Intravenous Fluids

Applicable to (please mark with an X)							
Group-wide		**LUHFT-wide**				**Liverpool Women's**	**x**
Aintree Hospital		**Broadgreen Hospital**		**LCL**		**Royal Liverpool Hospital**	

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Evidence Base and References e.g. Regional or National Guidelines such as NICE or Royal College.	Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition (NICE 32). Intravenous fluid therapy in adults in hospital (https://www.nice.org.uk/guidance/cg174?unlid=338759185201652316133)
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What is new in this version?

Latest Version	Page	Changes Made	Date
3.3		Minor changes. MEWS replaced by NEWS2.	**17/06/25**

1 Introduction

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.
Many adult hospital inpatients need intravenous (IV) fluid therapy to prevent or correct problems with their fluid and/or electrolyte status. Deciding on the optimal amount and composition of IV fluids to be administered and the best rate at which to give them can be a difficult and complex task and decisions must be based on careful assessment of the patient's individual needs.

This guideline does not apply to patients under 16 years, pregnant women, and those with severe liver or renal disease, diabetes or burns. They also do not apply to patients needing inotropes and those on intensive monitoring, and so they have less relevance to intensive care settings and patients during surgical anaesthesia.
The scope of the guideline does not cover the practical aspects of administration (as opposed to the prescription) of IV fluids.

1.1 Principles and protocols for intravenous fluid therapy

The assessment and management of patients' fluid and electrolyte needs is fundamental to good patient care.

1.1.1 Assess and manage patients' fluid and electrolyte needs as part of every ward review. Provide intravenous (IV) fluid therapy only for patients whose needs cannot be met by oral or enteral routes and stop as soon as possible.

1.1.2 Skilled and competent healthcare professionals should prescribe and administer IV fluids, and assess and monitor patients receiving IV fluids.

1.1.3 When prescribing IV fluids, remember the 5 Rs:

1. Resuscitation
2. Routine maintenance
3. Replacement
4. Redistribution
5. Reassessment.

1.1.4 Offer IV fluid therapy as part of a protocol (see Algorithms for IV fluid therapy):

- Assess patients' fluid and electrolyte needs following Algorithm 1: Assessment.
- If patients need IV fluids for fluid resuscitation, follow Algorithm 2: Fluid resuscitation.
- If patients need IV fluids for routine maintenance, follow Algorithm 3: Routine maintenance.
- If patients need IV fluids to address existing deficits or excesses, ongoing abnormal losses or abnormal fluid distribution, follow Algorithm 4: Replacement and redistribution.

See appendix for Algorithms for IV fluid therapy

1.1.5 Include the following information in IV fluid prescriptions:

- The type of fluid to be administered.
- The rate and volume of fluid to be administered.

1.1.6 Patients should have an IV fluid management plan, which should include details of:

- The fluid and electrolyte prescription over the next 24 hours
- The assessment and monitoring plan.

Initially, the IV fluid management plan should be reviewed by an expert daily. The term 'expert' refers to a healthcare professional who has core competencies to diagnose and manage acute illness. These competencies can be delivered by a variety of models at a local level, such as a critical care outreach team or a specialist trainee in an acute medical or surgical specialty. IV fluid management plans for patients on longer-term IV fluid therapy whose condition is stable may be reviewed less frequently.

1.1.7 When prescribing IV fluids and electrolytes, take into account all other sources of fluid and electrolyte intake, including any oral or enteral intake, and intake from drugs, IV nutrition, blood and blood products.

1.1.8 Patients have a valuable contribution to make to their fluid balance. If a patient needs IV fluids, explain the decision, and discuss the signs and symptoms they need to look out for if their fluid balance needs adjusting.

1.2 Assessment and monitoring

Initial assessment

1.2.1 Assess whether the patient is hypovolaemic. Indicators that a patient may need urgent fluid resuscitation include:

- Systolic blood pressure is less than 100 mmHg
- Heart rate is more than 90 beats per minute
- Capillary refill time is more than 2 seconds or peripheries are cold to touch
- Respiratory rate is more than 20 breaths per minute
- Passive leg raising suggests fluid responsiveness.

1.2.2 Assess the patient's likely fluid and electrolyte needs from their history, clinical examination, current medications, clinical monitoring and laboratory investigations:

- History should include any previous limited intake, thirst, the quantity and composition of abnormal losses (see Diagram of ongoing losses), and any comorbidities, including patients who are malnourished and at risk of refeeding syndrome (see Nutrition support in adults [NICE clinical guideline 32]).
- Clinical examination should include an assessment of the patient's fluid status, including:
    - Pulse, blood pressure, capillary refill and jugular venous pressure
    - Presence of pulmonary or peripheral oedema
    - Presence of postural hypotension.
- Clinical monitoring should include current status and trends in:
    - NEWS2
    - Fluid balance charts
    - Weight.
- Laboratory investigations should include current status and trends in:
    - Full blood count
    - Urea, creatinine and electrolytes.

Reassessment

1.2.3 If patients are receiving IV fluids for resuscitation, reassess the patient using the ABCDE approach (Airway, Breathing, Circulation, Disability, Exposure), monitor their respiratory rate, pulse, blood pressure and perfusion continuously, and measure their venous lactate levels and/or arterial pH and base excess according to guidance on advanced life support (Resuscitation Council [UK], 2011).

1.2.4 All patients continuing to receive IV fluids need regular monitoring. This should initially include at least daily reassessments of clinical fluid status, laboratory values (urea, creatinine and electrolytes) and fluid balance charts, along with weight measurement twice weekly. Be aware that:

- Patients receiving IV fluid therapy to address replacement or redistribution problems may need more frequent monitoring.
- Additional monitoring of urinary sodium may be helpful in patients with high-volume gastrointestinal losses. (Reduced urinary sodium excretion [less than 30mmol/l] may indicate total body sodium depletion even if plasma sodium levels are normal. Urinary sodium may also indicate the cause of hyponatraemia, and guide the achievement of a negative sodium balance in patients with oedema. However, urinary sodium values may be misleading in the presence of renal impairment or diuretic therapy.)
- Patients on longer-term IV fluid therapy whose condition is stable may be monitored less frequently, although decisions to reduce monitoring frequency should be detailed in their IV fluid management plan.

1.2.5 If patients have received IV fluids containing chloride concentrations greater than 120 mmol/l (for example, sodium chloride 0.9%), monitor their serum chloride concentration daily. If patients develop hyperchloraemia or acidaemia, reassess their IV fluid prescription and assess their acid–base status. Consider less frequent monitoring for patients who are stable.

1.2.6 Clear incidents of fluid mismanagement (for example, unnecessarily prolonged dehydration or inadvertent fluid overload due to IV fluid therapy) should be reported through standard critical incident reporting to encourage improved training and practice (see Consequences of fluid mismanagement to be reported as critical incidents).

1.2.7 If patients are transferred to a different location, reassess their fluid status and IV fluid management plan on arrival in the new setting.

1.3 Resuscitation

1.3.1 If patients need IV fluid resuscitation, use crystalloids that contain sodium in the range 130–154 mmol/l, with a bolus of 500 ml over less than 15 minutes. (For more information, see the Composition of commonly used crystalloids table.)

1.3.2 Do not use tetrastarch for fluid resuscitation.

1.4 Routine maintenance

1.4.1 If patients need IV fluids for routine maintenance alone, restrict the initial prescription to:

- 25–30 ml/kg/day of water **and**
- Approximately 1mmol/kg/day of potassium, sodium and chloride **and**
- Approximately 50–100 g/day of glucose to limit starvation ketosis. (This quantity will not address patients' nutritional needs; see Nutrition support in adults [NICE clinical

guideline 32].)

For more information see IV fluid prescription for routine maintenance over a 24-hour period.

1.4.2 For patients who are obese, adjust the IV fluid prescription to their ideal body weight. Use lower range volumes per kg (patients rarely need more than a total of 3 litres of fluid per day) and seek senior help if their BMI is more than 40 kg/m^2.

1.4.3 Consider prescribing less fluid (for example, 20–25 ml/kg/day fluid) for patients who:

- Are older or frail
- Have renal impairment or cardiac failure
- Are malnourished and at risk of refeeding syndrome (see Nutrition support in adults [NICE clinical guideline 32]).

1.4.4 When prescribing for routine maintenance alone, consider using 25–30 ml/kg/day of a balance crystalloid solution. Prescribing more than 2.5 litres per day increases the risk of hyponatraemia. These are initial prescriptions and further prescriptions should be guided by monitoring.

1.4.5 Consider delivering IV fluids for routine maintenance during daytime hours to promote sleep and wellbeing.

1.5 Replacement and redistribution

1.5.1 Adjust the IV prescription (add to or subtract from maintenance needs) to account for existing fluid and/or electrolyte deficits or excesses, ongoing losses (see Diagram of ongoing losses) or abnormal distribution.

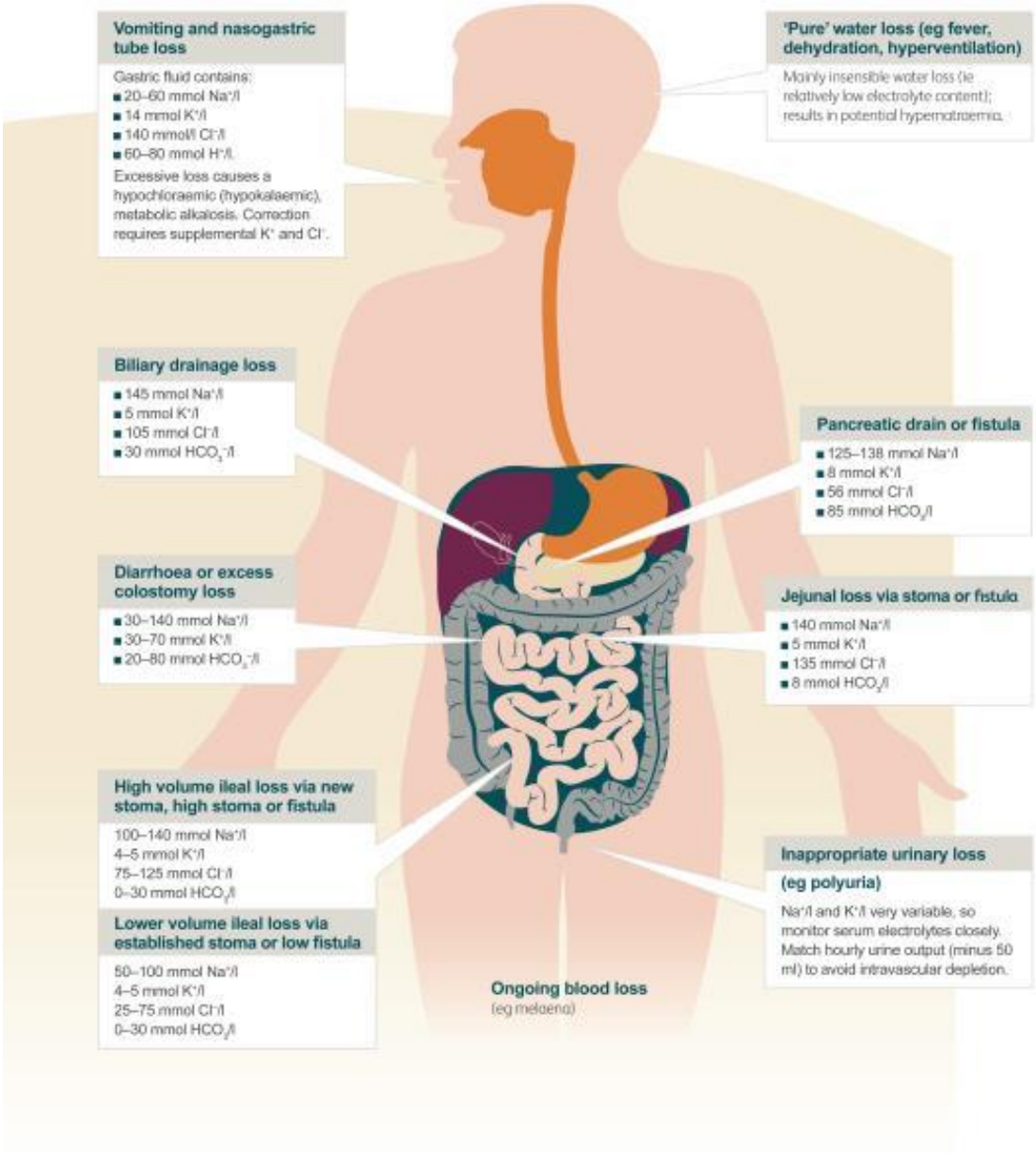
1.5.2 Seek senior help if patients have a complex fluid and/or electrolyte redistribution issue or imbalance, or significant comorbidity, for example:

- Gross oedema
- Severe sepsis
- Hyponatraemia or Hypernatraemia
- Renal, liver and/or cardiac impairment
- Post-operative fluid retention and redistribution
- Malnourished and refeeding issues (see Nutrition support in adults [NICE clinical guideline 32]).

1.6 Training and education

1.6.1 Medical staff receive training in IV fluids as part of their induction teaching programme. Nursing staff receive IV fluid training as part of IV medicines administration delivered by pharmacy. Training records are kept on the Trust's OLM database.

2 Diagram of Ongoing Losses



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3 Consequence of Fluid Mismanagement to be Reported as Critical Incidents

Consequence of fluid mismanagement	Identifying features	Time frame of identification
Hypovolaemia	• Patient's fluid needs not met by oral, enteral or IV intake **and** • Features of dehydration on clinical examination • Low urine output or concentrated urine • Biochemical indicators, such as more than 50% increase in urea or creatinine with no other identifiable cause	Before and during IV fluid therapy
Pulmonary oedema (breathlessness during infusion)	• No other obvious cause identified (for example, pneumonia, pulmonary embolus or asthma) • Features of pulmonary oedema on clinical examination • Features of pulmonary oedema on X-ray	During IV fluid therapy or within 6 hours of stopping IV fluids
Hyponatraemia	• Serum sodium less than 130 mmol/l • No other likely cause of hyponatraemia identified	During IV fluid therapy or within 24 hours of stopping IV fluids
Hypernatraemia	• Serum sodium 155 mmol/l or more • Baseline sodium normal or low • IV fluid regimen included 0.9% sodium chloride • No other likely cause of hypernatraemia identified	During IV fluid therapy or within 24 hours of stopping IV fluids
Peripheral oedema	• Pitting oedema in extremities and/or lumbar sacral area • No other obvious cause identified (for example, nephrotic syndrome or known cardiac failure)	During IV fluid therapy or within 24 hours of stopping IV fluids
Hyperkalaemia	• Serum potassium more than 5.5 mmol/l • No other obvious cause identified	During IV fluid therapy or within 24 hours of stopping IV fluids
Hypokalaemia	• Serum potassium less than 3.0 mmol/l likely to be due to infusion of fluids without adequate potassium provision • No other obvious cause (for example, potassium-wasting diuretics, refeeding syndrome)	During IV fluid therapy or within 24 hours of stopping IV fluids

Source: This table was drafted based on the consensus decision of the members of the Guideline Development Group.

4 Fluid Prescription (by body weight) for Routine Maintenance Over a 24-hour Period

Body weight	Water	Sodium, chloride, potassium	Body weight	Water	Sodium, chloride, potassium
kg	25–30 ml/kg/day	approx. 1 mmol/kg/day of each	kg	25–30ml/kg/day	approx. 1 mmol/kg/day of each
40	1000–1200	40	71	1775–2130	71
41	1025–1230	41	72	1800–2160	72
42	1050–1260	42	73	1825–2190	73
43	1075–1290	43	74	1850–2220	74
44	1100–1320	44	75	1875–2250	75
45	1125–1350	45	76	1900–2280	76
46	1150–1380	46	77	1925–2310	77
47	1175–1410	47	78	1950–2340	78
48	1200–1440	48	79	1975–2370	79
49	1225–1470	49	80	2000–2400	80
50	1250–1500	50	81	2025–2430	81
51	1275–1530	51	82	2050–2460	82
52	1300–1560	52	83	2075–2490	83
53	1325–1590	53	84	2100–2520	84
54	1350–1620	54	85	2125–2550	85
55	1375–1650	55	86	2150–2580	86
56	1400–1680	56	87	2175–2610	87
57	1425–1710	57	88	2200–2640	88
58	1450–1740	58	89	2225–2670	89
59	1475–1770	59	90	2250–2700	90
60	1500–1800	60	91	2275–2730	91
61	1525–1830	61	92	2300–2760	92
62	1550–1860	62	93	2325–2790	93
63	1575–1890	63	94	2350–2820	94
64	1600–1920	64	95	2375–2850	95
65	1625–1950	65	96	2400–2880	96
66	1650–1980	66	97	2425–2910	97
67	1675–2010	67	98	2450–2940	98
68	1700–2040	68	99	2475–2970	99

69	1725–2070	69	100	2500–3000	100
70	1750–2100	70	>100	2500–3000	100
Add 50–100 grams/day glucose (e.g. glucose 5% contains 5g/100ml). For special considerations refer to the recommendations for routine maintenance.					

5 Auditable Standards

5.1 Key Performance Indicators

Number of elective patients receiving IV fluids with a valid prescription.

5.2 Audit Outcomes

Number of elective patients receiving IV fluids with a valid prescription.

6 Associated Guidelines

- Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition (NICE 32).
- Intravenous fluid therapy in adults in hospital (https://www.nice.org.uk/guidance/cg174?unlid=338759185201652316133)

7 References

- Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition (NICE 32)

Appendix One: Document History and Version Control

Version	Date	Comments	Author/Job Title
1	Jan 2013	Guideline Created	Consultant Anaesthetist
2	Jan 2015	Review of guideline	Consultant Anaesthetist
2.1	May 2016	Minor change to current template extended to 3 yearly	Consultant Anaesthetist
3.0	Dec 2018	No changes required review date extended to 3 yearly	Consultant Anaesthetist
3.1	Apr 2022	No changes required review date extended to 3 yearly	Consultant Anaesthetist
3.3	17/06/25	Minor changes. MEWS replaced by NEWS2.	David Patrick, Consultant Anaesthetist