

# Taking IV Safety Software off the shelf: developing drug libraries to improve medication safety

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## Background

Incorrectly administered parenteral medicines represent a significant source of preventable patient harm. Intravenous Safety Software (IVSS) including a regularly updated drug library and use of medication infusion smart pumps is a critical strategy to mitigate this risk.<sup>1,2</sup>

## Aim

To prevent dose-related medication harm through a major 10-year update of all IVSS drug libraries in a tertiary Australian hospital.

## Methods

New IVSS drug libraries were developed across a 1000-bed hospital for all clinical areas including ICU, Neonatal ICU, Cardiology and general ward areas as part of a 10-year update.

A review of medication incident reports was conducted to identify profiles for improvement to prevent dose-related patient harm. Dispensing records, distributions and imprest holdings were considered to inform the addition or deletion of medication profiles.

Feedback from nursing, medical and pharmacist staff on the draft drug library was obtained. An iterative approach was used, where the drug libraries continued to be refined through multidisciplinary review as part of "on paper" clinical checking and "on pump" checking, until being finalised.

Image 1: searchable IVSS application developed for clinical staff

The screenshot shows the IVSS application interface. At the top, there is a search bar with the text "Search the table" and a "Reset the search filter" button. Below the search bar are three filter buttons: "-Filter by Drug Library-", "-Filter by Category-", and "-Filter by pump type-". The main content area displays a table of medication profiles. Each row includes a profile name, a shortname, and a pump type. The profiles shown are:

Profile	shortname	Pump
CCU	Acetylcysteine Bag 1	NAC - 1 Pump
General-Cardiology		IV Pump Settings
CCU	Acetylcysteine Bag 2	NAC - 2 Pump
General-Cardiology		IV Pump Settings
CCU	Aciclovir	Aciclovir Pump
General-Cardiology		IV Pump Settings
CCU	Adenosine FFR	AdenFFR Pump

There is also a yellow warning box that says "Watch for vein irritation".

Decision support including a new online application for clinical staff and IV administration guides were disseminated. Pharmacist and Nurse Educator-led inservices were provided to all nursing staff.

A pre- and post- drug library update audit of compliance with IVSS use and incident reports was performed.

## Contact Us

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## Results

Following the review, a total of 393 new medication profiles were added to the IVSS drug library. New dedicated categories for the Infusion Day Therapy Outpatient clinic and Post-Anaesthesia Care Unit were also added during the update.

Table 1: Scale of change – number of profiles pre- vs post-update

Location	Number of profiles	
	Old drug library	New drug library
Cancer Care	1	107
Emergency Department	41	54
General wards	50	150
Infusion Day Therapy Outpatient clinic	0	24
Maternity ward	10	24
Post-Anaesthetic Care Unit	0	26
Cardiology	47	121
Intensive Care Unit	108	144
<b>Total</b>	<b>257</b>	<b>650</b>

Compliance with intravenous medications administered in the correct profile improved from 81.2% pre-update to 93.9% post-update ( $p=0.003$ ).

Incident reports related to incorrect rate errors decreased from 46 incidents across a six-month period pre-implementation, compared to 33 incidents in the six months post-implementation.

Wrong administration technique incidents (45 incidents decreased to 33 incidents) and incorrect strength or concentration incidents (10 decreased to 8 incidents) also improved post-update.

Image 2: IVSS summary of changes disseminated to staff

The screenshot shows a document titled "Key changes" with several sections:

- Heparin:**
  - Note new 2 profiles
  - Heparin (historical profile) – allows max 3000units/h
  - Heparin HIGH (new profile) – allows max 4000units/h
  - Only use heparin HIGH if patient exceeds 3000units/h limit.
- IV Iron:**
  - Note different profiles available for IV iron
  - Iron carboxymaltose Ferinject
  - Iron RAPID polymaltose
  - Iron SLOW polymaltose
  - Iron sucrose – for renal patients only
- Antimicrobials:**
  - Penicillin/cephalosporins – can generally be given in generic antibiotic profile over 30/60mins OR Perfuser
  - Antibiotic 100mg/30min or 100mg/60min
  - Vancomycin
  - Maximum rates corrected
  - 24h infusion profiles added (different profiles for 250ml or 500ml)
  - COVID drugs added (penciclovir 100ml and 250ml, sotrovimab)
  - IV trimethoprim/sulfamethoxazole
  - Alert added – seek specialist advice from IDiAMS if on high dose treatment (i.e. 24 pumps multiple times a day) as large fluid volumes likely required
- New surgical-related profiles:**
  - Accessible from all areas via CELS pump
  - Bivalirudin HIT
  - Calcium CHLORIDE parathyroid – special functions programming no longer required
  - codepains Uic. Colite
  - Desipressin
  - Desmopressin
  - Pantoprazole – 2 profiles for available
  - Pantoprazole 10h – as per upper GI bleeding pathway
  - Pantoprazole 15ml 100ml – generic rapid infusion
  - Urokinase – bolus and infusion profiles
- New medical-related profiles:**
  - Accessible from all areas via CELS pump
  - Amiodarone LOAD
  - Amiodarone MANT
  - Chlorpromazine
  - Sodium thiosulfate
  - Multiple new neurology/anti-epileptic drugs
- New maternity library profiles:**
  - Maternity antimicrobials
  - Magnesium sulfate profiles – bolus option added
  - hydRALAZINE MANT
  - Iron carboxymaltose (Ferinject)
  - Labelled INFUSION
  - Division during labour and OXYTOCIN PPH profiles – transferred from oxytocin pumps (dedicated oxytocin pumps no longer required)
  - Tranexamic acid PPH
- Other additions:**
  - Blood products – names all commence with "BP"
  - Fluids – names all commence with "FL"
  - EXCEPT sodium chloride 3% hypertonic
  - Perfusee (syringe pump administration) – an option for selected antimicrobials to free up Infusional devices
  - Mostly penicillins and cephalosporins

A QR code is also present in the bottom right corner.

## Conclusion

This project included multi-stakeholder involvement to implement evidence-based changes to IVSS. Review and implementation of IVSS drug libraries has reduced dose-related errors and improved compliance with intravenous administration safety systems to prevent medication-related harm.

## References

- Institute for Safe Medication Practices (ISMP). *ISMP Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps*. ISMP; 2020. <https://www.ismp.org/node/972>
- Australian Commission on Safety and Quality in Health Care. *Standard 4, Action 4.15 High Risk Medicines*. ACSQHC; 2023. <https://www.safetyandquality.gov.au/our-work/indicators-measurement-and-reporting/patient-safety-culture>