

Calculating Infusion Rates for Intravenous Fluids When Treating Hyponatremia

Step 1: Choose an intravenous fluid (this will usually be normal saline or, in cases of severe hyponatremia, 3% normal saline).

<u>Intravenous Fluid</u>	<u>Sodium Content (mmol/L)</u>
Normal saline (NS)	154
1/2 NS	77
1/4 NS	39
3% NS	513
5% dextrose in NS (D5NS)	154
5% dextrose in 1/2 NS (D5 1/2 NS)	77
5% dextrose in water (D5W)	0
10% dextrose in water (D10W)	0

Step 2: Determine the patient's "total body water" content.

Total body water (L) = Fraction from following table x weight (kg)

Children 0.60

Women

Non-elderly 0.50

Elderly 0.45

Men

Non-elderly 0.60

Elderly 0.50

Step 3: Estimate the effect of 1 L of your chosen intravenous fluid on the serum sodium concentration.

$$\text{Serum sodium change} = \frac{(\text{Sodium content} + \text{Potassium content}) - \text{Serum sodium}}{\text{Total body water (from step 2)} + 1}$$

Step 4: Determine the rate of sodium correction (in mmol/L/hr) you desire based on the presence of symptoms and the chronicity of the hyponatremia.

Step 5: Divide the rate from Step 4 by the result from Step 3, and then multiply by 1000. This is the desired rate of infusion per hour (in mL) of your selected intravenous fluid.

An example: Suppose your patient developed a serum sodium concentration of 114 mmol/L 1 day following general surgery and is having seizures. You decide to treat with hypertonic saline, which has a sodium concentration of 513 mmol/L (**Step 1**). You patient is a middleaged man who weights 70 kg, so his total body water is $0.6 \times 70 = 42$ L (**Step 2**). The effect of 1 L of hypertonic saline will be to increase the serum sodium concentration by $[(513 + 0) - 114] \div (42 + 1) = 9.28$ mmol/L

(**Step 3**). You decide to initially correct the serum sodium concentration by 1 mmol /L/hr (**Step 4**). Therefore, the desired rate of infusion of hypertonic saline will be $1 \div 9.28 = 0.108$ L/ hr, or 108 mL/hr (**Step 5**).

Note. Remember that your clinical judgment is very important in decision making process (**see step 3**)