Holliday-Segar Method

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Abstract :

In the Holliday-Segar Method, fluid and electrolyte requirements are empirically based on the caloric needs of the average hospital patient. This caloric expenditure is approximated based on body weight using the following table:

Relation of Body Weight to Caloric Expenditure

For each kilogram in this range
Daily caloric cost per kilogram

1-10 kg
100 kcal/kg/day

11-20 kg
50 kcal/kg/day

>20 kg
20 kcal/kg/day

For every 100 kcal expended, a certain amount of fluid is lost either through "insensible water loss" or through renal function; a small amount is generated through oxidation of carbohydrates and tissue catabolism. Also, for every 100 kcal expended, electrolytes are lost in the following proportions:

Maintenance Electrolyte Requirements

Na
3 mEq per 100 kcal/day

K
2 mEq per 100 kcal/day

Cl
2 mEq per 100 kcal/day

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Example: Calculate the daily fluid requirements of a 10 year old boy who weighs 32 kg using the Holiday-Segar method:

Kcal expended
10*100 + 10*50 + 12*20
1740 kcal

H20 required
1740 kcal * 100 cc/100 kcal
1740 mL H2O

Na required
1740 kcal * 3 mEq/100 kcal
52.2 mEq Na

K required
1740 kcal * 2 mEq/100 kcal
34.8 mEq K

Cl required
1740 kcal * 2 mEq/100kcal
34.8 mEq Cl

Given good renal function and no overriding concerns about excess sodium, a maintenance fluid to provide at least the required amount of sodium. Potassium is usually added after the patient's first void in an amount that will yield the above maintenance level. Chloride is usually not a concern in and of itself, but is a passive ion. A table of common solutions can be consulted to pick an appropriate solution.
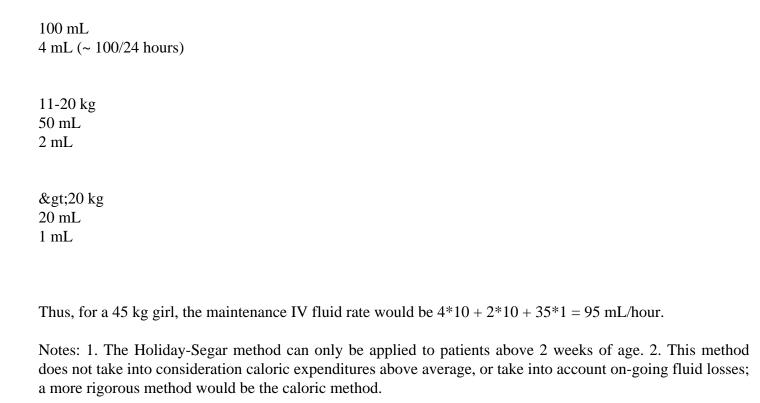
In this case, the target solution should have 52.2 mEq Na per 1.74 liters, or 30 mEq Na per liter. The closest solution is the 34.2 mEq/L found in 0.2% saline. Each liter should also contain 20 mEq of potassium. The Holiday-Segar can be used to quickly estimate fluid requirements in terms of mL/hour (a useful way of expressing it, since this is how IV infusion pumps are programmed):

Summary of Holiday-Segar Method

For each Kilogram in the Range
Add to Daily Requirement
Add to Hourly Requirement

0-10 kg

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100 mL
4 mL (~ 100/24 hours)

11-20 kg
50 mL
2 mL

>20 kg
20 mL
1 mL

Thus, for a 45 kg girl, the maintenance IV fluid rate would be 4*10 + 2*10 + 35*1 = 95 mL/hour.

Notes: 1. The Holiday-Segar method can only be applied to patients above 2 weeks of age. 2. This method does not take into consideration caloric expenditures above average, or take into account on-going fluid losses; a more rigorous method would be the caloric method.

Reference :
http://netscut.templaro.com/net_scut.html

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