NHS

South West Regional Transfusion Committee

South West Regional Transfusion Committee

Report on the South West regional survey of O-negative red cell distribution and use

June 2012

A survey of hospital O-negative red cell holding
in the South West region conducted March-July 2011

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South West Regional Transfusion Team (SWRTT):
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Introduction

Group O RhD negative (O^-) red cells are the first choice for use in emergencies if the recipient's blood group is unknown. O^- red cells in hospitals specifically allocated for use in these situations are known as emergency, or 'flying squad' blood.
Only 7% of the population are O^-. Although the National Blood Service works to achieve proportionally more donations from this group, emergency use added to routine elective use in transfusing O^- recipients places a high demand on the supply, making O^- red cells a precious resource and at risk of shortage.
To address this risk the National Blood Transfusion Committee of England (NBTC) has recommended that hospital transfusion laboratories ('blood banks') hold no more than 10.5% of their red cell stock as O^- (1).

There are certain factors that impact on a hospital's requirement for emergency O^- red cells. These include size, both in terms of the layout and the population they serve, the services they offer and the number of satellite fridges which hold emergency O^- red cells.
Several hospitals in the region also supply smaller hospitals, which can include emergency O^- red cells (primarily for sites that are performing surgery). The distance between the main supplying hospital and the smaller hospitals and the distance from the nearest blood centre may also be relevant to the emergency O^- red cell stock required.
Stocking of emergency fridges within a hospital/trust is generally decided by the Hospital Transfusion Team, in accordance with local policy. Provision of emergency O^- red cells to sites outside of this is agreed within a Service Level Agreement.

During a review of Key Performance Indicator data on O^- red cell issues at the South West Regional Transfusion Committee (SWRTC) meeting on 2nd November 2010, the target of 10.5% was discussed in terms of how realistic this might be when presented with the geographical challenges within the region and the number of smaller hospitals which some larger hospitals supply.
It was suggested that it would be useful to gather data on how many units of O^- red cells are kept outside of a hospital's main blood bank, and all present agreed to take part in a survey of O^- red cell distribution and use, across the South West region.

(1) Murphy, M. and Newland, A.; May 2011; The Chief Medical Officer's National Blood Transfusion Committee Ninth Annual Report (2010/11); accessed at:
www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@ab/documents/digitalasset/dh_130110.pdf

Methods

The South West Regional Transfusion Team developed a survey for completion (see Appendix) which was sent out electronically to all hospital Transfusion Laboratory Managers in the SWRTC in March 2011.

The survey looked at the stock holding of O^- red cells (both routine and emergency) within hospitals and the provision/distribution of emergency O^- red cells at other sites outside of the hospital. It also looked retrospectively at the use of emergency O^- red cells over a 12 month period (beginning of January to end of December 2010).

The working hypothesis for this survey was that a greater number of fridges containing emergency O^- red cells, especially if off site, leads to an increased requirement for O^- red cells (measured as a percentage of total red cell stock).

Audit responses were requested from every hospital that had a blood bank rather than by trust, as some trusts had more than one.

Data collection ran from March to July 2011.

Results

i) Responses

Out of the 19 NHS hospitals with a blood bank in the South West region, 18 responded (a response rate of 95%) and 3/4 independent hospitals with a blood bank responded (75% response rate) - giving data for 21 hospital blood banks.

Data for paediatric O^- red cells (paedipacks) was given by some hospitals, however this was not provided by most and therefore excluded from the results. All data provided in this report is for adult O^- red cells (standard units).

Some hospitals were unable to provide data for the number of emergency O^- red cell units used in 2010.

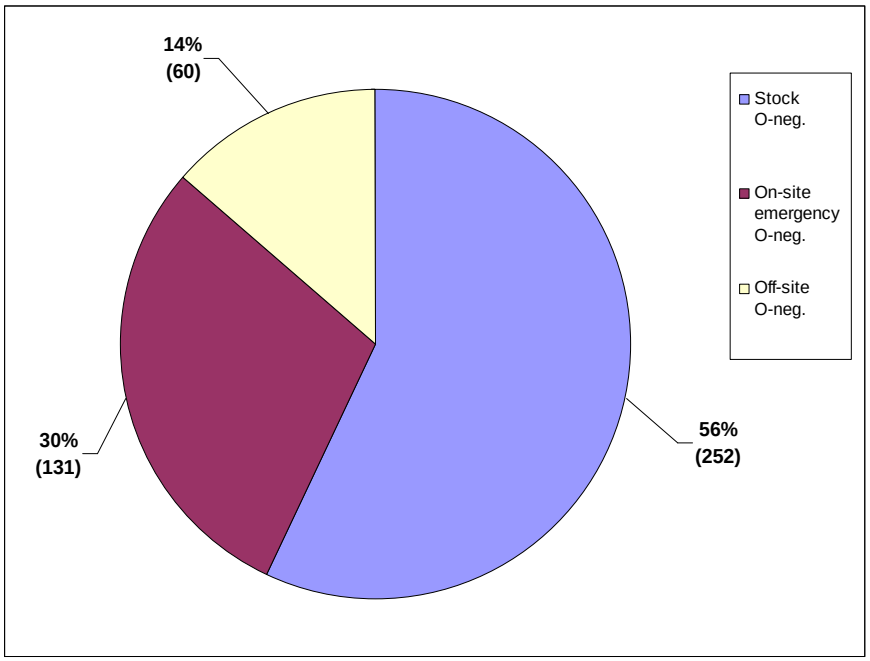
The data has been anonymised with the letters used applying consistently to the same hospital.

S, T and U are independent hospitals; S and T were both operating ‘hub and spoke’ management of blood fridges for other hospitals within their group.

ii) Distribution of all O negative red cells

A total of 443 units of O^- red cells were held by the responding hospitals as stock and for emergency use at any one time during the survey. Figure 1 shows the amount as either stock, or for on-site or off-site emergency use.

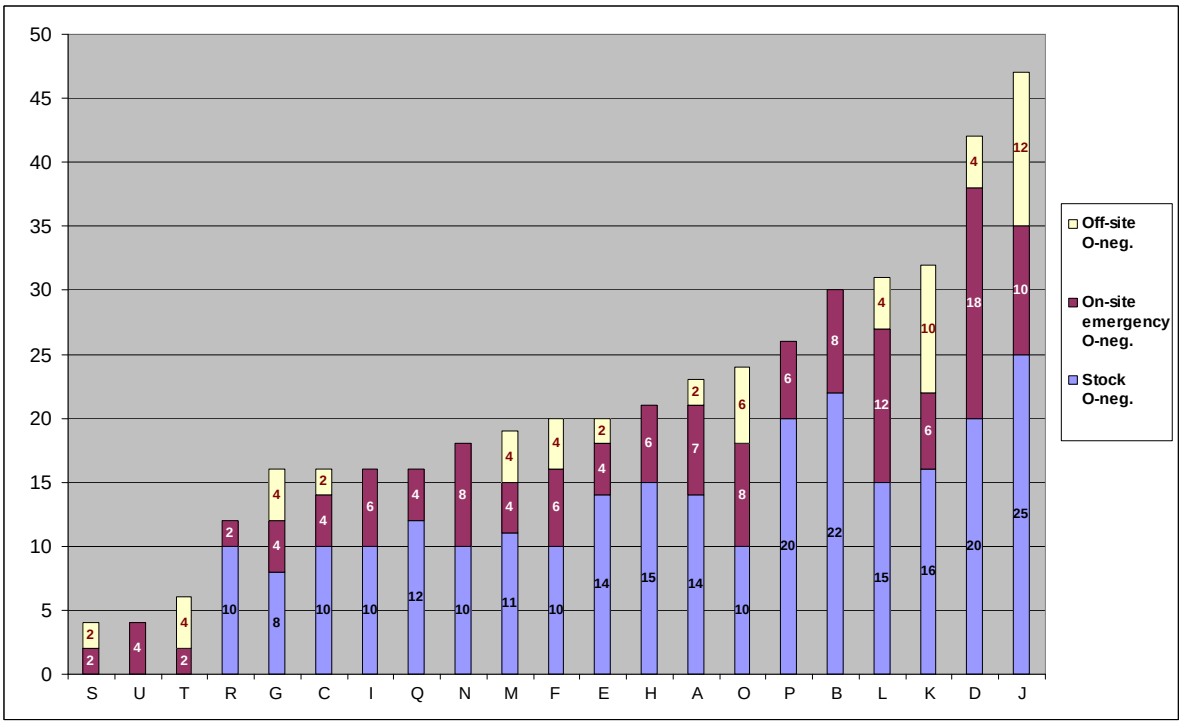
Figure 1: South West regional total of O^- red cell units held



The number of units of O^- red cells controlled by each hospital is shown in figure 2. Each column is broken down into stock, emergency units held 'on-site' within the hospital, and emergency units supplied 'off-site' to other hospitals. Higher total O^- red cell numbers reflected the higher red cell users as identified by the Blood Stocks Management Scheme.

All 21 hospitals held emergency on-site O^- red cells, 62% (13/21) supplied emergency off-site O^- red cells, and 86% (18/21) held O^- red cells as stock (S, T, & U are independent hospitals and held no O^- red cells stock).

Figure 2: distribution of O^- red cells units held (by hospital)



Distribution of emergency O⁻ red cells

The total number of fridges holding emergency O⁻ red cells was 72; 48 of these were on-site and 24 were off-site at other hospitals.

The locations of the on-site fridges is shown in figure 3. Each number represents a fridge and indicates the number of units held in it. There are multiple entries for locations in some hospitals, e.g. '2+2' in 'Theatres' indicates there are 2 fridges in theatres, each holding 2 units of emergency O⁻ red cells.

65% (31/48) of emergency on-site fridges held 2 units, while 31% (15/48) held 4 units or more.
Larger hospitals hold more on-site emergency O⁻ red cells, and there is commonality amongst all hospitals in the locations these are held.

13 hospitals supplied O⁻ red cells off-site. The majority (n=11) supplied only 1 or 2 fridges, while hospital J supplied 4 fridges, and hospital K supplied 5 (data not shown).

The transport time from the main blood bank to the locations of emergency on-site blood fridges ranged from 0 to 30 minutes. 25 of the 48 fridges were 2-5 minutes from the main blood bank, and 11 were documented as 0 minutes away.

Figure 3: on-site hospital fridges stocked with emergency O⁻ red cells (and units stocked)

BSMS category	Location of fridge					
	Lab. Issue fridge	Lab. Cold room	A&E / ED	Theatres	Mat./Ob.s (inc. Ob.s theatre)	Remote issue (not lab.)
Very High (6 hospitals)	2 2 4 4	2	2 4 4	2 2+2 2+2+8	2 2 2 2 4	2+2
High (7 hospitals)	2 2 4 4	4 4	2 4	2 2 2 2	2 2 2 2 2	
Moderate (5 hospitals)	1 2 4 4 4	3			3	
Very Low (3 hospitals)				2 2 4		

Usage of emergency O⁻ red cells

Between January and December 2010, a total of 375 units of emergency O⁻ red cells were recorded as being used from 33/72 blood fridges.

30 of these issues were from on-site fridges and only 3 were from off-site fridges.
The mean number of units issued from on-site fridges was 10.2 (347/34), however this figure was skewed by data from one fridge (62 units issued). The median number of units issued from on-site fridges was 6.

In 20/72 no emergency units were issued, and in 19/72 this data was unavailable.

iii) Shelf-life

If O^- red cells allocated for emergency use are nearing expiry, they are returned to routine stock so that they can be used for elective/planned transfusion. The average age at which this happens is shown in figures 4 & 5.
Age is measured in days shelf-life, i.e. the number of days left before the blood expires.

Figure 4: average shelf-life on return to stock of emergency O^- red cells from within hospitals

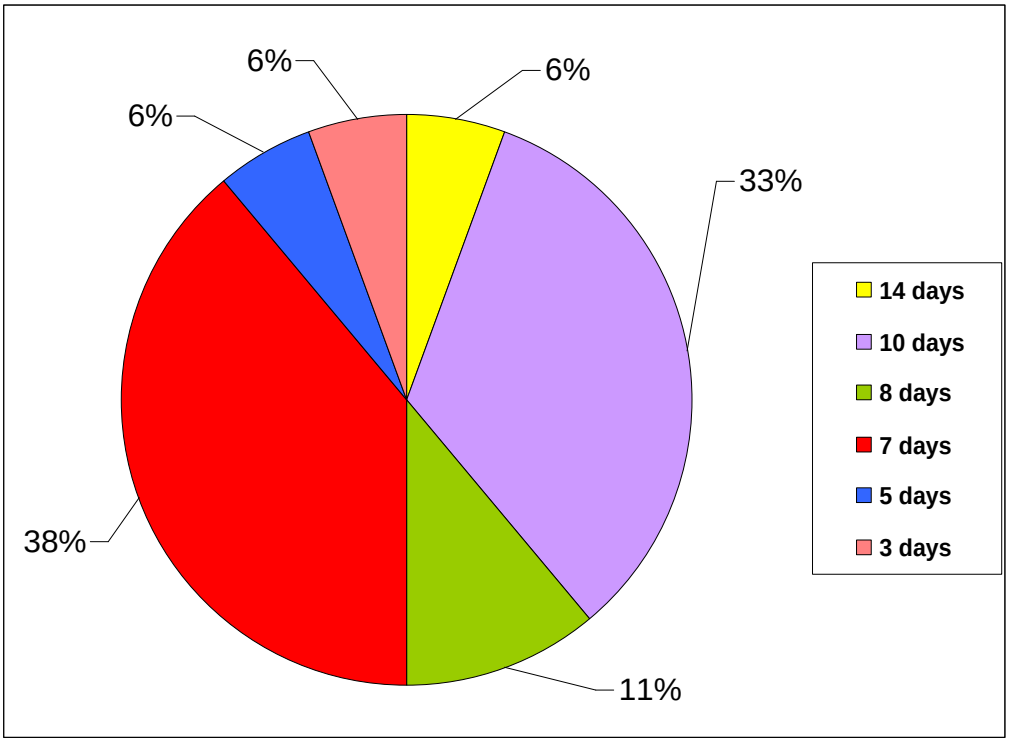
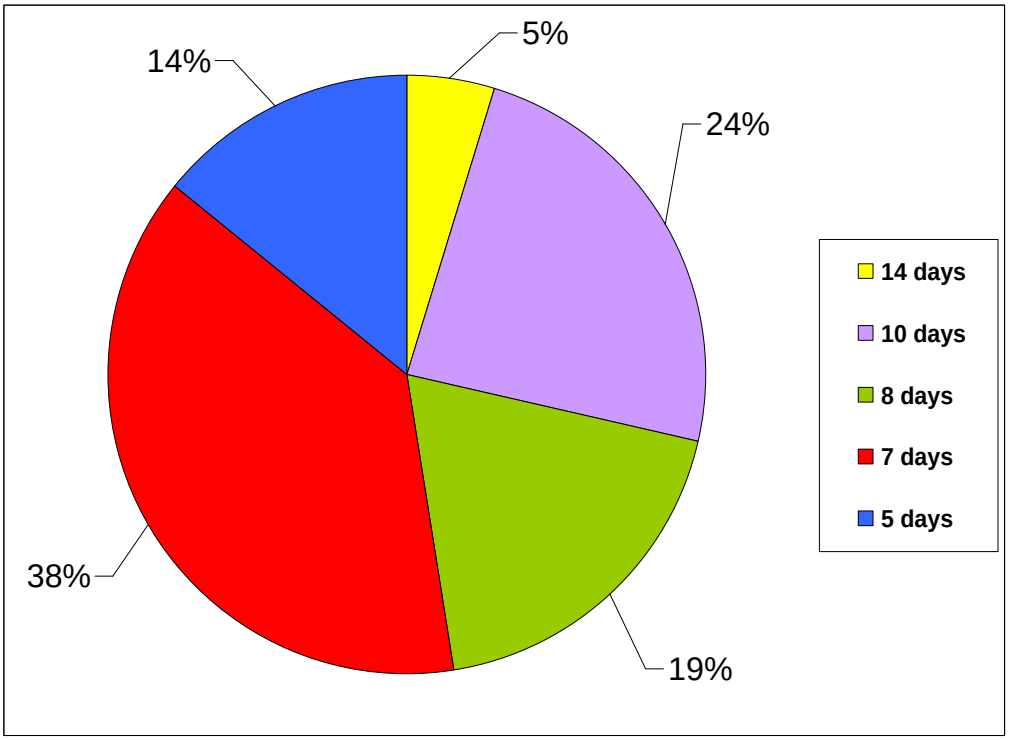


Figure 5: average shelf-life on return to stock of emergency O- red cells from off-site



iv) Appropriate use

In 2010 the National Comparative Audit of Blood Transfusion (NCA) conducted an audit of the use of O^- red cells (2). The percentage of O^- red cells given to known non O^- recipients to avoid wastage due to time-expiry was reported. This was regarded as a measure of inappropriate use due to over stocking.

The number of O^- red cells as a percentage of total red cells issued to hospitals by NHSBT was also regarded as an indicator of appropriate use. This was calculated for each NHS hospital for the calendar year of 2010.

The above have been applied as indicators of appropriate use and assessed against:
- Each hospitals total O^- red cell stock
- The percentage of O^- red cells held as emergency (both on and off site) stock
- The shelf life at which emergency units are returned to general stock

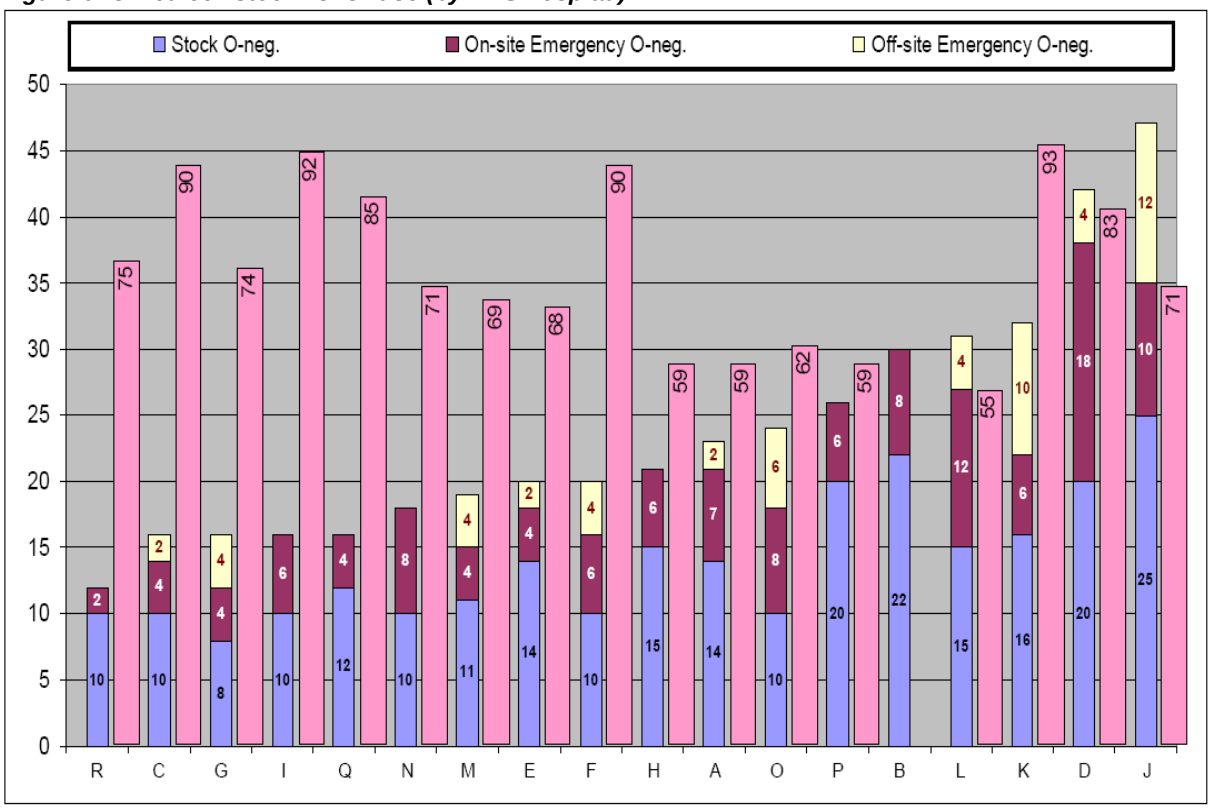
Hospital total O^- red cell stock compared with indicators of appropriate use

Figure 6 compares the percentages of O^- red cells given to O^- recipients reported in the NCA 2010 audit (the pink columns) against total O^- red cell stock for each hospital.

There appeared to be a tendency for hospitals holding fewer total O^- red cell stock to transfuse a higher percentage of O^- red cells to O^- recipients.

It should be noted that the data collection for the NCA took place more than a year earlier than this survey, during which time blood stock management practices may have changed.

Figure 6: O^- red cell stock vs. O^- use (by NHS hospital)



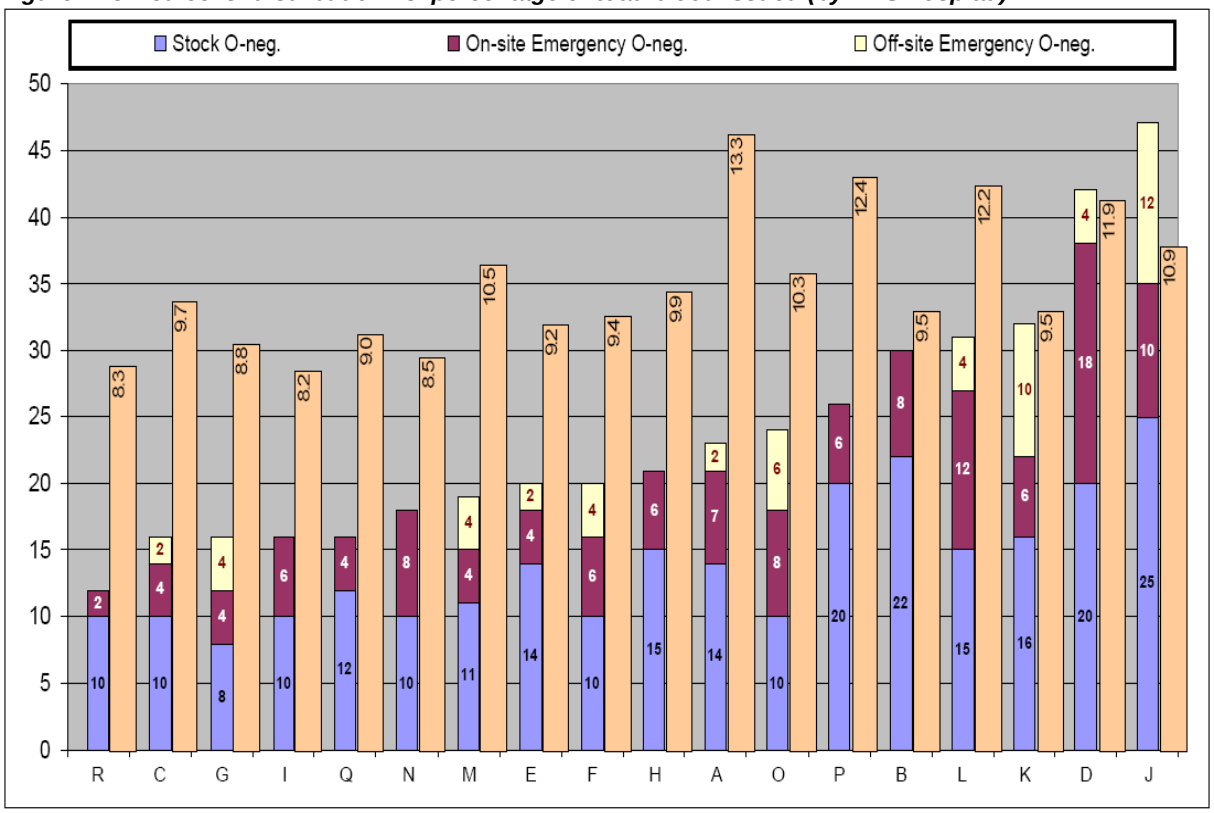
Note: one NHS hospital did not participate in the 2010 NCA of the use of O^- red cells.

(2) National Comparative Audit of Blood Transfusion; April 2010; 2010 Re-audit of the Use of Group O RhD Negative Red Cells; accessed at:
http://hospital.blood.co.uk/library/pdf/Re-audit_of_the_use_of_Group_O_RhD_negative_red_cells_doc_2010.pdf

Figure 7 shows O^- red cells as a percentage of red cell stock for 2010 (the orange columns) against total O^- red cell stock for each hospital.

There appeared to be a relationship between the total number of O^- red cells held and O^- red cells as a percentage of red cell stock. As the total number of O^- red cells held increased so did the percentage of O^- red cells as red cell stock.

Figure 7: O^- red cells: distribution vs. percentage of total blood issued (by NHS hospital)



The percentage of O⁻ red cells held as emergency (both on and off site) stock compared with indicators of appropriate use

Figure 8 shows the proportion of on-site plus off-site emergency O⁻ red cells as a percentage of total O⁻ red cells, and compares this with the percentage O⁻ red cells given to O⁻ recipients [NCA 2010] and O⁻ red cells as a percentage of red cell stock [2010]. Use of O⁻ red cells for O⁻ recipients below a level of 75%, and the issue of O⁻ red cells above 10.5% of total are highlighted in red.

There was no obvious correlation between the percentage of O⁻ red cells held as emergency (both on and off site) stock and markers of appropriate use.

There was no noticeable difference when on-site and off-site only emergency stock were considered separately (data not shown).

Figure 8: O⁻ red cells distribution vs. "appropriate O⁻ use" and issue [NHS hospitals]

Hospital	Stock O-neg.	On-site + Off-site Em. O-neg.	On-site + Off-site Em. O-neg. as % of total*		%age O-neg. given to O-neg. pts [NCA 2010]	O-neg. as %age of RCC issues [2010 average]
R	10	2	17%	≤25%	75%	8.3
P	20	6	23%		59%	12.4
Q	12	4	25%		86%	9.0
B	22	8	27%	>25% to <50%	-	9.5
H	15	6	29%		59%	9.9
E	14	6	30%		68%	9.2
C	10	6	38%		90%	9.7
I	10	6	38%		92%	8.2
A	14	9	39%		59%	13.3
M	11	8	42%		69%	10.5
N	10	8	44%		71%	8.5
J	25	22	47%		71%	10.9
G	8	8	50%	≥50%	74%	8.8
F	10	10	50%		90%	9.4
K	16	16	50%		93%	9.5
L	15	16	52%		55%	12.2
D	20	22	52%		83%	11.9
O	10	14	58%		62%	10.3

** total = stock O⁻ plus on-site emergency O⁻ plus off-site O⁻*

Shelf life compared with indicators of appropriate use

Figure 9 shows the shelf-life of emergency O^- red cells on return to stock compared to the percentage O^- red cells given to O^- recipients [NCA 2010] and O^- red cells as a percentage of red cell stock [2010].

In 4 hospitals the shelf life of off-site emergency O^- red cells on return to stock was different to that of on-site. In M and O shelf life for off-site returns was shorter than for on-site, in L and G shelf life for on-site returns was shorter than for off-site. These are identified in bold in figure 13.
In these cases the shelf life was calculated from both on-site and off-site, as follows –

(number on-site emergency units ÷ total number of emergency units) x days on-site shelf life +
(number off-site emergency units ÷ total number of emergency units) x days off-site shelf life

There appeared to be a relationship between shelf life remaining and percentage of O^- red cells given to O^- recipients. The shorter the shelf life remaining the lower the percentage of O^- units given to O^- recipients.

Figure 9: shelf-life vs. "appropriate O^- red cell use" and issue [NHS hospitals]

Hospital	Shelf-life of Em. O-neg. on return to stock (days)	%age O-neg. given to O-neg. pts [NCA 2010]	O-neg. as %age of RCC issues [2010 average]
G	**4***	74%	8.8
P	7	59%	12.4
A	7	59%	13.3
E	7	68%	9.2
N	7	71%	8.5
K	7	93%	9.5
L	**7.25***	55%	12.2
M	**7.5***	69%	10.5
O	**7.85***	62%	10.3
R	7-10	75%	8.3
Q	7-10	85%	9.0
J	8-10	71%	10.9
H	10	59%	9.9
D	10	83%	11.9
I	10	92%	8.2
C	10	90%	9.7
F	10	90%	9.4
B	14	-	9.5

** calculated shelf life*

Discussion

As in previous SWRTC audits there was a good response rate, 91% (21/23) of all eligible hospitals, allowing sufficient data for meaningful analysis.

All hospitals held on-site emergency O^- red cells; 62% supplied O^- red cells off-site, but this constituted just 14% of all O^- red cell stock within the region. Only 2 NHS hospitals had more than 25% of O^- red cells off-site, while 3 had 10% or less, and 7 had none.

This finding challenges the perception that large amounts of O^- red cells are held off-site in satellite hospitals.

In addition O^- red cells were used from only 3 off-site fridges during the whole of 2010 – 12 units in total. The routine stocking of emergency fridges where none was used over a one year period may be unnecessary and should be reviewed. It is worth reconsidering the need for storage in locations very close to the main hospital issue fridge.

Appropriate use – quantity and distribution

Good management of O^- red cells was quantified by the percentage of O^- red cells transfused to O^- recipients, and issues of O^- red cells as a percentage of total red cells.

There appeared to be a relationship between the total number of O^- red cells stocked and these appropriate use markers. The higher the total number held, the fewer units transfused to O^- recipients and the higher the percentage of O^- red cells held as stock.

However there was no obvious association between <u>where</u> the O^- red cells were kept and indicators of appropriate use, in contrast to the hypothesis that "a greater number of fridges containing emergency O^- red cells, especially if off site, leads to an increased requirement for O^- red cells".

For example hospital K held 50% of O^- red cells as emergency, the majority of which were off-site, but had just 9.5% of total red cells as O^- in 2010.

Similarly, hospital N held 44% of O^- red cells as emergency (all on-site) but had only 8.5% of total red cells as O^- in 2010.

Conversely, hospital P supplied no off-site O^- red cells and held only 23% as emergency on-site, but gave only 59% of O^- red cells to O^- recipients and had 12.4% of total red cells as O^- in 2010.

The finding that high red cell users tended to keep a higher proportion of red cell stock as O^- is in keeping with results from the NCA 2010 Re-audit of the use of group O RhD negative Red Cells. The reason for this is unclear however as in our survey this was not associated with stock held for emergency use either on or off-site. As demonstrated by hospital K, it would be logical to presume that a large turnover of O^- would mean a smaller percentage could be stocked as this would still represent a large reserve to divert to emergencies if required.

Appropriate use – shelf-life

8 out of 9 NHS hospitals that returned emergency O^- red cells to stock at 8 days or less prior to expiry used less than 75% O^- red cells for O^- recipients, while only 2 of the 8 hospitals that returned blood with 10 days or more did (where a range was given the greater number of days was used).

There was an association between 'fresher' emergency O^- red cells being returned to stock within NHS hospitals and appropriate use.

Returning emergency O^- red cells to stock 'fresher' allows more time for it to be used appropriately for routine planned transfusion of O^- recipients, instead of inappropriately on non O^- recipients or being wasted. This practice should not adversely affect the percentage issue of O^- red cells for hospitals.

Recommendations

Hospitals should reconsider the total amount of O^- red cells stocked.
In particular –

- Reassess the need for storage in satellite fridges if none were used over a one year period
- Reassess the need for storage on-site in locations very close to the main hospital issues fridge
- Review the shelf life remaining on emergency O^- red cells on return to general stock. 10 or more days may reduce the amount given to non O^- recipients to avoid wastage.

Glossary

Blood Bank	Hospital Transfusion Laboratory
National Blood Service	The blood service for England and North Wales, a part of NHSBT
NCA	National Comparative Audit of Blood Transfusion
NBTC	National Blood Transfusion Committee of England
NHSBT	NHS Blood and Transplant
O^-	Group O RhD negative (red cells/blood/blood group)
Red Cell(s)	Unit of blood for transfusion
RhD	The RhD red cell antigen
SWRTC	South West Regional Transfusion Committee
SWRTT	South West Regional Transfusion Team

Appendix: Survey

SW Regional Transfusion Committee
Regional Survey of Emergency O Neg Distribution and Use over a 12 month period

Trust:

O Neg red cells held as stock per Trust:

or in each Hospital:

Please list all fridges where Emergency O neg red cells are stored, including main transfusion laboratory and satellite fridges within the Trust, PCT/Private/Other sites

Name of Supplying Hospital	Name of Satellite Hospital (when relevant)	Location of fridge	Number of **emergency** O neg units available at any one time	Number of **emergency** O neg units used from this location (Jan-Dec 2010)	Average shelf-life on return to stock	Transport time to supply additional blood in an emergency