Estimating glomerular filtration rate in a population-based study.

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Abstract

BACKGROUND: Glomerular filtration rate (GFR)-estimating equations are used to determine the prevalence of chronic kidney disease (CKD) in population-based studies. However, it has been suggested that since the commonly used GFR equations were originally developed from samples of patients with CKD, they underestimate GFR in healthy populations. Few studies have made side-by-side comparisons of the effect of various estimating equations on the prevalence estimates of CKD in a general population sample.

PATIENTS AND METHODS: We examined a population-based sample comprising adults from Wisconsin (age, 43-86 years; 56% women). We compared the prevalence of CKD, defined as a GFR of <60 mL/min per 1.73 m(2) estimated from serum creatinine, by applying various commonly used equations including the modification of diet in renal disease (MDRD) equation, Cockcroft-Gault (CG) equation, and the Mayo equation. We compared the performance of these equations against the CKD definition of cystatin C >1.23 mg/L.

RESULTS: We found that the prevalence of CKD varied widely among different GFR equations. Although the prevalence of CKD was 17.2% with the MDRD equation and 16.5% with the CG equation, it was only 4.8% with the Mayo equation. Only 24% of those identified to have GFR in the range of 50-59 mL/min per 1.73 m(2) by the MDRD equation had cystatin C levels
>1.23 mg/L; their mean cystatin C level was only 1 mg/L (interquartile range, 0.9-1.2 mg/L). This finding was similar for the CG equation. For the Mayo equation, 62.8% of those patients with GFR in the range of 50-59 mL/min per 1.73 m(2) had cystatin C levels >1.23 mg/L; their mean cystatin C level was 1.3 mg/L (interquartile range, 1.2-1.5 mg/L). The MDRD and CG equations showed a false-positive rate of >10%.

**DISCUSSION:** We found that the MDRD and CG equations, the current standard to estimate GFR, appeared to overestimate the prevalence of CKD in a general population sample.