MONOGRAPH

POTASSIUM CHLORIDE

Scope (Staff):	Medical, Pharmacy, Nursing
Scope (Area):	All Clinical Areas

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this DISCLAIMER

⚠ HIGH RISK MEDICINE ⚠

QUICKLINKS

Dosage/Dosage Adjustments	Administration	Compatibility	Monitoring

DRUG CLASS

- Potassium is the primary intracellular cation that plays a major role in muscle and nerve cell electrodynamics.(1)
- INTRAVENEOUS POTASSIUM CHLORIDE CAN BE FATAL IF GIVEN INCORRECTLY.
- Potassium is a High Risk Medicine, hyperkalaemia can develop rapidly and asymptomatically and is potentially fatal.(2)

INDICATIONS AND RESTRICTIONS

- Potassium is indicated for the prevention and treatment of hypokalaemia.(3)
- The use of undiluted potassium chloride infusion (1 mmol/mL) is restricted to Paediatric Critical Care (PCC), Neonatal Intensive Care Unit (NICU) and Ward 1A.
- Due to the potential to cause significant harm when used in error, strictly adhere to dilution and administration guidelines for intravenous potassium chloride.(3)
- Potassium contained in parenteral nutrition (PN) is outside the scope of this monograph. Refer to PCH Parenteral Nutrition Prescribing Guideline

CONTRAINDICATIONS

- Hypersensitivity to potassium chloride or any component of the formulation.[3]
- Documented hyperkalaemia or hyperchloraemia.[4]

PRECAUTIONS

- Hyperkalaemia: Do not administer potassium chloride infusion without a recent potassium level. Cease potassium if serum potassium level >4.5 mmol/L.[3]
- Oliguria or impaired renal function: Avoid if possible. In case of significant hypokalaemia, administer at the maximum rate of 0.2 mmol/kg/hour and monitor serum potassium levels 1-2 hourly. Urine output, creatinine and urea should be monitored as frequently as 6-12 hourly.[2]
- Acid-base disorder: Hyper-osmolality or acidosis (or correction of alkalosis) is associated with hyperkalaemia. Assess serum potassium level in relation to blood pH and use potassium chloride with caution.[1]
- Concurrent use of potassium-sparing drugs: May cause hyperkalaemia, use with caution and monitor potassium levels regularly.[3]
- Cardiovascular disease (cardiac arrhythmias, heart failure): Patients may be more susceptible to cardiac effects associated with hyper/hypokalaemia. Use with caution.[4]

FORMULATIONS

Extra potassium must not be added to any "**premixed solutions"** containing potassium.[5]

****Note: Hartmann's Solution and Plasma-Lyte-148 contain 5 mmol/L potassium. Addition of potassium chloride to these fluid bags is ONLY permitted in the Paediatric Critical Care Unit and the Emergency Department.**

****Plasma-Lyte has shown to beneficially reduce chloride load in patients who are already acidotic and require maintenance fluid, in comparison to using sodium chloride 0.9% base fluid.**

Listed below are potassium chloride products available at PCH:

IV

Standard (premixed) intravenous solutions:

Potassium chloride 20 mmol in sodium chloride 0.9% 1000 mL (isotonic)

Potassium chloride 20 mmol in sodium chloride 0.9% and glucose 5% 1000 mL (hypertonic)

Potassium chloride 20 mmol in sodium chloride 0.45% and glucose 5% 1000 mL (hypertonic)

Potassium chloride 20 mmol, magnesium chloride 5 mmol in sodium chloride 0.45% and glucose 5% 1000 mL (hypertonic)

Potassium chloride 40 mmol in sodium chloride 0.9% 1000 mL (hypertonic)

Potassium chloride 40 mmol in sodium chloride 0.9% and glucose 5% 1000 mL (hypertonic)

Undiluted potassium chloride 10 mmol/10 mL ampoules (See **INDICATIONS/RESTRICTIONS** and **STORAGE**)

Undiluted potassium chloride 30 mmol/30 mL syringe (See **INDICATIONS/RESTRICTIONS** and **STORAGE**)

Oral

Potassium chloride 20 mmol/15 mL oral mixture, 500 mL bottle

Potassium chloride slow release tablets: 8 mmol potassium per tablet

Potassium effervescent tablets: 14 mmol potassium per tablet

PRESCRIBING

- The oral route is effective and appropriate in patients with asymptomatic hypokalaemia and can produce rapid correction without the limitations imposed by rate of administration when given intravenously.(1)
- Consider all sources of potassium (including PN) and medications affecting potassium homeostasis prior to prescribing potassium containing intravenous infusions and limit to a single route where possible.(6)
- Initial potassium replacement therapy should not involve glucose infusions, because glucose may cause a further decrease in the plasma potassium concentration.(2)
- The oral route should be used whenever clinically feasible. If an IV infusion is required, prescribe available standard (premixed) potassium infusion solutions whenever possible.(2)
- Where an order, other than the available standard (premixed) solution is required, the requesting doctor requires **authorisation from the treating consultant which must be documented in the patient notes.(5) These non-standard potassium containing IV solutions must be prepared by the Pharmacy Compounding Service (PCS) during Pharmacy operating hours. After hours, contact on-call pharmacist (See Storage section).**
- All IV potassium orders are valid for a maximum of 24 hours (unless order/duration specifies < 24 hours as per the medical officer).
- Prescribe on the Intravenous Fluid Order Form (MR828) and include the following details:
    - Potassium chloride written in full (abbreviation to KCl is unacceptable)
    - Amount (in mmol)##
    - Route of administration (peripheral or central)
    - Base fluid and its volume
    - Rate of administration in “mL/hr” AND “mmol/kg/hour”
    - Name of the consultant authorising the prescription in the case of ordering non-standard solutions

- Frequency of serum potassium levels for the next 24 hours (see monitoring)
- Specify the duration of infusion

Prescriptions for additional potassium in Hartmann's Solution or Plasma-Lyte-148 must clearly reflect the final potassium concentration (including the existing 5 mmol/L that is contained in the base fluid).

Addition of potassium chloride to these fluid bags is ONLY permitted in the Paediatric Critical Care Unit and the Emergency Department.

Prescribing example (20 kg patient):

Prescibed Date / Time	Route / Site	Type of Fluid	Additive(s) & Amount	Total Volume (mL)	Rate (mL/hour)	Prescriber	
04/05/25	IV	PlasmaLyte-148	Potassium Chloride 35mmol	1000	60	Name: A Doc	
12:10	PICC	Final potassium concentration (40mmol/L) = 0.12mmol/kg/hr Potassium Chloride				Sign: ADOC	Role: RMO

- **Ensure that the fluid chart is cross referenced on the WA Paediatric Hospital Medication Chart (pHMC) by placing a tick or cross in the space provided for the 'Intravenous Fluid Order Chart'.**

DOSAGE & DOSAGE ADJUSTMENTS

Neonates: Refer to Neonatal Medication Protocols

1 month to 18 years:

Prevention of hypokalaemia for ongoing potassium loss (e.g. during diuretic therapy)

Oral: 1-2 mmol/kg/day in 1-2 divided doses.[3] Usual maximum dose is 20 mmol/dose. However, higher doses may be warranted in certain disease states (e.g. salt losing tubulopathies).

Treatment of hypokalaemia

Oral: 2-5 mmol/kg/day orally in divided doses.[3] Usual maximum dose is 20 mmol/dose.

IV: Dosage is dependent on the deficit or the daily maintenance requirements and should be titrated against serum potassium levels.

- See **Administration** section for concentration and rate of infusion.
- For potassium use in the management of diabetic ketoacidosis, refer to Diabetic Ketoacidosis – ED Guidelines
- For potassium use in the management of severe, life-threatening potassium depletion (Potassium Level < 2.5 mmol/L), seek advice from a Paediatric Critical Care or Emergency Department Consultant immediately.

Hepatic impairment:

No dosage adjustment is required.

Renal impairment:

Reduce initial dose by at least 50%. See also "PRECAUTIONS: Oliguria or impaired renal function"

RECONSTITUTION & ADMINISTRATION

Oral:

Liquid: To avoid gastric irritation dilute in 2-6 parts of water or juice.[3, 6] Be aware of the potassium concentration of the juice if mixing with juice to mask the unpalatable taste. Orange juice may contain 4-5 mmol potassium per 100 mL.

Slow release tablets: Swallow whole and do not crush.[3]

Effervescent tablets: dissolve tablet in 120 to 240 mL of water.[4]

Caution: overdose or rapid IV administration of potassium can cause cardiac arrest; fatalities have occurred.[6]

Intravenous:

- Use standard (premixed) potassium infusion solutions whenever possible.[5]
- If potassium is added to an IV fluid bag or a syringe, mix immediately prior to administration by inverting the bag/syringe at least **TEN** times.[5]
- Extra potassium must not be added to standard (premixed) bags containing potassium (commercial or prepared by pharmacy).[5]
- Potassium chloride ampoules must not be added to an infusion bag once it has been hung for administration.[5]
- Do NOT flush the line during and post the potassium infusion.

Concentration:

- Maximum 40 mmol/L potassium when administering via peripheral IV cannula, infuse slowly over 2-3 hours. For concentrations greater than 40 mmol/L, administer centrally.[2]
- In exceptional circumstances, concentrations up to 80 mmol/L may be administered peripherally **ONLY** in Critical Care areas (Paediatric Critical Care and Emergency Department) at the discretion of the treating Consultant.
- Monitor injection site closely. Pain or phlebitis may occur with higher concentrations.[1, 2]

Rate of Infusion:

- Replace deficit slowly over at least 2 to 3 hours and at a rate not exceeding 0.2 mmol/kg/hour (to a maximum of 10 mmol/hour) via peripheral IV cannula.[6]
- Faster infusion rates (up to 0.4 mmol/kg/hr to a maximum of 20 mmol/hour) may be given in severe depletion preferably via central venous catheter only on Ward 1A and PCC upon consultant's advice.
- Any patient prescribed potassium at a rate exceeding 0.2 mmol/kg/hour must receive continuous electrocardiogram (ECG) monitoring.[2, 3]

Undiluted potassium chloride infusion (Maximum volume 30 mL):

- Administer via dedicated central line, in a syringe clearly labelled "Caution: Strong Potassium" using a dedicated syringe driver.
- Infusion rate must be programmed, and potassium chloride molar must be chosen from the drug library on a syringe driver clinically configured to remove the ability for bolus administration.
- The syringe driver must always be on locked function when not programming.
- Continuous ECG monitoring is required for a rate exceeding 0.2 mmol/kg/hour (or 10 mmol/hr) - See "Monitoring".

Administration in the management of severe, life-threatening potassium depletion (potassium level < 2.5 mmol/L):

- Seek advice immediately from a Paediatric Critical Care or Emergency Department Consultant as faster infusion rates may be required for a more rapid correction:
  - 10 mmol of potassium chloride in 100 mL sodium chloride 0.9% can be prescribed and administered peripherally[1]
  - Rates up to 1 mmol/kg/hr (to a maximum of 20 mmol/hr) may be required[1]
- In these situations:
  - A Paediatric Critical Care or Emergency Department Consultant must be consulted and prescribe the order
  - Product must be administered in an Emergency Department Resuscitation room or in the Paediatric Intensive Care Unit
  - Continuous cardiac monitoring is required
  - Serum potassium levels must be checked every 30 minutes
  - Monitor intravenous access site for signs of extravasation or thrombophlebitis[1, 2]

COMPATIBILITY *(LIST IS NOT EXHAUSTIVE)*

Compatible fluids: Glucose/sodium chloride solutions, Hartmann's solution, Ringer's.[2]

The below lists only the commonly used drugs and is not complete. Compatibilities of IV drugs must be checked when two or more drugs are given concurrently.

Incompatible drugs: Fat emulsion, mannitol, amoxicillin, azithromycin, haloperidol lactate, methylprednisolone sodium succinate, pentamidine, promethazine, sodium nitroprusside, thiopental sodium.[2]

MONITORING

Typical target level for serum potassium is 3.5 to 5 mmol/L.[3]

The use of any potassium containing fluid requires a potassium level and review at least every 24 hours (for acute corrections see below).

Cannula Site: Inspect the insertion site hourly with peripheral intravenous cannulas. Cease the infusion where there is evidence of phlebitis or pain and contact a medical officer.[2]

Urea, creatinine, electrolytes: Check baseline prior to administration and assess serum electrolytes 1 to 4 hourly while acutely correcting low potassium level. If urine output decreases or renal function deteriorates review the use of potassium replacement and monitor levels closely.[2, 3]

Continuous electrocardiogram (ECG) monitoring: Required for all patients receiving potassium at a rate exceeding 0.2 mmol/kg/hour (or >10 mmol/hour).[1]

ADVERSE EFFECTS

Hyperkalaemia: Symptoms include paraesthesia, mental confusion, hypotension, cardiac arrhythmias and heart block. For information on the management of hyperkalaemia, refer to Hyperkalaemia (PCH ED Guideline).

Oral: nausea, vomiting, abdominal pain, flatulence, GI bleeding, GI obstruction.[3]

IV: pain and phlebitis at cannula site, especially if the concentration is >30 mmol/L or when solution is not isotonic.[3]

STORAGE

Standard (premixed) intravenous solutions: Clearly labelled and separated from other same size commercial intravenous infusions.

Undiluted potassium chloride 10 mmol/10 mL ampoules: Stored in an ADM in a locking (preferred) or sensing lid bin. The exception is locations where larger quantities are required, where they must be stored on a shelf in an ADM in a red container labelled "Caution: Strong Potassium" and separated from all other ampoules.[5] These are kept as imprest in PCC, NICU, Emergency, theatre and Ward 1A only.

Potassium ampoules **must not** be placed on **resuscitation trolleys**.

During Pharmacy opening hours Monday to Friday, contact the ward pharmacist if potassium chloride ampoules are required. During weekends and public holidays send a non-imprest request with a copy of the intravenous fluid order form to the main pharmacy. After hours, potassium chloride ampoules may be accessed via ADM from other areas of the hospital under the explicit direction of the on-call pharmacist.

Where potassium chloride ampoules are dispensed to a patient on a general ward, any unused ampoules must be returned to Pharmacy immediately.

INTERACTIONS

This medication may interact with other medications; consult PCH approved references (e.g. Clinical Pharmacology), a clinical pharmacist or PCH Medicines Information Service on extension 63546 for more information.

Please note: The information contained in this guideline is to assist with the preparation and administration of **Potassium**. Any variations to the doses recommended should be clarified with the prescriber prior to administration

Related external legislation, policies and guidelines

Central Venous Access Devices (CVAD) and Midline Insertion and Management

Intraosseous access

Potassium Chloride Patient Safety Alert Poster

References

1. Clinical Pharmacology powered by ClinicalKey [Internet]. Elsvier. 2024 [cited 22/05/2024]. Available from: http://www.clinicalpharmacology-ip.com.pklibresources.health.wa.gov.au/default.aspx.
2. Symons K. Ermer J. (editors). Australian injectable drugs handbook. Collingwood: The Society of Hospital Pharmacists of Australia; 2024.
3. Potassium Chloride: Paediatric Drug Information [Internet]. Lexicomp. 2024 [cited 11/07/2024].
4. MIMS Australia. MIMS online [full product information]. St Leonards, N.S.W: CMP Medica Australia.; 2024 [cited 2023 21st Mar].
5. Health WADo. Mandatory Standard for intravenous potassium. Perth: WADoH; 2020 2020.
6. Royal Australian College of General Practitioners, Pharmaceutical Society of Australia, Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists. AMH: Children's Dosing Companion. Adelaide: Australian Medicines Handbook Pty Ltd; 2024.

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File Path:	W:\Safety & Quality\CAHS\CLOVERS MEDICAL Pharmacy\Procedures Protocols and Guidelines\Medication Monographs_Word\PCH.MED.Potassium.DOCX		
Document Owner:	Chief Pharmacist		
Reviewer / Team:	Supervisor Pharmacist – Clinical Services; Senior Pharmacist; Clinical Nurse Manager – Oncology; Consultant Nephrologist; Emergency Department - Head of Department; Oncology – Head of Department; Intensive Care Unit -Head of Department; Clinical Nurse Manager – Intensive Care Unit		
Date First Issued:	Sept 2014	**Last Reviewed:**	Dec 2024
Amendment Dates:	July 2020, Jul 2024, Sept 2025	**Next Review Date:**	Dec 2027
Approved by:	Medication Safety Committee	**Date:**	Nov 2024
Endorsed by:	Drugs and Therapeutics Committee	**Date:**	Dec 2024
Standards Applicable:	NSQHS Standards: NSMHS: N/A Child Safe Standards: N/A		

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