Nottingham University Hospitals NHS
NHS Trust

** Haematology Electrolyte Replacement Guidelines**

Full Title of Guideline:	2748 Local Guideline for Electrolyte Replacement in Adult Haematology Patients (excluding Outpatients)
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Division & Speciality:	Clinical Haematology, CAS Directorate
Version:	6
Ratified by:	Haematology Governance, July 2024
Scope ***(Target audience, state if Trust wide):***	All grades of doctors treating, all pharmacists providing services to and all nursing staff looking after adult haematology patients
Review date ***(when this version goes out of date):***	June 2026
Explicit definition of patient group to which it applies ***(e.g. inclusion and exclusion criteria, diagnosis):***	All adult in-patients within Clinical Haematology receiving treatment for haematological malignancies
Changes from previous version ***(not applicable if this is a new guideline, enter below if extensive):***	Updated to allow the administration of 2 concentrated potassium 50mmol syringes consecutively, without the need for U&Es in between, as agreed at MSG May 2019. Updated to state concentrated potassium can be considered if potassium level is <3mmol/L or patient cannot tolerate oral replacement. It can be also considered as a 1st line for potassium level of 2.5-2.9 and when patient is fluid restricted as agreed by J Addada June 2024
Summary of evidence base this guideline has been created from:	Trust wide electrolyte disturbances guidelines

Written by: Nicola Nicoll Checked by: Dr Mark Bishton, Dr Chris Fox
Reviewed by: Dr Dean Smith, Helen Scarfe May 2020
Dr Kandeepan Saravanamuttu, Helen Scarfe May 2023
Reviewed by Vida Moazzami June 2024

This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date or outside of the Trust.

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Local Guideline for Electrolyte Replacement in Adult Haematology Patients (excluding Outpatients)

This guideline is a summary of the Trust guidelines for electrolyte replacement adapted for use in Haematology patients specifically. Full guidelines for each electrolyte can be found at:
http://nuhnet/nuh_documents/Lists/Clinical%20A%20to%20Z/AK5.aspx?RootFolder=http%3a%2f%2fnuhnet%2fnuh%5fdocuments%2fLists%2fClinical%20A%20to%20Z%2fElectrolytes%20Disturbances&FolderCTID=0x0120000A04A8C608278A4C87397FA7D0D7D31E

Before any electrolyte replacement, review clinical factors for increased loss, check electronic drug chart and supplementary paper charts, review what electrolyte replacement has been delivered in the previous 24-48hours and put in to context of the present result and replacement strategy. The patient may also be receiving additional sources of electrolytes, such as in TPN, and these should be included in calculations. Liaise with the nutrition team as necessary.

1. Potassium

Hyperkalaemia
Follow the Trust guideline.

Hypokalaemia
A decrease in serum potassium of 1mmol/L represents a loss of about 100-200mmol of potassium from body stores

- Replacement via the oral route is preferred if clinically appropriate.
- Monitor potassium daily.
- Use caution in patients with renal impairment (risk of hyperkalaemia).

Potassium <3.5mmol/L

- **Sando® K Effervescent Tablets** – 2 tablets taken three times a day (=72mmol/day)
- If not tolerated:
  Potassium chloride syrup (Kay-Cee-L®) contains 5mmol potassium in 5mL - 25mL taken three times a day (=75mmol/day)
  Potassium Chloride MR 600mg tablets (unlicensed import) contains potassium 8mmols per tablet and should only be used if Sando® K or Kay-Cee-L® are inappropriate.
- If oral replacement not appropriate:
  IV Potassium chloride 20mmol or 40mmol in 1L sodium chloride 0.9%

Potassium <3mmol/L

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- Max rate of IV potassium is 20mmol/hour
- IV potassium chloride 40mmol in 1L sodium chloride 0.9% over 4 to 8 hours (if fluid status allows)
- If on Ambisome® consider addition of amiloride 5-10mg once daily
- In **fluid restricted** patients or those at risk of circulatory overload who have **central access** only (this can be a Hickman line or PICC line):
    - Discuss with a registrar or consultant before prescribing IV potassium chloride.
    - Use the pre-printed prescribing sticker to prescribe potassium chloride 50mmol in 50ml water for injection over 5 hours. The prescription MUST state **via a central line only**. This should be prescribed on a supplementary infusion chart and a placeholder added to the electronic prescription chart.
    - Document the registrar or consultant who has authorised the prescription on the sticker and the date and time of authorisation.
    - A repeat urea and electrolyte blood sample is usually required 30 minutes post infusion completion if the patient is unwell and/or symptomatic of hypokalaemia or if the patient requires more than one syringe of 50mmols of potassium in 24 hours. However, if the patient is at risk of persistent loss of potassium then the registrar or consultant may decide to administer two syringes one after the other without rechecking U&Es. This plan must be clearly documented in the medical notes. Repeat U&Es **must** be checked 30 minutes after the second infusion has finished, and at least once daily.
- In **fluid restricted** patients with only **peripheral access**:
    - The absolute maximum concentration of potassium that can be delivered peripherally is 80mmol/L (must be discussed with senior medical staff first).
    - Use the largest vein possible.
    - Prescribe either 1 or 2 bags of IV potassium chloride 40mmol in 500ml sodium chloride 0.9% or 1 bag of IV potassium chloride 60mmol in 1L sodium chloride 0.9%, depending on the patient's requirements.
    - Infuse at a rate of 10mmol/hour.
    - Check potassium levels after every 40mmol - 80mmol and at least once daily to determine the need for further infusions and to avoid hyperkalaemia.
    - Also <u>concentrated potassium</u> can be considered if potassium level is <3mmol/L or patient cannot tolerate oral replacement. It can be also considered as a 1st line for potassium level of 2.5-2.9 and when patient is fluid restricted.

2. <u>Magnesium</u>

Hypomagnesaemia

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- Hypomagnesaemia often causes secondary hypocalcaemia, and also hypokalaemia and hyponatraemia. Therefore correction of magnesium may aid the correction of other electrolytes.
- Avoid oral magnesium replacement in Haematology patients, especially if patient has diarrhoea.
- Monitor magnesium levels once daily until normal

Magnesium <0.6mmol/L (or symptomatic)

- IV magnesium sulphate 20mmol in 500ml to 1L glucose 5% (preferred), sodium chloride 0.9% or glucose 4%/sodium chloride 0.18% over 6 to 12 hours via a volumetric pump.
- In fluid restricted patients, use 20mmol in 50ml over 5 hours – max rate 4mmol/hour.
- Preferably administer via a large peripheral vein (or central venous catheter).

Magnesium <0.5mmol/L

- Day 1; IV magnesium sulphate 40mmol in 500ml to 1L over 12 hours via a volumetric pump.
- Day 2 to 5; IV magnesium sulphate 20mmol in 500ml over 6 hours via a volumetric pump.
- Preferably administer via a large peripheral vein (or central venous catheter).
- In fluid restricted patients see above.

Rate

- An infusion rate of 1g magnesium sulfate (4mmol magnesium) per hour is recommended. A maximum infusion rate (except in emergencies) of 2g magnesium sulfate (8mmol magnesium) per hour is used in most clinical scenarios.
- Refer to Trust hypomagnesaemia guideline for more information.

3. Phosphate

- Patients with hypocalcaemia should have their calcium corrected before replacing phosphate to prevent further hypocalcaemia.
- Intravenous phosphate is potentially dangerous and can cause fatal hypocalcaemia.
- IV phosphate should be used with caution in patients with severe renal impairment and dosage adjustment will be required. Large doses can result in metabolic acidosis. If creatinine clearance <15ml/min, discuss with the renal team for specialist advice.
- Check serum phosphate levels daily, treatment may be discontinued once the plasma level is above 0.8mmol/L.

Phosphate <0.6mmol/L

- If no hyperkalaemia, use potassium dihydrogen phosphate (potassium acid phosphate) 9mmol in 250ml sodium chloride 0.9% over 12 hours.
  Repeat every 24 hours until phosphate is >0.6mmol/L.

Phosphate <0.32mmol/L

- If no hyperkalaemia, use potassium dihydrogen phosphate (potassium acid phosphate) 9mmol in 250ml sodium chloride 0.9% over 6 hours x 2 infusions (i.e. 18mmol over 12 hours).
- Repeat every 24 hours until phosphate is >0.6mmol/L.

Refer to the Trust hypophosphataemia guideline if the patient is also hyperkalaemic

4. Calcium

Hypercalcaemia

This may be related to the underlying diagnosis, and senior advice should be sought.

Hypocalcaemia

- Rule out acute renal failure and consider tumour lysis syndrome. Seek advice from the renal team if the patient has renal insufficiency.
- Correct hypomagnesaemia if present.
- Seek advice if hyperphosphataemia also present.
- Monitor albumin adjusted calcium.

Albumin adjusted plasma calcium 1.9 – 2.2mmol/L and Asymptomatic

- Adcal D3 Chewable® one or two tablets twice a day.
- Not effective in renal failure (CrCl <20ml/min).
- Not effective in liver failure.

Albumin adjusted plasma calcium <1.9mmol/L **OR** Symptomatic

- IV via a large peripheral vein or central vein.
- 10ml of calcium gluconate 10% (2.23mmols calcium) in 100ml sodium chloride 0.9% or glucose 5% over 10 minutes.
- Followed by a continuous infusion of 100ml of calcium gluconate 10% (22.3mmols of calcium) in 1L sodium chloride 0.9% over 24 hours.
- Max rate 0.5mmol per minute.
- ECG monitoring may be required, especially in those at high risk of arrhythmias or cardiac disease.

References

See individual electrolyte guidelines on the intranet at
http://nuhnet/nuh_documents/Lists/Clinical%20A%20to%20Z/AK5.aspx?RootFolder=http%3a%2f%2fnuhnet%2fnuh%5fdocuments%2fLists%2fClinical%20A%20to%20Z%2fElectrolytes%20Disturbances&FolderCTID=0x0120000A04A8C608278A4C87397FA7D0D7D31E

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