Potassium Supplementation Policy

1. Background

Potassium is a major intracellular cation and is essential for the maintenance of electro-potential gradient of the cell membrane, isotonicity and acid-base balance. Potassium supplementation is routine clinical practice but can be associated with significant risk.

Potassium is a high risk medication as defined by the Australian Commission on Safety and Quality in Health Care and the WA High Risk Medication Policy (MP 0131/20). Health Service Providers are required to have local guidelines in place which adhere to the minimum safety requirements set out by the WA Health Mandatory Standard for intravenous potassium.

For appropriate intravenous potassium replacement in paediatric patients, refer to Child and Adolescent Health Service, Perth Children's Hospital, Department of Pharmacy Intravenous Potassium Chloride Policy.

2. Policy Statement

This policy describes the distribution, prescribing and administration requirements for potassium supplementation in the WA Country Health Service (WACHS).The key principles of this policy are:

- Oral/enteral is the preferred route of potassium administration
- If intravenous potassium is required, pre-mixed infusion bags are to be used unless under special circumstances as outlined in the policy below.
- The maximum rate of potassium chloride administration via peripheral lines is 10mmol per hour.
- The maximum potassium chloride concentration for administration via peripheral lines is 40mmol/L. The exception is 10mmol in 100mL sodium chloride 0.29% pre-mixed mini-bags (isotonic solution).
- Storage of potassium chloride 10mmol/10mL ampoules and other forms of high concentration injectable potassium must be restricted to pharmacy departments and clinical areas with continuous cardiac monitoring approved by the region's Drugs and Therapeutics Committee or equivalent.

This policy references intravenous potassium chloride, although the requirements also apply to intravenous potassium dihydrogen phosphate and intravenous potassium acetate.

2.1 Storage and supply requirements

- Potassium supplements should be available in all sites. As a minimum, all sites should have an oral formulation and an appropriate intravenous pre-mixed potassium infusion bag available.
- The storage of all high concentration potassium products for intravenous administration must be restricted to the Pharmacy Department and Drug and Therapeutic Committee approved clinical areas with cardiac monitoring facilities. In these approved areas these products must be stored separately from other ampoules and each product must be stored in a sealed, clearly marked, red container.

2.1.1 Pre-mixed potassium chloride products

- Pre-mixed potassium solutions must have pink outer packaging and red printed labels.
- Standard pre-mixed solutions must contain either 10mmol, 20mmol, 30mmol or 40mmol of potassium chloride. Alternative potassium-containing intravenous solutions may be stocked in addition to the standard premix solutions listed above, with the provision that they are adequately labelled, stored and administered in accordance with this policy.
- Standard pre-mixed solutions must be made up in a solution of sodium chloride, glucose a combination of both sodium chloride and glucose, or sodium lactate (i.e. 30mmol in Hartman's Solution).
- Most pre-mixed solutions are NOT isotonic. The exception is potassium chloride 10mmol in 100mL as it is prepared with a lower concentration of sodium chloride (0.29%) and hence can be administered peripherally.

2.1.2 High concentration potassium products

- High concentration potassium products are any intravenous potassium formulation that exceeds 40mmol/L. The exception is 10mmol potassium chloride in 100ml sodium chloride 0.29% pre-mixed mini-bags.
- All high concentration potassium products such as potassium chloride 10mmol/10mL ampoules, potassium dihydrogen phosphate 10mmol/10mL ampoules and potassium chloride 40mmol/100ml pre-mixed bags are restricted to pharmacy departments and clinical areas with continuous cardiac monitoring approved by the region's Drugs and Therapeutics Committee or equivalent.
- In these approved areas, products must be stored separately from other ampoules in a sealed, clearly marked red container.
- Access to high concentration potassium products should be restricted to regional resource centres and larger district hospitals. These products must never be stored on general wards, on resuscitation trolleys or borrowed from other areas of the hospital unless on the direction of a pharmacist or nurse manager.
- Regions must have an endorsed procedure outlining the local process to manage access of undiluted potassium ampoules and other high concentration potassium products, particularly after hours.
- If high concentration potassium products are required in an unapproved ward area for a specific order for a specific patient, then region specific guidelines for

distribution must be followed and the prescription must be written on the 'MR176 Intravenous Fluid Treatment Chart', with written evidence that the prescription has been approved by the consultant/director/senior medical practitioner of the department

2.2 Prescribing requirements

- Potassium supplements are to be administered **orally or enterally** wherever possible.
- Oral potassium supplements are prescribed on the WA Hospital Medication Chart (MR170A WA Hospital Medication Chart – Adult Short Stay, MR171 WA Hospital Medication Chart – Adult Long Stay, MR170D National Inpatient Medication Chart - Paediatric Short Stay)
- All IV potassium orders must be prescribed on the MR176 Intravenous Fluid Treatment chart for adults or MR176P WACHS Neonatal / Paediatric Intravenous Fluid Treatment Form for paediatric patients. Ensure that the fluid order chart is cross referenced by placing a tick or cross in the space provided for the 'Intravenous Fluid Order Chart'.
- Intravenous potassium chloride must be prescribed in millimoles (mmol) of potassium and must specify the following:
    a. The dose of intravenous potassium
    b. The fluid in which it is to be diluted
    c. The volume of fluid
    d. The rate of administration expressed as millilitres per hour (mL/hour).
    e. Prescriber signature and printed name
    f. Date and time to start treatment
- The rate should not exceed 10mmol/hour except in critical care areas with continuous cardiac monitoring under the direction of a consultant/senior medical practitioner.
- Standard pre-mixed potassium infusion bags are to be prescribed whenever possible for all intravenous potassium administration. A list of available formulations is listed in Appendix 1.
- Under exceptional circumstances, non-standard concentrations of potassium may be permitted when clinically indicated after discussion with the senior medical practitioner. The name of the senior medical practitioner providing the approval must be documented on the 'Intravenous Fluid Order Chart'
- To replace potassium without giving a large volume of fluid, repeated doses of 10mmol potassium chloride in 100ml 0.29% sodium chloride (isotonic) premixed minibags may be given.

2.3 Intravenous preparation and administration requirements

- ALL infusions containing potassium must be administered via an infusion pump.
- The maximum rate of potassium chloride administration via a **peripheral** intravenous line is **10mmol/ hour** except in critical care areas under the direction of a consultant/senior medical practitioner.

- The maximum concentration of potassium chloride for administration via a peripheral line is 40mmol/L except 10mmol potassium chloride in 100ml 0.29% sodium chloride (isotonic) pre-mixed minibags.
- Non-standard potassium chloride infusions should only be prepared where a premix bag is unsuitable.
- If an intravenous potassium infusion must be prepared onsite, the following must be followed to reduce the risk of adverse events occurring because of preparation errors:
    - The solution must be inverted at least 10 times to ensure that the solute (potassium chloride) is thoroughly mixed throughout the solution. Unshaken bags are prone to layering of added concentrate and are extremely hazardous.
    - Extra potassium must not be added to pre-mixed solutions containing potassium.
    - Potassium chloride ampoules must not be added to an infusion bag once it has been hung for administration.
      Ampoules must be diluted with a compatible fluid before administration to the patient. Sodium chloride 0.9% is the preferred diluent, unless contraindicated, as glucose solutions may decrease serum potassium levels. Compound lactate solution and plasma-lyte solutions contain potassium and this potassium content needs to be considered when adding potassium to these fluids.

- Concentrations above 40mmol/L (except isotonic formations) are not to be administered via peripheral veins due to the risk of phlebitis and pain.
- Rates above 10mmol/h and hypertonic infusions (concentration greater than 40mmol/L) must be administered via a **central line** (CVC). Admission to an area with cardiac monitoring capability is required and continuous electrocardiogram (ECG) monitoring is recommended when the rate is faster than 10mmol/hour.
- Rates in excess of 20mmol/hour are potentially hazardous and are not permitted.
- Any deviation from these recommendations for critical care areas must be approved by the region's Drug and Therapeutics Committee and supported by local policy.

2.4 Monitoring

- **Continuous cardiac monitoring is required when the infusion rate is faster than 10mmol/hour.**
- All patients who are receiving intravenous potassium supplementation must have their serum potassium concentration monitored. The frequency is determined by the severity of the deficit being corrected and the clinical situation.

- All patients being treated with intravenous potassium should have at least daily measurement of plasma potassium levels until levels are within the normal range and stable.
- Observe the intravenous site closely for signs of extravasation when using hypertonic solutions. Refer to the WACHS Peripheral Intravenous Cannulae (PIVC) Management and WACHS Central Venous Access Device (CVAD) and Long Peripheral Venous Catheter (PVC) Management Clinical Practice Standard for the management of extravasation.

3. Definitions

Drugs and Therapeutics Committee	A regional level committee that governs the distribution and use of medications and is responsible for the region's medication management.
KCl	Chemical abbreviation for potassium chloride. Chemical abbreviations are not to be used when prescribing potassium supplementation.
K+	Potassium (elemental) Chemical abbreviations are not to be used when prescribing potassium supplementation.
High concentration potassium products	Any intravenous potassium formulation that exceed 40mmol/L. The exception is 10mmol potassium chloride in 100ml sodium chloride 0.29% pre-mixed mini-bags.
Senior medical practitioner	Most senior contracted doctor for that hospital or health service.

4. Roles and Responsibilities

Prescribers are responsible for:

- prescribing potassium in accordance with the policy on the appropriate intravenous order chart
- ensuring appropriate monitoring and review of the patient's ongoing need for supplementation occurs.

Nursing are responsible to ensure potassium supplements are administered in accordance with the policy and the medication order.

Pharmacy staff and after hours nurse managers are responsible for ensuring:

- clinical staff are aware of the different premixed potassium chloride solutions available at their site and include information on which products are isotonic and non-isotonic.
- for ensuring supply of undiluted potassium products and high strength potassium bags (40mmol in 100ml) occurs in accordance with local endorsed procedures.

All Staff are required to work within policies and guidelines to make sure that WACHS is a safe, equitable and positive place to be.

5. Compliance

Failure to comply with this policy may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the Integrity Policy Framework issued pursuant to section 26 of the *Health Services Act 2016* (WA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

6. Records Management

All WACHS clinical records must be managed in accordance with Health Record Management Policy.

7. Evaluation

Evaluation of this policy is to be coordinated by the Regional Medication Safety Governance Group. The following means or tools are to be used:

1. Assessment of clinical incidents involving potassium supplements
2. Audit of storage requirements as required by local endorsed procedures.

8. Standards

National Safety and Quality Healthcare Standards:
Medication Safety Standard: 4.1, 4.15

9. Legislation

Medicine and Poison act 2014 and Medicine and Poison Regulations 2016

10. References

1. Australian Commission of Safety and Quality in Health Care. High Risk Medication Resources Sydney 2019 [Accessed 8 January 2021]
2. Australian Commission of safety and Quality in Health Care. Recommendations for terminology, abbreviations and symbols used in bedicines documentation. Sydney:ACSQHC;2016.
3. Royal Perth Bentley Group Potassium Supplementation Clinical Guideline (accessed 12th January 2021)
4. Perth Children's Hospital Potassium Chloride Monograph (accessed 12th January 2021)
5. Sir Charles Gairdner Hospital Potassium Supplement (Intravenous) (accessed 12th January2021)
6. Fiona Stanley Hospital Potassium Supplementation (accessed 12th January 2021)

11. Related Forms

MR170A WA Hospital Medication Chart – Adult Short Stay
MR170D National Inpatient Medication Chart - Paediatric Short Stay
MR171 WA Hospital Medication Chart – Adult Long Stay
MR176 Intravenous Fluid Treatment
MR176P WACHS Neonatal / Paediatric Intravenous Fluid Treatment Form

12. Related Policy Documents

WACHS Central Venous Access Device (CVAD) and Long Peripheral Venous Catheter (PVC) Management Clinical Practice Standard
WACHS High Risk Medications Procedure
WACHS Peripheral Intravenous Cannulae (PIVC) Management Clinical Practice Standard
WACHS Specialised Medication - Intravenous Phosphate Supplementation in Adults Guideline

Local Endorsed Procedures:

WACHS Great Southern Management of Potassium Ampoules Procedure - Albany Hospital
WACHS Midwest Supply and Management of Potassium Ampoules Procedure Midwest
WACHS South West Handling and Supply of Concentrated Potassium-Containing Solutions Procedure
WACHS South West Intravenous Infusion Orders for Common Drugs in the Intensive Care Unit Guideline - Bunbury Hospital

13. Related WA Health System Policies

WA High Risk Medication Policy - MP 0131/20
WA Health Mandatory Standard for intravenous potassium
WA Health Mandatory Standard for Intravenous Potassium

14. Policy Framework

Clinical Governance, Safety and Quality Policy Framework

15. Appendix

Appendix 1: Standard Potassium Supplements in WACHS

This document can be made available in alternative formats on request for a person with a disability

Contact:	Chief Pharmacist		
Directorate:	Medical Services	**EDRMS Record #**	ED-CO-19-741
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Appendix 1: Standard Potassium Supplements in WACHS

Product	Volume	Strength	Notes
ORAL			
Potassium Chloride slow release Tablets		8mmol Potassium (600mg potassium chloride)	Slow release tablets – do not crush or chew
Potassium effervescent tablets (Chlorvescent®)		14mmol Potassium 8mmol Chloride	Dissolve each tablet in at least 120ml water. Suitable for enteral feeding tubes.
Potassium Chloride 10% Elixir 500ml		20mmol Potassium in 15ml	Dilute in 50-100ml fluid before administration. Suitable for enteral feeding tubes.
INTRAVENOUS			
Potassium Chloride 10mmol in 0.29% Sodium Chloride	100ml	10mmol/ 100ml **ISOTONIC** Potassium	Suitable for peripheral lines.
Potassium Chloride 20mmol in Sodium Chloride 0.9%	1L	20mmol/ 1L Potassium	
Potassium Chloride 20mmol in Glucose 5%	1L	20mmol/ 1L Potassium	
Potassium Chloride 20mmol in Sodium Chloride 0.9% / Glucose 5%	1L	20mmol/ 1L Potassium	Recommended for Paediatric patients.
Potassium Chloride 40mmol in Sodium Chloride 0.9%	1L	40mmol/ 1L Potassium	
HIGH CONCENTRATION INTRAVENOUS			
Potassium Chloride 750mg in 10 ml AMPS	10ml	10mmol/ 10ml Potassium	MUST be diluted before use
Potassium Chloride 40mmol in Sodium Chloride 0.9%	**100ml**	40mmol/ 100ml Potassium	ICU use only.

Compound lactate solution (Hartmann's Solution) and Plasma-Lyte 148 contain 5mmol/ L potassium however these products are considered insufficient concentration to treat hypokalaemia.

Additional products may be available in regions as endorsed by the local medication safety governance or product evaluation processes.