

**INTRAVENOUS POTASSIUM, STORAGE, PRESCRIBING, PREPARATION AND ADMINISTRATION**

<p><b>Cross references</b> (including NSW Health/ SESIAHS policy directives)</p>	<p><i>NSW Health PD2005_342 Safe Handling of Intravenous Potassium Chloride in Health Care Facilities</i> <i>SGSHSS Hyperkalaemia - Monitoring and Treatment Guidelines</i> <i>SGSHSS Medication - Administration of Intravenous Medications, Therapy and Additives</i></p>
<p><b>1. What it is</b></p>	<p>A clinical business rule (CIBR) describing the minimum standards for safe storage, prescribing, preparation and administration of intravenous (IV) potassium at St George Hospital (SGH) and The Sutherland Hospital (TSH).</p>
<p><b>2. Employees it applies to</b></p>	<p>Registered nurses (RN), medical officers (MO) and pharmacists Enrolled nurses may commence <u>pre-loaded</u> bags (6.2) of IV fluids containing potassium but are not permitted to load or commence bags to which potassium has been added.</p>
<p><b>3. When to use it</b></p>	<p>When storing, prescribing, preparing and administering potassium via the IV route (refer to 6.1 Description)</p>
<p><b>4. Why the rule is necessary</b></p>	<ul style="list-style-type: none"> <li>• To optimise patient and staff safety</li> <li>• Administration of IV potassium is a potentially dangerous procedure. Errors in prescription, dispensing or administration of potassium containing solutions can result in serious adverse reactions and even death.</li> <li>• If a near miss, incident, or error involving any aspect of this CIBR occurs this must be reported using the incident reporting system (IIMS) so that strategies can be adapted to minimise the risks associated with using potassium.</li> </ul>
<p><b>5. Who is responsible</b></p>	<p>Directors of Clinical Services Directors of Pharmacy Directors of Nursing Nursing Unit Managers</p>
<p><b>6. PROCESS</b> <b>6.1 DESCRIPTION</b> Potassium is an electrolyte essential for healthy cellular function, particularly muscle cells. Potassium is given orally or intravenously as clinically indicated by potassium blood levels. Potassium chloride is the most commonly prescribed potassium salt, but potassium may also be prescribed IV as other salts eg potassium dihydrogen phosphate, potassium acetate.</p>	

## 6.2 PREPARATIONS AND SOLUTIONS CONTAINING POTASSIUM CHLORIDE

- Ampoules contain 10mmol/10mL (0.75g/10mL) potassium chloride concentration. This concentration must be diluted with a compatible IV solution prior to administration.

### *Pre-Loaded Solutions of Potassium Chloride*

1000mL	500mL (mandatory for paediatric infusions)	100mL
<ul style="list-style-type: none"> <li>• 30mmol in 0.9% sodium chloride</li> <li>• 30mmol in 4% glucose/0.18% sodium chloride</li> <li>• 30mmol in Hartmanns</li> </ul>	<ul style="list-style-type: none"> <li>• 10mmols in 2.5% glucose/0.45% sodium chloride</li> </ul>	<ul style="list-style-type: none"> <li>• 10mmol in 100mLs sodium chloride 0.29% ISOTONIC SOLUTION</li> </ul>

## 6.3 ACCESS & STORAGE OF INTRAVENOUS POTASSIUM

To reduce the risk of inadvertent administration of IV potassium the availability of 10mmol/10mL ampoules of potassium chloride and isotonic solution is restricted to the following critical care and specialist areas. The storage must be separate and distinct from the area where normal saline, water for injection and IV fluid bags are stored.

### *Critical Care Areas*

ICU, HDU, CCU, CICU, Emergency Department, Theatres and Recovery

### *Specialist units*

Renal ward, Dialysis unit, Colorectal/Liver surgery ward, paediatrics (TSH only) and special care nursery (TSH only).

### *General Ward Areas*

- Pre loaded bags (see 6.3) are kept as stock except the 100mL preloaded bags (10mmol potassium chloride in 0.29% saline)
- Potassium ampoules must not be kept as stock in general ward areas
- Refer to 6.5 *Dispensing* for obtaining potassium ampoules
- Until used, the ampoules must be stored separately and distinct from the area where normal saline and water for injection ampoules are stored.

## 6.4 PRESCRIBING

Refer to 6.9 *Compatibility with other Medications and Fluids*

- All orders for IV potassium must clearly specify:
  - Amount to be administered in millimoles (may be abbreviated to mmol)
  - Rate of administration
  - Diluent fluid
- Prescription for IV potassium should be written on the IV fluid chart
- Orders for IV potassium should be written so as to facilitate the use of pre-loaded bags (without the need for additional potassium to be added).
- Multiple day orders will **not** be recognised. A new order must be written each day after assessment of the patient's serum potassium level.
- Pre-loaded potassium must be prescribed where possible – refer to 6.2
- The word "BOLUS" must **never** be used when prescribing potassium; instead the time frame for infusion must be specified eg: over 1 hour (the ONLY EXCEPTION to this is the Advanced Life Support guidelines)
- All paediatric infusions are to be ordered as 500mL bags

### 6.5 DISPENSING

- Only the 10mmol/10mL strength of IV potassium chloride will be kept by Pharmacy.
- After hours stock can be obtained via the After Hours Senior Nurse Manager (AHSNM) from the Emergency Drug Room. The AHSNM should only issue enough for the order(s) on the medication chart or intravenous fluid order sighted.
- An ALERT sticker is attached to all potassium ampoules by pharmacy prior to distribution to storage areas.
- The dispensing pharmacist should query all non-standard orders for potassium presented to the pharmacy with the MO.
- 10mmol/100mL 0.29% sodium chloride (isotonic solution) obtained from pharmacy at TSH and SGH

### 6.6 PRINCIPLES FOR SAFE ADMINISTRATION OF INTRAVENOUS POTASSIUM

*Intravenous potassium can cause fatal cardiac arrhythmias if given inappropriately. Extreme care in prescribing, dispensing, preparation and administration is essential.*

*MO are responsible for monitoring the patient's response to administration of IV potassium, including ordering and checking electrolyte levels, as clinically indicated.*

1. Infusions containing potassium **MUST ALWAYS** be delivered via an infusion pump.
2. No medication, including potassium, should be added to a flask in progress.
3. If potassium is required, the flask in progress should be discarded and replaced with a new flask with the required concentration of potassium. The flask must be shaken well to ensure even distribution of potassium in the solution.
4. An additive label must be affixed to the bag if potassium is **added to** infusion fluid, **including additions of potassium chloride to pre-loaded solutions**. As a minimum, the label must include patient's name and ward, IV solution, name/dose of additive, date and time of preparation, date and time to be discarded (to be changed every 24 hours), signature of person preparing the bag and the person checking
5. Preparation of IV potassium must be double-checked prior to administration by 2 staff (RN, MO or pharmacist).
6. The vascular access device patency must be checked prior to its use for the administration of potassium.
7. The peripheral IV cannula site should be directly visible throughout a potassium infusion for monitoring for phlebitis/extravasation.
8. Patients should be educated to report pain, stinging or leakage from the peripheral IV cannula. If any of these occur the infusion should be paused for assessment of cannula patency and a replacement IV cannula inserted if indicated.

## 6.7 RECOMMENDED CONCENTRATIONS AND RATES OF ADMINISTRATION

- *In certain areas a separate unit specific CIBR may apply. Unit specific CIBR must be approved by the site Drug Committee annually to be valid.*
- *Refer to 6.5 Dispensing for how to obtain potassium ampoules and 10mmol Potassium in 100mL Sodium Chloride 0.29% in ward areas.*
- *Refer to 6.9 for Compatibility with Intravenous Fluids*

### 6.7.1 Adults (16 years and over) - General Ward

For fluid restricted patients refer to 6.7.2

- **Maximum rate** of administration for potassium is 10mmol/hr via a peripheral line
- **Maximum concentration** via a peripheral line is 40mmol potassium per litre of fluid
- In a general ward concentrations above 40mmol per 1000mLs (up to 80mmol/L) should be administered via a central venous access device at a rate of no greater than 10mmol/hr.

### 6.7.2 Fluid Restricted Patients and Acute Hypokalaemia in a General Ward

Peripheral cannula

- **10mmol Potassium in 100mL Sodium Chloride 0.29%** (preloaded bag) may be used, administered at 10mmol per hour via a **peripheral line**. (This is an isotonic solution. It is the only preparation at this concentration that may be administered via a peripheral cannula in a general ward).

Central venous access device (CVAD)

- **10mmol Potassium in 100mL Sodium Chloride 0.9%** may be used, administered at 10mmol per hour; ensure correct labelling as per 6.6.4

### 6.7.3 High Dependency/Critical Care

- Cardiac monitoring is recommended for administration rates >10mmol per hour and **essential** for rates of 20mmol per hour and over
- Maximum concentration via a central line in critical care is 25mmol/100mLs
- If serum K<sup>+</sup> is between 2-3 mmol/L or urgent treatment is required K<sup>+</sup> may be infused at 20-40mmol per hour

### 6.7.4 Paediatrics

For children up to the 16<sup>th</sup> birthday:

- All paediatric infusions are to be ordered as 500mL bags
- Concentration is usually 1-3mmol/kg/day to a maximum concentration of 30mmol/500mL
- **Rate of administration** in paediatrics is usually 0.3mmol/kg/hr or less
- **Maximum rate of administration** in paediatrics is 0.4mmol/kg/hr for 4-6 hours then 4mmol/kg/day. This rate requires ECG monitoring & must be administered in a critical care setting.
- **Maximum concentration via a peripheral line** in paediatrics is 0.05mmol/mL.

**6.8 ADDITION OF POTASSIUM CHLORIDE TO PRE LOADED SOLUTIONS**

*Additional Potassium Chloride may be added to pre-loaded solutions to achieve the prescribed concentration. Refer to table below.*

DOSE ORDERED	PREPARATION OF POTASSIUM CHLORIDE INFUSION <i>Refer to 6.7 Recommended concentrations and rates of administration</i>
10mmol	<p>Add 10mL of Potassium Chloride 10mmol /10mL to a 1 litre, 500mL or 250mL bag of one of the following:</p> <ul style="list-style-type: none"> <li>• 0.9% Sodium Chloride</li> <li>• 4% Glucose / 0.18% Sodium Chloride</li> <li>• Hartmanns Solution</li> <li>• 5% glucose</li> </ul> <p><i>For fluid restricted patients or for more concentrated solution refer to 6.7.2.</i></p> <p><b>OR paediatric fluids</b></p> <ul style="list-style-type: none"> <li>• 0.9% saline &amp; 2.5% dextrose</li> <li>• 0.45% saline &amp; 2.5% dextrose</li> <li>• 10% dextrose</li> <li>• 0.225% saline &amp; 10% dextrose</li> <li>• 0.45% saline &amp; 2.5% dextrose &amp; 10mmol KCL</li> </ul>
15mmol	<p>Add 15mL of Potassium Chloride 10mmol / 10mL to a 1 litre or 500mL bag of one of the following:</p> <ul style="list-style-type: none"> <li>• 0.9% Sodium Chloride</li> <li>• 4% Glucose / 0.18% Sodium Chloride</li> <li>• Hartmanns Solution</li> <li>• 5% glucose</li> </ul>
30mmol	Use Pre-mix Potassium Chloride bag - <b>no addition required</b>
40mmol	Add <b>10mL</b> of Potassium Chloride (10mmol / 10mL) to a pre-mixed 1litre bag of 30mmol Potassium Chloride.

**SOLUTIONS ABOVE 40mmol/L  
via Central Venous Access Device (CVAD) ONLY**

60mmol Via CVAD only	Add <b>30mL</b> of Potassium Chloride (10mmol / 10mL) to a pre-mixed 1litre bag of 30mmol Potassium Chloride.
80mmol Via CVAD only	Add <b>50mL</b> of Potassium Chloride (10mmol / 10mL) to a pre-mixed 1litre bag of 30mmol Potassium Chloride.

**6.9 COMPATIBILITY WITH INTRAVENOUS FLUIDS**

Contact the ward pharmacist during business hours or medical officer in charge after hours if information re compatibility with medications or fluids not listed here is required.

- 0.9% sodium chloride, 0.45% sodium chloride.
- 4% glucose and 0.18% sodium chloride.
- 3.75% glucose and 0.225% sodium chloride.
- 2.5% glucose and 0.45% sodium chloride.
- 5% glucose.
- Hartmanns solution.
- 10% glucose and 0.225% saline
- 10% glucose
- TPN (must be loaded by a TPN accredited RN).

**7. Compliance evaluation**

*Q1: Discuss some rules for storage of potassium ampoules in ward areas.*

A: Potassium ampoules must not be kept as stock in general ward areas. The areas where potassium may be kept as stock include ICU, HDU, CCU, CICU, CTU, ED, Theatres and Recovery, Renal ward, Dialysis unit, Colorectal/Liver surgery ward, paediatrics (TSH only) and special care nursery (TSH only). In these areas the storage of potassium must be separate and distinct from the area where normal saline and water for injection are stored due to the similarity in ampoule appearance and therefore risk of inadvertent administration of potassium.

*Q2: What is the maximum concentration of potassium that may be administered in a general ward area?*

A: In a general ward area concentrations above 40mmol per litre of fluid (up to 80mmol/L) must be administered via a central venous access device. Fluid restricted patients may have **10mmol potassium in 100mL Sodium Chloride 0.29%** administered at 10mmol/hr via a peripheral cannula or **10mmol potassium in 100mL Sodium Chloride 0.9%** at 10mmol per hour via a central venous catheter.

*Q3: What must be specified in an order for IV potassium?*

A: The MO must specify the amount to be administered (in millimoles) (abbreviated as mmol), the rate of administration, and the diluent fluid (Sodium Chloride 0.9%, Glucose 5% etc.).

**8. External references**

[MIMS Full Product Information Online Sterile Potassium Chloride Concentrate accessed 7/7/11](#)

The Society of Hospital Pharmacists of Australia, (2008) *Australian Injectable Drugs Handbook*. "Potassium Chloride" 4<sup>th</sup> Edition. Published by the Society of Hospital Pharmacists

Safety and Quality Council, Medication Safety Taskforce of the Australian Council for Safety and Quality in Health Care. *Intravenous Potassium Chloride can be fatal if given inappropriately*. Alert 1. October 2003.

	<p><i>Paediatrics references</i>                  Paediatric Injectable Guideline 3<sup>rd</sup> Edition August 2006. The Royal Children’s Hospital Melbourne                  Sydney Children’s Hospital; Clinical Standards and Practice Manual; SCH.C.5.10                  HCN (Health Communication Network) Paediatric Manual; Good Prescribing (Appendix: medication dosage Guideline) 2010-2011                  Shann, F. <i>Drug Dose</i>, Intensive Care Unit, Royal Children’s Hospital Parkville, 14<sup>th</sup> Ed</p>
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I, *Martin Mackertich, Director of Clinical Services St George and Sutherland Hospitals and Health Services* attest that this business rule is not in contravention of any legislation, industrial award or policy directive.

**Revision and approval history**

<b>Date</b>	<b>Revision number</b>	<b>Contact Officer (Position)</b>	<b>Date for revision</b>
Nov 2011	1	NM Nursing Practice X32063 Director of Pharmacy	Nov 2014