

Cryoprecipitate usage in South Australian Public Hospitals

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Background

- > During major bleeding from surgery or after trauma, fibrinogen is the first coagulation factor to reach critical levels¹. Fibrinogen is the precursor of fibrin, and adequate fibrinogen levels are a fundamental requirement for effective coagulation¹.
- > Cryoprecipitate is a concentrated source of fibrinogen. It is derived from apheresis or from whole blood donation.
- > As outlined in the National Patient Blood Management (PBM) Guidelines – Critical Bleeding Module (2011), a standard adult dose of 3–4 g of fibrinogen is equivalent to 8–10 whole blood or 4–5 apheresis units of cryoprecipitate². Critical bleeding protocols have been in place in most SA Public Metropolitan Hospitals since prior to the release of the Guidelines in 2011.
- > SA Blood Management Council developed an adult cryoprecipitate dosing guideline which was implemented across the SA public sector in July 2013 to avoid confusion with use of both apheresis and whole blood units (1 adult dose=10 whole blood or 5 apheresis units).

Aim

- > To review the patterns and drivers of clinical utilisation of cryoprecipitate in SA public metropolitan hospitals.

Methods

- > A linked database containing clinical, epidemiological and transfusion data within 7 major SA public metropolitan hospitals was used and reviewed for 3¼ financial years (FY) from 1 July 2009 through to 31 March 2013.
- > For the purposes of this audit, all usage was converted to 'whole blood equivalents' (WBE). One apheresis pack was considered equivalent to two whole blood derived packs².
 - Usage by type of product (apheresis versus whole blood) was not available for 30 admissions across the hospitals over the 3¼ FYs and these were excluded from analysis.
 - For 1 hospital, data was only available for later 1¼ FYs. This hospital was a small user of cryoprecipitate with only 1 patient admission during this time.
 - Usage figures for first ¾ of the 2012–13 FY were based on patient issues available in the linked database. For purposes of assessing usage trends over time, for the remaining ¼ of 2012–13 FY, patient issues were estimated based on actual units (WBE) supplied to the 7 hospitals minus reported wastage.

Discussion

- > There has been a continuing increase in the use of cryoprecipitate in SA major metropolitan public hospitals, particularly in the 2012–13 FY (increase in both number of admitted patients and WBE units per patient stay). The introduction of a standard adult dosing guideline is likely to further increase use.
- > Based on statewide issue data, the 7 SA hospitals in this study used 77% of SA's cryoprecipitate in the 2012–13 FY. There was an increase in cryoprecipitate issues across the state of 31% from 2011–12 to 2012–13 and an increase of 40% for the 7 hospitals combined consistent with the data from this study. The increase in use of cryoprecipitate in SA is consistent with increases in other states (Figure 6).
- > It is not possible to assess the appropriateness of the increase in usage from this study. The earlier use of cryoprecipitate in recent years as part of critical bleeding protocols and increased access to point of care testing such as ROTEM (in cardiac surgery and liver transplant) are likely contributors.
- > Age and sex distribution of admitted patients issued with cryoprecipitate in this audit was similar to previous audits conducted in Australia⁴, New Zealand⁵ and England⁶.

Results

Demographics:

- > From July 2009 to March 2013, a total of 8,421 WBE units (4,395 units of either apheresis or whole blood cryoprecipitate) were transfused in 877 admissions across 7 major metropolitan SA public hospitals.
- > 64% (539/877) of admitted patients were male and 36% were female.
- > The median age was 55 years (IQR 40 – 70 years) [IQR = interquartile range]
 - 6% (47) < 18 years old
 - 2% (17) < 1 year old
 - 10% (84) > 80 years

Admission Type:

- > 74% of admissions issued with cryoprecipitate were emergency.
- > Based on Diagnostic Related Group (DRG), admissions included:
 - 63% surgical
 - 29% medical
 - 8% obstetric
- > **Figure 1** shows usage by Speciality Related Group (SRG). The top 5 users were tracheostomy, haematology, transplant, cardiothoracic surgery and obstetrics which constituted 65% of the total use.
 - Tracheostomy SRG (includes patients with multitude of diagnoses) was predominantly cardiothoracic surgery, abdominal aortic aneurysm surgery and trauma patients.
 - Transplant SRG mainly included liver transplants from 1 hospital.

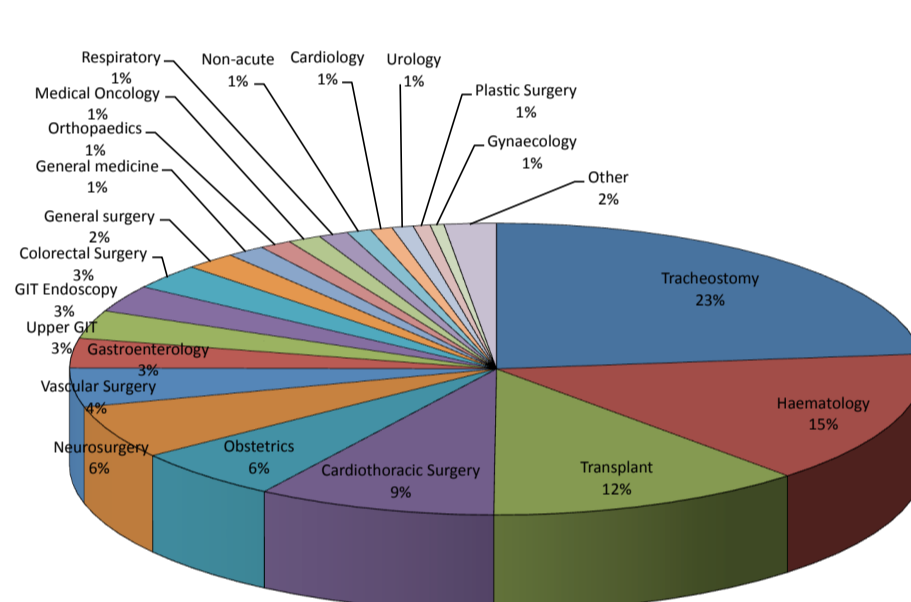


Figure 1: Cryoprecipitate Issues by Speciality Related Group

Other Products Issued:

- > Admitted patients issued with cryoprecipitate also were issued:
 - Red Cells (93%)
 - FFP (94%)
 - Platelets (84%)
- > Of the patients issued with Red Cells during their hospital stay:
 - 17% received 1–4 units
 - 25% received 5–9 units
 - 51% received > 10 units
- > Patients who were not issued Red Cells (7%) were mainly haematology (haematological malignancy) and gastroenterology patients.

Usage Patterns:

- > **Figure 2** shows the use of apheresis versus whole blood cryoprecipitate by FY. Overall 90% of use was apheresis cryoprecipitate.
- > **Figure 3** shows the increase in usage over the 3 complete FYs.
 - Issues have increased steadily year upon year since 2010–11 FY, with a more substantial increase in 2012–13 FY.
- > **Figure 4** shows over time that there was both an increase in total number of separations (admissions) issued with cryoprecipitate and the number of WBE units issued per patient stay (or transfusion index = total WBE units / admissions issued cryoprecipitate).

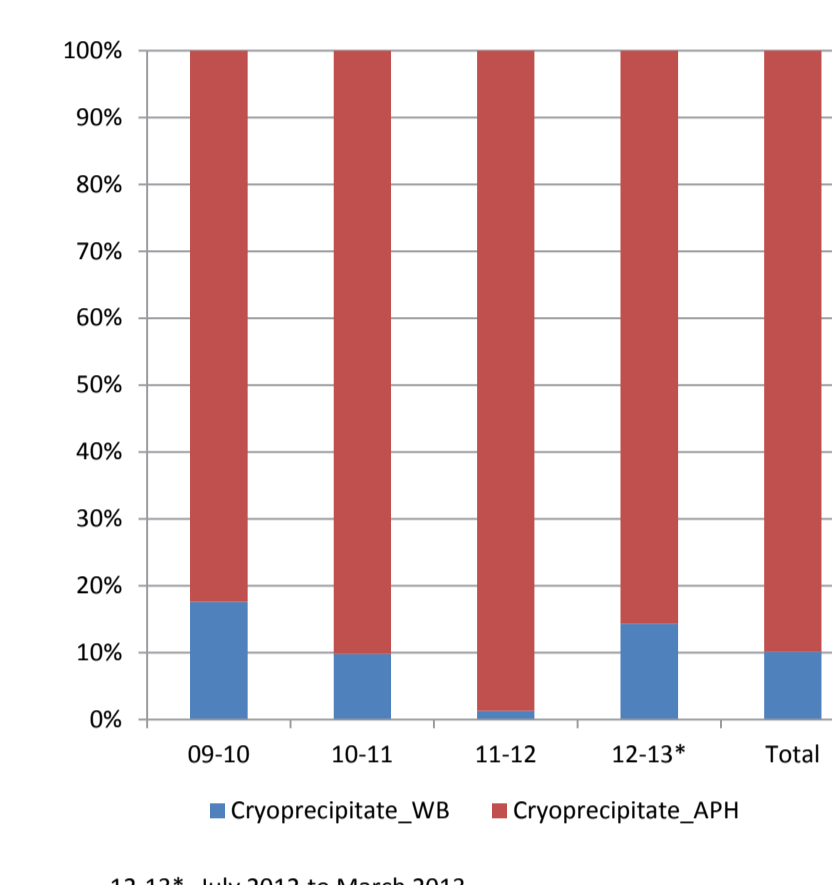


Figure 2: Proportion of Apheresis (APH) versus Whole Blood (WB) Cryoprecipitate Issued by Financial Year

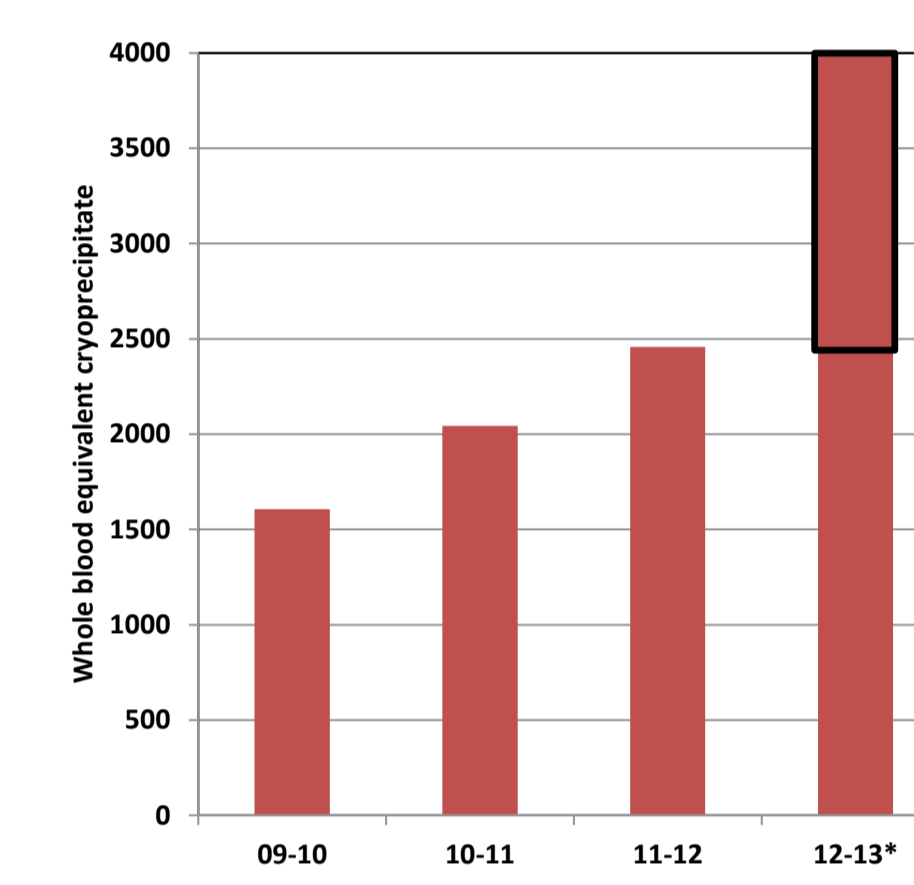


Figure 3: Whole Blood Equivalent (WBE) Units of Cryoprecipitate Usage by Financial Year (FY)

The black outlined box represents the estimated patient issues for the last quarter of 2012-13 FY (actual supply in WBE units to the 7 hospitals minus wastage).

*July 2012 to March 2013 usage is based on issues to admitted patients in the linked database.

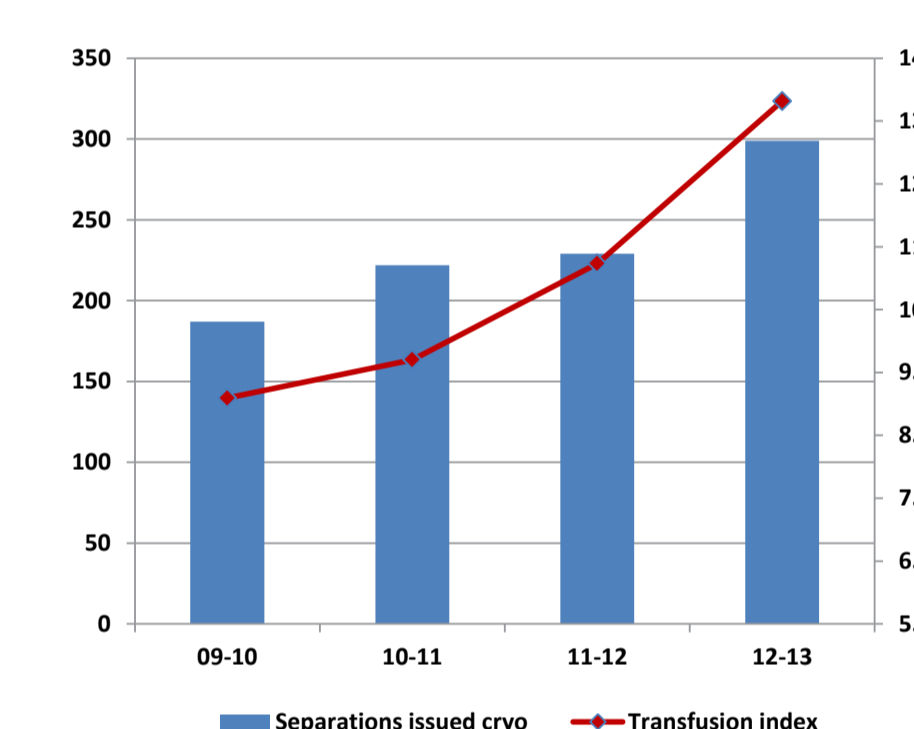


Figure 4: Number of Admitted Patients (Separations) Issued Cryoprecipitate and Transfusion Index (WBE units per admission) by Financial Year (FY)

12–13 includes estimated use for the last quarter of the 12–13 FY as in Figure 3.

Issues Per Patient Stay:

- > The median number of whole blood units issued per patient admission was 6 (IQR 4–10) and for apheresis units the median was 2 (IQR 2–5).
- > **Figure 5** shows range of WBE units of cryoprecipitate issued to patients ≥ 18 years during their hospital stay. Overall, 49% of patients were issued with < 8–10 WBE units per stay.
- > The new SA adult dosing guideline of 10 WBE units would be expected to increase the demand for cryoprecipitate. We attempted to estimate the increase in demand for patients who received WBE units less than a standard dose of 10 WBE units.
 - As the number of WBE units per patient stay had increased over the 3¼ FY, the last ¾ FY was used to estimate the potential impact of the new guideline.
 - During the 9 months of 12–13 FY, 153 admissions received less than 10 WBE units amounting to 783 WBE units. The estimated use based on new adult dosing (had this been in place) during this period, would be additional 747 WBE units for 9 months and 996 for the entire 12–13 FY. This would increase the total projected use for 12–13 FY to around 5000 WBE units or twice the usage in WBEs of the previous FY.

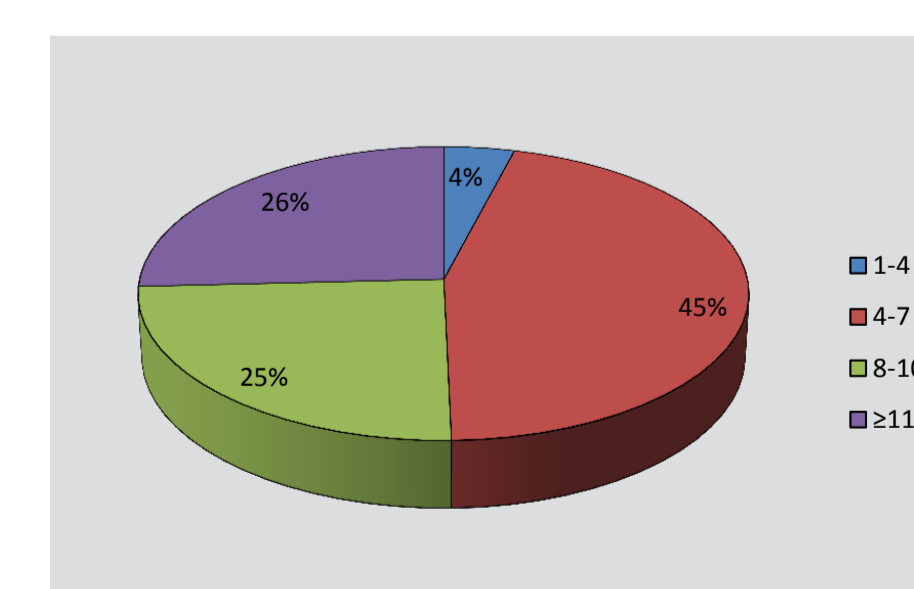


Figure 5: Number of Whole Blood Equivalent (WBE) Units of Cryoprecipitate Issued per Admitted Patient ≥ 18 years over 3¼ Financial Years

12–13* – July 2012 to March 2013 (not full year data)

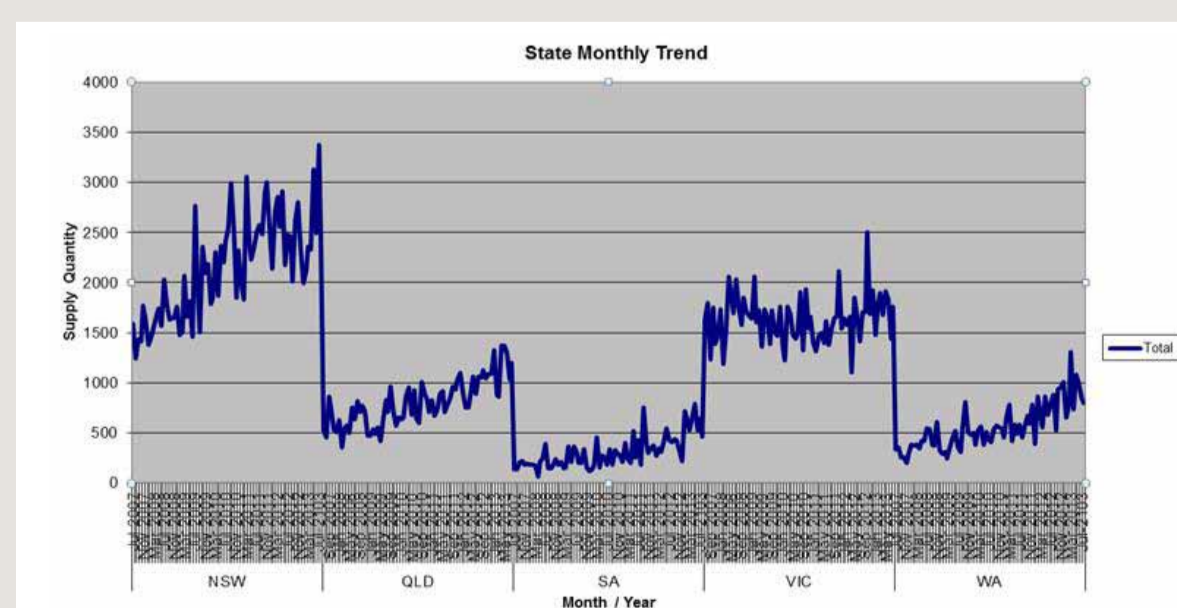


Figure 6: Patterns of National Cryoprecipitate Supply by Month in Whole Blood Equivalents (1st July 2007 to 31st August 2013)

References

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