Estimating glomerular filtration rate (eGFR): Information for General Practitioners

The National Service Framework (NSF) for Renal Services has recommended that local health organisations can work with pathology services and networks to develop protocols for measuring kidney function by serum creatinine concentration together with a formula-based estimation of glomerular filtration rate (GFR), calculated and reported automatically by all clinical biochemistry laboratories. The aim of this information sheet is to provide some background relevant to the implementation of eGFR reporting nationally.

Why?

Chronic kidney disease (CKD) affects about 10% of the population and is often asymptomatic until renal function is severely reduced. Mild CKD is also important as it represents a significant risk factor for coronary heart disease. Once identified patients with progressive CKD can be actively treated to preserve remaining renal function and to manage potential complications such as cardiovascular disease. The introduction of estimated glomerular filtration rate (eGFR), based on serum creatinine measurement and application of a formula, will enable GPs to create a register of patients with CKD stages 3–5 and identify patients who require referral to renal services, while continuing to manage the majority of patients with stable CKD themselves.

Traditionally serum creatinine measurements have been one of the mainstays for initial identification of renal disease. The cumbersome creatinine clearance test, and other technically demanding measurements, are then used to further estimate GFR. Knowledge of the GFR is essential for the diagnosis of CKD. Serum creatinine measurements on their own are insufficiently sensitive to detect moderate CKD as many patients who have reduced GFR have serum creatinine concentrations that fall inside the conventional laboratory 'normal' ranges. It is partly because of these complications that the Department of Health have recommended that all clinical biochemistry laboratories should provide eGFR to identify affected patients. Formula-based eGFR calculation takes into account some of the factors that complicate serum creatinine interpretation and provides a practical and more sensitive approach to identification, initial staging and monitoring of CKD patients.

How?

In adults (≥ 18 years old) eGFR will be calculated by the laboratory using the 4-variable Modification of Diet in Renal Disease (MDRD) equation. The four variables are:

- Serum creatinine concentration
- Age
- Sex
- Ethnic origin (for African-Caribbean people only, eGFR multiplied by 1.21).

The ethnicity correction only applies to African-Caribbean patients. Laboratory reports should indicate whether a correction has been applied.

The eGFR will be reported as mL/min/1.73 m^2. When eGFR exceeds 89 mL/min/1.73 m^2 values will be reported as ≥ 90 mL/min/1.73 m^2.

Cautions?

The equation is only an estimate and is not validated for use in:

- Children
- Acute renal failure
- Pregnancy
- Oedematous states
- Muscle wasting disease states
- Amputees
- Malnourished patients.

In the UK Caucasian population, the equation seems to work quite well. It may not perform so well in all other ethnic groups.

The MDRD formula should not be used in children. When required, eGFR can be calculated using the Schwartz formula, which requires knowledge of height (length) of the child. Whilst such estimates may be used in specialist settings, they will not be routinely produced and reported on samples received from children in a primary care setting.

When?

The Department of Health is recommending implementation of routine eGFR reporting by all NHS clinical biochemistry laboratories by 1 April 2006 to fit in with the Quality and Outcomes Framework 2006 (QOF) coming into effect.

In whom?

The NSF and the UK CKD Guidelines have made specific recommendations concerning which groups should be screened for CKD, and how often. In particular, people with diabetes, vascular disease, heart failure, hypertension, urinary tract obstruction, neurogenic bladder or surgical urinary diversion, people taking diuretics, angiotensin converting enzyme inhibitors or angiotensin II receptor blockers and people with a family history or genetic risk of kidney disease should undergo regular surveillance. eGFR should be reported on all samples carrying a request for serum creatinine measurement, bearing the above cautions in mind. Local laboratory service providers, primary care trusts and renal units should develop systems to manage these groups in which a cautious approach to application of formula-derived GFR estimates should be exercised.

What does it mean?

The UK CKD guidelines (www.renal.org/CKDguide/ckd.html) provide extensive guidance on the further investigation and management of patients with CKD. The following indicates the relationship between eGFR and the stages of kidney disease with suggested frequency of retesting to be adopted:

Stage	mL/min/1.73 m^2	Frequency of testing
1 Normal GFR*	>90	annually
2 Mild impairment*	60–89	annually
3 Moderate impairment	30–59	6-monthly
4 Severe impairment	15–29	3-monthly
5 Established	<15	3-monthly

*The terms stage 1 and stage 2 CKD are only applied when there is a structural abnormality, as determined by renal ultrasound, such as polycystic kidney disease or a functional abnormality such as persistent proteinuria or microscopic haematuria. If there is no such abnormality, a GFR of 60–89 mL/min/1.73 m^2 is not regarded as abnormal.

There is a decline in eGFR as people age, which is predominantly related to disease. In CKD the eGFR falls at a predictable rate related to the disease process. Monitoring trends in eGFR, with identification of increased rates of decline, will provide an important indicator of need for intervention in CKD patients.

Further information can be obtained from:

Department of Health. National Service Framework for Renal Services. Part Two: Chronic Kidney Disease, Acute Renal Failure and End of Life Care. 2005. Available at: www.dh.gov.uk/renal, accessed 18 January 2006

Joint Specialty Committee for Renal Disease Royal College of Physicians of London and the Renal Association. *Chronic Kidney Disease in Adults: UK Guidelines for Identification, Management and Referral*. Royal College of Physicians of London, 2005, in press. Available at: www.renal.org/CKDguide/full/UKCKDfull.pdf, accessed 18 January 2006

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