CLINICAL GUIDELINE FOR INTRAVENOUS FLUID THERAPY FOR ADULTS IN HOSPITAL

1. **Aim/Purpose of this Guideline**

1.1. This guideline contains recommendations about general principles for managing intravenous (IV) fluids, and applies to a range of conditions and different settings. It does not include recommendations relating to specific conditions.

1.2. The contents of the guideline follow closely the recommendations published by the National Institute for Health and Care Excellence (NICE) from their clinical guideline 174 (accessed 10 September 2014), with some modifications relevant to practice in RCHT.

2. **The Guidance**

2.1. **Principles and protocols for intravenous fluid therapy**

- When prescribing IV fluids, remember the 5 Rs: Resuscitation, Routine maintenance, Replacement, Redistribution and Reassessment.
- Offer IV fluid therapy as part of a protocol (see Algorithms for IV fluid therapy).
- Patients should have an IV fluid management plan.

2.2. **Assessment and Monitoring**

2.3. Initial assessment:

- Using the ABCDE (airway, breathing, circulation, disability and exposure) approach, assess whether the patient is hypovolaemic and needs fluid resuscitation.

- Indicators of urgent requirement for fluid resuscitation include:
  - Systolic BP < 100mmHg
  - Heart rate > 90 bpm
  - Capillary refill time > 2 secs (and/or cool peripheries)
  - Respiratory rate > 20 breaths per minute
  - National Early Warning Score (NEWS) ≥ 5

- Assess likely fluid and electrolyte needs from the history, clinical examination, current medications, clinical monitoring and laboratory investigations.
  - History should include previous limited intake, thirst, quantity and composition of abnormal losses (eg drain losses, sweating, vomit: see Diagram of ongoing losses), and co-morbidities, including patients who are malnourished and at risk of re-feeding syndrome.
  - Examination should include an assessment of fluid status, including pulse, BP, capillary refill, JVP, presence of pulmonary or peripheral oedema, and postural hypotension.
  - Monitoring should include current status and trends in NEWS, fluid balance charts and patient weight.
Laboratory investigations should include status and trends in FBC and U&Es

2.4. Reassessment:

- If patients are receiving fluids for resuscitation, reassess using the ABCDE approach. Monitor respiratory rate, pulse, blood pressure and perfusion continuously, and measure their blood lactate and/or arterial pH and base excess.
- All patients continuing to receive IV fluids need regular monitoring. This should include at least daily reassessment of clinical fluid status, U&Es, and fluid balance charts, along with twice weekly weight measurements.
- Note:
  - Patients with replacement or redistribution problems may need more frequent monitoring
  - Urinary sodium monitoring may be helpful in patients with high-volume GI losses
- Monitor serum chloride daily and reassess IV fluid prescription if hyperchloraemia develops.
- Report clear incidents of fluid mismanagement through the Datix system.
- Reassess fluid status and IV fluid management plan if the patient is transferred to a new ward or location.

2.5. Resuscitation:

- If patients need IV fluids for resuscitation, use 0.9% Saline or Hartmann’s solution in 500ml boluses over less than 15 minutes.

2.6. Routine maintenance:

- For patients requiring routine maintenance alone, restrict the initial prescription to:
  - 25 – 30 ml/kg/day of water AND
  - approximately 1 mmol/kg/day of potassium, sodium and chloride AND
  - 50-100 g/day glucose to limit starvation ketosis. (This quantity will NOT address nutritional needs: see the RCHT Nutrition guideline.
- This can be achieved using 0.18% Saline in 4% glucose with 20mmol potassium on day one (use caution if total fluid prescription exceeds 2.5 litres per day as this prescription may increase the risk of hyponatraemia).
- Use ideal body weight to assess fluid needs in obese patients.
- Consider restricting fluids to 20 – 25 ml/kg/day in frail, older patients, those with renal impairment or cardiac failure, and malnourished patients at risk of refeeding syndrome.
- Consider adjusting the prescription to deliver the fluids during daytime hours.
- Allow for any fluids taken orally and deduct this volume from the total prescription.

2.7. Replacement and Redistribution:
Add to or subtract from maintenance needs to account for existing fluid and/or electrolyte deficits or excesses, on-going losses or abnormal distribution (see Diagram of ongoing losses).

Seek expert help for complex fluid and/or electrolyte issues (such as: gross oedema, sepsis, hypo/hypernatraemia, renal, liver or cardiac impairment, post-operative patients, and malnourished patients). The appropriate expert will depend on the clinical situation, but may be the medical registrar, Outreach practitioner, or other specialist.

2.8. Algorithms for IV fluid therapy

- Algorithm 1: Assessment
- Algorithm 2: Fluid resuscitation
- Algorithm 3: Routine Maintenance
- Algorithm 4: Replacement and redistribution

2.9. Diagram of ongoing losses
Guide to IV fluid prescription (by body weight) for routine maintenance over a 24-hour period (this is total fluid requirement: a deduction may need to be made if the patient is also taking oral fluids).

<table>
<thead>
<tr>
<th>Body weight (kg)</th>
<th>Volume of water (ml)</th>
<th>Body weight (kg)</th>
<th>Volume of water (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-44</td>
<td>1000-1320</td>
<td>70-74</td>
<td>1750-2220</td>
</tr>
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<td>1375-1770</td>
<td>85-89</td>
<td>2125-2670</td>
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<td>60-64</td>
<td>1500-1920</td>
<td>90-94</td>
<td>2250-2820</td>
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<td>65-69</td>
<td>1625-2070</td>
<td>95-99</td>
<td>2375-2970</td>
</tr>
<tr>
<td>≥100</td>
<td></td>
<td></td>
<td>2500-3000</td>
</tr>
</tbody>
</table>

Add 50-100g/day glucose (eg 5% Glucose contains 5g/100ml. Add 1mmol/kg of each of sodium, potassium and chloride

3. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Adherence to guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Appropriate intravenous fluid prescription</td>
</tr>
</tbody>
</table>

Lead

Dr J Paddle

Tool

NICE approved audit tool:


Frequency

Initial monitoring 6 months after introduction of guideline, thereafter annual or after substantial amendments to guideline

Reporting arrangements

Intravenous fluid guidance committee, minuted meeting

Acting on recommendations and Lead(s)

Intravenous fluid guidance committee (chair: Dr J Paddle)

Change in practice and lessons to be shared

Educational responsibilities lie within the intravenous fluid committee. Decisions as to how to implement changes in practice to be made by this committee

4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the ‘Equality, Diversity & Human Rights Policy’ or the Equality and Diversity website.

4.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.
Appendix 1. Algorithm 1: Assessment
‘Algorithm 1: Assessment’ has been published separately as Appendix 1 and can be accessed via the Document Library by searching for ‘Intravenous Fluid Therapy’ or click here.

Appendix 2. Algorithm 2: Fluid resuscitation
‘Algorithm 2: Fluid resuscitation’ has been published separately as Appendix 1 and can be accessed via the Document Library by searching for ‘Intravenous Fluid Therapy’ or click here.

Appendix 3. Algorithm 3: Routine Maintenance
‘Algorithm 3: Routine Maintenance’ has been published separately as Appendix 1 and can be accessed via the Document Library by searching for ‘Intravenous Fluid Therapy’ or click here.

Appendix 4. Algorithm 4: Replacement and redistribution
‘Algorithm 4: Replacement and redistribution’ has been published separately as Appendix 1 and can be accessed via the Document Library by searching for ‘Intravenous Fluid Therapy’ or click here.
Appendix 5. Combined Algorithms for IV fluid therapy

Using an ABCDE (Airway, Breathing, Circulation, Disability, Exposure) approach, assess whether the patient is hypovolaemic and needs fluid resuscitation
Assess volume status taking into account clinical examination, trends and context. Indicators that a patient may need fluid resuscitation include: systolic BP <100mmHg; heart rate >90bpm; capillary refill >2s or peripheries cold to touch; respiratory rate >20 breaths per min; NEWS ≥5; 45° passive leg raising suggests fluid responsiveness.

Assess the patient's likely fluid and electrolyte needs
- History: previous limited intake, thirst, abnormal losses, comorbidities.
- Clinical examination: pulse, BP, capillary refill, JVP, oedema (peripheral/pulmonary), postural hypotension.
- Clinical monitoring: NEWS, fluid balance charts, weight.
- Laboratory assessments: FBC, urea, creatinine and electrolytes.

Fluid resuscitation required?

Assess the patient's likely fluid and electrolyte needs

History: previous limited intake, thirst, abnormal losses, comorbidities.
Clinical examination: pulse, BP, capillary refill, JVP, oedema (peripheral/pulmonary), postural hypotension.
Clinical monitoring: NEWS, fluid balance charts, weight.
Laboratory assessments: FBC, urea, creatinine and electrolytes.

No
Yes

Can the patient meet their fluid and/or electrolyte needs orally or enterally?

Ensure nutrition and fluid needs are met
See Nutrition and Hydration Policy for adults

Does the patient have complex fluid or electrolyte replacement or abnormal distribution issues?
Look for existing deficits or excesses, ongoing abnormal losses, abnormal distribution or other complex issues.

Does patient have complex fluid or electrolyte replacement or abnormal distribution issues?

No
Yes

Assess for complex fluid or electrolyte replacement or abnormal distribution issues. Look for existing deficits or excesses, ongoing abnormal losses, abnormal distribution or other complex issues.

Give maintenance IV fluids
Normal daily fluid and electrolyte requirements are:
- 25-30 ml/kg/day water
- 1 mmol/kg/day sodium, potassium and chloride
- 50-100 g/day glucose
For the first 24 hours an appropriate first line fluid would be:
- 25-30 ml/kg of 0.18% saline with 4% glucose and 20mmol/l potassium

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.

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

End

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?

No
Yes

Give a further fluid bolus of 250–500 ml of crystalloid

Does the patient have signs of shock?

No
Yes

Seek help from Medical Registrar or Outreach practitioner

Does the patient still need fluid resuscitation? Seek expert help if unsure?

No
Yes

>2000 ml given?

Ongoing abnormal fluid or electrolyte losses
Check ongoing losses and estimate amounts. Check for:
- vomiting and NG tube loss
- biliary drainage loss
- high/low volume ileal stoma loss
- diarrhoea/excess colostomy loss
- ongoing blood loss, e.g. melaena
- sweating/fever/dehydration
- pancreatic/jejunal fistula/stoma loss
- urinary loss, e.g. post AKI polyuria.

Check ongoing losses and estimate amounts. Check for:
- gross oedema
- severe sepsis
- hypotension/hypotension
- renal, liver and/or cardiac impairment.
- post-operative fluid retention and redistribution
- malnourished and refedding issues
- Seek expert help if necessary and estimate requirements.

Redistribution and other complex issues

Check for:
- gross oedema
- severe sepsis
- hypotension/hypotension
- renal, liver and/or cardiac impairment.
- post-operative fluid retention and redistribution
- malnourished and refedding issues
- Seek expert help if necessary and estimate requirements.

Ongoing abnormal fluid or electrolyte losses
Check ongoing losses and estimate amounts. Check for:
- vomiting and NG tube loss
- biliary drainage loss
- high/low volume ileal stoma loss
- diarrhoea/excess colostomy loss
- ongoing blood loss, e.g. melaena
- sweating/fever/dehydration
- pancreatic/jejunal fistula/stoma loss
- urinary loss, e.g. post AKI polyuria.
### Appendix 5. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Clinical Guideline for Intravenous Fluid Therapy for Adults In Hospital</th>
</tr>
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<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>15 Jan 2015</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>15 Jan 2015</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>14 Jan 2018</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Dr J Paddle. Department of Intensive Care</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 253147</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>Summary of NICE CG174 guideline for intravenous fluid administration in adults</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Intravenous Fluid prescription Fluid calculator</td>
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<td>Target Audience</td>
<td>RCHT</td>
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<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>New Document</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Fluid balance guideline: supporting optimal hydration in adults during hospital stay. Sept 2011</td>
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<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Intravenous Fluid committee</td>
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<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Medical Director</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>Not required</td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on Policies – Approvals and Ratification):</td>
<td>Internet &amp; Intranet ✗ Intranet Only</td>
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<tr>
<td>Document Library Folder/Sub Folder</td>
<td>Clinical/CriticalCareAndResuscitation</td>
</tr>
<tr>
<td>Links to key external standards</td>
<td>NICE CG174 (2013)</td>
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<td></td>
<td>NICE CG32 (Nutrition support)</td>
</tr>
<tr>
<td>Related Documents:</td>
<td>NICE CG174 (2013)</td>
</tr>
<tr>
<td>Training Need Identified?</td>
<td>Yes</td>
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</table>
## Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
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<tbody>
<tr>
<td>7 Nov 14</td>
<td>V1.0</td>
<td>Initial Issue including revisions following discussion at fluids committee</td>
<td>Dr J Paddle</td>
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</table>

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This document is to be retained for 10 years from the date of expiry.

This document is only valid on the day of printing

**Controlled Document**

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Appendix 6. Initial Equality Impact Assessment Form

<table>
<thead>
<tr>
<th>Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy) (Provide brief description):</th>
<th>Clinical Guideline for Intravenous Fluid Therapy for Adults In Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate and service area:</td>
<td>Critical Care and Resuscitation Is this a new or existing Policy? New</td>
</tr>
<tr>
<td>Name of individual completing assessment:</td>
<td>Dr J Paddle Telephone: 01872 253147</td>
</tr>
<tr>
<td>1. Policy Aim* Who is the strategy / policy / proposal / service function aimed at?</td>
<td>Medical and nursing staff of RCHT</td>
</tr>
<tr>
<td>2. Policy Objectives*</td>
<td>Improve intravenous fluid prescription and administration</td>
</tr>
<tr>
<td>3. Policy – intended Outcomes*</td>
<td>Improved fluid management for patients requiring intravenous fluids</td>
</tr>
<tr>
<td>4. *How will you measure the outcome?</td>
<td>Planned audit programme</td>
</tr>
<tr>
<td>5. Who is intended to benefit from the policy?</td>
<td>Adult Patients requiring intravenous fluids</td>
</tr>
<tr>
<td>6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?</td>
<td>No</td>
</tr>
<tr>
<td>b) If yes, have these *groups been consulted?</td>
<td></td>
</tr>
<tr>
<td>C). Please list any groups who have been consulted about this procedure.</td>
<td></td>
</tr>
</tbody>
</table>

7. The Impact
Please complete the following table.

<table>
<thead>
<tr>
<th>Are there concerns that the policy could have differential impact on:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equality Strands:</td>
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<tr>
<td>Age</td>
</tr>
<tr>
<td>Sex (male, female, transgender / gender reassignment)</td>
</tr>
<tr>
<td>Race / Ethnic communities /groups</td>
</tr>
<tr>
<td><strong>Disability</strong> - Learning disability, physical disability, sensory impairment and mental health problems</td>
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<td>---</td>
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<tr>
<td><strong>Religion / other beliefs</strong></td>
</tr>
<tr>
<td><strong>Marriage and civil partnership</strong></td>
</tr>
<tr>
<td><strong>Pregnancy and maternity</strong></td>
</tr>
<tr>
<td><strong>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</strong></td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended. **Yes**  **No**

9. If you are not recommending a Full Impact assessment please explain why.

Signature of policy developer / lead manager / director

Date of completion and submission

Names and signatures of members carrying out the Screening Assessment
1. Dr J Paddle
2.

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed ____________________

Date ____________________