PAEDIATRIC FLUIDS

RCH DEHYDRATION

AIMS

- Understand normal fluids electrolyte requirements/ maintenance
- Understand how to assess DEHYDRATION in children
- Understand the difference between DEHYDRATION and SHOCK but that they may occur together

RCH FLUID CALCULATOR

MAINTENANCE FLUIDS

ection

es index

e development

sources

sts

k

Fluids Calculator

Maintenance Fluid Requirements for essentially well child with normal hydration status - Most unwell children should receive 2/3 of this amount

Weight:	kg	
	mls/hr	Clear

100mls/hour (2500 mls/day) is the normal maximum amount for any patient.

Think carefully if there are factors which will decrease or increase the maintenance fluid requirement for your patient.

Remember to calculate replacement of any deficit and additional ongoing losses (eg chest drainage).

Fluid & Electrolytes

Normal Fluid Requirements

Body Weight	Fluid requirement per day	Fluid requirement per hour
First 10 kg	100 ml/kg	4 ml/kg
Second 10 kg	50 ml/kg	2 ml/kg
Subsequent kg	20 ml/kg	1 ml/kg

INSENSIBLE LOSSES

- Caloric content of feeds
- Ambient temperature
- humidity of inspired air
- Fever

- Stool output usually between 0 -10 ml/kg/ day are lost in stools *(may exceed 300 ml/kg/ day in diarrhoea)*
- Urinary output usually between 1-2 ml/kg/ hour

Fluid & Electrolytes
Normal Electrolyte Requirements

Body Weight	Sodium mmol/kg/day	Potassium mmol/kg/day
First 10 kg	2 - 4	1.5 - 2.5
Second 10 kg	1 - 2	0.5 - 1.5
Subsequent kg	0.5 - 1	0.2 - 0.7

DEHYDRATION

A condition caused by the excessive loss (deficit) of water from the body

DEGREE OF DEHYDRATION

What are the symptoms and signs of dehydration?

How do you distinguish MILD v MODERATE v SEVERE dehydration?

WEIGHT

- Weigh bare child and compare with any recent (within 2 weeks) weight recordings

- The best method relies on the difference between the current body weight and the immediate pre-morbid weight.

MILD DEHYDRATION <4%

- No clinical signs
- They may have increased thirst
- They will have a history of losses eg vomiting, diarrhoea, increased insensible losses
  - *DOCUMENT FREQUENCY/ VOLUME/ DURATION OF LOSSES*

MODERATE DEHYDRATION 4-6%

- HISTORY OF LOSSES +/ DECREASED URINE OUTPUT

- Central Capillary Refill Time> 2 secs
- Increased respiratory rate
- Mild decreased tissue turgor
- Sunken eyes, fontanelle
- Dry mucous membranes

SEVERE DEHYDRATION > 7%

- HISTORY OF LOSSES, decreased urine output +/- lethargy

- CRT > 3 secs
- Mottled skin
- Decreased tissue turgor
- Other signs of shock
  - Tachycardia
  - Neurological: irritable or reduced conscious level,
  - Hypotension
- Deep, acidotic breathing

Considering fluids:

Degree of dehydration (deficit)

+

Maintenance fluid requirements

+

Ongoing losses

Calculate deficit

- Degree of dehydration expressed as % of body weight
  - e.g. a 10kg child who is 5% dehydrated has a water deficit of 500mls
  - WEIGHT X DEFICIT % X 10 (in ml)
  - = 10 X 5 X 10 = 500 ML
- The deficit is replaced over a time period that varies according to the child's condition. Precise calculations (eg 4.5%) are not necessary
- The rate of rehydration should be adjusted with ongoing assessment of the child.

Speed of replacement

- Replacement may be rapid in most cases of gastroenteritis (best achieved by oral or ng fluids)

- SLOWER in DKA, meningitis and HYPERNATRAEMIA
  - In Hypernatraemia aim to rehydrate over 48 hours with Na not falling more than 1mmol/litre/hour

SHOCK

Shock occurs as result of rapid loss of 20 mL/kg from the intravascular space

SHOCK

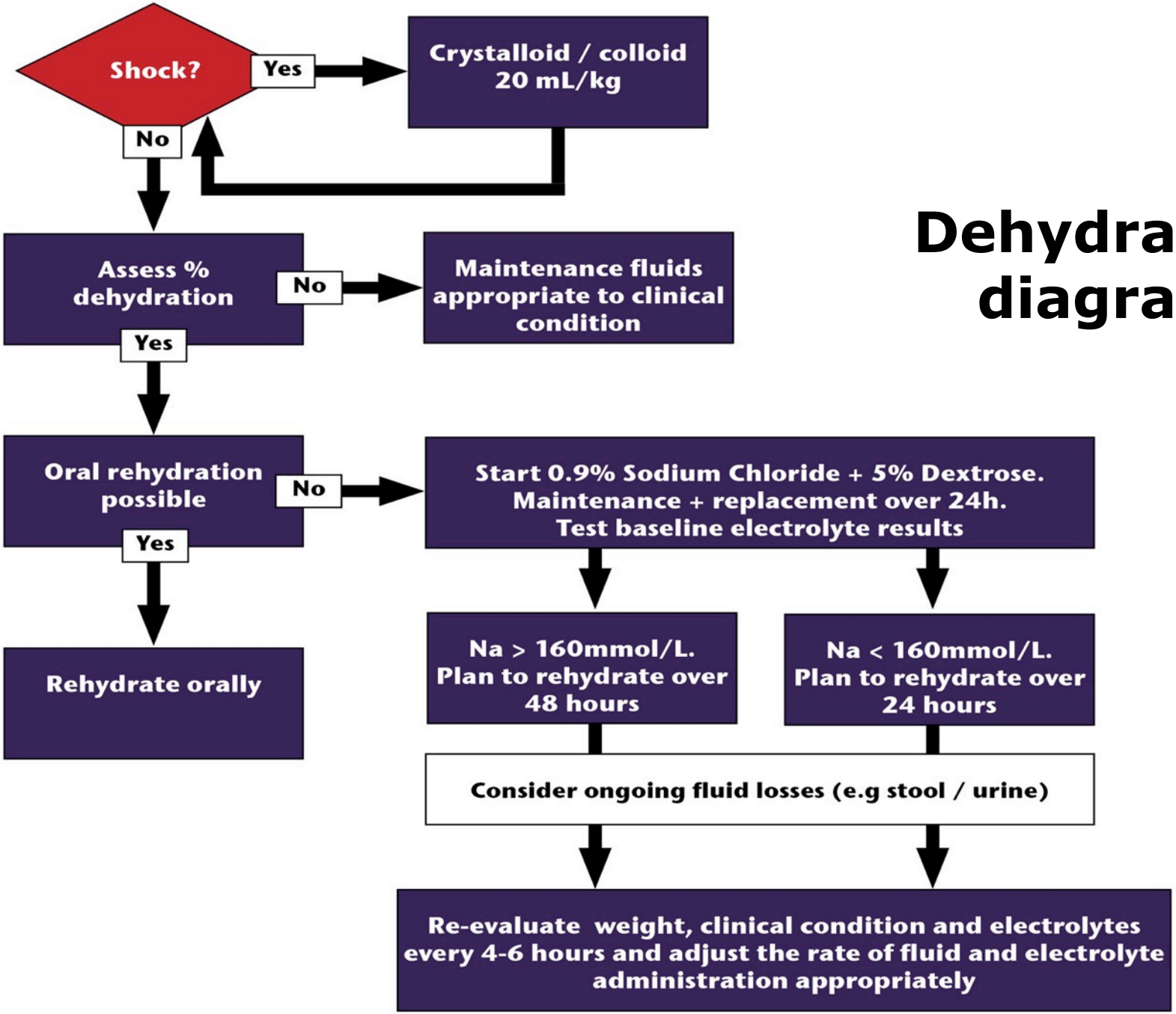
- The treatment of shock requires rapid administration of a bolus of intravascular fluid (start with 10- 20ml/kg then reassess) with electrolyte content that approximates to plasma (eg. 0.9% saline)

- If the intravascular volume is maintained, clinical dehydration is only evident after losses of >25 mL/kg of total body water.

DEHYDRATED BUT NOT SHOCKED

- The treatment of dehydration requires gradual replacement of fluids, with electrolyte content that relates to the to the electrolyte losses, or to the total body electrolyte content.

Dehydration diagram



RATE OF REPLACEMENT

- RCH Gastroenteritis
- Aim for ENTERAL replacement if possible
- PO
  - Ondansetron if >6m/ >8kg
  - 10-20ml/kg over an hour of ORS
- NG
  - Ondansetron as above
  - BHS we do SLOW rehydration

NG fluid replacement

- Replace deficit over first 6 hours and then give daily maintenance over the next 18 hours. To calculate hourly rate

- TABLE 3 of the RCH gastroenteritis

IV FLUIDS

- NG is safer and more effective but IV rehydration is indicated for severe dehydration and if NG fails (eg. ongoing profuse losses or abdominal pain)

- Also suitable for children who already have an IV insitu

- Certain comorbidities, particularly GIT conditions (eg. short gut or previous gut surgery) - discuss these patients with senior staff.

IV fluid choice (not shocked)

- **Rapid IV Rehydration (d/w senior)**
  - In older children > 4 years
  - moderate dehydration with no comorbidities, no electrolyte disturbance and no significant abdominal pain
  - **10 ml/kg/hr (up to 1000ml/hr) for 4 hours 0.9% sodium chloride (normal saline) and 5% Glucose, then reassess.**

Standard IV Rehydration for the first 24 hours.

- Table 4 RCH guideline
- Table 4

IV FLuids

- **0.9% sodium chloride (normal saline) and 5% Glucose** for rehydration after any required boluses.
  - If serum K < 3mmol/L, add KCl 20mmol/L, or give oral supplements

- **Measure Na, K and glucose** at the outset and at least 24 hourly from then on (more frequent testing is indicated for patients with comorbidities or if more unwell)

- *Plasmalyte 148 is used in ICU at BHS*

Monitoring

- Bare weigh patient 6 hourly in moderate and severe dehydration, who are receiving NGTR or iv fluids

- Carefully reassess after 4-6 hours, then 8 hourly to guide ongoing fluid therapy – *this should be part of morning & afternoon handover*

- Look particularly for:
  - weight change
  - clinical signs of dehydration
  - urine output
  - ongoing losses
  - signs of fluid overload, such as puffy face and extremities.

FLUIDS

- Understand maintenance requirements
- Understand assessment of dehydration
- Differentiating dehydration v shock v dehydration & shock
- Fluid replacement
  - Po
  - Ng
  - Iv fluids