Wrightington, Wigan and Leigh Teaching Hospitals
NHS Foundation Trust

1.

Title of Guideline	Paediatric IV Fluids
Contact Name and Job Title (Author)	Dr Emily Moore
Division & Specialty	Child Health
Guideline Number	CG20-028
Version Number	2.1
Date of Review	May 2027
Approving Committee(s)	Child Health Clinical Cabinet
Date of Approval	May 2025
Explicit definition of patient group to which it applies	Child Health
Consultation Process	
Target Audience	Child Health
This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.	

Excluded from this Guideline are:

1.1. Babies on the Neonatal Unit – Follow Neonatal IV Fluid Guidelines
1.2. Neonates with problems establishing breast feeding and hypernatraemic dehydration
1.3. Diabetic Ketoacidosis – Please refer to DKA Guidelines
1.4. Babies with Pyloric Stenosis – Please refer to Pyloric Stenosis Guidelines after discussion with Surgical Team
1.5. Patients with burns – please discuss with the burns service at RMCH
1.6. Patients requiring hyperhydration as directed by Tertiary Teams (e.g. New ALL)
1.7. Raised intercranial pressure – requiring mannitol or 2.7% saline

2. Before starting Intravenous Fluid Therapy:

2.1. Consider if IV Fluids are clinically necessary
2.2. Ensure adequate IV access is established
2.3. Consider the use of Oral Rehydration Therapy (Dioralyte) in children who could have their fluid requirements met orally or via an NGT

3. Assess and document within the patient notes the following:

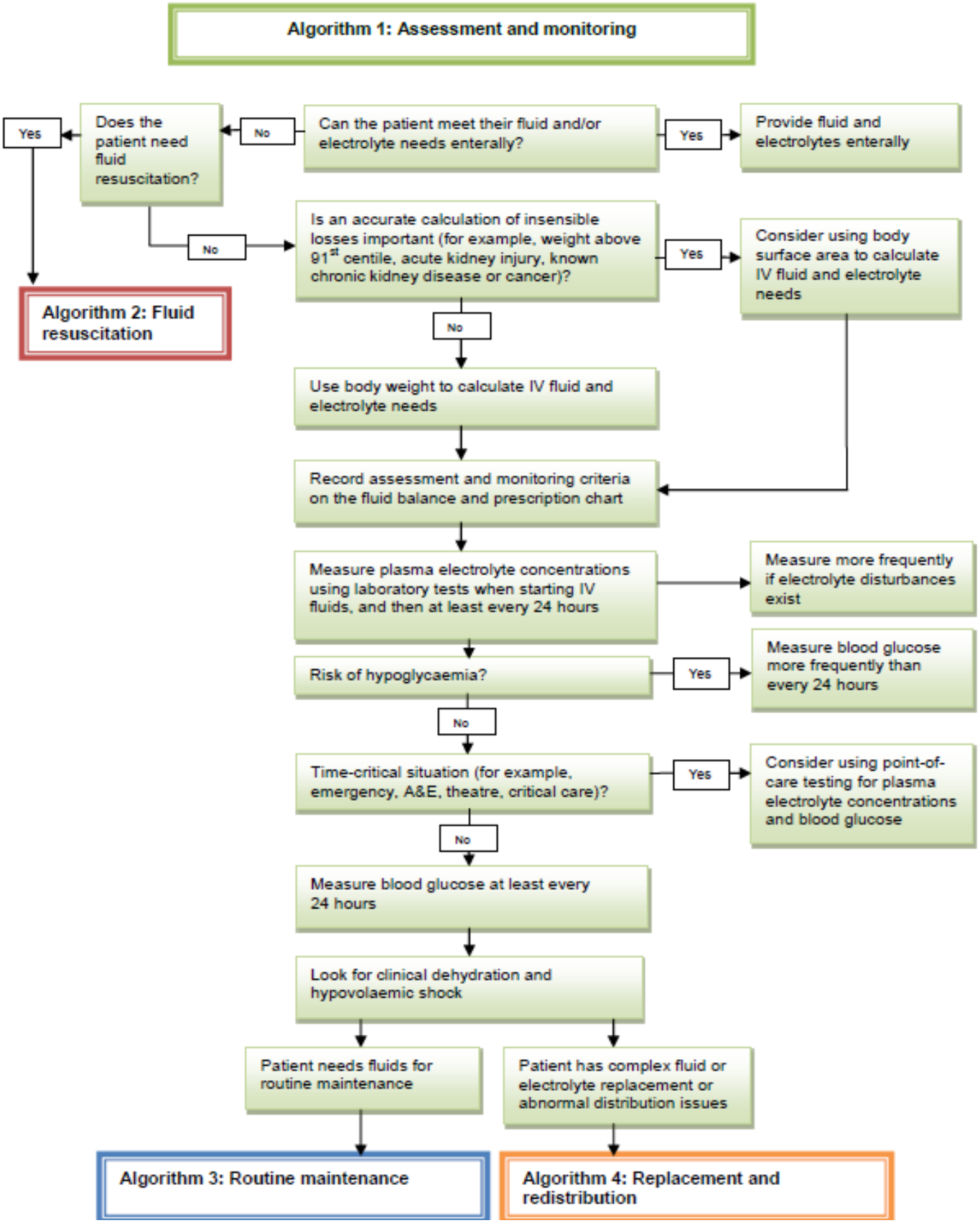
3.1. Actual or estimated daily body weight. If an estimate is used, the actual weight should be measured as soon as clinically possible.
3.2. Fluid input, output and balance over the previous 24 hours.
3.3. Any special instructions for prescribing, including relevant history.
3.4. An assessment of the patient's fluid status clinically
3.5. The results of laboratory and point-of-care assessments, including:
    3.5.1. Full blood count
    3.5.2. Urea
    3.5.3. Creatinine
    3.5.4. Plasma electrolyte concentrations (including chloride, sodium and potassium)
    3.5.5. Blood glucose
    3.5.6. Urinary electrolyte concentrations – where fluid status is difficult to determine

3.6. Details of any ongoing losses.
3.7. Calculations of fluid needs for routine maintenance, replacement, and resuscitation
3.8. The fluid and electrolyte prescription (in ml per hour), with clear signatures, dates and times (see below for calculations)
3.9. Types and volumes of fluid input and output (urine, GI losses and other)
3.10. 24-hourly fluid balance + fluid prescription review once commenced on IV fluids

3.11. Use the below NICE guidelines algorithm as an aid to decision making when initiating and continuing IV fluids.

3.12. See Below for Algorithm 2, 3 and 4

Algorithms for IV fluid therapy in children and young people in hospital



4. Type of Maintenance Fluid:

4.1. Term Neonates 7 days old and under:

4.1.1. 0.18% Sodium Chloride + 10% Dextrose

4.2. Children and Young Adults 8 days old and above:

4.2.1. Plasma-Lyte 148 + 5% Dextrose

4.2.2. Alternative: 0.9%NaCl with 5% Dextrose

4.3. Hypotonic solutions (0.45% NaCL + 5% Dextrose) may be required in certain circumstances for significant electrolyte derangement. Seek Senior Paediatric/Consultant advice prior to starting.

4.4. **Hypokalaemia:**

4.4.1. Normal range 3.5 – 5.3mmol/l

4.5. Plasma-Lyte 148 contains 5mmol/litre of potassium.

4.6. **If additional potassium replacement is required with maintenance fluids, then use of 0.9%NaCl + 5% with 10 or 20mmol/500ml.**

4.7. **Potassium cannot be added to Plasma-Lyte 148.**

5. Routine Maintenance Fluid Volumes:

5.1. Prior to commencing fluids ensure to assess the patient's degree of dehydration. See below for management of dehydration.

5.2. For **children and young people 28 days old and above** - Holliday–Segar formula

5.2.1. 100 ml/kg/day for the first 10 kg of weight

5.2.2. 50 ml/kg/day for the next 10 kg

5.2.3. 20 ml/kg/day for the remaining weight over 20 kg

5.3. Be aware that over a 24-hour period, adult males rarely need more than 2,500 ml and females rarely need more than 2,000 ml of fluids.

5.4. Calculate routine maintenance IV fluid rates for term neonates according to their age, using the following as a guide:

5.5. For **TERM neonates 27 days old or less:**

5.5.1. birth to day 1: 50–60 ml/kg/day

5.5.2. Day 2: 70–80 ml/kg/day

5.5.3. Day 3: 80–100 ml/kg/day

5.5.4. Day 4: 100–120 ml/kg/day

5.5.5. Days 5–28: 120–150 ml/kg/day.

5.6. If there is a risk of water retention associated with non-osmotic antidiuretic hormone (ADH) secretion (SiADH), consider either:

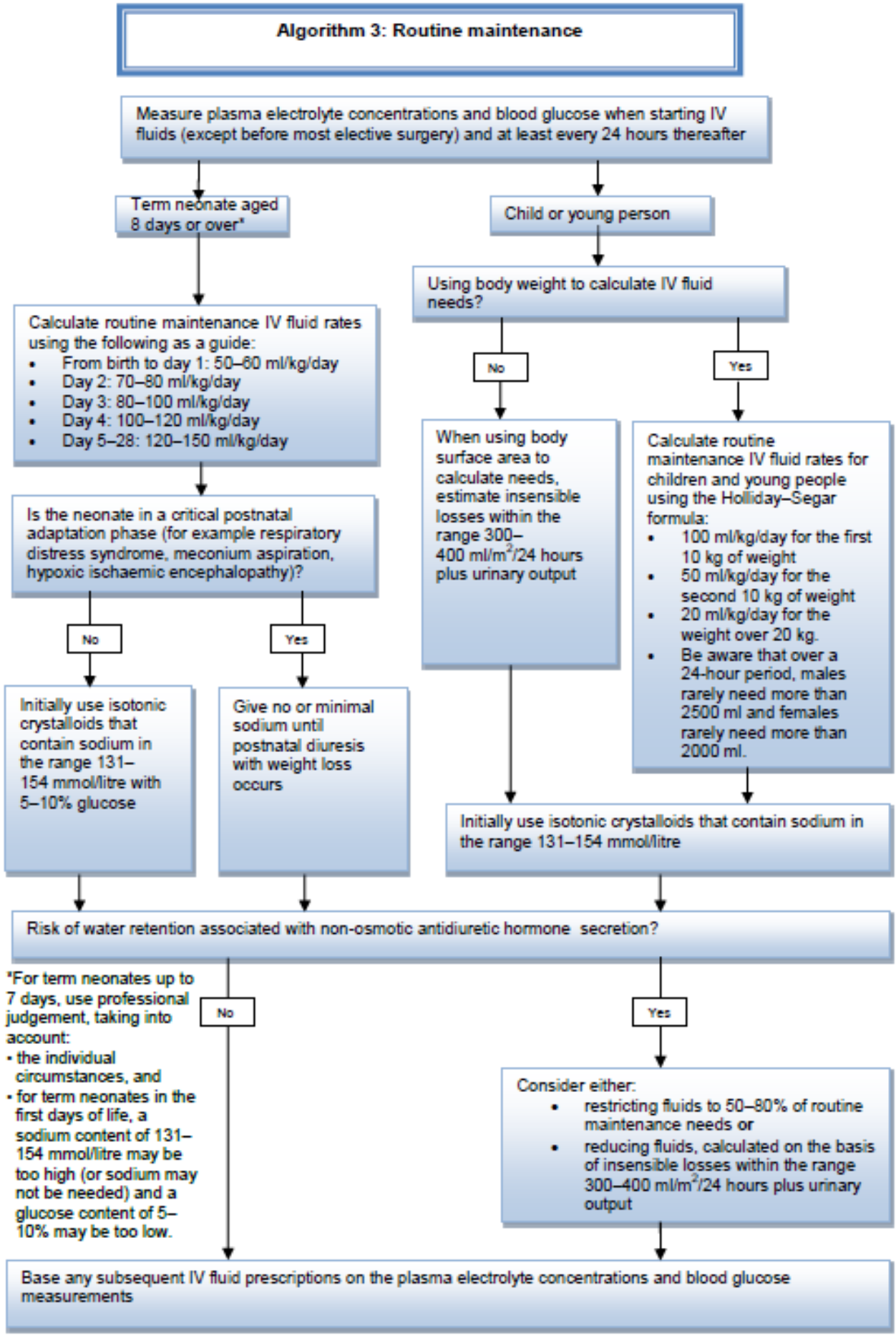
5.6.1. restricting fluids to 50–80% of routine maintenance needs or

5.6.2. Reducing fluids, calculated on the basis of insensible losses within the range 300–400 ml/m2/24 hours plus urinary output.

5.6.3. Children and Young People with complex underlying health problems such as cardiac or renal disease may need varying fluid volumes and a bespoke plan for IV Fluids. This should be led by tertiary teams following discussion with them.

6. Fluid Resuscitation and Management of Hypovolaemia:

6.1. Hypovolaemic shock and its management is outlined by APLS and should be managed according to APLS guidelines and with reference to NWTS regional guidelines on Management of Shock and Paediatric Sepsis (See Guidelines section of NWTS Website)



6.2. Clinical Signs:
- 6.2.1. Tachycardia
- 6.2.2. Tachypnoea
- 6.2.3. Prolonged CRT and poor perfusion
- 6.2.4. Altered level of consciousness
- 6.2.5. Hypotension

6.3. Use a 10-20ml/kg Bolus of **glucose free ISOTONIC fluid** and reassess response.

6.4. **First Line Resuscitation Fluid:**
- 6.4.1. Plasma-Lyte 148
- 6.4.2. Alternatives:
  - 6.4.2.1. 0.9% NaCl
  - 6.4.2.2. Hartmann's Solution

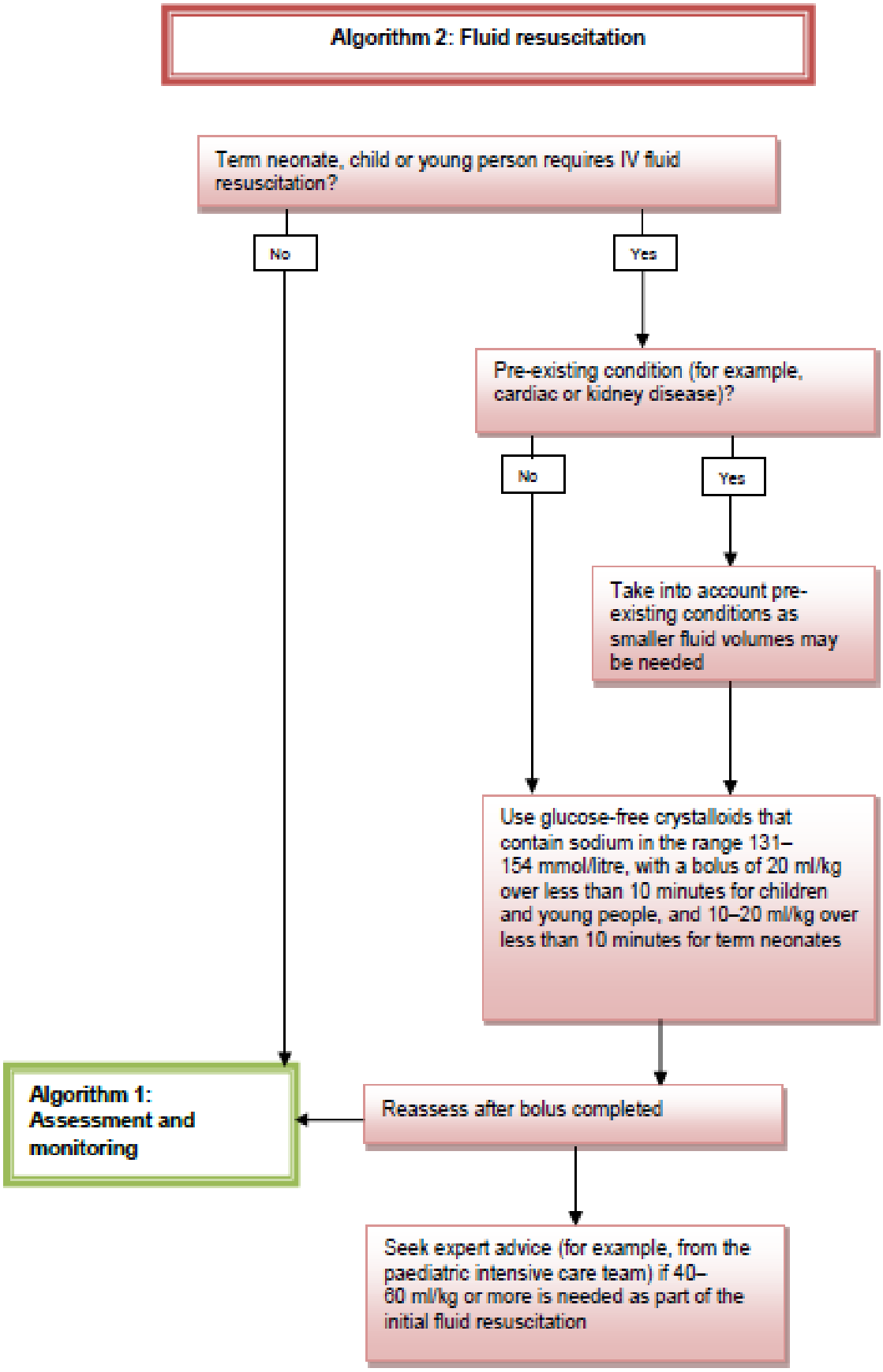
6.5. **On specialist advice / NWTS for the following fluids**:
- 6.5.1. 4.5% Human Albumin Solution – obtained from blood bank
- 6.5.2. Gelofusin- obtained from Stores.

6.6. This can be repeated as required after re-assessment of clinical response.

6.7. In every case when giving fluid boluses a clinical re-assessment of response after each bolus must take place.

6.8. If more that 40mls/kg of fluid is required, then contact the Paediatric Consultant on call immediately and seek advice from NWTS via their contact number: 08000 84 83 82.

6.9. In children with pre-existing cardiac or renal conditions then smaller bolus fluid volumes may be needed – discuss with Paediatric Consultant on Call.


Algorithm 2: Fluid resuscitation
Term neonate, child or young person requires IV fluid resuscitation?
No
Yes
Pre-existing condition (for example, cardiac or kidney disease)?
No
Yes
Take into account pre-existing conditions as smaller fluid volumes may be needed
Use glucose-free crystalloids that contain sodium in the range 131–154 mmol/litre, with a bolus of 20 ml/kg over less than 10 minutes for children and young people, and 10–20 ml/kg over less than 10 minutes for term neonates
Algorithm 1: Assessment and monitoring
Reassess after bolus completed
Seek expert advice (for example, from the paediatric intensive care team) if 40–60 ml/kg or more is needed as part of the initial fluid resuscitation

7. Dehydration

7.1. If a child presents with an illness which may lead to dehydration (e.g. D&V) then the degree of dehydration the amount of additional fluid needed to rehydrate the child can be estimated using clinical examination and assessment. Based on the examination findings IV fluid rate can then be adjusted to include this additional fluid requirement.

7.2. Mild - Moderate Clinical dehydration (5%):
- 7.2.1. Dry mucous membrane.
- 7.2.2. Decreased urine output
- 7.2.3. Increased thirst
- 7.2.4. Clinical parameters in normal range

7.3. Severe Clinical Dehydration (10%) **As above, but including one or more**:
- 7.3.1. Deep breathing (a sign of acidosis)
- 7.3.2. Prolonged capillary refill time
- 7.3.3. Cool, pale peripheries
- 7.3.4. Lethargy
- 7.3.5. Irritability
- 7.3.6. Sunken fontanelle (infants)
- 7.3.7. Tachycardia
- 7.3.8. Sunken eyes
- 7.3.9. SHOCK

7.4. To calculate the volume of fluid deficit:
- 7.4.1. **Fluid deficit (ml) = (Weight (in kg) x % dehydration) x 10**

7.5. The precise calculation of dehydration using clinical signs is often inaccurate. The best method relies on the difference between current body weight and the child's weight when they are well.

7.6. Babies with hypernatraemic dehydration may not show obvious clinical signs of dehydration.

7.7. Fluid deficit should be replaced over the following time period:
- 7.7.1. In children with normal U&Es and 5% dehydration or less then fluid deficit should be replaced over 48 hours
- 7.7.2. In dehydration associated with hypernatraemia (Na >145mmol/L) or when 10% dehydration is suspected the fluid deficit should be replaced over 48 hours or longer, using an isotonic fluid only.
- 7.7.3. *See below for the management of Hypernatraemia.*

7.8. When children receive additional fluid to replace fluid lost because of dehydration they should be weighed every 4 hours and fluid balance reviewed to ensure they are not being overloaded.

7.9. IV Fluid rates can be reduced down to maintenance if there is improvement in clinical signs and weight.

7.10. Be watchful of children who arrive with dehydration, have IV fluids and then start drinking orally on top of this. They are at high risk of hyponatraemia and IV fluids should be quickly reduced or stopped.

7.11. **Example Calculation**
- 7.11.1. Child weighing 10kg, assessed as mild – moderate dehydration (5%)
- 7.11.2. Maintenance fluids = 10 x 100 = 1000mls/48 hrs
- 7.11.3. Fluid deficit = 10 x 5 x 10 = 500mls for 48 hrs
- 7.11.4. Total for first 48 hrs = 1500mls

7.11.5. Rate for first 48 hrs = 62.5mls/hr for 48 hrs

7.11.6. If fluids are needed after 48 hrs then rate should reduce to just maintenance = 42 mls/hr

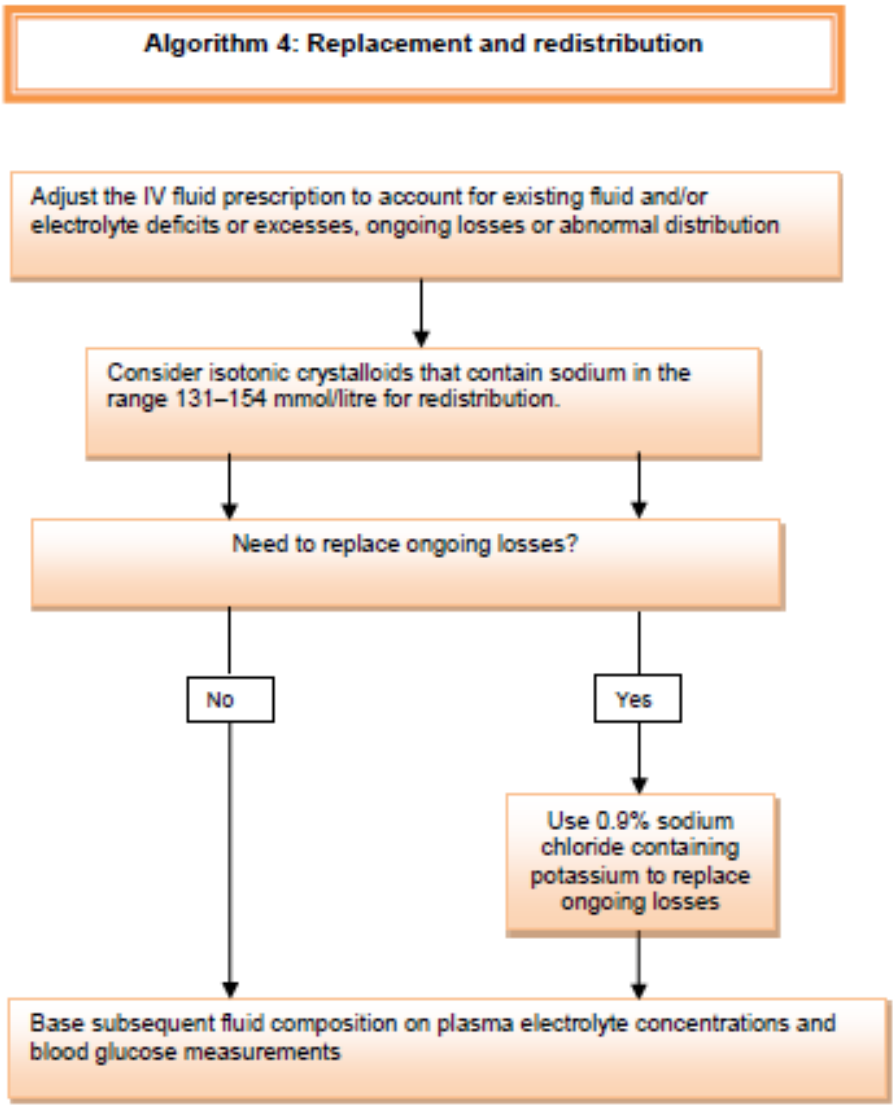
7.12. **Continuous Losses (from enteral feeding tubes, surgical drains etc.)**

7.13. These should be measured and replaced by calculating losses over the previous hour, or four hour period depending on the clinical situation.

7.14. Use Plasma-Lyte 148 with 5% Glucose as first line for most cases. 0.9% NaCl with or without potassium can also be used if required depending on type of losses and electrolyte values. These need to be measured more frequently in these patients.

7.15. Maintenance fluids for these patients who require it on top of additional losses should be prescribed as per the maintenance section above.

8.



9. Monitoring for Patients on IV Fluids:

9.1. 24 hourly monitoring of U&E when IV fluids started and then at least every 24 hours whilst on IV fluids

9.2. U&E monitoring every 4-6 hrs in the following:
- 9.2.1. Electrolytes abnormal
- 9.2.2. Sodium less than 130
- 9.2.3. Very sick child or significant deterioration

9.3. 12-24hrly blood glucose if on IV fluids containing dextrose

9.4. 4-6 hourly blood glucose if only on IV fluids not containing dextrose

9.5. Re-check U&E immediately if signs of Hyponatraemia (See below)

9.6. Children should be weighed prior to starting IV fluids and daily whilst receiving them

9.7. Children should be weighed four hourly when receiving additional fluid correction for dehydration

9.8. Accurate fluid balance should be recoded hourly

9.9. Clinical assessment of the need for ongoing IV fluids every 12 hours *and documented on fluid balance / medical notes on HIS.*

10. Managing Hypernatraemia (Sodium >145) that develops during intravenous fluid therapy:

10.1. If hypernatraemia develops in term neonates, children and young people review their fluid status and manage as below:
- 10.1.1. If there is no evidence of dehydration and an isotonic fluid is being used, consider changing to a hypotonic fluid (for example, 0.45% sodium chloride with 5% Dextrose).
- 10.1.2. If dehydration is suspected, calculate the fluid deficit and replace it over 48 hours, initially with Plasma-Lyte 148 + 5% Dextrose
- 10.1.3. If the fluid status is uncertain, measure urine sodium and osmolality.
- 10.1.4. If hypernatraemia worsens or is unchanged after replacing the deficit, review the fluid type and consider changing to a hypotonic solution (for example, 0.45% sodium chloride with glucose).
- 10.1.5. When correcting hypernatraemia, ensure that the rate of fall of plasma sodium does **NOT exceed 12 mmol/litre in a 24-hour period.**
- 10.1.6. Measure plasma electrolyte concentrations every 4–6 hours for the first 24 hours, and after this base the frequency of further plasma electrolyte measurements on the treatment response.

11. Managing Hyponatraemia (Sodium <135) that develops during intravenous fluid therapy:

11.1. If asymptomatic hyponatraemia develops in term neonates, children and young people, review the fluid status and manage as follows:
- 11.1.1. If a child is prescribed a hypotonic fluid (e.g. 0.45%NaCL), change to an isotonic fluid (for example, Plasma-Lyte 148 with 5% Dextrose).
- 11.1.2. Restrict maintenance IV fluids in children and young people who are hypervolaemic or at risk of hypervolaemia (for example, if there is a risk of increased ADH secretion) by either:
  - 11.1.2.1. Restrict maintenance fluids to 50–80% of routine maintenance needs or
  - 11.1.2.2. Reduce fluids, calculated on the basis of insensible losses within the range 300–400 ml/m2/24 hours plus urinary output.
- 11.1.3. Repeat U&E every 4-6 hours until electrolytes within the normal range

11.1.4. Ensure plasma sodium levels do in increase by more than 0.5mmol/l/hour

12. Acute Symptomatic Hyponatraemia:

12.1. Headache
12.2. Nausea and vomiting
12.3. Confusion and disorientation
12.4. Irritability
12.5. Lethargy
12.6. Reduced consciousness
12.7. Convulsions
12.8. Coma
12.9. Apnoea

12.10. **THIS IS A MEDICAL EMERGENCY**

12.11. If acute symptomatic hyponatraemia develops in term neonates, children and young people who are receiving IV fluids then this is likely to have occurred quickly and therefore requires correction quickly. **Review the fluid status, seek immediate expert advice** (Paediatric Consultant on Call or NWTS) and **consider** management as follows:
  12.11.1. Use a bolus of 2 ml/kg (maximum 100 ml) of 2.7% sodium chloride over 10–15 minutes.
  12.11.2. Use a further bolus of 2 ml/kg (maximum 100 ml) of 2.7% sodium chloride over the next 10–15 minutes if symptoms are still present after the initial bolus.
  12.11.3. If symptoms are still present after the second bolus, check the plasma sodium level and consider a third bolus of 2 ml/kg (maximum 100 ml) of 2.7% sodium chloride over 10–15 minutes.
  12.11.4. Measure the plasma sodium concentration at least hourly.

12.12. As symptoms resolve, decrease the frequency of plasma sodium measurements based on the response to treatment and ensure that the rate of increase of plasma sodium **does not exceed 0.5mmol/litre/hr**

12.13. Do not manage acute hyponatraemic encephalopathy using fluid restriction alone.

Algorithm 6: Managing hyponatraemia (plasma sodium less than 135 mmol/litre) that develops during IV fluid therapy

Be aware that the following symptoms are associated with acute hyponatraemia:

- Headache.
- Nausea and vomiting.
- Confusion and disorientation.
- Irritability.
- Lethargy.
- Reduced consciousness.
- Convulsions.
- Coma.
- Apnoea.

Hyponatraemia symptoms?

No

If a child is prescribed a hypotonic fluid, change to an isotonic fluid (for example, 0.9% sodium chloride)

If hypervolaemic or at risk of hypervolaemia, restrict maintenance IV fluids by either:

- restricting maintenance fluids to 50–80% of routine maintenance needs **or**
- reducing fluids, calculated on the basis of insensible losses within the range 300–400 ml/m^2/24 hours plus urinary output.

Yes

Seek immediate expert advice (for example, from the paediatric intensive care team)

Consider a bolus of 2 ml/kg (maximum 100 ml) of 2.7% sodium chloride over 10–15 minutes

Symptoms still present after the initial bolus? — **No**

Yes

Consider a further bolus of 2 ml/kg(maximum of 100 ml) of 2.7% sodium chloride over the next 10–15 minutes

Symptoms still present after the second bolus? — **No**

Yes

Check plasma sodium level and consider a third bolus of 2 ml/kg (maximum of 100 ml) of 2.7% sodium chloride over 10–15 minutes

Measure plasma sodium concentration at least hourly

As symptoms resolve, decrease the frequency of plasma sodium measurements based on the response to treatment

Ensure that the rate of increase of plasma sodium does not exceed 12 mmol/litre per 24 hours

13. Nursing Assessment

13.1. All patients should have a new and completed admission on HIS consisting of previous medical conditions, medications and allergies

13.2. Ensure allergy status is questioned routinely particularly during administration of medication and mealtimes.

13.3. Patient to be weighed on each admission and documented

13.4. Name band must be worn at all times

13.5. Record baseline observations

13.6. Complete a strict diet & Fluid chart to assess input & output

13.7. Check capillary refill time on a regular basis

13.8. Assess the need for intravenous fluids in accordance with protocols.

13.9. Ensure a cannula is in situ and in working order, if not assist with this procedure.

14. Nursing Management

14.1. Ensure the intravenous fluids are prescribed dependant on the weight. Also, that they are the correct fluids prescribed depending on age of child and condition.

14.2. Gather all relevant equipment needed to administer intravenous fluids and ensure everything is in working order.

14.3. Check VIP score of cannulas prior to commencement of IV fluids and each time canula is accessed and document on HIS VAD chart.

14.4. Check Bag of fluids with another nurse that the bag of fluid is the correct fluid that is prescribed, check name bands and sign the prescription sheet.

14.5. Ensure you are trained to use the Alaris agila Volumatic pump and insert the giving set into the pump, if not seek training from Training & Development sister.

14.6. Set up the Alaris pump to infuse one hour amount.

14.7. Commence hourly monitoring of cannula – check VIP score **(ensure hourly recording on fluid balance chart)**

14.8. Commence hourly recordings of rate and total input / output on fluid balance chart.

14.9. Ensure all nursing documentation is complete.

14.10. Ensure child has daily U&E's taken.

14.11. To encourage oral intake when able and either reduce or stop intravenous fluids when clinically able.

Appendix 2 - Fluid balance Chart

NAME	DATE	DAILY WEIGHT

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TIME	INPUT															OUTPUT								
	PUMP 1 / SITE				PUMP 2 / SITE				PUMP 3 / SITE							URINE								
	DEVICE NO.				DEVICE NO.				DEVICE NO.															
	FLUID TYPE				FLUID TYPE				FLUID TYPE															
	RATE	HOURLY TOTAL	VIP SCORE	TOTAL	RATE	HOURLY TOTAL	VIP SCORE	TOTAL	RATE	HOURLY TOTAL	VIP SCORE	TOTAL	DIET ORAL/NG FEEDS	MEDS / FLUSH	TOTAL INPUT	HOURLY	ML/KG/HR	NG / ASPIRATE / VOMIT	BOWEL	DRAIN / BLOOD LOSS	TOTAL OUTPUT	FLUID BALANCE +/-	SIGNATURE
08																							
09																							
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Clinical Guideline: CG20-028 - Paediatric IV Fluid Management
Review Date: May 2027

NAME	DATE	DAILY WEIGHT

NHS
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HOSPITAL NUMBER
DATE OF BIRTH
ADMISSION WEIGHT (DATE WEIGHED)

GASTROSTOMY TYPE/SIZE
GASTROSTOMY TYPE/SIZE
DATE WATER TO BE CHANGED

NG TYPE/SIZE
DATE NG INSERTED
DATE NG TO BE CHANGED

URINARY CATHETER SIZE
DATE CATHETER INSERTED
DATE CATHETER TO BE CHANGED
NAPPY DRY WEIGHT

TYPE OF FEED	ROUTE	BOLUS / CONTINUOUS PUMP

FLUID BALANCE
INPUT TOTAL - OUTPUT TOTAL

URINE MLS/KG/HR
COLLECTED URINE ÷ WEIGHT ÷ TOTAL HOURS SINCE LAST CALCULATION

24 HOUR TOTAL INPUT	
24 HOUR TOTAL OUTPUT	
FLUID BALANCE	

CLINICIAN REVIEW (FLUID PRESCRIPTION, OBSERVATIONS, BLOOD RESULTS, FLUID BALANCE, ASSESS PATIENT	REVIEWING CLINICIAN NAME	SIGNATURE

Appendix 3 – Fluid Prescription / Fluid Calculation chart

See below document ----

A CALCULATIONS SHEET SHOULD BE COMPLETED AND ADDED TO FILE FOR ALL FLUID PRESCRIPTIONS

Summary of Guidelines: **Term Neonates**

Maintenance		**Resuscitation**
0.18% Sodium Chloride + 10% Dextrose		• 10-20ml/kg bolus of **Plasmalyte 148** over less than 10 minutes • Reassess clinically. • Seek expert advice if more than 40ml/kg required
• Birth – Day 1: • Day 2: • Day 3: • Day 4: • Day 5:	50 - 60ml / kg / day 70 - 80ml / kg / day 80 - 100ml / kg / day 100ml – 120ml / kg / day 120 - 150ml / kg / day Follow child guidelines	**Monitoring**: All neonates requiring intravenous fluids require repeat bloods every 24 hours at least: • Urea & Electrolytes • Blood Glucose • Weight Plus, reassessment of fluids and prescription every 12 hours

Summary of Guidelines: **Children and Young Adults**

Maintenance		**Resuscitation**
Plasmalyte 148 + 5% Dextrose		• 10-20ml / kg bolus of **Plasmalyte 148** over less than 10 minutes • Reassess clinically. • Seek expert advice if more than 40ml/kg required
• Up to 10kg: • 10 – 20kg: • >20kg:	100ml / kg / 24 hour 1000ml + 50ml for every kg > 10 / 24 hour 1500ml + 20ml for every kg > 20 / 24 hour	**Monitoring**: All patients requiring intravenous fluids need repeat bloods every 24 hours at least: • Urea & Electrolytes • Blood Glucose • Weight Plus reassessment of fluids and prescription every 12 hours

Fluid Deficit:

Moderate 5% dehydration Appears unwell, sunken eyes, dry mucous membranes, diminished skin turgor, drowsy, irritable, deep (acidotic breathing), increased PEWS score	**Fluid prescription** 5 x weight in kg x 10 mls (over **48 hours**) added to maintenance
Severe 10% dehydration Decreased peripheral perfusion, cool/pale/mottled peripheries, circulatory collapse, CRT >2seconds, increased PEWS score, decreased level of consciousness	**Fluid prescription** 10 x weight in kg x 10 mls (over **48 hours**) added to maintenance

Name: **Hospital Number:** **Date:**

Intravenous Fluid Prescription

Date	Time	Fluid	Volume	Rate (ml / hour)	Prescriber's signature	Administered by:	Checked by:	Start time	Finish time	Volume given (ml)
										Use fluid balance chart

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FLUID CALCULATIONS SHEET

Calculations guidance for intravenous fluid prescriptions for children under 16 years of age:
Please ensure a record of calculations for **all** fluid prescriptions are completed and added to the patient's file.
For babies < 1 week of age, always discuss fluid prescriptions with a senior clinician.
Fluids prescribed for neonates should be based on **birth weight** until exceeded by their current weight.

MAINTENANCE FLUIDS:

First 10kg: 100ml/kg/day =	A	ml/day
Second 10kg (10-20kg): 50ml/kg/day =	B	ml/day
For each kg over 20kg: 20ml/kg/day =	C	ml/day
Maintenance total (A+B+C) =	D	ml/day
MAINTENANCE TOTAL (D) / 24 HOURS =	**E**	ml/hour

FLUID DEFICIT CALCULATION:

% dehydration ( ) % x bodyweight (_) kg x 10 =	F	ml
Volume given as fluid bolus =	G	ml
Residual deficit (F – G) =	H	ml
Rate of deficit replacement = H / 48 hours =	**I**	ml/hour

ONGOING LOSSES (vomiting, diarrhoea, drains etc) =	**J**	ml/hour

TOTAL HOURLY RATE OF FLUID REPLACEMENT (E + I + J) = *(maintenance + fluid deficit + ongoing losses)*	ml/hour

Completed by …….
Date …….
Time …….

References:

Nice Guidelines 2020: Intravenous fluid therapy in children and young people in hospital https://www.nice.org.uk/guidance/ng29

Nice Guidelines 2015 Algorithms for IV fluid therapy in children and young people in hospital https://www.nice.org.uk/guidance/ng29/resources/algorithms-for-iv-fluid-therapy-in-children-and-young-people-in-hospital-set-of-6-pdf-2190274957

WWL Neonatal- Nursing - Intravenous fluids Guideline 2017

Nursing and Midwifery Council 2020: The Code: Professional standards of practice and behaviours for nurses and midwives https://www.nmc.org.uk/standards/code/read-the-code-online/#first

Intravenous Fluid Guideline for Children, Manchester University NHS Foundation Trust.