram based on an equation to estimate GFR based on serum creatinine, age and sex that was developed for the study Berlin Initiative Study (only individuals older than 70 years were included). The performance of the equation, called BIS1 was compared with Hioxal (gold standard), three equations based on serum creatinine (CG, MDRD and CKD-EPI) and three equations based on cystatin C (proposed by the CKD-EPI) and the second showed less bias among that another equations and compared the CG, MDRD and CKD-EPI equations, had the lowest rate of misclassification of CKD in participants with less than 60 mL/min/1.73 m².

Keywords: aged; glomerular filtration rate; kidney diseases.

Dear Editor,
Chronic kidney disease (CKD) is deemed a public health problem in the countries in which it has been properly studied. Early diagnosis of CKD and the treatment of the disease’s complications and comorbidities decrease the rate at which kidney function is lost and reduce cardiovascular death by up to 50%.1 The identification of patients with altered glomerular filtration rates (GFR) also allows increased accuracy in the prescription of drugs eliminated via the kidneys and the assessment as to whether certain imaging tests should be carried out, in addition to offering valuable input to the choice of renal replacement therapy and the evaluation of kidney donors.

The GFR gradually decreases after the second decade of life (the normal value for a young adult is around 120 mL/min/1.73 m²) by a mean of 8-9 mL/min/1.73 m²/decade. There is considerable debate over the relevance of this ‘physiological decrease’ in the GFR with aging. In many occasions it has been described as the effect of concurrent findings of high blood pressure, atherosclerosis, and cardiovascular disease in elderly
individuals. Reductions in the GFR with aging combined with nephrosclerosis make elderly individuals particularly susceptible to CKD, with prevalence rates reaching 47% among individuals aged 70 years or older.

Considered the best estimator of renal function, the GFR has been included in the main CKD guidelines. However, elderly individuals were either not included or poorly represented in the Cockcroft-Gault (CG), Modification of Diet in Renal Disease (MDRD), and Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equations cited in the guidelines.

More recently, an equation to estimate the GFR based on creatinine levels, gender, and age was developed for the Berlin Initiative Study, which included only individuals with ages greater than 70 years. The BIS1 equation was compared to Hioxal (the gold standard), three creatinine-based equations (CG, MDRD, and CKD-EPI), and three equations based on cystatin-C (proposed by the CKD-EPI), and was shown to produce less bias than any of its counterparts. Additionally, when compared to the CG, MDRD, and CKD-EPI equations, the BIS1 led to fewer misses in the categorization of CKD in individuals with a GFR lower than 60 mL/min/1.73 m².

The two attached nomograms show the findings for female (Figure 1) and male (Figure 2) patients based on the BIS1 equation. The stages of CKD are color-coded, and the nomograms also pay special attention to the need of identifying markers of renal parenchyma injury in patients with a GFR of 60 mL/min/1.73 m² or lower.

To sum up with, the presented charts, derived from the BIS1 equation, appear to provide a more accurate estimation of the GFR in elderly subjects and allow the identification of
patients with asymptomatic CKD without requiring the use of additional tools (computers, smartphones, calculators, or the Internet), which may not always be available. However, as pointed out by the authors of the study, the equation was developed based on a population comprised of elderly Caucasian German patients, and needs to be validated for other ethnic groups.

REFERENCES


