eHealth NSW

High stakes: Piloting and evaluating an electronic blood product prescribing and administration solution

Authors: Jillian Campbell B.Pharm MSHPA[1] , Anny Kim B.Pharm (Hons) [1], Katy Lu B.Engineering (Biomedical) [1], Aiden Shi M.Pharm [1], Judy Wong B.Pharm (Hons I) [2], Wade McKeown BA, BSc, M.Pharm [2]

Affiliations: 1. eHealth NSW 2. Western Sydney Local Health District

Background: Blood and blood product management is complex and involves multiple aspects – prescribing and administration, monitoring, as well as documentation and fluid balance management. There is a range of clinical risks associated with blood and blood product transfusions, with the potential for serious adverse effects.

Traditionally, most blood and blood products have been prescribed for administration on the National Inpatient Medication Chart (NIMC) or intravenous fluid charts. As NSW Health implemented Electronic Medication Management (eMM) for medication and fluid orders, these products have continued to be managed on paper, causing frustration for clinicians accustomed to having increased access and visibility with electronic systems, and retaining the associated risk of patient harm that comes from hybrid records.

eHealth NSW identified this hybrid workflow as a priority area for the Electronic Medical Record (eMR) Connect Complex and High-Risk Medicines Project team to address, as part of the Fluid and Infusion Management Design Working Group. The solution would need to support clinicians to prescribe and administer blood and blood products in the eMR, in accordance with the blood management standards in the National Safety and Quality Health Service (NSQHS) Standards, Australian Commission on Safety and Quality in Health Care (ACSQHC).

A design was developed and piloted at two facilities, Blacktown Hospital at Western Sydney Local Health District (WSLHD) and Nepean Hospital at Nepean Blue Mountains LHD (NBMLHD).

Objective: Develop a comprehensive, standardised, safe, easy to use method to prescribe and administer blood and blood products using already available eMM technology, that could be adopted state-wide from highly specialised tertiary hospitals to rural and remote inpatient facilities.

Action: A multi-disciplinary working group was convened to determine the project scope and requirements for blood and blood product prescribing and administration. This Design Focus Group (DFG) was formed as a subgroup of the Fluid and Infusion Management design working group.

The DFG was comprised of clinical subject matter experts, representatives from rural, metropolitan, adult and paediatric hospitals, information technology eMM specialists, experts in training, change management, policy, legislation, and reporting.

A comprehensive design was developed to cover the essential requirements for fresh blood, plasma derived and recombinant products. The project scope focused on all products listed on the National Blood Authority product list.

The below workflows and activities were in scope for this solution:

- Prescribing (strictly an authority to administer)
- Administration
- Clinical Decision Support
- Clinical Information, Results Documentation and Monitoring (for administered blood and blood products)
- Technical processes for supply of blood products issued from Pharmacy (aligning with existing medication supply processes)

Electronic requisitions from Blood Bank, closed loop scanning and electronic capturing of consent were not in scope.

There were some challenges adapting the existing eMM technology to fit the requirements, and an iterative design approach was taken to troubleshoot and workshop solutions.

The final design taken to pilot consisted of several key functionalities:

- New fresh blood products were added to the order catalogue, as these are not included in the standard Cerner Multum drug, herbal and nutraceutical database
- Three new order formats were developed to accommodate the different workflow requirements for:
  - Fresh blood product prescribing
  - Recombinant & plasma derived infusions
  - Recombinant & plasma derived injections

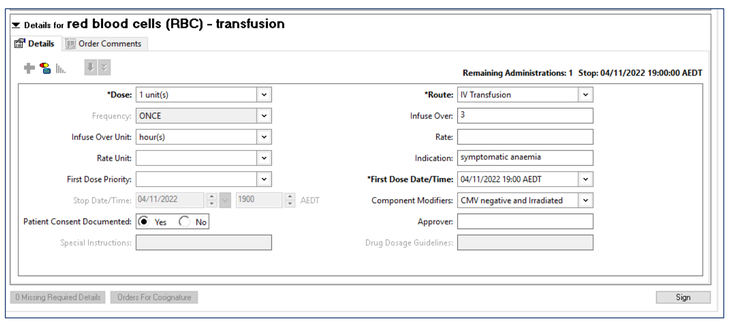


***Figure 1**: Fresh blood product order entry format*

- A PowerPlan (pre-defined grouping of orders) was developed to facilitate retrospective documentation of blood products used during Massive Transfusion Protocol (MTP) events
- Fresh blood products were also added to the allergy database, with a corresponding new rule to alert for any cross-reactions when prescribing any other fresh blood products
- Additional terminology was added to SNOMED to document special patient blood requirements, i.e. CMV negative or irradiated blood products
- Additions were made to the discharge summary to include a record of which blood products had been administered during the inpatient admission
- A dose calculation tool was developed to support prescribers to calculate paediatric doses of red blood cells

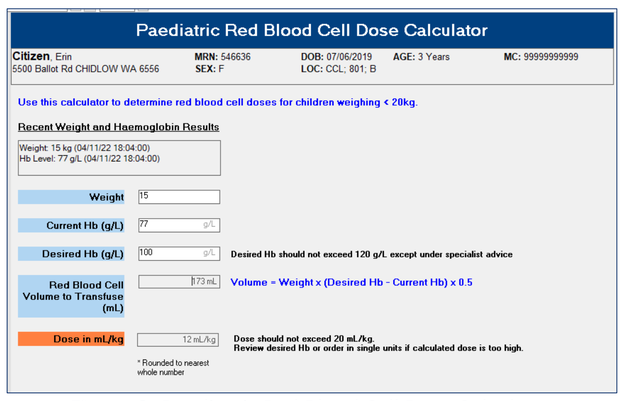


***Figure 2**: Paediatric Red Blood Cell Dose Calculator*

- New sections were added into the nursing documentation tool (iView) to facilitate capturing pre-transfusion checklist information, infusion start and stop times, rate changes, fluid balance volumes and transfusion reactions

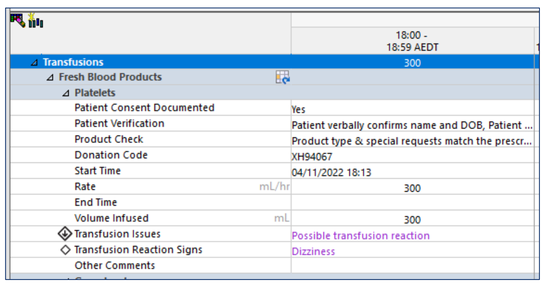


***Figure 3**: iView nursing documentation*

- Other rules and alerts were developed to facilitate best practice prescribing, including:
  - Single unit prescribing to reduce risk of over-transfusion
  - Guiding prescribers to use the correct unit of measure for the patient age (i.e. units for adults, mL for paediatrics)

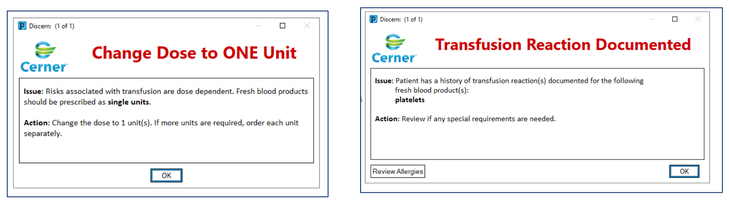


***Figure 4**: Alerts to guide prescribing*

The design was endorsed for implementation at the pilot sites where further refinements were made to the design prior to go-live, after consultation with local subject matter experts. The closely monitored pilot was run at both hospitals for a period of eight weeks, from go-live on 15 February - 12 April 2022.

Evaluation: Data was collected against five key domains from both hospitals, using a combination of clinician surveys and audit data before and after the pilot. Go-live issues and system reports were analysed once the pilot had been completed.

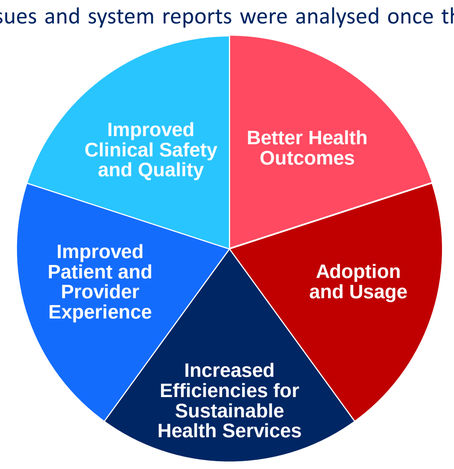


***Figure 5**: Monitoring and evaluation domains from the eMR Connect Monitoring and Evaluation Strategic Framework*

Notable results included:

Improved Provider Experience: A wide spread of medical and nursing staff completed both baseline and post implementation surveys. 72 Clinicians completed the baseline survey while 79 completed the post implementation survey.

57% of medical officers agree it is easy to access information to inform the decision to transfuse

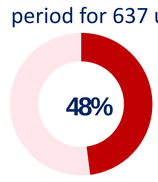
46% increase in nursing satisfaction with the efficiency of the documentation process compared to baseline

21% increase in nursing satisfaction with the legibility of prescription details compared to baseline

79% of nursing staff agreed it is easy to access documentation of all transfusions currently underway, a 49% increase on baseline

Increased efficiencies for sustainable health services: 35.7% (n=85/238) of fresh blood and plasma-derived/recombinant infusion orders contained some conflicting information in the prescription details where all four Rate & Rate Unit, Infuse Over & Infuse over units were completed. The conflicting information made it difficult for nurses to administer as directed.

Adoption and Usage: A total of 1925 prescriptions were placed during the pilot period for 637 unique patients.



Red blood cells were the most prescribed blood product (n=932) which comprised 48% of total prescriptions placed during the pilot period

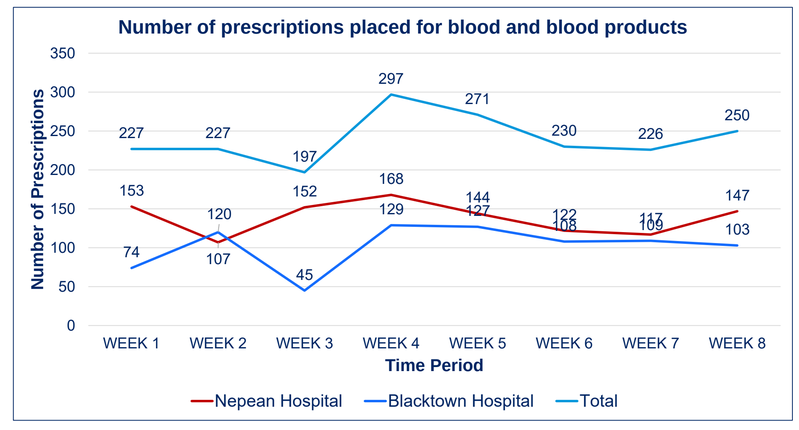


***Figure 6**: Number of prescriptions ordered during the pilot period*

Discussion: Some unexpected trends appeared in the prescribing patterns and administration documentation practices that had not been anticipated by the members of the working group.

Recommendations were made for a number of design changes based on feedback from clinicians surveyed and after analysing the report data. Key design changes included:

- Modifications to the discharge summary design to better accommodate the workflow in the Emergency Department
- Prevent both rate and infuse over time being completed for fresh blood products using a rule, to stop conflicting information being entered
- Remove the infuse over field completely from the plasma derived and recombinant infusion product order format to prevent ambiguous orders. If specific infusion time information is required it can be added as an order comment
- Simplify the nursing documentation workflow for injectable plasma derived and recombinant products

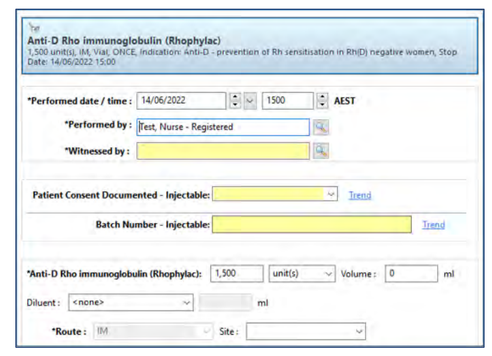


***Figure 7**: Revised injectable administration documentation*

- Add a new alert to prevent prescribing of fresh blood infusions > 4 hour infuse over time

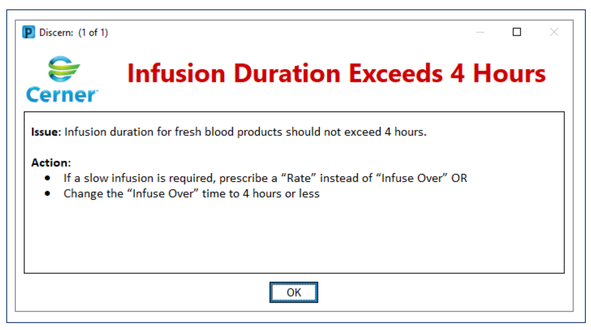


***Figure 8**: Revised injectable administration documentation*

Conducting a comprehensive evaluation process for this successful pilot was a worthwhile investment, as several interventions including design changes were required post-pilot to meet the original stated aims of the project. Overall, the project was well received by the clinicians at both pilot sites. The feedback gained has helped the project team improve the final design to make it safer, easier to use, and ready to roll out to more sites in NSW.

Thank you to all involved:

- Western Sydney Local Health District and Nepean Blue Mountains Local Health District
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- Blood and Blood Product Management Design Focus Group
- A special acknowledgement of our co-chairs for their guidance and leadership:
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  - Melissa Glass, Blood Management Clinical Nurse Consultant, Illawarra Shoalhaven Local Health District