

# Fluids: an e-Learning resource



Developed by RCH Medical Education

# Introduction

This learning resource has six components:

- [Before you start - preview activity](#)
- [Watch and Learn – fluids power point and audio](#)
- [Practical tips](#)
- [Patient safety tips](#)
- [Where to now? – post power point activity](#)



# Before you start: How confident are you in prescribing fluids to children?

In the ED you see a four year old girl with 2 days of fever, vomiting and diarrhoea

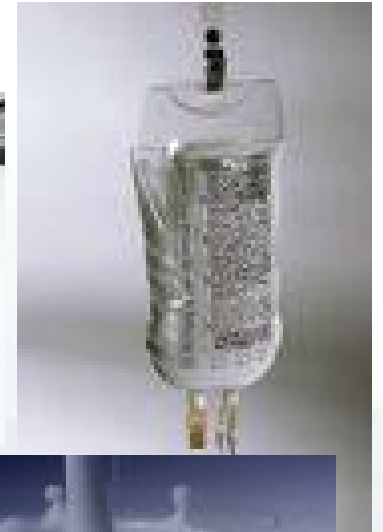
- She is previously well and weighed 15kg last month
- Today she weighs 14kg
- She is pale and not interactive, only weakly resisting your examination
- Her HR is 120, BP 80/50, capillary return 2 sec centrally
- Her abdomen is soft and non tender



# What things do you need to think about with this scenario?

You might like to consider:

- Why am I giving fluid?
- How will I give fluid?
- What fluid?
- How much fluid?
- How will I monitor?



# 5 Questions to always consider

- **Why** am I giving fluid?
- **How** will I give fluid?
- **What** fluid?
- **How much** fluid?
- How will I **monitor**?



# Why give fluid?

- Resuscitation
- Deficit replacement
- Ongoing losses
- Maintenance



# How will I give fluid?

- Enteral
  - Oral
  - Nasogastric
- Parenteral
  - IV



# What IV fluid – general principles

- Resuscitation
  - 0.9% saline (= 'normal' saline)
- Current maintenance guidelines
  - 0.45% saline + 5% glucose +/- 20 mmol/L KCl
  - 0.9% saline + 5% glucose +/- 20 mmol/L KCl
  - Other options eg. Hartmann's





# What IV fluid? General principles

- Drug lines usually 0.9% saline
- Stronger glucose solutions – NICU and PICU
- Correct hypo or hypernatraemia slowly
- Consider adding KCl 20mmol/L unless high K or anuric



# How much will I give?

Consider these indications

- Resuscitation
- Deficit
- Ongoing losses
- Maintenance



# How much - Resuscitation

## Hypovolaemia

- Give boluses of 20 ml/kg 0.9% saline
- May be repeated
- If patient requires more than 2 boluses of 20 ml/kg, call ICU



# How do you assess the deficit?

Mild (< 4%)

- No clinical signs

Moderate (4-6%)

- Some clinical signs

Severe (>6%)

- Multiple signs
- +/- acidosis, hypotension



# Clinical Assessment

Clinical signs only approximate deficit

- Cool peripheries
- Increased thirst
- Delayed central capillary refill
- Decreased turgor
- Acidotic breathing



# How to Calculate Deficit?

- Describe deficit as % body weight
- Ideally calculate deficit using pre-morbid weight (if available) and current weight (bare!)
- Replace deficit
  - Quickly if using enteral fluids
  - Slowly (over 48 hours) if using IV fluids – particularly DKA, meningitis, hypo or hypernatraemia – risk of cerebral oedema



# For example

- Child who was previously noted to be 10kg and is assessed to be 5% dehydrated.
- What is the water deficit?



# Now consider maintenance fluids

Weight	Fluid required per 24 hours	Fluid required per hour
1st 10 kg	100 ml/kg	4 ml/kg
2nd 10 kg	50 ml/kg	2 ml/kg
Subsequent kg	20 ml/kg	1 ml/kg





# Plus ongoing Losses

- These may include:
  - Urine
  - Stool
  - Skin (eg burns)
  - Drains
  - Redistribution / 3<sup>rd</sup> spaces
- Best measured and replaced (hrly or 4 hrly)
- 0.9% saline may be sufficient if using IV



# Considerations in unwell children

- Any sick child is at risk of excess ADH secretion
- Sick children retain free water
  - Hyponatraemia - fluid shifts into ICF - cerebral oedema
- If hyponatraemic give adequate sodium and consider fluid restriction



# Monitor

- Fluid status
  - Clinical – heart rate, perfusion
  - Weight – baseline, 6 hours then daily
  - Input / output charts
- Electrolytes (Na / K / gluc)
  - Baseline
  - Every day for every child receiving IV fluids
  - More frequently if child sick/ electrolyte imbalance



# Scenario 1

- 3 year old girl
- 15 kg
- Requires fluid resuscitation...
- What fluid should you use?
- How much should you give?



# Scenario 1

- 15 kg
- Fluid resuscitation
- 20 mls / kg of 0.9% saline = 300 mls



# Scenario 2

- 8 year old boy
- 25 kg
- What is his normal daily fluid requirement?
- What is his normal hourly fluid requirement?



# Scenario 2

- 25 kg
- Daily fluid requirement:
- 100 mls/kg for first 10 kg = 1000 mls
- 50 mls/kg for next 10 kg = 500 mls
- 20 mls/kg for subsequent kgs =  $5 \times 20 = 100$  mls
- Total = 1600 mls / day



# Scenario 2

- 25 kg
- Hourly fluid requirement
- 4 mls/kg for first 10 kgs = 40 mls
- 2 mls/kg for next 10 kgs = 20 mls
- 1 ml/kg for subsequent kgs =  $5 \times 1 = 5$  mls
- Total = 65 mls / hour





# Going back to our original case

- In the ED you see a four year old girl with 2 days of fever, vomiting and diarrhoea
- She is previously well and weighed 15kg last month
- Today she weighs 14kg
- She is pale and not interactive, only weakly resisting your examination
- Her HR is 120, BP 80/50, capillary return 2 sec centrally
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# Thanks...

[www.rch.org.au/clinical  
guide](http://www.rch.org.au/clinical_guide)

Intravenous fluids  
Hypernatraemia  
Hyponatraemia  
...and many more!

# Practical Tips

- Familiarise yourself with bags of IV fluids and what the different type looks like
- Don't try and set up fluid pumps or alter them yourself – they are all different. Nurses are specifically trained and should do this.

# Patient Safety Tips

- IV fluids are potentially dangerous
  - Most common source of adverse events
  - Consider oral or enteral hydration
- Use the Clinical Practice Guidelines
- Beware of electrolyte disturbances, especially hyponatraemia
- Remember neonates, diabetics, complicated surgical patients etc have different needs....  
**ALWAYS ASK!**
- You can **ALWAYS** ask for help

# Where to now?

## Reflection

What did you learn? Are there still gaps in your knowledge?

If you need further help please see:

- Clinical practice guidelines
- Paediatric handbook
- Ask your registrar or consultant