

Surrey and North West Sussex Calculating Creatinine Clearance for DOACs



Cockcroft-Gault equation is the standard method for estimating creatinine clearance (CrCl) and drug dose adjustment in adults. It is recommended by the manufacturers of all Direct Oral Anticogulants (DOACS – apixiban, dabigatran, edoxaban and rivaroxaban) for determining kidney function of patients when prescribing these agents. Studies have demonstrated that use of the Cockcroft-Gault equation allows appropriate dosing of DOACs and minimises the risk of over anticoagulation. Estimated glomerular filtration rate (eGFR) should not be used, as data suggests this can lead to inappropriate dosing in up to 50% of patients.

Cockcroft-Gault Equation
$\text{Creatinine Clearance (ml/min)} = \frac{(140 - \text{Age}) \times \text{Weight (kg)} \times \text{constant}}{\text{Serum Creatinine (}\mu\text{mol/L)}}$
Constant = 1.23 for male and 1.04 for female

*Accuracy of Cockcroft-Gault estimation is influenced by bodyweight

The Cockcroft-Gault equation estimates CrCl using the patient's age, weight, gender and serum creatinine. Inaccuracies in estimating CrCl with the equation are noted in extremes of bodyweight, especially in those who are obese. We therefore recommend as a guide the following:

- For patients with a BMI < 30kg/m² calculate creatinine clearance using **actual body weight**:
 - Practices with EMIS: use the EMIS DOAC template to estimate creatinine clearance. Enter the patient's actual body weight into the weight field (uses actual body weight)
 - Practices with System One: use the System One creatinine clearance calculator for patients with a BMI < 20kg/m². For patients with a BMI 20-30kg/m² use [MD+CALC](#) actual body weight: see **BOX 1 in example** as the System One calculator for this BMI range uses ideal body weight
 - Vision: use the Vision creatinine clearance calculator which uses actual body weight
- For patients with a BMI 30–40kg/m² do **not** use GP clinical systems instead use the [MD+CALC](#) equation which recognises the need to adjust for bodyweight in obese individuals. It will calculate a modified estimate of CrCl and provide a range that is based on ideal bodyweight (IBW) and adjusted body weight (ABW) that defines the lower and upper boundaries: see **BOX 2**. If the range provided crosses over a DOAC dosing threshold, then assess bleeding and thrombosis risk to support shared decision-making on suitable dose.

[MD+CALC](#) can be accessed using the hyperlink provided or it can be downloaded as an app to an apple device or android device. (Always check the default units are correct when entering weight, serum creatinine and height. These can be changed using the drop down list if needed)

- For patients with a BMI > 40kg/m² or those with weight > 120 kg the evidence for using a DOAC is limited and warfarin may be the preferred option. Discuss treatment options with patient and consider seeking advice from your local anticoagulant service. If the decision is made to use a DOAC use the [MD+CALC](#) equation as for patients with a BMI 30-40

If you have concerns about dose adjustments for DOACs based on estimating renal function using Cockcroft-Gault, please seek advice from your local anticoagulant service

Creatinine Clearance (Cockcroft-Gault Equation) ☆

Calculates CrCl according to the Cockcroft-Gault equation.

When to Use	Pearls/Pitfalls	Why Use
Sex	Female	Male
Age	74	years
Weight	87	kg
Creatinine	165	μmol/L
The Cockcroft-Gault Equation may be inaccurate depending on a patient's body weight and BMI; by providing additional height, we can calculate BMI and provide a modified estimate and range.		
Height	165	cm

42.7 mL/min	35.2 mL/min	30.2 - 35.2 mL/min
Creatinine Clearance, Original Cockcroft-Gault	Creatinine Clearance Modified for Overweight patient, using adjusted body weight.	This range uses IBW and ABW, but controversy exists over which form of weight to use.

Table 1: [MD+CALC](#) example

References

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