

What GFR estimating equation should be used in elderly patients?

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Introduction:

The elderly are the biggest consumers of prescription medication, and are most likely to have drug interactions and suffer adverse events from medication. Adverse drug reactions are 3-10 times more common in elderly patients with chronic kidney disease (CKD) than those without. Kidney function declines with age and measurement of glomerular filtration rate (GFR) is important in accurate dosing of renally excreted medication. However routine measurement of GFR in the elderly is problematic and still not validated.

Methods:

We undertook a systematic review of the literature in relation to the accuracy of GFR estimating equations in the elderly and the ability of GFR estimating equations to predict outcomes. A systematic literature search was carried out in Central, PubMed and MEDLINE. "Elderly" was defined as older than 65 years. Selected abstracts were screened independently by two reviewers and differences resolved by discussion. From the initial search papers were identified for detailed review and data extraction.

Results:

1471 abstracts were screened, 156 selected for eligibility assessment, and 52 assessed for data quality. Data extraction was carried out on 30. 24 of the selected studies were observational non-comparative cross-sectional studies measuring the bias (difference between the mean of measurements and the reference value), precision (range of the difference) and accuracy (the closeness of a measurement to the true GFR) of different GFR estimating equations compared to a measured reference GFR. Five observational studies assessed the value of measured different GFR estimating equations in predicting outcomes (mortality, cardiovascular mortality). 48 different GFR estimating equations were included in a total of 14,740 patients. GFR estimating equations depend critically on the creatinine assay used to derive them. A lack of uniformity in the creatinine methodology makes generalisations between studies difficult. All equations demonstrated imprecision and bias to a greater or lesser extent in the elderly. The inclusion of Cystatin-based equations appeared to improve bias, precision and accuracy. Amongst the better known GFR equations CKD-EPI gave less bias, more precision and accuracy than MDRD. CKD-EPI_{Cystatin} was able to predict cardiovascular outcomes better than CKD-EPI_{Cr}.

Conclusions:

Though use of CKD-EPI equations may have marginal comparative benefits, the absence of a clearly outstanding GFR estimating equation highlights the need to improve practitioner understanding of the limitations of GFR estimation in the elderly. Greater consistency in the use of creatinine assay methodology would benefit interpretation.

