

ESTIMATION OF GLOMERULAR FILTRATION RATE IN CHILDREN

Written by Dr. Colin White and Ms. Kathleen Collin BSc(Pharm)

$$\text{GFR} = \frac{0.413 \times \text{height}}{S_{\text{cr}}}$$

where GFR = estimated glomerular filtration rate (mL/min./1.73 m²)
height = in centimetres
S_{cr} = serum creatinine in mg/dL (divide μmol/L by 88.4 = mg/dL)

NEVER use this equation (or other GFR estimating equations) for important decision-making regarding drug dosing, for example: chemotherapy dosing. In these conditions, consider measuring GFR (see Stevens LA article).

This equation is only to be used for the following types of children:

1. Estimation of GFR in children with serum creatinine at steady state (for example, with stable renal function). This equation is NOT to be used for patients with fluctuating serum creatinine, as it will under- or over-estimate the GFR.
2. Children between the age of 2-18 years
3. NOTE: this equation is NOT validated for children with GFR below 25 or above 75 mL/min/1.73 m²

This equation is NOT to be used for the following types of patients:

- neonates
- children < 2 years old
- patients whose renal function is unstable and may be changing rapidly: eg. ICU patients
- Patients receiving any form of renal replacement therapy: PD, HD, CRRT
- Patients receiving significant IV fluid volumes, in particular TPN (contains protein)
- Patients with nephrotic syndrome or severe edema/ascites
- Patients with abnormal body habitus e.g. growth abnormalities or amputation
- Be cautious with use in children at Tanner stages 4/5 (71% of the patients used to formulate this equation were in Tanner stage 1/2)

Additional information:

1. when dosing drugs that require [reaching a therapeutic effect quickly](#), e.g. antibiotics, give the usual first dose and consider adjusting the dose and/or interval for renal dysfunction with subsequent doses.
2. consult appropriate references and/or specialists as needed.
3. ALWAYS make use of appropriate therapeutic drug monitoring whenever available.

References:

1. personal communication with Dr. Colin White, Pediatric Nephrologist, Children's Hospital

2. Schwartz GJ et al. New equations estimate GFR in children with chronic kidney disease. *J Am Soc Nephrol* 2009; 20(3): 629-637.
3. Stevens LA, Levey AS. Measured GFR as a confirmatory test for estimated GFR. *J Am Soc Nephrol* 2009; 20:2305-2313.
4. Dersch D, McCormack J. Estimating renal function for drug dosing: rewriting the gospel? *CJHP* 2008; 61(2): 138-143.

Other useful resources for dose adjustment in renal impairment:

1. Drug prescribing in renal failure 5th edition. Aronoff GR et al. (www.kdp-baptist.louisville.edu/renalbook)
2. Micromedex (individual drug monographs)
3. Harriet Lane Handbook (individual drug monographs)
4. Pediatric Dosage Handbook Taketomo CK et al (also found on www.uptodate.com) (individual drug monographs)
5. University of Kentucky Dept. of Pharmacy Clinical Pharmacokinetics Service Manual (www.hosp.uky.edu/Pharmacy/CPS/PKmanual-disclaimer.html)