

11. DENGUE FEVER IN PEDIATRIC POPULATION^{134, 135}

The pathogenesis of Dengue Fever and the principles of management apply equally well to children as they do to the adults. In the pediatric population special consideration has to be given to the weight of the patient; because of its wide variation. Fluid quota, therefore, has to be carefully calculated keeping in mind the weight of the patient. In the dehydrated child the measured weight may not be true representation of the actual weight of the child. Additionally, the ideal body weight of a child may not be the same as the actual weight.

11.1.1 Calculation of Ideal Body Weight

Estimation of the ideal body weight may be made by any of the following ways:

- Weight for height using a growth chart (50th centile) - **Best Method**
- Weight for age using a growth chart (50th centile)
- In an emergency situation use the following formulae may be used

<1 year	$\frac{\text{Age (in Months)+ 9}}{2}$
< 7 years	$(\text{Age x 2})+ 8$
> 7 years	Age x 3
APLS	$(\text{Age + 4}) \times 2$

The weight chosen for calculation should be the current weight or ideal body weight, whichever is lower.

Following illustrates calculation of fluids for critical period in a child

Calculation of total fluids for critical period	
M (Maintenance)	100ml/kg for 1 st 10 kg +50 ml/kg for next 10 kg +20 ml/kg for balance wt
5% of body weight =	+50ml x body wt (kg)
<i>E.g.: Body weight 25 kg (This is ideal or actual body weight, whichever is smaller)</i>	
M	= 100 x 10 + 50 x 10 + 20 x 5 = 1600 ml
5%	= 50 x 25 = 1250 ml
M + 5%	= 1600 + 1250 = 2850 ml
<i>This is the total fluid volume this patient will need over the entire critical period irrespective of its length.</i>	

The maximum weight for which fluid is calculated in any patient should not exceed 50 kg. Accordingly M+5% should not exceed 4600 ml in any patient (adult or pediatric).

11.1.2 Choice of fluids

Use half normal saline (N/2) in 5% dextrose in infants less than 6 months of age because of poor sodium handling by immature kidneys.

For children above 6 months of age, when the patient is not taking orally for prolonged periods, it is useful to give normal saline in 5% dextrose to avoid hypoglycemia.

11.1.3 Rate of administration of IV fluids in critical phase – without shock

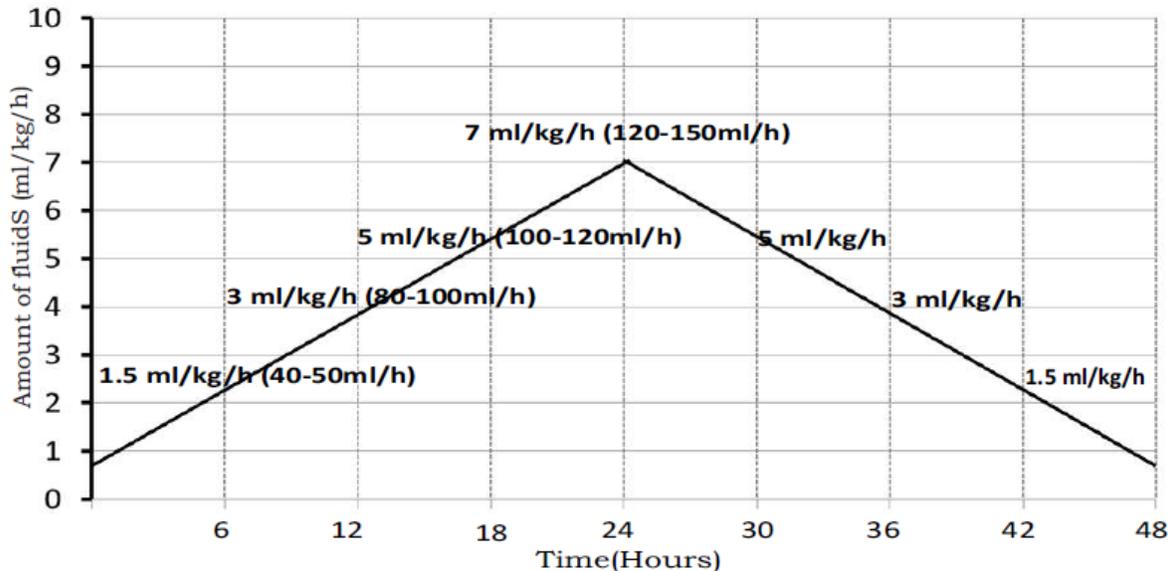
- Upon entering the critical phase shift to HDU and **start IV fluids**.
- Initial fluid requirement (oral + IV) is 1.5 ml/kg/hr. Those who can drink well may be given IV fluids at the minimal rate 0.5ml/kg/hr and the balance as oral.
- Calculation of fluid quota (M+ 5%) is for entire critical phase. If the patient has been in the critical phase for some time, calculate the remaining volume of fluid keeping in mind the duration of critical phase elapsed and the amount of fluid already given.
- Rate of infusion depends on the rate of leak judged by pulse, BP, pulse pressure, capillary refill time, HCT and urine output.
- Urine output should be maintained between **0.5 -1 ml/ kg/hour** during the critical period.

Hourly urine output is the best guide to decide the rate of infusion. If UOP is above one ml/kg/hour it suggests that infusion rates are too high. If the UOP is <0.5ml/kg/hr it may suggest inadequate fluids. Catheterization may be required for accurate UOP measurement.

* There is wide variation in the rate of leak from patient to patient and within the same patient over period of time.

(Chart II below may be used as a guide for patients with shock while remembering that there is wide variation in rate of leak from patient to patient)

Chart I : Guide to rate of fluid intake in Critical Phase - without shock



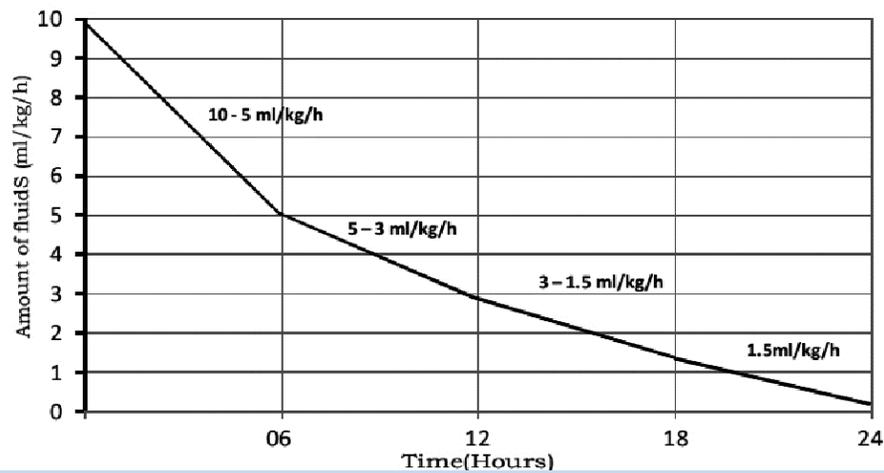
Courtesy of WHO Collaborating Centre for Case Management of Dengue/DHF/DSS, Queen Sirikit National Institute of Child Health, Bangkok, Thailand (**Fluids for adolescents are mentioned with-in brackets.**)

11.1.4 Intravenous fluid replacement – during shock (refer to Algorithms A & B)

- Patient who is in significant shock might well be will be in a stage of plasma leak for considerable length of time, therefore he might stop leaking much earlier than 48 hours.
- Individual patient's fluid rates administered will depend on his/her rate of leak – as judged by the pulse pressure and urine output.
- Remember that total fluid quota (M+5%) would not only include the IV fluids but also the bolus fluids given during resuscitation and any administered orally.

(Chart II below may be used as a guide for patients with shock while remembering that there is wide variation in rate of leak from patient to patient)

Chart II : Guide for the rate of IV fluids in profound shock after initial resuscitation



Courtesy of WHO Collaborating Centre for Case Management of Dengue/DHF/DSS, Queen Sirikit National Institute of Child Health, Bangkok, Thailand

11.2 Special Considerations for Infants¹³⁶

DHF/DSS is less common in infancy but mortality is higher than in older children. There are very few published studies on fluid management in DHF in infants. Physiologically speaking, fluids account for a greater proportion of body weight in infants than in children and minimum daily requirements are correspondingly higher. Infants have lower intracellular fluid reserves and the capillary beds are intrinsically more permeable than older children and adults. Early cardiovascular compromise and significant fluid overload are more likely to occur if capillary leak occur in this age group. Babies born to mothers who have developed dengue fever close to delivery will have circulating antibodies due to trans-placental passage. In such babies DHF may develop even during first infection due to antibody-dependent enhancement of viral replication mediated by the antibodies of maternal origin.

Like in adults, primary dengue infection in infants often presents as simple fever, indistinguishable from other viral infections. Maculopapular rashes may accompany the fever or may appear during defervescence. Upper respiratory and gastrointestinal symptoms (gastroenteritis) may be seen. Unusually, infants may present with seizures.

Splenomegaly has been observed in young infants (especially under six months) clinically or by radiological examination (USS). Leucopenia may not be present; instead the total white cell count may be high - reaching up to $18-19 \times 10^3$. Infants are more prone to liver involvement with AST in the range of 200 – 500 (may occasionally rise to > 1000). They are also more prone to electrolyte imbalance due to poor renal handling of Na^+ .

As compared to older age group, infants experience plasma leakage for shorter duration and respond quickly to fluid resuscitation. The volume actually required may be less than the calculated quota of $M + 5\%$. Fluid administration in infants should be evaluated meticulously and oral intake (i.e. breast feeding) taken into account ¹³⁵. Intravenous fluids should be stopped as soon as the leaking phase is over – in order to avoid the risk of fluid overload. All infants with dengue fever must be treated as high-risk patients in HDU and they all would require early intervention with colloids, at par with the older children with severe disease.

Dengue in infants : Difference from the adult presentation

Fits are more common	URT, or GI features predominate
Leucocytosis rather than leucopenia	More prone to plasma leak
More prone to electrolyte imbalance (particularly sodium)	Hepatomegaly and deranged LFTs are more common