

Neonatal Intravenous Fluids

Key Points

- Careful fluid and electrolyte management and monitoring is vital in neonates, especially during the first few days of life which pose unique challenges.
- Gestation at birth, day of life and clinical condition of the baby means that adjustments to fluid requirements (and electrolyte additives) will need to be made.
- Many preterm neonates will only briefly receive IV fluids and are started onto TPN early – please see the Neonatal TPN guideline for further information.
- After birth there is physiologic diuresis of extracellular fluid resulting in weight loss over the first 3 to 5 days of life. Most babies lose about 5+% weight in first few days.
- In the first week of life abnormal serum sodium is primarily due to abnormalities of water balance, rather than excess or deficiency of sodium.
- When prescribing IV fluids with electrolyte additives you **MUST** calculate the number of mmol that need to be added to the whole 500mL bag, so that the baby will safely receive the correct amount of electrolytes/kg.
- Refer to site specific tertiary centre guidance and advice as and when needed.

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Abbreviations

HIE	Hypoxic-ischaemic encephalopathy
IVH	Intraventricular Haemorrhage
RDS	Respiratory distress syndrome
SIADH	Syndrome of Inappropriate Antidiuretic Hormone Secretion
TPN	Total Parenteral Nutrition

1 Introduction

1.1 Scope of document

Unwell term babies or preterm babies may need IV fluids for hydration (e.g. if too unwell to adequately feed) or to address electrolyte (including serum glucose) and/or fluid imbalances.

Careful fluid and electrolyte management and monitoring is vital in neonates, especially during the first few days of life which pose unique challenges. Gestation at birth, day of life and clinical condition of the baby means that adjustments to fluid requirements (and electrolyte supplements) will need to be made.

Many preterm neonates will only briefly receive IV fluids and are started onto TPN early – please see the Neonatal TPN guideline for further information.

2 Prescribing protocol

2.1 Volume

Day of life	IV fluid volume	Additional comments
Day 1	60 mL/kg/day	Consider 40 mL/kg/day in term babies, if HIE or respiratory diagnosis
Day 2	90 mL/kg/day	Consider 60-80 mL/kg/day in term babies
Day 3	(100-)120 mL/kg/day	
Day 4 +	(120-)150 mL/kg/day	

These are rough guides and must be adjusted each day according to baby's weight and urea and electrolytes (U&Es) results.

Please consider:

- Babies < 1kg have greater water loss through their skin, therefore consider giving fluids one day ahead e.g. starting at 90 mL/kg/day on day 1.
- For babies receiving phototherapy using fluorescent blue light, requirements may be higher ¹.
- Babies with respiratory distress syndrome (RDS) tend to retain fluid, therefore consider increasing more slowly e.g. at 40 mL/kg/day on day 1.
- After birth there is physiologic diuresis of extracellular fluid resulting in weight loss over the first 3 to 5 days of life¹. Most babies lose about 5+% weight in first few days ¹.

- If large volumes of fluids are required to prevent hyponatremia, remember to cut back on the fluid volume as soon as baby starts to (re)gain weight.
- In older babies who have had a period of feeding but start/re-start IV fluids due to clinical deterioration then usually maximum volume of 100 mL/kg/day (with additives – see below) is appropriate.

2.2 Type of fluid

- Typically, 10% glucose is used for standard neonatal IV fluids¹.
- 500mL bags of 10% glucose are kept as stock on the neonatal unit.
- Sometimes different concentrations of glucose are required, e.g. in hyper or hypoglycaemia management – please see relevant guidelines.
- In babies born at term, and who are older than 8 days, then isotonic (0.9% sodium chloride) fluid with 5-10% glucose may be considered², e.g., 0.9% sodium chloride with 5% glucose².

2.3 Additives

Electrolytes are not added to IV fluids in the first 48 hours¹.

Sodium

- It is usual practise to add sodium to IV fluids by day 3 (or as soon as >5% weight loss, whichever is first). In unwell term babies give no or minimal sodium additive in IV fluids until postnatal diuresis with weight loss has occurred².
- Be guided by weight and U&Es.
- **Add 2-4 mmol/kg/day sodium** to IV fluids, in the form of **30% sodium chloride (= 5 mmol/mL of sodium)**.
- **Please discuss amount to add with a senior doctor.**
- Some babies will subsequently require higher electrolyte requirements.
- In the first week of life, abnormal serum sodium is primarily due to abnormalities of water balance, rather than excess or deficiency of sodium¹.
 - If serum sodium is low, this is most often due to excess water or SIADH (e.g. intercurrent respiratory pathology or severe IVH)¹, consider this before increasing the amount of sodium added to IV fluids.
 - After 4-5 days of life, low serum sodium may be due to negative sodium balance (e.g. high renal losses due to immature tubular function)¹.
 - If serum sodium is high, this is most often due to excess water loss¹.

Potassium

- It is usual practice to add potassium (K) to IV fluids by day 3, ensure serum K is <5 mmol/L.
- Be guided by weight and U&Es.
- Add **1-2 mmol/kg/day potassium** to IV fluids, in the form of **15% potassium chloride (= 2 mmol/mL of potassium)**
- **Please discuss amount to add with a senior doctor.**
- Some babies will subsequently require higher electrolyte requirements.
- Abnormal serum potassium is generally not due to abnormalities of water balance, consider amongst other causes:
 - High serum potassium: kidney dysfunction, inappropriate high potassium supplementation¹.
 - Low serum potassium: chronic diuretic treatment, losses e.g. ileostomy¹.

NOTE: Glucose 10% bags have a volume of 500mL as a standard, therefore you MUST calculate the number of mmol of electrolytes required for the whole 500mL bag, so the baby will safely receive the correct amounts of supplemented electrolytes.

Epic prescribing guide is on the next page.

2.4 Monitoring

Consider monitoring the following daily for babies on full IV fluids for more than 24 hours:²

- Potassium and sodium (gas samples may be suitable)
- Blood sugar (should be checked at least 12 hourly)
- Weight
- Input/output and fluid balance

If serum electrolytes are abnormal or there are concerns regarding renal function, abnormal urine output or weight then the frequency of monitoring should be increased to twice daily or every 8 hours.

2.5 Epic prescribing guide

1. Order 'IV fluid neonatal' build.

2. Enter the below:

- Dose using pre-set buttons (the mL/hour should automatically calculate)
- Frequency for 24 hours
- If additives are required. Please select accordingly, complete the mmol box with the **TOTAL** number of mmol required in the **500mL bag** (see worked example below)
- Select the appropriate base, if glucose 10%, select a volume of 500mL
 - Note, if the baby requires a different concentration of glucose, this will alter the total volume of the bag (see glucose monograph in the IV infusion formulary for final volume, this will also alter the concentration of additives)
- Complete the 'Admin instructions' with the number of mmol/kg/day required of additives.
 - Note, if this is day 1 of life and no additives are required, this line can be removed.

2.6 Example calculation and Epic prescription

See below example for guidance:

Baby B is born at 35 weeks gestation, weighing 2.5kg. She is 3 days old, fluids should run at 120 mL/kg/day with 3 mmol/L/kg/day of sodium and 2 mmol/L/kg/day of potassium.

- **Fluid:** $2.5\text{kg} \times 120 \text{ mL/kg/day} = 300 \text{ mL/day} = 12.5 \text{ mL/hour}$
- **Sodium:** $2.5\text{kg} \times 3 \text{ mmol/kg/day} = 7.5 \text{ mmol/day}$
- **Potassium:** $2.5\text{kg} \times 2 \text{ mmol/kg/day} = 5 \text{ mmol/day}$

Therefore, 300mL of 10% glucose + 7.5 mmol of sodium + 5 mmol of potassium is the daily requirement.

- **Sodium** in 500mL bag = $(500/300) \times 7.5\text{mmol/L} = 12.5 \text{ mmol/L}$
- **Potassium** in 500mL bag = $(500/300) \times 5\text{mmol/L} = 8.3 \text{ mmol/L}$

Note the prescription title will change based on the values inputted – double check before signing the order

sodium chloride 30% 12.5 mmol, potassium chloride 15% 8.4 mmol in glucose 10% 500 mL infusion				☒ Accept	☐ Cancel
Dose:	120	mL/kg/day	60 mL/kg/day 90 mL/kg/day 120 mL/kg/day 150 mL/kg/day		
Weight Type:		Weight:			
Recorded 2.54 kg		Order-Specific 2.5 kg		2.5 kg	
Calculated dose:		12.5 mL/hr			
Route:	Intravenous				
Frequency:	Continuous				
Starting		For			
14/1/2025		Today Tomorrow		Hours Days	
At					
18:45					
		Starting: Today 18:45		Ending: Until Discontinued	
Rate:	12.5 mL/hr				
Additives					
☒	sodium chloride 30%	12.5	mmol		
☒	potassium chloride 15%	8.3	mmol		
Calc. dose:		8.4 mmol			
Base (Selection Required)					
☐	glucose 5%				
☒	glucose 10%	500	mL	500 mL	
☐	glucose 12.5%				
☐	glucose 15%				
☐	glucose 17.5%				
☐	glucose 20%				
Admin Instructions: abc undo redo help add Insert SmartText left right print 100%					
A total number of 3 mmol/kg/day of sodium chloride and 2 mmol/kg/day of potassium chloride is required.					
<input checked="" type="button" value="Next Required"/>	Link Order	☒ Accept ☐ Cancel			

References

1. Ringer, S. (2024) 'Fluid and electrolyte therapy in newborns', in T.W. Post (ed) UpToDate. Waltham, MA: UpToDate. <https://www.uptodate.com/> (Accessed: 01 May 2025).
2. National Institute for Health and Care Excellence [NICE] (2020) Intravenous fluid therapy in children and young people in hospital. NG29. Available at: <https://www.nice.org.uk/guidance/ng29> (Accessed: 01 May 2025).

Full version control record

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Version History

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1.0	April 2025	Claire Oclee-Brown and Ruhena Ahmad	Final	New cross-site guideline

Related Documents

None