

Case 1. A patient (SP), a student athlete needs to be started on gentamicin for a serious infection in the right knee. The patient is a 22 Y.O. white female, 5'7" and weighing 77 Kg. Her serum creatinine is 1.5 mg/dL and she demonstrates clear physical signs of de-hydration. The medical resident wants to start cefotetan and wants to know if a dosing adjustment is needed because of the SrCr level:

First find out if this cephalosporin needs a dose adjustment in renal impairment. For this you can look it up in the Handbook of Clinical Drug Data and Goodman & Gilman, but let's say you wanted to use a handheld resource. If you downloaded the MicroGuide App, go to the Antimicrobial guide, the Adult Antimicrobial Guide and then Renal Dosing of Antimicrobials, then Renal Insufficiency and then look at Cefotetan. Notice that a dosage adjustment is required for CrCl < 50 ml/min.

Now we need to estimate the patients CrCl

Estimate IBW:

$$IBW = 45.5 \text{ Kg} + 2.3 * (\text{Ht in.} - 60) = 61.6 \text{ Kg}$$

Estimate CrCl:

$$BMI = \text{Wt (Kg)} / (\text{Ht (In)} * 0.0254)^2 = 77 \text{ Kg} / (67 \text{ In} * 0.0254)^2 = 26.6$$

$$\text{so CrClWt} = 67.8 \text{ Kg} \quad CrCl = \frac{(140 - \text{Age}) \cdot CrClWt}{SrCr \cdot 72} = 62.9 \text{ ml/min}$$

Because SP's CrCl is above 50 ml/min, no dosing adjustment is needed.

Case 2. A 65 YO WF with a neutropenic fever that you had treated 2 weeks ago with an aminoglycoside now requires Cefipime. Your monitoring form indicates that her IBW is 63.9 Kg (she is not overweight) and her CrCl was 43.5 ml/min. Her SrCr is stable but is slightly higher at 1.6 mg/dl. What CrCl estimate would you use to compute her cefipime dose and what dose would you recommend?

$$\underline{CrCl = 35.4 \text{ ml/min}}$$

$$CrCl = (0.85 + 0 * 0.15) * (140 - 65) * 63.9 / (1.6 * 72) = 35.4 \text{ ml/min}$$

Dosage adjustment – decrease the dose from 2 to 1 g or increase the interval from Q8H to Q12H

Case 3. An 11 year old boy needs to be placed on a cephalosporin, cefazolin. Estimate the renal function to determine if a dosage adjustment is necessary. The boy weighs 38.5 Kg, is 36 inches tall and has a SrCr of 0.95 mg/dl.

$$\underline{CrCl = 39.1 \text{ ml/min}}$$

11 year old so must use the Shull equation:

$$CrCl = [(3.5 * 11) + 23.6] / 0.95 = 65.4 \text{ ml/min} / 1.73 \text{ m}^2$$

But that is normalized, so must un-normalize to dose:

$$BSA = 38.5 \text{ Kg}^{0.5378} * (36 \text{ in.} * 2.54 \text{ cm/in})^{0.3964} * 0.024265 = 1.035 \text{ m}^2$$

$$CrCl = CrCl \text{ Norm} * BSA / 1.73 = 65.4 * 1.035 / 1.73 = 39.1 \text{ ml/min}$$

Dosage adjustment would be necessary.

Case 4. A 45 YO WM who weighs 89 Kg is 5'11" and has a SrCr = 1.3 mg/dl is going to require vancomycin. Please determine her IBW, BMI, CrCl-WT, BSA and CrCl to be used in determining a dose for this patient. Also compute GFR-MDRD and normalized CrCl for comparison.

IBW = 75.3 Kg, BMI = 27.4 Kg/m², CrCl-WT = 80.8 Kg, BSA = 2.13 m² and CrCl = 88.8 ml/min, GFR-MDRD = 65.5 ml/min/1.73 m², GFR-CKD-EPI = 72.6 ml/min/1.73 m², CrCl Norm = 72.3 ml/min/1.73 m²

$$\begin{aligned} \text{IBW} &= 50.0 + 2.3 * 11 = 75.3 \text{ Kg} \\ \text{BMI} &= 89 \text{ Kg} / (71 \text{ in} * 0.0254 \text{ m/in})^2 = 27.4 \text{ Kg/m}^2 \\ \text{CrCl-WT} &= \text{AdjWT} = 75.3 \text{ Kg} + 0.4 * (89 \text{ Kg} - 75.3 \text{ Kg}) = 80.8 \text{ Kg} \quad [\text{Because BMI} > 25] \\ \text{BSA} &= 89 \text{ Kg}^{0.5378} * (71 \text{ in} * 2.54 \text{ cm/in})^{0.3964} * 0.024265 = 2.13 \text{ m}^2 \\ \text{CrCl} &= (0.85 + 1 * 0.15) * (140 - 45) * 80.8 / (1.2 * 72) = 88.8 \text{ ml/min} \\ \text{GFR-MDRD} &= 175 * 1.2^{-1.154} * 45^{-0.203} * (0.742 + 1 * 0.258) * (1 + 0.21 * 0) = 65.5 \text{ ml/min/1.73 m}^2 \\ \text{SrCr is} &> 0.7 + 0.2 * 1 \text{ so SrCrExp} = 0.88 \\ \text{GFR-CKD-EPI} &= 144 - (1 * 3)(1 + 0.155 * 0) * (0.993^{45}) * (1.2 / (0.7 + (0.2 * 1)))^{(-0.329 - 0.88)} = 72.6 \\ &\text{ml/min/1.73 m}^2 \\ \text{CrCl Norm} &= 88.8 \text{ ml/min} * 1.73 / 2.13 = 72.3 \text{ ml/min/1.73 m}^2 \end{aligned}$$