Changing concentrations in smart pump protocols. Planning ahead essential

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Background:

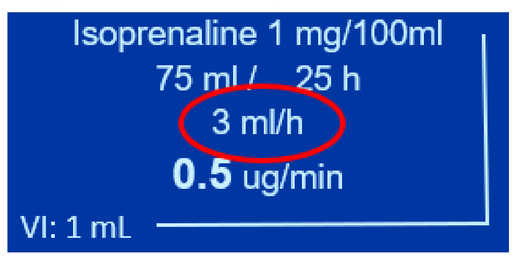
- **Wi-Fi enabled smart pumps** are considered essential for timely updates[1]. Our experience is that after two weeks, only approximately 60% of devices are updated following a dataset release.
- **Changes in concentration** and dose rate units of critical care infusions to achieve statewide standardisation, meant a rapid and complete update was required.

Amiodarone	450 mg in 500 mL	→	Amiodarone	900 mg in 500 mL
Isoprenaline	100 mg in 100 mL	→	Isoprenaline	600 mg in 500 mL
Dobutamine	250 mg in 100 mL	→	Dobutamine	250 mg in 100 mL
Milrinone	30 mg in 100 mL	→	Milrinone	20 mg in 100 mL
Levosimendan	12.5 mg in 500 mL	→	Levosimendan	12.5 mg in 250 mL

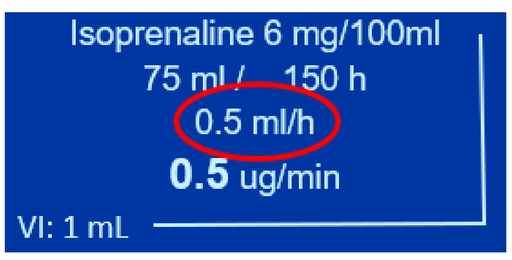
- **The potential risk of patient harm was high.**

Risk analysis identified the drug library update would result in some devices having updated concentrations, while others would have the previous version.

Original version of isoprenaline



Updated version of isoprenaline



Objective:

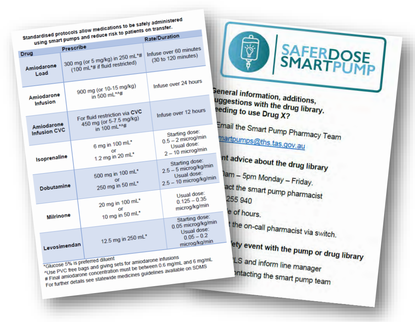
- Plan an update of several critical care infusion concentrations in a statewide smart pump fleet across 4 hospitals and 3 regions to minimise risk of medication error and patient harm.

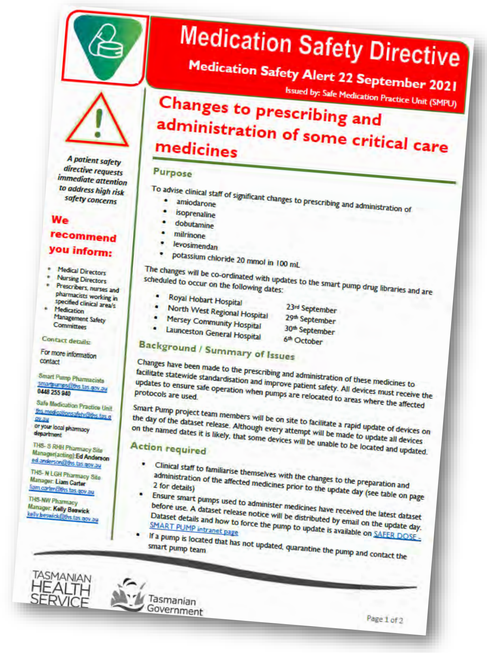
Region ONE	Region TWO	Region THREE	
Hospital ONE	Hospital TWO	Hospital THREE	Hospital FOUR
880 devices	758 devices	278 devices	123 devices

Method:

Prior to Go-live

- Complete change process mapped, and Go-live date nominated
- Organised sufficient staff to manually update all devices rapidly.
- Guidelines updated and co-ordinated to be released with updated dataset.
- Resources including alerts, lanyard cards, and training sessions to support updates.





On the Go-live date

- Four teams of two were allocated to find and update 880 devices at "Hospital ONE". Each team had at least one experienced clinical pharmacist. Teams commenced in clinical areas most likely to be using affected medicines
- Nursing staff were supported to minimise the risk of unexpected updates for patients already on the updated medicines.
- Devices not in use updated before checking for devices attached to patients. For short infusions, finish time was noted, and devices updated later in the day. For low-risk continuous infusions (e.g., maintenance fluids) pumps were swapped out for already updated devices.
- All manually updated or checked devices labelled with clear indicator. Approximately 90% of devices were found and updated in a 7.6 hours. Further devices were located over following weeks with ongoing surveillance of device Wi-Fi "check ins" to the smart pump server.

Evaluation:

There was one report of incorrect infusion preparation and administration on Go-live day, unrelated to changing concentration and identified by the change management team.

Discussion

Being Wi-Fi enabled is considered an essential feature of any large fleet of smart infusion devices. However, there is a substantial delay in achieving 90% of devices uploaded with newly released datasets. Nine days after our last dataset release for three hospitals, confirmed distribution is only 55% (1046 of 1917 devices). Concentration is used by smart pumps to calculate the rate of dose rate infusions (e.g. mg/minute). In changing the concentration of isoprenaline from 1 mg in 100 mL to 6 mg in 100 mL, a six times error in programming the concentration could have resulted in a six times error (under or overdose) in rate. When concentration changes are required for dose-rate smart-pump protocols, there is a significant risk of medication error and patient harm resulting from incorrect programming of devices. Careful planning and co-ordinated implementation is recommended.

References

1 Institute for Safe medication Practices. Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps. 2020