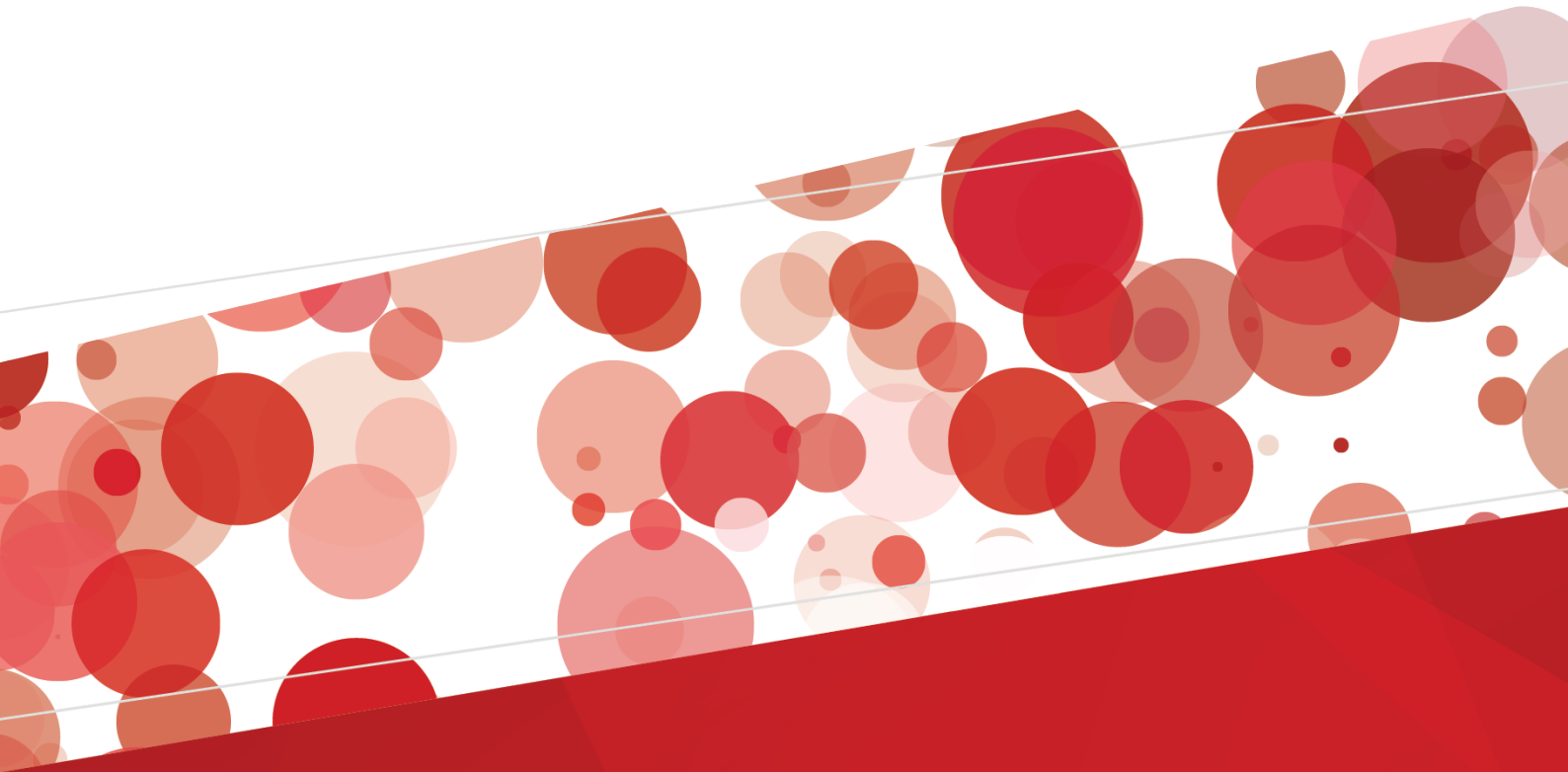
The indications for the use of O RhD negative red blood cells audit report

2024



VICTORIA State Government

Australian Red Cross Lifeblood

Blood Matters

The indications for the use of O RhD negative red blood cells audit report

2024

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Acknowledgements

Blood Matters thanks the health services and transfusion laboratories across all participating jurisdictions that contributed to the audit.

Abbreviations and acronyms

Term	Definition
ANZSBT	Australian and New Zealand Society of Blood Transfusion
BSMS	Blood stocks management scheme (United Kingdom)
RBC	Red blood cells
NBA	National Blood Authority: A statutory agency established by the National Blood Authority Act 2003 that manages and coordinates arrangements for the supply of blood, blood products and blood services in Australia
PBM	Patient blood management
MHP	Massive haemorrhage protocol
National Statement	National Statement for the Emergency Use of Group O Red Blood Cells, February 2023 <https://www.blood.gov.au/national-guidance-management-red-blood-cell-inventory>
NHS	National Health Service (United Kingdom)
Lifeblood	Australian Red Cross Lifeblood

Executive summary

Thank you to all the Victorian health services and transfusion laboratories that participated in this audit and contributed data.

The audit aimed to assess the use of O RhD negative red blood cells (RBC) against general principles and guidance in Australia and compare the results to the 2017 Blood Matters O RhD negative audit results.[1]

Since the 2017 audit, the National Statement for the Emergency Use of Group O Red Cells[2] (the National Statement) was released in 2023 with recommendations, actions and supporting notes to guide the emergency use of group O uncrossmatched RBC. To assess the impact of this guidance, the 2017 data was reanalysed in accordance with the National Statement to identify any changes in the use of emergency group O RBC following its release.

The audit consisted of two components:

1. O RhD negative RBC policy and inventory
2. O RhD negative RBC usage.

The policy and inventory component asked health services if they had policies in place to conserve inventory of group O RhD negative RBC and to provide current inventory levels of all blood groups.

The usage component of the audit captured data for 2,379 RBC issued by Australian Red Cross Lifeblood (Lifeblood) during the month of March 2024, with 2,220 having a reported fate and 159 that were rotated or transferred. The data showed that there has been little change in practice from the 2017 audit and a large proportion (41 per cent) of O RhD negative RBC with a reported fate were not transfused according to current guidelines.

Blood Matters recommends that health services and transfusion laboratories review the report, together with their individual and comparative data. Health services should work with their local blood management/transfusion committee to implement the recommendations and support alignment with best practice guidelines.

[1] <https://www.health.vic.gov.au/patient-care/blood-matters-audit-reports>

[2] <https://www.blood.gov.au/national-guidance-management-red-blood-cell-inventory>

Background

The Blood Matters Program works with health services to ensure that blood components and products are used appropriately and safely.

Lifeblood provides general principles to promote the best use of O RhD negative RBC.[3] This guidance includes recommendations on the use of O RhD positive RBC for RhD negative patients where O RhD negative RBC are in short supply or for large volume replacement. These recommendations support the National Statement which has been released since the previous 2017 Blood Matters audit.

Blood Matters conducted an O RhD negative RBC audit in 2017 and found that 64 per cent of O RhD negative RBC were transfused within guidelines current at that time, including 11 per cent for emergency use. Of the RBC transfusions outside guidelines, 17 per cent were to prevent time expiry. This report has reanalysed the 2017 data against the guidance in the National Statement for comparison purposes to identify changes in practice.

Nationally, the demand for RBC has increased since 2020. This trend has also been seen in Victoria, where the overall number of RBC issued has increased 12 per cent between 2020 and 2024. It is thought that the impact of COVID-19 on health management and healthcare along with a growing and ageing population may be contributing to the increase. The National Blood Authority (NBA) and Lifeblood are working to identify the drivers and future trends of this national increase.

Whilst the percentage of O RhD negative RBC issued as a total of all RBC issued has remained relatively constant in recent years, the overall number has increased (see Table 1).

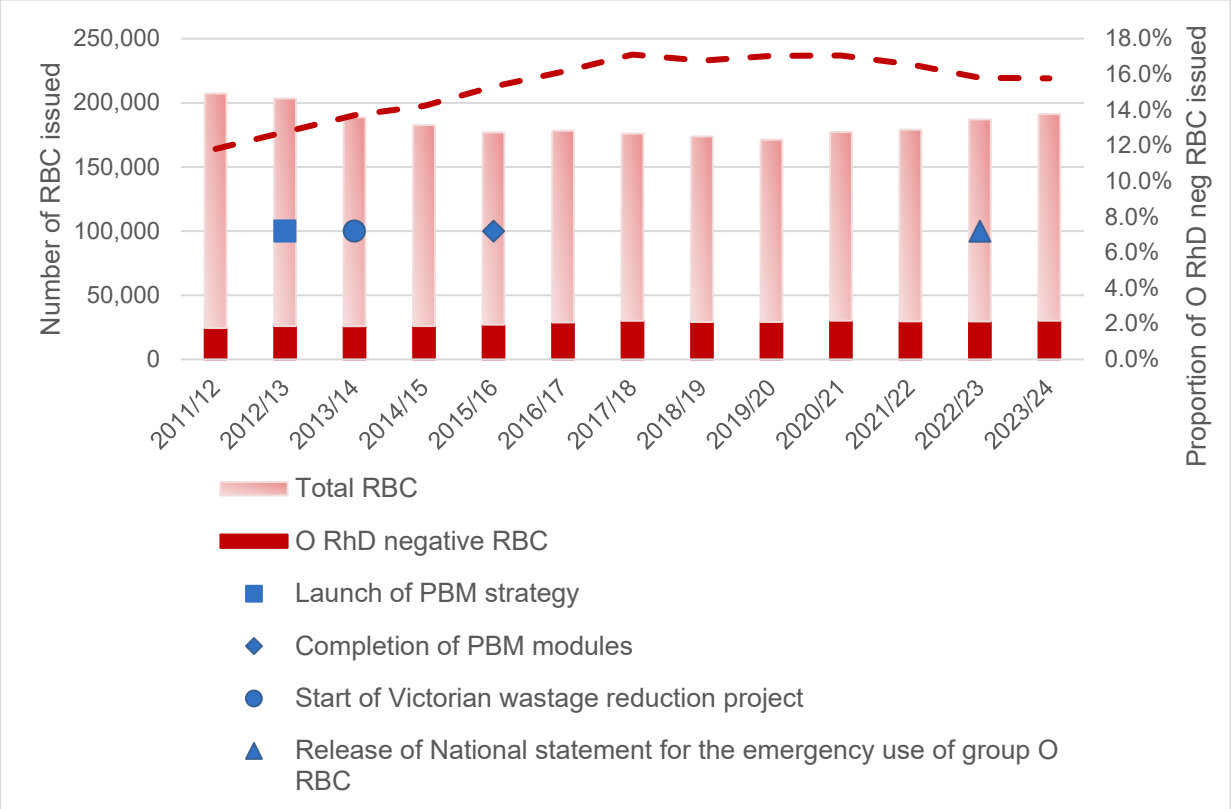
The data demonstrates a mismatch between demand for O RhD negative RBC and the proportion of the population who are O RhD negative (15.8 per cent demand versus 6.5 per cent of population).

Table 1: Changes in RBC issues from 2011 to 2024

Victorian data	2011	2017	2024
Total RBC issued	210,593	176,685	191,255
O RhD neg RBC issued	24,594	29,263	30,149
O RhD neg issued as a proportion of total RBC issued	**12%**	**17%**	**16%**

[3] <https://www.lifeblood.com.au/health-professionals/clinical-practice/use-of-blood-components/use-of-group-o-rhd-negative-red-cells>

Figure 1: Victoria RBC issued 2011–2024



In 2022 Hirani et al. found the proportion of O RhD negative RBC issued continued to increase nationally from 2010 to 2020. They state this was partly because health services and transfusion laboratories were simplifying inventory to decrease wastage due to time expiry. This trend was also seen in Victoria, with an overall reduction in wastage due to time expiry but an increased O RhD negative use over this period. Blood Matters decided to revisit the 2017 O RhD negative RBC audit to identify any changes in RBC management and use, particularly after the publication of the National Statement.

The demand for blood and blood products is continually changing and a complex algorithm is used to predict demand. Lifeblood, health services and transfusion laboratories must work together to ensure there is equitable access to O RhD negative RBC and that they are available for those who need it most such as O RhD negative recipients and those with RhD antibodies.

Aims and objectives

The audit aimed to assess the use of O RhD negative red blood cells (RBC) against current guidelines in Australia and compare the results to the 2017 Blood Matters O RhD negative audit.

The objectives of the audit were to:

- Assess the use of O RhD negative RBC in Victorian health services against the "Indications for the use of Group O RhD negative RBCs" prepared by Australian Red Cross Lifeblood and the National Statement
- Provide health services and transfusion laboratories with a snapshot of O RhD negative RBC use in their organisations and identify any opportunities for improved management and use of O RhD negative RBC
- Benchmark practice between health services and transfusion laboratories.

Limitations

Auditors received audit tool instructions and were able to seek clarification from Blood Matters staff on data collection, however they did not receive formal training. This may have resulted in variance in interpretation of some questions.

Clarification was required regarding which rotated/transferred RBC should be in scope for the audit. For consistent interpretation and comparison, the analysis only included rotated/transferred RBC that were originally issued by Lifeblood in March 2024.

During the audit period (March 2024):

- Lifeblood placed B RhD negative and A RhD negative RBC on medical officer approval restrictions due to low inventory. When these restrictions are in place, named patient orders must be placed with Lifeblood for a medical officer to review and approve. Two health services reported using nine O RhD negative RBC as a direct result of these restrictions.
- A health service received 23 O RhD negative RBC in error and to manage additional red blood cell inventory, some were used outside usual inventory management practice.

Method

Blood Matters invited all public and private health services in 4 jurisdictions (Victoria n = 91, Northern Territory n = 6, Australian Capital Territory n = 3 and Tasmania n = 9) to participate in a retrospective audit of all O RhD negative RBC issued by Lifeblood in March 2024.

An Excel audit worksheet was sent to each health service to complete electronically and return via email. The audit was open from 12 May to 28 June 2024.

Data presented in this report only includes Victorian health services. Health services from other jurisdictions were provided with individual summary reports and a comparison with Victorian peer groups and overall data.

The audit consisted of two parts:

Part 1: Policy and inventory

The policy component examined governance surrounding the use of emergency group O RBCs, as well as the management and preservation of O RhD negative stock. Where inventory was held, the usual inventory level of all RBC was requested.

Part 2: O RhD negative RBC usage

To enable health services to complete the usage component of the audit, all Victorian transfusion laboratories were provided with a list of O RhD negative RBC donation numbers issued by Lifeblood in March 2024. Each health service was instructed to contact their transfusion laboratory or blood bank to obtain a list of donation numbers. Paediatric packs were considered separately because these are one-quarter of an adult unit. The audit required each O RhD negative RBC to be allocated a fate: transfused, rotated or discarded. Blood Matters assessed if the use of O RhD negative RBC was in accordance with guidelines not the appropriateness of the transfusion.

For RBC transfused, patient characteristics were documented: sex, year of birth, ABO group, RhD group, existing immune/allo anti-D, existing other immune/allo antibodies, specific phenotype requirement, need for repeat transfusions, ABO mismatched haemopoietic transplant, clinical trial involvement and clinical specialty. Further information on the transfusion episode was collected: urgency, massive haemorrhage protocol, blood group known at issue, number of O RhD negative RBC transfused, number of O RhD positive RBC transfused, and total RBC transfused.

In addition, the audit asked the health service to identify the primary reason an O RhD negative RBC was selected for transfusion.

An algorithm was used to determine the most likely indication for transfusing each O RhD negative RBC based on the guidelines or other reasons for use. Other reasons for use included stock not held in inventory, special requirements (other than phenotype), or used to prevent time expiry. The algorithm results were compared with the primary indication provided by the health service.

To support validation, each participating health service received a preliminary report detailing their individual data, applicable peer group and overall data. The preliminary report included the final fate of each RBC, algorithm-determined indication, a summary of the percentage of O RhD

negative RBC that aligned with Lifeblood indications for use, and areas where use may not have been indicated. Health services were encouraged to review their data and seek clarification of any indication reclassification to ensure consistency of data.

Data submission was extended to September 2024 to provide additional time for health services to submit data.

Results

Introduction

Audit response rates

All Victorian health services and transfusion laboratories that stock or transfuse O RhD negative RBC participated in this audit (n=91).

Four health services reported they did not have blood inventory held on site, and therefore did not have a policy relating to its use.

Six health services that did not use, rotate or discard O RhD negative RBC during the audit period reported on policy and inventory only.

In March 2024, Lifeblood issued a total of 2,503 O RhD negative RBC, comprising 2,402 adult units and 101 paediatric packs to Victorian transfusion laboratories.

Victorian health services submitted data on 2,827 RBC, including 99 paediatric RBC packs. Of these, 254 RBC were excluded for the following reasons:

- 42 RBC not O RhD negative
- 43 duplicate entries, including two paediatric
- 129 RBC rotated into transfusion laboratory but issued by Lifeblood in January or February (not March)
- 11 RBC with no final fate reported, for example RBC unit crossmatched to patient but not transfused
- 26 WashT trial (washed paediatric RBC pack)
- Three recalled by Lifeblood.

Paediatric RBC packs (n = 71) were analysed and considered separately to avoid confusion as each paediatric RBC pack is one-quarter of an adult unit.

Of the remaining 2,502 adult RBC, 123 had multiple data entries by different health services due to rotations and/or transfers. Data submission was completed for 2,379 unique adult O RBC, accounting for 99 per cent of all adult O RhD negative RBC issued in March 2024. Of these, 2,220 had a reported fate and 159 were rotated or transferred with no end fate recorded.

Figure 2 provides a schematic analysis of reported RBC data.

Figure 2: Breakdown of RBC reported

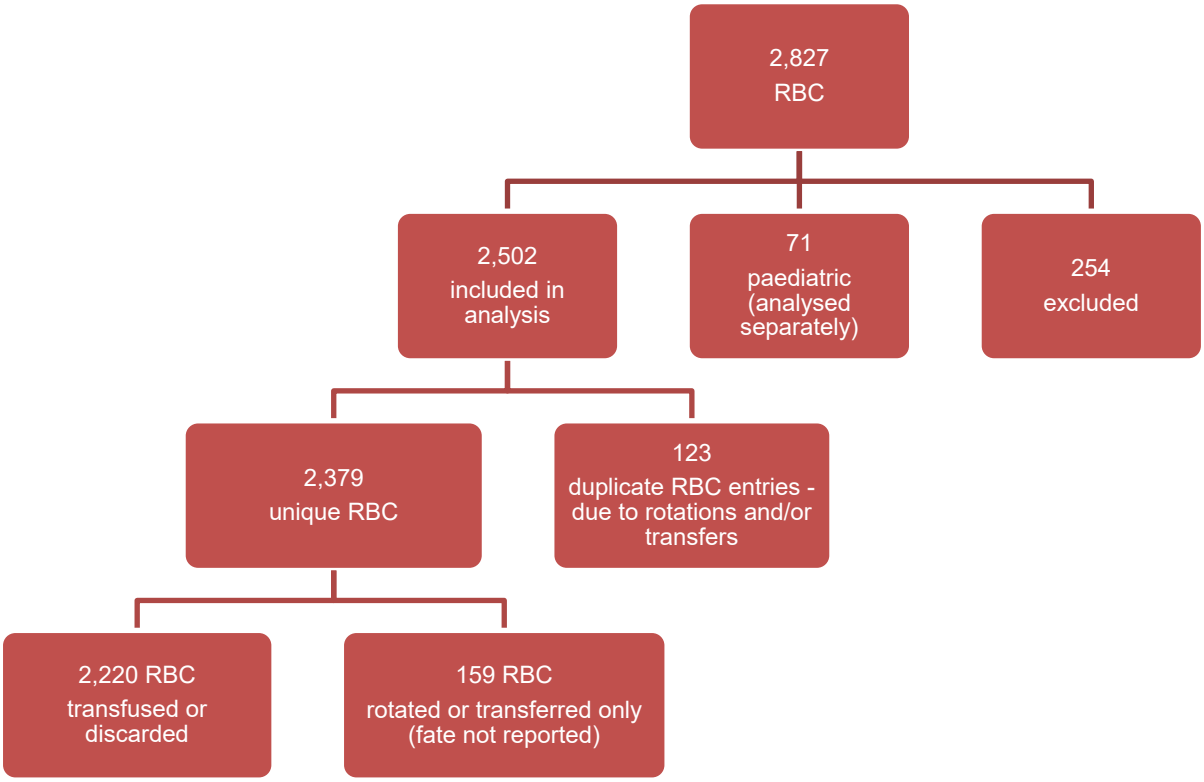


Table 2 shows the health service responses to the audit in peer groupings (AIHW 2015) and the number of O RhD negative RBC reported.

Table 2: Victorian hospital peer grouping and number of responses

Hospital peer groups (see Appendix 1)	Policy responses	Practice responses (health services reporting fate of at least one adult RBC)	O RhD negative RBC reported (adult units only)
Principal referral hospitals	6	6	754
Public acute group A	14	13	620
Public acute group B	8	8	275
Public acute group C	17	17	208
Public acute group D	3	1	2
Other specialist overnight (public)	5	4	152
Very small hospitals	1	1	2

Hospital peer groups (see Appendix 1)	Policy responses	Practice responses (health services reporting fate of at least one adult RBC)	O RhD negative RBC reported (adult units only)
Private acute group A	8	8	230
Private acute group B	8	8	169
Private acute group C	12	11	58
Private acute group D	8	7	32
Other specialist overnight (private)	1	-	-
Total	**91**	**84**	**2,502**

Note: 'Other specialist overnight (public)' and 'Other specialist overnight (private)' are not peer groups due to the diverse characteristics of the hospitals within the groups.

Agreement between algorithm and self-reported reason for selection of RBC unit

An algorithm determined the indication for the use of O RhD negative RBC to ensure correct and consistent classification across all health services. The algorithm and self-reported indications were compared and where there were any variations, further analysis ensured the correct indication was assigned.

The algorithm results matched the health service indication for O RhD negative RBC use 90 per cent of the time. Of the 222 misaligned indications, 181 were due to the health service not assigning an indication for O RhD negative use.

The algorithm reassigned 32 'special requirements' indications to 'phenotype requirements' (n = 14) and 'O RhD negative patients needing repeat transfusions or are likely to become transfusion-dependent' (n = 18). Nine RBC used 'to avoid time expiry' were reassigned to the group 'transfuse the same ABO and RhD group wherever possible'.

One health service disputed the preliminary data report and provided a revised indication for selection (n = 5) that was reported as 'unknown' in the original data submission.

Part 1: Policy and inventory

Ninety-one (100 per cent) Victorian health services responded to part 1 of the audit.

Policy

Four health services reported they did not have blood inventory held on site, and therefore did not have a policy relating to its use. The results presented are from the 87 health services with an inventory held onsite in the transfusion laboratory or satellite blood fridge, or a co-located private pathology laboratory. This data is compared to the 88 health services with policies in 2017.

Table 3 summarises the responses to the policies and guidance in place at the health service and/or the transfusion laboratory.

Table 3: Health services and transfusion laboratories with policies to conserve stock of group O RhD negative RBC

Policy/guidance documents topic	2017 Number (%)	2024 Number (%)
When to use emergency O RhD negative RBC	79 (90)	86 (99)
When to use emergency O RhD positive RBC in patients with an unknown blood group	75 (85)	66 (76)
When to provide O RhD positive RBC in massive blood transfusion to O RhD negative females with no childbearing potential and adult males with no anti-D	68 (77)	74 (85)
When to obtain a specimen for pretransfusion testing, including early collection and urgency of this specimen	n/a	85 (98)
When to move to group specific blood, if able, before moving to crossmatched blood in MHPs/critical bleeds?	n/a	77 (89)
Preference for transfusing crossmatch compatible RBC rather than emergency use RBC	n/a	83 (95)
The requirement to rotate RBC to prevent time expiry	65 (74)	78 (90)
How many days prior to expiry is rotation required (range, mode)	4–16 (14)	4–14 (7)
To flag when O RhD neg RBC may be used to prevent time expiry?	n/a	13 (15)
How many days prior to expiry are RBC flagged (range, mode)	n/a	0–14 (5.5)

Most health services have policies that reflect the guidance to transfuse the same ABO and RhD group as the patient wherever possible. These policies specify when a pretransfusion specimen should be taken including the requirement for early collection in emergencies (n=85, 98 per cent), and when to transition to group-specific RBC before moving to crossmatched RBC in MHPs/critical bleeds (n=77, 99 per cent). Additionally, 83 (95 per cent) health services have policies that state the preference for transfusing crossmatch compatible RBC rather than emergency use RBC.

Twelve health services reported that the policy on when to use emergency O RhD positive RBC in a patient with an unknown blood group was ‘in progress’ in relation to this question. However, 11 of these health services responded ‘yes’ to the same question in 2017. These health services may have reported ‘in progress’ as they incorporate the 2023 National recommendation to use O RhD positive RBC from the outset of a potential MHP into their policies.

Inventory

Four health services reported not holding an inventory of any RBC onsite. Twenty-nine (33 per cent) health services/transfusion laboratories stocked only O RhD negative RBC (between 2 and 6 units). This is an increase from the previous audit in 2017 where 21 (24 per cent) health services/transfusion laboratories stocked only O RhD negative RBC.

Five (6 per cent) health services reported holding all ABO and RhD blood groups compared to 8 (9 per cent) in 2017. For these health services, total inventory size ranged from 96 to 294 RBC, with O RhD negative RBC making up 13 to 21 per cent of total inventory.

The majority (90 per cent, n = 78) of health services reported regularly reviewing inventory levels of all ABO and RhD blood groups.

Table 4 shows the distribution of blood group inventory across all health services.

Table 4: Health services inventory levels by blood group

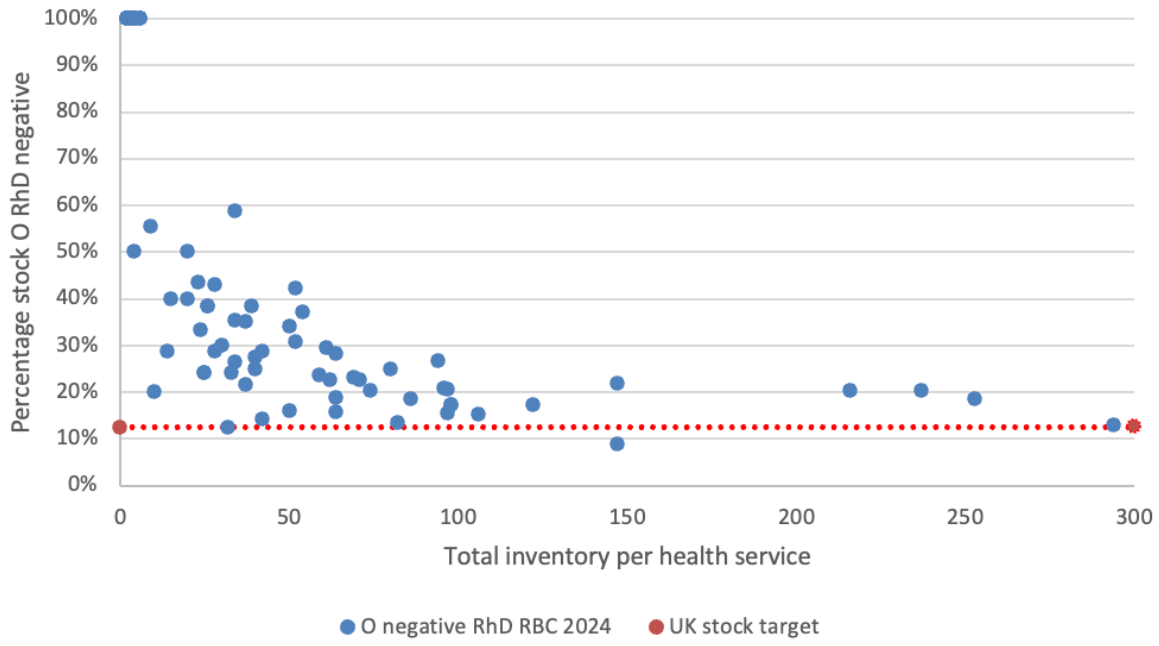
Blood group	2017 health services stocking blood group Number (%) [n = 83]	2024 health services stocking blood group Number (%) [n = 87]
O RhD negative	83 (100)	87 (100)
O RhD positive	59 (71)	58 (67)
A RhD negative	55 (66)	51 (59)
A RhD positive	59 (71)	55 (63)
B RhD negative	32 (39)	29 (33)
B RhD positive	32 (39)	29 (33)
AB RhD negative	12 (14)	9 (10)
AB RhD positive	13 (16)	9 (10)

Health services reported a total of 960 O RhD negative RBC in their inventory (349 emergency and 611 other stock). O RhD negative RBC allocated for emergency use were not included in the NBA's online blood ordering and inventory management system (BloodNet) accounts for 42 (48 per cent) health services corresponding to 208 units (or 22 per cent of O RhD negative inventory held in health services and transfusion laboratories). All O RhD negative RBC inventory should be recorded in BloodNet to assist the NBA and Lifeblood with forecasting demand and meeting supply.

Hospitals in the United Kingdom are recommended to have an inventory of 12.5 per cent or less O RhD negative RBC (National Health Service (NHS) National Survey)[4]. Figure 3 shows that only two health services responding to the audit would meet the UK recommendation, with an additional two falling between 12.5 and 13.5 per cent. The National Blood Authority (NBA) is scheduled to release new inventory guidance in 2025 which will outline a target proportion of O RhD negative RBC inventory for medium and large Australian health services.

[4] <https://hospital.blood.co.uk/audits/national-comparative-audit/reports-grouped-by-year/2018-survey-of-group-o-d-negative-red-cell-use/>

Figure 3: Health service/transfusion laboratory O RhD negative RBC as a proportion of total RBC inventory



Part 2: O RhD negative RBC usage

Eighty-four Victorian health services reported the fate (transfused, discarded or rotated) of at least one O RhD negative RBC issued during March 2024. Victorian health services reported the fate of 2,379 RBC. Of these, 159 were transferred or rotated only with no final fate recorded leaving a total of 2,220 RBC (89 per cent of issued O RhD negative RBC) with reported fates.

The number of RBC with a reported fate in 2017 was 2,035, 92 per cent of issued O RhD negative RBC.

Use of O RhD negative RBC within guidelines

Since the previous 2017 audit, guidelines for the use of O RhD negative RBC have been revised. The National Statement now recommends the first line use of O RhD positive RBC for females over 50 years and adult males over 18 years in an emergency when the blood group is unknown.

The audit aimed to determine whether the use of O RhD negative RBC was aligned with current guidelines. It does not, however, examine whether the indication for transfusion was appropriate.

General principle: transfuse the same ABO and RhD group as the patient wherever possible

As shown in Table 5, 40 per cent of all O RhD negative RBC units issued during March 2024 were transfused to O RhD negative patients.

Table 5: O RhD negative RBC issued to known O RhD negative patients

Transfuse the same ABO and RhD group as the patient wherever possible	2017 Number (%) [denominator n=2035]	2024 Number (%) [denominator n=2220]
O RhD negative patients with anti-D	25 (1)	33 (1)
O RhD negative paediatric males (≤ 18 years or as per local paediatric policy)	12 (0.6)	12 (0.5)
O RhD negative females with childbearing potential (≤ 50 years)	98 (5)	99 (4)
O RhD negative patients who will receive repeated transfusions, or are likely to become transfusion-dependent, for example, patients with hemoglobinopathies, aplastic anaemia, myelodysplasia	274 (13)	300 (14)
Other O RhD negative patients	431 (21)	454 (20)
Total	**840 (41)**	**898 (40)**

Emergency, life-saving transfusions where the patient's ABO and RhD blood group is unknown

Table 6 shows three per cent of all O RhD negative RBC issued during March 2024 was transfused in an emergency to patients with an unknown blood group, according to guidelines.

Table 6: O RhD negative RBC issued to patients with unknown blood group in an emergency

Emergency, life-saving transfusions where the patient's blood group (ABO/RhD) is unknown:	2017 Number (%)	2024 Number (%)
Females with childbearing potential (≤ 50 years)	35 (2)	61 (3)
Paediatric males (≤ 18 years or as per local paediatric policy)	3 (0.1) *	6 (0.3)
Patients where sex and age are uncertain	-	6 (0.3)
Total	**38 (2)**	**73 (3) ****

*Note: 2017 data reanalysed against 2024 guidelines.

**Note: Percentages may not add due to rounding.

Other generally accepted indications

In 2017, RBC were manually phenotyped, with the preference for testing O RhD negative RBC. Automated donor phenotyping and genotyping began in 2019, with approximately 42,000 additional donors phenotyped per year. The increase in phenotyping and genotyping across all blood groups has not significantly decreased the number of O RhD negative RBC transfused to meet specific phenotyping requirements. Table 7 shows the proportions of O RhD negative RBC being used to meet specific phenotype requirements across both audits are similar.

Table 7: Other indications where O RhD negative RBC issued

Other indications	2017 Number (%)	2024 Number (%)
Neonatal transfusion where suitable group specific red cells are unavailable	-	16 (0.7)
When phenotyped red cells are O RhD negative	214 (11)	233 (10)
ABO group mismatched stem-cell transplant recipients	62 (3)	49 (2)
Total	**276 (14)**	**298 (13)**

Note: The use of the adult units for paediatric patients is acceptable use. However, health services should review their inventory to include paediatric packs where appropriate.

Table 8 shows the shift towards extended phenotyping (Rh, Kell, Kidd, Duffy, MNS blood group systems) donors of all ABO and RhD blood groups. O RhD negative donors remain the largest proportion of phenotyped donors at 57 per cent.

Table 8: Proportion of donor panel with extended phenotype performed, by blood group

Blood group	2019 % of donors phenotyped	2024 % of donors phenotyped
O RhD positive	13	34
O RhD negative	25	57
A RhD positive	9	30
A RhD negative	14	43
B RhD positive	3	22
B RhD negative	6	26
AB RhD positive	1	13
AB RhD negative	2	15
Total	**12**	**35**

Use of O RhD negative RBC units outside guidelines

Emergency use

There were 38 health services that reported issuing emergency use O RhD negative RBC to females over 50 years and adult males over 18 years, with unknown blood group. Of these, 27 (71 per cent) had laboratory and/or health service policy in place to issue emergency use O RhD positive RBC to these population groups. Another nine health services reported that policies were being updated to reflect recommendations.

Three O RhD negative RBC were issued by two health services outside of guidelines due to O RhD positive stock being depleted by prior massive transfusion episodes.

As shown in Table 9, 208 O RhD negative RBC (9 per cent) were selected contrary to the National Statement. The patients ranged in age from 38 to 89 for males, and 57 to 83 for females.

Table 9: O RhD negative RBC use contrary to the National Statement for patients with an unknown blood group in an emergency

Use contrary to National Statement	2017 Number (%)	2024 Number (%)
Emergency use for females > 50 years and adult males > 18 years:	175 (9) *	200 (9)
Emergency use beyond **4 units** of uncrossmatched group O RhD negative RBC	10 (0.5) *	8 (0.4)
Total	**185 (9)**	**208 (9)**

Note: *2017 data reanalysed against 2024 guidelines.

Other indications for use outside guidelines

Table 10 shows the indications reported for O RhD negative use outside the guidelines. These are allocated the broad categories of perceived clinical need, inventory management issues or other/unknown.

Table 10: Indication for use outside of the guidelines

Other indication for O RhD negative RBC use	2017 Number (%)	2024 Number (%)
Perceived clinical need: Special requirement (e.g. CMV negative)	48 (2)	55 (2)
Inventory management: To prevent time expiry	337 (17)	454 (20)
Inventory management: Patient-specific blood group not held in inventory	80 (4)	53 (2)
Inventory management: Insufficient stock	55 (3)	90 (4)

Other indication for O RhD negative RBC use	2017 Number (%)	2024 Number (%)
Inventory management: Other/unknown	88 (4)	40 (2)
Total	**608 (30)**	**692 (31) ***

*Note: Percentages may not add to due to rounding.

Twenty per cent of all O RhD negative RBC issued in March 2024 were selected to prevent time expiry compared to 17 per cent in the 2017 audit.

There were instances (as shown in Table 10, row 'Other/unknown') where a patient's blood group was stated as known prior to the issue of O RhD negative RBC, and the auditor commented the reason for selecting an O RhD negative RBC was unknown.

Table 11 shows how insufficient stocks of other ABO and RhD blood groups impact on O RhD negative RBC use. Six per cent of all O RhD negative RBC were used because other RBC groups were not held in the inventory or there was insufficient stock at the time.

Table 11: Distribution of patient blood group when O RhD negative RBC issued for stock not held or insufficient stock of patient's own blood group

Patient blood group	Insufficient stock: O RhD negative RBC issued (number health services)	Stock not held: O RhD negative RBC issued (number health services)
O RhD positive	23[5] (10)	9[6] (1)
B RhD negative	26[7] (11)	19 (10)
B RhD positive	12 (6)	3 (1)
A RhD negative	23[7] (10)	14 (4)
A RhD positive	4 (3)	0 (0)
AB RhD negative	2 (1)	7 (3)
AB RhD positive	0 (0)	1 (1)

Discarded O RhD negative RBC

Table 12 shows a reduction in discards in 2024 in comparison to 2017. Nine health services reported discarding a total of 51 (2.2 per cent) O RhD negative RBC as opposed to 88 (4 percent) in 2017. Discards due to 'Other' reasons included clinical, damage and transportation causes.

[5] Including five requiring K negative.

[6] Including requirement for irradiated blood.

[7] Lifeblood issued due to MO restriction during March.

Table 12: Discard reasons for O RhD negative RBC

Reason for discard	2017 Number (%)	2024 Number (%)
Time expiry	54 (3)	16 (0.7)
Out of controlled storage (> 30 minutes)	0 (0)	24 (1)
Other	34 (2)	11 (0.5)
Overall discard rate	**88 (4)**	**51 (2)**

Note: Percentages may not add due to rounding.

Inventory management

There were 282 rotations and transfers of O RhD negative RBC reported involving 159 unique RBC units (see Table 13). Of these, 116 had a final fate reported (see Table 14), including 63 (54 per cent) transfused according to guidelines, 32 (28 per cent) transfused to prevent time expiry and only 3 (3 per cent) reported as discarded. This shows a concerted effort on the part of health services to rotate stock in time to prevent time expiry.

Table 13: Rotation and transfer of O RhD negative RBC (n = 282)

Peer group (total issues)	Rotation to prevent wastage Number (%)	Transfer for specific patient Number (%)
Principal referral (n = 754)	22[8] (3)	1 (0.1)
Public A (n = 620)	18 (3)	26 (4)
Public B (n = 275)	42 (15)	-
Public C (n = 208)	83 (40)	7 (3)
Public D (n = 2)	-	-
Public: other acute specialised hospitals (n = 152)	13 (9)	-
Private A (n = 230)	8 (3)	-
Private B (n = 169)	19 (11)	-
Private C (n = 58)	20 (34)	7 (10)
Private D (n = 32)	16 (50)	-
All reporting health services (n = 2,390)	241 (10)	41 (2)

[8] Due to an order fulfillment error of O RhD negative RBC to one health service.

Table 14: Final fate of rotated O RhD negative RBC (n = 116)

Final fate of RBC	Unique RBC rotated or transferred and subsequently fated[9] (%)
General principle: Transfuse the same ABO and RhD group as the patient wherever possible	53 (46)
Emergency, life-saving transfusions where the patient's blood group (ABO/RhD) is unknown	3 (3)
When phenotyped RBC are O RhD negative	5 (4)
ABO group mismatched stem-cell transplant recipients	2 (2)
Emergency use of group O negative red blood cells in females over 50 years and males over 18 years	6 (5)
Special requirement (e.g. CMV negative)	2 (2)
To prevent time expiry	32 (28)
Patient-specific blood group not held in inventory	3 (3)
Insufficient stock	3 (3)
Transfused other reasons/unknown	4 (3)
Discarded	3 (3)

Note: Percentages may not add due to rounding

Paediatric RBC

Six health services reported on 71 paediatric O RhD negative RBC packs from 28 donations. Table 15 shows that 11 (15 per cent) of the paediatric RBC packs were discarded. Usual management of paediatric packs may explain the higher discard rate. Paediatric RBC packs comprise one adult RBC unit divided into four packs of equal volume. The four paediatric RBC packs from one adult donor are generally kept together and often reserved for one patient to minimise exposure to multiple donors.

Table 15: Indications for paediatric group O RhD negative RBC

Indication for use of O RhD negative RBC	O RhD negative RBC Number (%)
Patient blood group O RhD negative	5 (7)
Emergency, life-saving transfusions where the patient's blood group (ABO/RhD) is unknown	1 (1)
Neonatal transfusion where suitable group specific red cells are unavailable	50 (70)
To prevent time expiry	4 (6)
Discarded	11 (15)

[9] Denominator = 116 based on RBC with a known fate.

Indication for use of O RhD negative RBC	O RhD negative RBC Number (%)
Total	**71**

Summary of findings

Overall, health services and laboratories have policies in place that support and meet the guidelines and recommendations for the responsible use and stewardship of O RhD negative RBC. There are, however, opportunities for health services to improve in aligning practice with guidelines and local policy.

Table 16: Summary of use based on guidelines and recommendations

Indications for use	O RhD negative RBC Number (%)
Within guidelines: Patient blood group O RhD negative	898 (40)
Within guidelines: Emergency use aligned to guidelines	73 (3)
Within guidelines: Phenotyped	233 (10)
Within guidelines: Other	65 (3)
Total within guidelines	**1269 (57)**
Outside guidelines: Emergency use in female patients > 50 years and male patients > 18 years)	200 (9)
Outside guidelines: Emergency use beyond four units of O RhD negative RBCs	8 (0.4)
Outside guidelines: Used to prevent expiry	454 (20)
Outside guidelines: Inventory (stock not held or insufficient stock of other blood groups)	143 (6)
Outside guidelines: Other (including special requirements)	95 (4)
Total outside guidelines	**900 (41)**
Total discarded	**51 (2)**

Discussion

Policy

The policy results from the 2017 and 2024 audits reflect the guidance that was current at the time each audit was conducted. For health services with policies, there was an improvement from the 2017 audit on when to use emergency O RhD negative RBC (90 per cent in 2017 to 99 per cent in 2024). However, the number of health services with a policy covering the use of emergency O RhD positive RBC for patients with an unknown blood group decreased from 75 (85 per cent) in 2017 to 66 (76 per cent) in 2024. This may be due to the 12 health services stating their policy updates were in progress, likely to incorporate the guidance outlined in the National Statement.

All health services that transfuse and transfusion laboratories should have a policy that aligns with the National Statement covering the emergency use of group O RBC as appropriate to that health service.

O RhD negative use in an emergency

Two hundred (9 per cent) O RhD negative RBC audited were issued to females > 50 years and adult males > 18 years with an unknown blood group in an emergency, who could have been issued O RhD positive uncrossmatched RBC as per the National Statement. The 2017 data was reanalysed against this guidance and the same percentage of O RhD negative RBC were used for patients with these demographics in both 2017 and 2024. This demonstrates that no change in practice has occurred, where it was anticipated to decrease following the release of the National Statement.

Inventory management

Forty-one per cent (900) of RBC with a reported fate were transfused outside guidelines, with 20 per cent of these used to prevent expiry rather than for clinical need which is an increase from 17 per cent in 2017. RBC rotation occurred between four to 14 days prior to the date of expiry with seven days being the most common time frame, a decrease from 14 days in the 2017 audit. To ensure RBC can be used appropriately, they must be rotated with sufficient time before expiry. The receiving laboratory should be informed of planned rotations to prevent over-ordering and subsequent inventory overstocking.

Rotating blood components is a common strategy to ensure equitable access to components and reduce waste due to time expiry. Typically, smaller, regional health services and transfusion laboratories (spokes) have a rotation agreement with larger health services and laboratories (hubs). These larger organisations have a more diverse patient population and a greater likelihood of using the component before it expires. There was a marked improvement in health service policy that outlined the requirement to rotate RBC to prevent time expiry, 74 per cent in 2017 to 90 per cent in 2024.

When comparing 2017 with 2024 audit data the proportion of sites holding only O RhD negative RBC increased (24 per cent in 2017 to 33 per cent in 2024) and sites holding all blood groups decreased (9 per cent in 2017 to 6 per cent in 2024). Many group B patients received O RhD negative RBC (236, 10.6 per cent of the O RhD negative RBC transfused) due to insufficient stock or stock not held. Using O RhD negative instead of ABO and RhD group-specific RBC for transfusion may have unwanted consequences, including alloimmunisation. RBC inventory should reflect local ABO blood group distribution to meet clinical need whilst maintaining appropriate levels to minimise time expiry, with regular review.

An anticipated decrease in the proportion of O RhD negative RBC held in inventories in response to the National Statement and the move to emergency O RhD positive RBC for females over 50 years and males over 18 years has not yet occurred. Health services that have implemented the recommendations of the National Statement should review inventory levels to determine whether O RhD negative RBC stock can be safely reduced and whether increasing O RhD positive RBC stock would be appropriate.

Conclusion

The results of this audit will assist health services and transfusion laboratories to identify any gaps in policy and practice, understand the current pattern of use for O RhD negative RBC and prompt regular re-evaluation of their RBC inventory.

Findings from the audit indicate much of O RhD negative RBC use remains outside guidelines (41%) and is largely used for inventory management rather than clinical need.

Closer management and rationalisation of O RhD negative RBC use, including emergency use, is expected to ease pressure on O RhD negative RBC supplies and donors.

Health services and transfusion laboratories should review their policies and practices and incorporate the guidance in the National Statement where appropriate.

Regular evaluation of RBC inventory management, incorporating patient demographics and usage patterns, will help balance RBC demand and supply, ensuring appropriate blood resources are available for patients when needed.

The demand for blood and blood products is continually changing and a complex algorithm is used to predict demand. Lifeblood, health services and transfusion laboratories must work together to ensure there is equitable access to O RhD negative RBC and that they are available for patients when needed

Recommendations

Blood Matters will:

- disseminate data to key stakeholders including:
  - Victorian health services/transfusion laboratories
  - Victorian Blood User Group
  - National Blood Transfusion Committee
  - Australian Red Cross Lifeblood
  - National Blood Authority
- assist individual health services/transfusion laboratories to align with guidelines as needed
- provide audit tools for health services/transfusion laboratories for re-auditing.

Health services and transfusion laboratories should collaborate to:

- review policy (including massive haemorrhage protocol) against the National Statement to include:
  - when to use emergency O RhD negative RBC in patients with an unknown blood group
  - when to use emergency O RhD positive RBC in patients with an unknown blood group
  - when to switch to O RhD positive RBC for all patients (regardless of age or sex of patient) in critically bleeding patients
  - when to move to group-specific RBC before moving to crossmatched RBC in critically bleeding patients
- review policy for rotating RBC 7–14 days before expiry to reduce wastage and better facilitate appropriate use
  - include communication with receiving laboratory so Lifeblood orders can be adjusted accordingly
- review inventory of all ABO and RhD groups in conjunction with local patient ABO and RhD group distribution
  - consider including more ABO groups where appropriate and decreasing group O accordingly
- review policy regarding blood and blood product storage and transportation requirements to ensure it is aligned with ANZSBT guidelines.
  - provide guidance and education where necessary
- explore laboratory information system interface with BloodNet to improve inventory visibility
- re-audit to measure success of any practice changes implemented.

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Appendix 1: Hospital peer groups

Hospital peer groupings define groups of similar hospitals based on shared characteristics and allow a better understanding of the organisation and provision of hospital services.

When presenting and analysing health performance and other information, it is important that to make valid comparisons. Peer grouping hospitals supports comparisons that reflect the purpose, resources and role of each hospital.

Public and private acute hospitals are not directly comparable. To address this, the Australian Institute of Health and Welfare (AIHW) created different peer groupings.

See the AIHW website for more information.[10]

Peer group	Definition
Principal referral hospitals	These are public acute hospitals that provide a very broad range of services, have a range of highly specialised service units, and have very large patient volumes. The term 'referral' recognises that these hospitals have specialist facilities not typically found in smaller hospitals.
Public acute group A hospitals	These are public acute hospitals that provide a wide range of services typically including a 24-hour emergency department, intensive care unit, coronary care unit and oncology unit, but do not provide the breadth of services provided by principal referral hospitals.
Public acute group B hospitals	These are those public acute hospitals that do not have the service profile of the principal referral hospitals and group A hospitals but do have a 24-hour emergency department. They typically provide elective surgery and have specialised service units such as obstetric, paediatric and psychiatric units.
Public acute group C hospitals	These include those public acute hospitals that provide a more limited range of services than principal referral hospitals or public acute group A and B hospitals, but do have an obstetric unit, provide surgical services and/or some form of emergency facility (emergency department, or accident and emergency service).
Public acute group D hospitals	These are acute public hospitals that offer a smaller range of services relative to the other public acute hospital groups and provide 200 or more separations per year. They are mostly situated in regional and remote areas.
Private acute group A hospitals	These are private acute hospitals that have a 24-hour emergency department and an intensive care unit and provide a number of other specialised services such as coronary care, special care nursery, cardiac surgery and neurosurgery.
Private acute group B hospitals	These are private acute hospitals that do not have a 24-hour emergency department but do have an intensive care unit and a number of other specialised services including coronary care, special care nursery, cardiac surgery and neurosurgery.
Private acute group C hospitals	These are those private acute hospitals that do not provide emergency department services or have an intensive care unit but do provide specialised services in a range of clinical specialities.

[10] <https://www.aihw.gov.au/reports/hospitals/australian-hospital-peer-groups/contents/table-of-contents>

Peer group	Definition
Private acute group D hospitals	These are those private acute hospitals that do not provide emergency department services or have an intensive care unit, do not provide specialised services in a range of clinical specialities, but had 200 or more separations.
Specialist overnight hospitals	These are public and private hospitals that provide care on a same day and overnight basis to a specific target population or group of conditions. Subgroups include children's hospitals and women's hospitals. The overarching peer group cannot be grouped as such for comparisons due to the diverse characteristics of the hospitals.
Sub- and non-acute hospitals	These are hospitals that provide mostly sub- and non-acute care (for example, rehabilitation, palliative care, geriatric care) on a same day and overnight basis. Sub- and non-acute hospitals were identified where: over 70 per cent of separations were sub- and non-acute separations, or over 70 per cent of patient days were sub- and non-acute days and over 50 per cent of separations were sub- and non-acute separations.
Very small hospitals	These have few beds and provide care for few admitted patients. Most do not perform surgery.

Appendix 2: Use of O RhD negative RBC by peer group

Table 17: Summary audit results for public hospitals

Public hospital data	Principal referral	Public group A	Public group B	Public group C
Number of health services	6	13	8	14
Total of O RhD negative RBC issued	731	576	233	118
Number of O RhD negative RBC transfused or discarded per health service range (mean)	62–177 (122)	12–79 (44)	3–82 (29)	1–34 (8)

Table 18: Audit results for public hospitals: Indication for O RhD negative RBC within guidelines

Indication for O RhD negative RBC within guidelines	Principal referral % range (% mean)	Public group A % range (% mean)	Public group B % range (% mean)	Public group C % range (% mean)
O RhD negative patients with anti-D	0 – 4 (2)	0 – 10 (1)	0 – 33 (3)	0 – 67 (3)
O RhD negative paediatric males (≤ 18 years or as per local paediatric policy)	0 – 1 (0.1)	0 – 2 (0.2)	-	-
O RhD negative females with childbearing potential (≤ 50 years)	0 – 16 (6)	0 – 10 (3)	0 – 29 (3)	0 – 40 (13)
O RhD negative patients who will receive repeated transfusions, or are likely to become transfusion-dependent, for example, e.g. patients with hemoglobinopathies, aplastic anaemia, myelodysplasia	2 – 21 (11)	0 – 27 (14)	0 – 18 (11)	0 – 100 (34)
Other O RhD negative patients	6– 27 (18)	0 – 63 (26)	0 – 39 (17)	0 – 63 (15)
Total RBC issued to known O RhD negative patient	**20 – 59 (37)**	**12 – 90 (45)**	**0 – 44 (34)**	**0 – 100 (57)**
Emergency use: Females with childbearing potential (≤ 50 years)	0 – 5 (2)	0 – 12 (2)	0 – 39 (11)	0 – 33 (1)
Emergency use: Paediatric males (≤ 18 years or as per local paediatric policy)	0 – 1 (0.1)	0 – 1 (0.2)	0 – 8 (1)	-
Emergency use: Patients where sex and age are uncertain	0 – 3 (1)	0 – 4 (0.2)	-	-
Total RBC issued in emergency	**0 – 7 (3)**	**0 – 12 (2)**	**0 – 42 (12)**	**0 – 33 (1)**
Neonatal transfusion where suitable group specific red cells are unavailable.	0 – 1 (0.1)	0 – 3 (0.2)	0 – 13 (4)	-
When phenotyped RBC are O RhD negative.	2 – 27 (18)	0 – 17 (5)	0 – 6 (3)	0 – 13 (1)

Indication for O RhD negative RBC within guidelines	Principal referral % range (% mean)	Public group A % range (% mean)	Public group B % range (% mean)	Public group C % range (% mean)
ABO group mismatched stem-cell transplant recipients	0 – 15 (6)	-	-	-
Total RBC meeting indications	**54 – 77 (63)**	**25 – 90 (53)**	**33 – 67 (53)**	**0 – 100 (66)**

Table 19: Audit results for public hospitals: Use of O RhD negative RBC outside guidelines

Indication for use outside guidelines	Principal referral % range (% mean)	Public group A % range (% mean)	Public group B % range (% mean)	Public group C % range (% mean)
For females > 50 years and all adult males > 18 years - issue group O RhD positive uncrossmatched RBC until the patient's ABO RhD blood group has been determined using a valid current specimen	2 – 22 (12)	0 – 58 (7)	0 – 67 (15)	0 – 100 (7)
Where FOUR uncrossmatched group O RhD negative RBC have been issued to a patient of unknown RhD group then local policies should include the use of group O RhD positive RBC irrespective of age, gender or child-bearing potential	0 – 3 (1)	-	-	-
Special requirement (e.g. CMV negative)	0 – 8 (2)	0 – 16 (3)	0 – 2(1)	0 – 18 (2)
To prevent time expiry	9 – 38 (18)	0 – 42 (24)	0 – 41 (20)	0 – 67 (12)
Patient-specific blood group not held in inventory	0 – 3 (1)	0 – 24 (3)	0 – 8 (1)	0 – 25 (3)
Insufficient stock	0 – 5 (2)	0 – 21 (6)	0 – 17 (4)	0 – 33 (6)
Other reasons/unknown	0 -1 (1)	0 – 5 (1)	0 – 6 (3)	0 – 50 (2)
Total RBC outside guidelines	**23 – 45 (35)**	**10 – 75 (45)**	**28 – 67 (44)**	**0 – 100 (31)**

Table 20: Audit results for public hospitals: Discard of O RhD negative RBC

Discards	Principal referral % range (% mean)	Public group A % range (% mean)	Public group B % range (% mean)	Public group C % range (% mean)
Discards: Expired	0 – 0 (0)	0 – 6 (1)	0 – 3 (1)	-
Discards: Clinical	0 – 1 (0.3)	-	0 – 6 (0.4)	-
Discards: Storage/damage	0 – 6 (2)	0 – 9 (1)	0 – 8 (2)	0 – 29 (3)
Total discards	**0 – 6 (2)**	**0 – 6 (1)**	**0 – 8 (3)**	**0 – 5 (1)**

Public group D only had one health service reporting a fate for an O RhD negative RBC issued in March

Table 21: Summary audit results for private hospitals

Private hospital data	Private group A	Private group B	Private group C	Private group D
Number of health services	8	7	7	4
Total of O RhD negative RBC issued	222	150	31	16
Number of O RhD negative RBC transfused or discarded per health service range (mean)	5 – 49 (28)	4 – 38 (21)	2 – 12 (4)	1 – 8 (4)

Table 22: Audit results for private hospitals: Indication for O RhD negative RBC within guidelines

Indication for O RhD negative RBC within guidelines	Private group A % range (% mean)	Private group B % range (% mean)	Private group C % range (% mean)	Private group D % range (% mean)
O RhD negative patients with anti-D	-	-	-	-
O RhD negative paediatric males (≤ 18 years or as per local paediatric policy)	-	-	-	-
O RhD negative females with childbearing potential (≤ 50 years)	0 – 12 (2)	0 – 6 (1)	-	-
O RhD negative patients who will receive repeated transfusions, or are likely to become transfusion-dependent, for example, e.g. patients with hemoglobinopathies, aplastic anaemia, myelodysplasia	0 – 39 (12)	0 – 67 (23)	0 – 80 (13)	0 – 100 (63)
Other O RhD negative patients	0 – 55 (28)	0 – 26 (17)	0 – 100 (13)	0 – 100 (6)
Total RBC issued to known O RhD negative patient	**20 – 67 (41)**	**20 – 75 (41)**	**0 – 100 (26)**	**0 – 100 (69)**
Emergency use: Females with childbearing potential (≤ 50 years)	0 – 40 (2)	-	-	-
Emergency use: Paediatric males (≤ 18 years or as per local paediatric policy)	-	-	-	-
Emergency use: Patients where sex and age are uncertain	-	-	-	-
Total RBC issued in emergency	**0 – 40 (2)**	**-**	**-**	**-**
Neonatal transfusion where suitable group specific red cells are unavailable.	-	-	-	-
When phenotyped RBC are O RhD negative.	0 – 25 (6)	0 – (11)	0 – 20 (3)	0 – 20 (6)
ABO group mismatched stem-cell transplant recipients	-	-	-	-
Total RBC meeting indications	**33 – 73 (50)**	**23 – 76 (52)**	**0 – 100 (29)**	**20 – 100 (75)**

Table 23: Audit results for private hospitals: Use of O RhD negative RBC outside guidelines

Indication for use outside guidelines	Private group A % range (% mean)	Private group B % range (% mean)	Private group C % range (% mean)	Private group D % range (% mean)
For females > 50 years and all adult males > 18 years - issue group O RhD positive uncrossmatched RBC until the patient's ABO RhD blood group has been determined using a valid current specimen	0 – 20 (6)	0 – 13 (5)	0 – 100	-
Where FOUR uncrossmatched group O RhD negative RBC have been issued to a patient of unknown RhD group then local policies should include the use of group O RhD positive RBC irrespective of age, gender or child-bearing potential	-	-	-	-
Special requirement (e.g. CMV negative)	0 – 31 (7)	-	-	-
To prevent time expiry	0 – 53 (21)	5 – 75 (27)	0 – 100 (58)	0 – 20 (6)
Patient-specific blood group not held in inventory	0 – 28 (6)	0 – 26 (7)	-	-
Insufficient stock	0 – 26 (4)	0 – 11 (3)	0 – 50 (3)	0 – 60 (19)
Other reasons/unknown	0 – 13 (2)	0 – 18 (6)	-	-
Total RBC outside guidelines	**18 – 65 (45)**	**24 – 77 (48)**	**0 – 100 (71)**	**0 – 80 (25)**

Table 24: Audit results for private hospitals: Discard of O RhD negative RBC

Discards	Private group A % range (% mean)	Private group B % range (% mean)	Private group C % range (% mean)	Private group D % range (% mean)
Discards: Expired	0 – 17 (3)	-	-	-
Discards: Clinical	-	-	-	-
Discards: Storage/damage	0 – 6 (2)	-	-	-
Total discards	**0 – 17 (5)**	**0 – 0 (0)**	**0 – 0 (0)**	**0 – 0 (0)**