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

<table>
<thead>
<tr>
<th>Weight</th>
<th>Fluid required per 24 hours</th>
<th>Fluid required per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 10 kg</td>
<td>100 ml/kg</td>
<td>4 ml/kg</td>
</tr>
<tr>
<td>2nd 10 kg</td>
<td>50 ml/kg</td>
<td>2 ml/kg</td>
</tr>
<tr>
<td>Subsequent kg</td>
<td>20 ml/kg</td>
<td>1 ml/kg</td>
</tr>
</tbody>
</table>
Plus ongoing Losses

- These may include:
  - Urine
  - Stool
  - Skin (eg burns)
  - Drains
  - Redistribution / 3rd 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 x 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 x 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
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• 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
Thanks…

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