THE PATHCARE NEWS

CKD-EPI FORMULA FOR eGFR

In addition to the MDRD calculation, the estimated Glomerular Filtration Rate (eGFR) will now also be reported by means of the CKD-EPI formula.

What is the CKD-EPI formula?

The Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) study group developed this formula in 2009, using data from 8254 subjects, including Caucasians and African-Americans, with and without kidney disease. The equation is based on a mathematical model that establishes the relationship between GFR and serum creatinine (IDMS-standardized), gender, age and race:

Caucasian Females: If S-creat is ≤ 62 µmol/L: $eGFR = 144 \times (S\text{-creat}/61.88)^{-0.329} \times (0.993)^{Age}$
If S-creat is > 62 µmol/L: $eGFR = 144 \times (S\text{-creat}/61.88)^{-1.209} \times (0.993)^{Age}$

Caucasian Males: If S-creat ≤ 80 µmol/L: $eGFR = 141 \times (S\text{-creat}/79.56)^{-0.411} \times (0.993)^{Age}$
If S-creat > 80 µmol/L: $eGFR = 141 \times (S\text{-creat}/79.56)^{-1.209} \times (0.993)^{Age}$

Why use the CKD-EPI formula?

The CKD-EPI is now the preferred formula for calculation of eGFR, and endorsed by the South African Renal Society. Since the MDRD formula was developed in a population with CKD, its accuracy is best at lower levels of GFR, however it underestimates renal function in those with higher levels of GFR. The CKD-EPI equation is shown to be as accurate as the MDRD in patients with GFR <60 ml/min/1.73m^2, and substantially more accurate in patients with GFR > 60 ml/min/1.73m^2.

Ethnicity

Studies in Africa have shown that a significant bias exists when applying the African-American ethnicity factor. It is therefore recommended that the coefficients for black subjects derived outside Africa, should not be used in African black populations.

Drug dosing

The CKD-EPI eGFR can be used for drug dosing, provided that the adjustment for body surface area is removed in patients with extremes of body size.

Limitations

As with all creatinine-based estimates, factors that may influence results, include: muscle mass, diet, cephalosporins, cimetidine, trimethoprim, ketones. During rapidly-changing kidney function, no eGFR equation is accurate. While serum creatinine rises, eGFR will overestimate renal function, and vice versa. The CKD-EPI formula has not been validated in pregnant women and children <18y. In children, the Schwartz bedside formula can be used.

Practical

The CKD-EPI calculation for eGFR will now be reported with every serum creatinine measured in patients ≥18y, if the gender is supplied. In order to get familiarized with results for the new equation, it will be reported together with the MDRD for a period of time, following which the MDRD will be discontinued.

References: Clin Biochem Rev 2011;32:75-79
https://www.kidney.org/professionals/KDOQI/gfr
http://www.sa-renalsociety.org/guidelines/SARS-Guideline1_ChronicDialysis-Adults_2015.pdf

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CKD-EPI FORMULE VIR bGFS

Bykomend tot die MDRD berekening, gaan die beraamde Glomerulêre Filtrasiespoed (bGFS) nou ook m.b.v. die CKD-EPI formule gerapporteer word.

Wat is die CKD-EPI formule?

Die Chronic Kidney Disease Epidemiology Collabortion (CKD-EPI) studiegroep het hierdie formule in 2009 ontwikkel, deur gebruik te maak van data van 8254 persone, insluitend Kaukasiërs en Afro-Amerikaners, met en sonder niersiekte. Die vergelyking is gebaseer op 'n wiskundige model wat die verhouding tussen GFS en serum kreatinien (IDMS-gestandaardiseer), geslag, ouderdom en ras beskryf:

Middeldosering

Die CKD-EPI kan vir middeldosering gebruik word, indien die aanpassing vir liggaamsoppervlak in pasiënte met buitensporige liggaamsgrootte, verwyder word.

Beperkinge

Soos met alle kreatinien-gebaseerde beramings, is daar faktore wat resultate mag beïnvloed, insluitend:spiermassa, dieet, kefalosporiene, cimetidien, trimetoprim, ketone. Gedurende vinnig-veranderende nierfunksie is geen bGFS berekening akkuraat nie. Terwyl serum kreatinien styg, sal bGFS die nierfunksie oorskat, en omgekeerd. Die CKD-EPI formule is nie in swanger vroue en kinders <18j gevalideer nie. In kinders kan die 'Schwartz bedside' formule gebruik word.

Kaukasiër Vroue: As S-kreat ≤ 62 µmol/L: $bGFS = 144 \times (S\text{-kreat}/61.88)^{-0.329} \times (0.993)^{Ouderdom}$

As S-kreat > 62 µmol/L: $bGFS = 144 \times (S\text{-kreat}/61.88)^{-1.209} \times (0.993)^{Ouderdom}$

Kaukasiër Mans: As S-kreat ≤ 80 µmol/L: $bGFS = 141 \times (S\text{-kreat}/79.56)^{-0.411} \times (0.993)^{Ouderdom}$

As S-kreat > 80 µmol/L: $bGFS = 141 \times (S\text{-kreat}/79.56)^{-1.209} \times (0.993)^{Ouderdom}$

Waarom die CKD-EPI formule gebruik?

Die CKD-EPI is nou die verkose formule vir berekening van bGFS, en is onderskryf deur die Suid-Afrikaanse Niervereniging. Aangesien die MDRD formule van 'n populasie met chroniese nierversaking afkomstig is, het dit die beste akkuraatheid teen laer vlakke van GFS. Dit onderskat egter nierfunksie in diegene met hoër vlakke van GFS. Daar is aangetoon dat die CKD-EPI vergelyking net so akkuraat as die MDRD is in pasiënte met GFS <60 ml/min/1,73m^2, en aansienlik meer akkuraat in pasiënte met GFS >60 ml/min/1,73m^2.

Ras

Studies in Afrika het aangetoon dat 'n betekenisvolle sydigheid ontstaan wanneer die Afro-Amerikaanse ras faktor toegepas word. Daar word dus aanbeveel dat die koëffisiënte vir swart persone wat buite Afrika ontwikkel is, nie gebruik moet word in swart populasies in Afrika nie.

Prakties

Die CKD-EPI berekening vir bGFS sal nou gerapporteer word met elke serum kreatinien gemeet in pasiënte ≥18j, as die geslag verskaf is. Ten einde uself te vereenselwig met resultate van die nuwe vergelyking, sal dit vir 'n tydperk tesame met die MDRD gerapporteer word, waarna die MDRD gestaak sal word.

Verwysings Clin Biochem Rev 2011;32:75-79
https://www.kidney.org/professionals/KDOQI/gfr
http://www.sa-renalsociety.org/guidelines/SARS-Guideline1_ChronicDialysis-Adults_2015.pdf

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