Letters to the Editor

Detecting of chronic kidney disease in older people by the MDRD and MCQ formulas

SIR—Healthcare professionals have been recently prompted by leaders of the American Association of Clinical Chemistry, the American Diabetes Association, the American Society of Nephrology and the College of American Pathologists as well as the National Kidney Disease Education Program to report estimated glomerular filtration rate (eGFR) by all hospital and commercial laboratories in the USA, preferably by using the Modification of Diet in Renal Disease (MDRD) formula [1]. However, since this formula systematically underestimates GFR, and may erroneously categorise some healthy persons as having chronic kidney disease (CKD), a new ‘Mayo Clinic Quadratic’ (MCQ) equation has been developed [2]. We read with interest the article of Roderick et al., concluding that an eGFR <60 ml/min/1.73 m², calculated by the MDRD formula, is very common in older people [3].

To verify how both formulas perform in a population of older people, we analysed results of serum creatinine tests performed on consecutive outpatients aged 75 and over, referred by general practitioners for routine blood testing to our laboratory over the past year. Venous blood was routinely collected in the morning on fasting subjects. Serum creatinine was measured on a Roche/Hitachi Modular System P (Roche Diagnostics GmbH, Mannheim, Germany) by Jaffe, rate blanked and compensated assay. Throughout the study, the quality of results was validated by regular internal quality control procedures and participation in an External Quality Assessment Scheme. The eGFR was estimated by the MDRD formula, as modified by Levey et al. for methods traceable to the serum creatinine reference system [4], and the newer MCQ equation \( \text{eGFR} = \exp\{1.911 + (5.249/\text{serum creatinine}) - (2.114/\text{serum creatinine}^2) - 0.00686 \times \text{age} - 0.205 \text{(if female)}\}; \) if serum creatinine is <71 μmol/l, it is replaced by 71 μmol/l [2]. The significance of differences was assessed by the Mann–Whitney test (for continuous variables) and the \( \chi^2 \) test (for categorical variables).

Cumulative results were retrieved for 1,634 outpatients ≥75 years over the 1-year period (M/F = 726/908; age range: 75–91 years). The prevalence of CKD estimated by both formulas is reported in Table 1. Surprisingly, the prevalence of subjects with eGFR <60 ml/min/1.73 m² was remarkable lower when estimated by the MCQ formula, whereas the prevalence of subjects with eGFR either <45 or <30 ml/min/1.73 m² did not differ statistically.

Although we could not measure eGFR by a reference method (i.e. iothalamate clearance), our results attest that routine calculation of eGFR using the newer MCQ equation rather than the MDRD formula would identify a smaller sub-group of older people with stage 3–5 CKD, while both formulas do not differ significantly in detecting more severe degrees of CKD (stages 4–5). Accordingly, the MCQ formula might be more appropriate in the ageing population, to prevent misclassification of ‘diseased’ individuals.

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Table 1. Estimated glomerular filtration rate (eGFR) calculated by the Modification of Diet in Renal Disease (MDRD) formula and the ‘Mayo Clinic Quadratic’ (MCQ) in 1,634 older outpatients

<table>
<thead>
<tr>
<th>eGFR (ml/min/1.73 m²)</th>
<th>MDRD</th>
<th>MCQ</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 ml/min/1.73 m²</td>
<td>344/1,634 (21.1%)</td>
<td>151/1,634 (9.2%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>45 ml/min/1.73 m²</td>
<td>103/1,634 (6.3%)</td>
<td>75/1,634 (4.6%)</td>
<td>0.417</td>
</tr>
<tr>
<td>60 ml/min/1.73 m²</td>
<td>28/1,634 (1.7%)</td>
<td>37/1,634 (2.3%)</td>
<td>0.689</td>
</tr>
</tbody>
</table>

The significance of differences is assessed by the Mann–Whitney test (for continuous variables) and the \( \chi^2 \) test (for categorical variables). SEM, standard error of the mean.


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