IV FLUIDS IN NURSING PRACTICE

Andrew Barton
Advanced Nurse Practitioner
Vascular Access and IV Therapy
“As many as 1 in 5 patients receiving intravenous fluids and electrolytes in hospital suffer complications due to inappropriate administration”

(NICE 2015)
TYPES OF IV FLUIDS

• Isotonic
• Hypotonic
• Hypertonic
ISOTONIC FLUIDS

• When the concentration of particles (solute) in the IV fluid is similar to that of plasma.
• The IV fluid doesn't move into the cells and remains within the extracellular compartment thus increasing intravascular volume.
• Examples of isotonic IV fluids:
  • 0.9% Sodium Chloride (Normal Saline)
  • Plasmalite
HYPOTONIC FLUIDS

• A hypotonic solution will have a lower concentration of solutes than the cell. The cell will also have a higher osmotic pressure — the tendency for water to move into a cell by osmosis — than the solution surrounding it. This will cause fluid to move into the cell causing them to swell, then burst — also known as lyse.
HYPERTONIC FLUIDS

• A hypertonic solution will have a higher concentration of solutes than the cell and will have a higher osmotic pressure outside the cell than inside the cell.

• This will cause the water to be pulled from the cell, which results in the cell’s attempt to equalize osmotic pressure. The cell will crenate or shrink.
5% Dextrose – As the dextrose is metabolised the remaining water is hypotonic. The Dextrose is metabolised within 5 mins of infusion.

<table>
<thead>
<tr>
<th>HYPOTONIC SOLUTIONS</th>
<th>ISOTONIC SOLUTIONS</th>
<th>HYPERTONIC SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.45% (N/2) Saline</td>
<td>Normal (0.9%) saline</td>
<td>3% Saline</td>
</tr>
<tr>
<td>0.18% (N/5) Saline</td>
<td>Hartmann's' solution</td>
<td>Mannitol</td>
</tr>
<tr>
<td>5% Albumin</td>
<td>20% Albumin</td>
<td></td>
</tr>
</tbody>
</table>
WHAT ARE THE RECOMMENDATIONS

• IV fluid therapy is to be provided only to those patients whose needs cannot be met by oral or enteral routes.

• Prescribing staff need to remember the five rs:
  
  resuscitation, routine maintenance, replacement, redistribution and reassessment.

• Specification of the type of fluid and rate/volume to be administered.

• IV fluid management plan to review patients requirements over the next 24 hours and on a daily basis.
THE NICE QUALITY STATEMENTS

• Hospitals have an intravenous (iv) fluids lead

• Healthcare professionals should be competent in assessing patients' fluid and electrolyte needs, prescribing and administering iv fluids, and monitoring patient response.

• Patients should have an IV fluid management plan, to cover 24 hours and arrangements for assessing patients and monitoring their plan.

• For adults who receive IV fluid therapy in hospital, clear incidents of fluid mismanagement are reported as critical incidents.
NURSING INTERVENTIONS

• Continuous assessment of patients condition
• Support junior doctors clinical decisions
• Administer prescribed fluids and record accurate fluid balance
• Withhold IV fluids if necessary until formal review
• Monitor nutritional requirements
• Act as patients advocates
• DO NO HARM
NURSING IV FLUID MANAGEMENT PLAN

The IV fluid management plan should outline the fluid and electrolyte prescription over the next 24 hour period. It will cover the type, rate, and volume of fluid and how it is to be given:

• Blood pressure and vital signs – hypotension etc..
• Nutritional status – NBM etc..
• Daily bloods to check biochemistry/electrolyte
  ✓ Full blood count
  ✓ Urea, creatinine and electrolyte
• Fluid balance and weight
• Clinical history – heart failure, diarrhoea, vomiting etc..
MONITORING CARE AGAINST THE PLAN

Clinical team review IV fluid requirements every day

Nursing actions:
• Monitor fluid input and output and document actions
• Urinary catheter care
• Utilise the naso-gastric route
• Weight chart
• Early warning score, including urine output.
RISK ASSESSMENT FOR IV FLUIDS

• What fluid has been prescribed
• How is the IV therapy being delivered
• What vascular access device is being used
• What is the patient's history
• What is the patient's current condition
• Slow the rate, stop the infusion.
SAFE, EFFECTIVE IV FLUIDS ADMINISTRATION

- Consistent education – part of the IV course and annual update.
- Evidenced based practice
- Empower the nursing staff to challenge clinical teams
- Ensure vascular access is appropriate and patent
- Take into account all other sources of fluid and electrolytes; intake including drugs, IV nutrition, blood and blood products, diluents and other IV fluid additives
INFORMING THE PATIENT

Patient information:

• Why are IV fluids required
• Complications of IV fluids
• Signs and symptoms
• Effective history taking
• Benefits of IV fluids
WHICH FLUID IS BEST

25 – 30mL/kg/day of fluid containing:

Approx. 1mmol/kg/day of potassium, sodium and chloride

Approx. 50-100g/day of glucose

e.g.. A 70 kg man requires 2 litres of fluid containing

70 mmol of Na+, K+ and Cl- with some glucose
## FLUID COMPARISONS

<table>
<thead>
<tr>
<th></th>
<th>Na</th>
<th>Cl</th>
<th>Buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plasma</strong></td>
<td>140</td>
<td>100</td>
<td>Bicarbonate 25</td>
</tr>
<tr>
<td>Sodium chloride (NS)</td>
<td>154</td>
<td>154</td>
<td>0</td>
</tr>
<tr>
<td>Hartmann’s solution</td>
<td>131</td>
<td>111</td>
<td>Lactate 29</td>
</tr>
<tr>
<td>Ringer’s lactate</td>
<td>130</td>
<td>109</td>
<td>Lactate 28</td>
</tr>
<tr>
<td>Plasma-Lyte 148</td>
<td>140</td>
<td>98</td>
<td>Acetate 23</td>
</tr>
<tr>
<td>HES (6% starch in NS)</td>
<td>154</td>
<td>154</td>
<td>0</td>
</tr>
</tbody>
</table>
Algorithm 2: Fluid Resuscitation

- Initiate treatment
  - Identify cause of deficit and respond
  - Give a fluid bolus of 500 ml of crystalloid (containing sodium in the range of 130–154 mmol/l) over 15 minutes

- Reassess the patient using the ABCDE approach
- Does the patient still need fluid resuscitation? Seek expert help if unsure

- Yes

- No

- Does the patient have signs of shock?
- Yes
  - >1000 ml given?
    - Yes
      - Seek expert help
    - No
      - Give a further fluid bolus of 260–600 ml of crystalloid
  - No
    - Reassess and monitor the patient

Algorithm 3: Routine Maintenance

- Give maintenance IV fluids
- Normal daily fluid and electrolyte requirements:
  - 25–30 ml/kg/d water
  - 1 mmol/kg/day sodium, potassium, chloride
  - 50–100 g/day glucose (e.g. glucose 5% contains 8 g/100ml)

- Reassess and monitor the patient
- Stop IV fluids when no longer needed
- Nasogastric fluids or enteral feeding are preferable when maintenance needs are more than 3 days

Algorithm 4: Replacement and Redistribution

- Review fluid and electrolyte losses
  - Ongoing abnormal fluid or electrolyte losses
    - Check for:
      - Dehydration
      - Fluid overload
      - Hyperkalaemia
      - Hypokalaemia
      - Hyponatraemia
    - Estimate deficits or excesses

- Redistribution and other complex issues
  - Check for:
    - Gross oedema
    - Renal failure
    - Hypertension
    - Hypovolaemia
    - Cardiovascular collapse
    - Postoperative fluid retention and redistribution
    - Malnourished and refeeding issues
    - Seek expert help if necessary

- Prescribe by adding to or subtracting from routine maintenance, adjusting for all other sources of fluid and electrolytes (oral, enteral and drug prescriptions)

- Monitor and reassess fluid and biochemical status by clinical and laboratory monitoring
OUR CHANGES IN PRACTICE

- Redesigned drug chart to document biochemistry results as part of the IV fluid prescription and 24hr review
- Ward based training for nursing staff who give IV therapy
- E-learning for all doctors
- Consultant training
- Nurse IV training updated
- New IV fluids introduced
- IV fluid administration joined up with AKI work and the resuscitation teams
IMPLEMENTATION PROCESS

1. Identify the IV fluid lead
2. Creation of IV fluid working group
3. Audit practice
4. Identify risks to clinical practice
5. Engage medical and nursing leadership
6. Pharmacy change over IV fluid stock
7. Initiate eLearning for prescribers
8. Monitor and re-audit practice
PATIENT SAFETY

• Report incidents involving IV fluid
• Monitor incidents through safer meds group
• Encourage IV fluid administration via a pump
• Joining work streams – AKI, sepsis, IV fluids, resus.
THANK YOU

Questions