Government of **Western Australia**
Department of **Health**

Intravenous (IV) Potassium Standard

Medicines and Technology Unit
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Introduction

Potassium salts are administered intravenously (IV) to replace clinical deficiency in patients who cannot receive the electrolyte orally or when urgent replacement is required. Potassium chloride is the most commonly used salt, with phosphate and acetate used less often. This Standard outlines the minimum criteria for safe therapeutic use of potassium associated with its prescribing, preparation and administration in parenteral solutions.

Health Service Providers are required to have local guidelines in place which adhere to the minimum safety requirements outlined in this Standard.

This Standard is based on national alerts on intravenous potassium developed by the Australian Commission for Safety and Quality in Health Care. The Australian Commission for Safety and Quality in Health Care published an updated alert in February 2019.

Intravenous Potassium Standard

The following safety requirements reference intravenous potassium chloride, although the requirements below also apply to potassium dihydrogen phosphate and potassium acetate. Specific requirements for these potassium salts can be found in section 2.3 Other potassium preparations.

Where automation, electronic prescribing and/or electronic medication management systems (eMMS) are available, Health Service Providers must also ensure adequate measures are in place to ensure safe prescribing, dispensing and administration of intravenous potassium chloride, in line with this Standard.

1. Prescribing requirements

- Intravenous potassium chloride must only be prescribed when the oral or enteral route is unavailable or clinically inappropriate.
- Intravenous potassium chloride must be prescribed in millimoles (mmol) of potassium on the ‘Intravenous Fluid Order Chart’, and must specify the following:
    - dose of intravenous potassium
    - fluid in which it is to be diluted
    - volume of fluid
    - rate of administration expressed as millilitres per hour (mL/hour). The rate of administration is not to exceed the maximum rates specified in section 4 of this Standard
    - prescriber signature and printed name
    - date and time to start treatment.

- Ensure that the fluid order chart is cross referenced on the Western Australian Hospital Medication Chart (WA HMC) by placing a tick or cross in the space provided for the ‘Intravenous Fluid Order Chart’. This may not be applicable to sites

where electronic prescribing is available, however measures must be in place to ensure that the prescription is not duplicated. Prescriptions not meeting the prescribing practice defined above will be considered incomplete and must be clarified with the prescriber.

- Intravenous potassium chloride prescribed as a rapid IV push or bolus (10mmol/10mL) must only be prescribed in exceptional circumstances (e.g. cardiac arrest) under the direction of the most senior doctor present.
- Standard pre-mixed potassium chloride solutions are to be prescribed whenever possible in all areas of the hospital (see section 2.2 Pre-mixed intravenous potassium chloride products).
- Prescription of non-standard potassium chloride solutions is permitted only in exceptional circumstances or when the patient is admitted to an intensive care or high dependency unit and with the agreement of the supervising consultant responsible for that patient. The name of the consultant providing the approval must be documented on the 'Intravenous Fluid Order Chart' (i.e. 'approved by Dr 'given name surname'). Local policy must be available to specify management of non-standard potassium chloride solutions in health services without intensive care or high dependency units.

2. Storage and supply requirements

The storage of all high concentration potassium products for intravenous administration (including potassium chloride, potassium dihydrogen phosphate, and potassium acetate) must be restricted to the Pharmacy Department and Medicines and Therapeutics Committee (or equivalent) 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 Potassium chloride ampoules

- Premix intravenous (IV) potassium chloride bags must be supplied and prescribed preferentially wherever possible.
- Only one strength and size of potassium chloride ampoules must be stocked (10mL ampoules containing 10mmol of potassium chloride).
- Potassium chloride ampoules must not be stored on general wards.
- Potassium chloride ampoules must not be placed or stored on resuscitation trolleys.
- Potassium chloride ampoules must not be borrowed from other areas of the hospital unless on the explicit direction of a pharmacist (e.g. after-hours via the on-call pharmacist).
- If potassium chloride ampoules are required in particular ward areas (e.g. nephrology) for a specific order for a specific patient, then:
    - The prescription must be written on the 'Intravenous Fluid Order Chart', or equivalent, with written evidence that the prescription has been approved by

the consultant/director of the department and must be forwarded to the Pharmacy Department in advance of supply.
    - Order must include patient name, exact number of ampoules required and prescriber authorising the order.
    - The Pharmacy Department will dispense the exact number of potassium chloride ampoules required.
    - Alternatively, the solution may be made up in the Pharmacy Department (where applicable).
    - Where potassium chloride ampoules are dispensed to a general ward, any unused ampoules must be returned to Pharmacy immediately.
- All health care sites/hospitals must have local guidelines in place governing the provision of potassium chloride ampoules outside normal pharmacy hours.

2.2 Pre-mixed intravenous potassium chloride products

- Pre-mixed potassium solutions must have pink outer packaging and red printed labels.
- Standard pre-mixed solutions of potassium chloride must be stocked by WA hospitals, wherever possible.
- Standard pre-mixed solutions must contain either 10mmol, 20mmol, 30mmol or 40mmol of potassium chloride.
- 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 10mmol potassium chloride in 100ml sodium chloride 0.29% pre-mixed mini-bags.
- Concentrations above 40mmol/L (except isotonic formations) are not to be administered via peripheral veins due to the risk of phlebitis and pain. Potassium chloride 10mmol in 100mL is an isotonic solution as it is prepared with a lower concentration of sodium chloride (0.29%) and hence can be administered peripherally.
- For appropriate intravenous potassium replacement in paediatric patients, refer to Child and Adolescent Health Service, Perth Children's Hospital Potassium Chloride Monograph or local hospital guidelines.
- Healthcare sites/hospitals may stock alternative potassium-containing intravenous solutions in addition to the standard premix solutions listed above, with the provision that they are adequately labelled, stored and administered in accordance with this Standard and the prescription is guided by hospital-approved guidelines. The Pharmacy Department can be contacted for advice on preparations for individual health services.
- Health Service Providers must provide information to clinical staff on the different premixed potassium chloride solutions available at their site and include information on which products are isotonic and non-isotonic.

2.3 Other potassium preparations

- Health care sites/hospitals may stock other high concentration potassium ampoules where appropriate such as:
  - Potassium acetate 25mmol in 5mL ampoule
  - Potassium dihydrogen phosphate 10mmol in 10mL ampoule.
- The storage and supply of these preparations must comply with the requirements for potassium chloride ampoules.
- Health Service Providers must develop local strategies to prevent inadvertent selection of the wrong ampoule, especially when these preparations are stocked in clinical areas that also have potassium chloride ampoules on imprest.

3. Preparation requirements

Preparation and administration errors of intravenous potassium can be fatal. Adverse incidents which relate to intravenous potassium use include:

Too rapid administration	Fatality can result from receiving a potassium chloride infusion too rapidly, even when appropriately diluted.
Selection of the wrong ampoule	Potassium chloride ampoules can be mistaken for ampoules of similar appearance, for example, sodium chloride 0.9% (normal saline) when reconstituting a drug for injection. Consequently, the patient can be administered an unintended bolus of potassium.
Preparation error	Where potassium solutions are prepared from potassium chloride ampoules, 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.
Use of an excessively concentrated solution	Fatality can result from receiving concentrated potassium chloride as a direct intravenous push. Cardiac arrest may occur when potassium chloride concentrate has been added to an infusion without mixing prior to administration.

Strategies to reduce the risk of adverse events occurring due to preparation errors include the following:

- Preparation of infusions using potassium chloride ampoules must follow a safe onsite preparation protocol, which is compliant with all the existing standards for the preparation and labelling of intravenous solutions.
- Where potassium solutions are prepared from potassium chloride ampoules, 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.

The above information also relates to the preparation of solutions containing either potassium acetate or potassium dihydrogen phosphate

4. Administration requirements

Regimens for the administration of intravenous potassium chloride that differ from this Standard must be under the documented guidance of an appropriate consultant and documented on the 'Intravenous Fluid order Chart'.

For smaller healthcare sites and rural hospitals with no treating specialist, consultation with an Emergency Department or Intensive Care Unit (ICU) consultant must be sought or undertaken wherever possible.

For appropriate intravenous potassium replacement in paediatric patients, Health Service Providers and hospitals must refer to the Child and Adolescent Health Service, Perth Children's Hospital, Potassium Chloride Monograph or local hospital guidelines where applicable.

4.1 Peripheral intravenous administration

- A rate-limiting device must be used for administration via intravenous infusion to prevent unintentional bolus doses of solutions containing potassium chloride.
- The maximum rate of potassium chloride administration via peripheral lines is 10mmol per hour. (For appropriate intravenous potassium replacement in paediatric patients, refer to Child and Adolescent Health Service, Perth Children's Hospital, Potassium Chloride Monograph or local hospital guidelines).
- 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).
- If giving potassium dihydrogen phosphate as a phosphate supplement for management of hypophosphatemia, the rate of infusion is slower (due to the risk of hypocalcaemia if phosphate is given too fast).
- Protocol deviation from the recommendations for critical care areas must be approved by the Medicines Therapeutic Committee (or equivalent) and supported by local policy.

4.2 Central administration

- For concentrations greater than 40mmol/L or infusion rates greater than 10mmol/hour, it is recommended the solution be infused via a central line (Central Venous Catheter) although there may be exceptions (refer to local guidelines).
- 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.
- Admission to a high dependency unit or intensive care unit is advisable. In an emergency situation the infusion may be started through a peripheral line until a central venous line is inserted, if appropriate.
- The above must conform to local policy for high dependency areas.
- Rates in excess of 20mmol/hour are potentially hazardous and are permitted only when the patient is admitted to a high dependency unit with the agreement of the consultant/director in charge of the unit and the prescription is guided by local policy.

5. Document Control

Version	Approved by	Published date	Review date	Amendment(s)
1.0	Manager, Medicines and Technology Unit	10 February 2020	February 2023	Original Version
2.0	Manager, Medicines and Technology Unit	10 December 2025	December 2028	Review of document. Delete and updated terminology from “Drugs and Therapeutic Committee” to “Medicines and Therapeutics Committee (or equivalent)” Updated paediatric reference to “Potassium Chloride Monograph”

6. Reference

High Risk Medication Alert – Intravenous Potassium Chloride. Australian Commission on Safety and Quality in Health Care February 2020.

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

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