

One step for medication safety



Concentrated potassium ampoules

Check safe storage and management

Background and evidence

Concentrated potassium ampoules (potassium chloride, potassium phosphate or potassium dihydrogen phosphate) are often packaged and labelled in similar ways to sodium chloride ampoules and water for injection. The effect of concentrated potassium solution injected as a bolus can be fatal as it may cause arrhythmias.

Lucian Leape (co-author of 'To err is human: Building a safer health system') said: 'The way to prevent tragic deaths from accidental intravenous injection of concentrated potassium chloride is excruciatingly simple – organizations must take it off the floor stock of all units. It is one of the best examples I know of a "forcing function" – a procedure that makes a certain type of error impossible.'

In line with other countries, a medication safety alert on concentrated potassium chloride injection was issued in New Zealand in 2004 ([see Appendix 4 of the Safe and Quality Use of Medicines 2005–2007 Report](#)). An **updated alert** was issued in 2008 when it was recognised the actions recommended in the original alert had not been implemented in all hospitals. The actions suggested in the alerts were:

- only stock one strength of concentrated potassium chloride in the hospital
- review the use of ampoules and replace with pre-mixed potassium chloride intravenous infusion fluids when possible
- safe storage of concentrated potassium ampoules when ampoules were necessary on the ward
- procedures to ensure safe practice when using concentrated potassium ampoules to prepare fluids.

An evaluation in 2009 identified some progress had been made but not all DHBs completed the evaluation. The evaluation sought to identify the pre-mixed potassium infusion bags that would allow the removal of concentrated potassium chloride ampoules from the wards, with the exception of specialised units, such as intensive care.

In 2009 Capital & Coast DHB issued its learning from a serious adverse event where concentrated potassium chloride was administered as a central venous catheter flush. This was the first time this event had been recognised and reported in New Zealand.

The specific safety issues are:

- the potential for selection error if concentrated potassium ampoules are stored in proximity to other similar-looking ampoules
- use of commercially available pre-mixed potassium chloride infusions would remove the need to store concentrated potassium chloride ampoules on most wards, therefore reducing the opportunity for inadvertent administration as a bolus.

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The activity:

Test if there are processes in place to reduce the risk of incorrect administration of concentrated potassium ampoules in ward(s)/area(s) of the hospital.

The Health Quality & Safety Commission's Medication Safety team has put together a simple data collection tool to assess concentrated potassium chloride/phosphate management at either individual ward/unit or hospital level.

Hospital	Ward/Unit	
Are concentrated potassium ampoules available on the ward/unit?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
If yes, are the concentrated potassium ampoules stored in a locked container/cupboard?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Is there a specific policy governing the use of concentrated potassium ampoules in the ward/unit or hospital?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Are there restrictions to the use of concentrated potassium ampoules in the ward/unit or hospital?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
How many different pre-mixed potassium chloride infusion bags are stocked in the ward/unit or hospital?	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/>	
Are pre-mixed potassium chloride infusion bags stored so that different strengths and different fluids are clearly separated and labelled?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Review your results with your team

- What do the results show?
- Where does your hospital or team need to focus to improve the safe storage and use of potassium chloride ampoules and infusions?

Next steps

If concentrated potassium chloride ampoules are available on the ward/unit, consider reviewing the use of intravenous fluids containing potassium chloride. This will identify if you can completely eliminate the risk of inadvertent bolus administration by removing concentrated potassium ampoules from the ward/unit.

- Review when and if pre-mixed potassium infusion bags could replace the use of the concentrated potassium chloride ampoules.

If this first step has been done across the whole hospital, it may now be timely to review the prescribing of potassium chloride on a ward-by-ward/unit-by-unit basis to identify if concentrated potassium chloride ampoules can be removed across all areas.

With thanks to the Patient Safety First Campaign for permission to use the one step approach