The Blood Stocks Management Scheme

Annual Report 2002- 2003

CONTENTS

Foreword

This report looks at the second year of the Blood Stocks Management Scheme. The year has been a successful one for the Scheme, seeing greater participation from members and having enough information to begin to interpret supply chain trends.

The challenge for us all, whether we work for the NBS or hospitals, is to ensure that we make best use of the Scheme's information, leading to more effective management of a scarce and freely donated resource.

I hope that you will find this report an interesting read and that you will find at least one thing in it that will help you to review your own blood management practices.

Finally, I'd like to thank all those people, particularly in busy hospital blood transfusion laboratories, who enable the Scheme to operate at all. If the data wasn't collected and input into the Scheme's database, none of this knowledge would be available.

Liz Reynolds

Steering Group Chair

Blood Stocks Management Scheme

24th July 2003

1. Introduction

1.1. Background

The Blood Stocks Management Scheme (BSMS) was implemented in April 2001 as a partnership between hospitals and the NBS to increase knowledge and understanding of the blood supply chain.

1.2. Objectives

The scheme objectives for 2002-03 were

Objective	Approach	Achievement
Increase BSMS participation	Through publicity and presentations.	Membership increased by 28%.
Update and develop the software to enable collection of platelet data from April 2003 and improve the red cell pages	Work with BSMS participants and NBS software development to achieve a workable system for collecting platelet data and upgrade the red cell software.	Specification written and completed on schedule. New data management software ready for launch in May 2003.
Ensure an effective reporting system	Investigate the use of Business Objects software for improving reporting. Ensure year-on-year data in six-monthly reports. Publish an annual report.	Six monthly reports published and included year-on-year data. Annual report published The use of Business Objects scoped and in development stage.
Investigate the use of Electronic Data Interchange (EDI) for data input	Work with the IT suppliers to establish feasibility of EDI.	Meeting held with IT suppliers to explore developments. BSMS EDI included in NBS EDI roadmap.
Suggest good practice	Publish case studies of good practice from participants in the BSMS News Sheets.	News Sheets during 2003 included cases of good practice.
Improve website access	Work with NBS systems security to resolve website access problems.	Improvements made to website access.
Publish papers and give presentations on blood stocks management and associated topics	Publication in blood transfusion journals and presentations at meetings.	Vox Sanguinis (2002) **83** 239 – 246. Presentation at the International Society of Blood Transfusion meeting, Vancouver August 2002.

1.3. Staffing

The three staff are comprised of a scheme manager, data analyst and an administrative assistant.

1.4. Budget

The budget for the scheme for the year April 2002 to March 2003 was £131,113.

1.5. Open Meeting 2002

The BSMS held a successful first open meeting in July 2002 in Coventry. The meeting was supported by the major blood transfusion laboratory IT software suppliers. 160 BSMS participants, non-participants, NBS staff and IT suppliers attended. The day consisted of a plenary session, which included a review of the first year's data, afternoon workshops with IT suppliers, and a question and answer forum. Feedback from the meeting was positive and a second meeting will take place in 2003. Further information on the 2002 meeting can be found on the BSMS website; www.bloodstocks.co.uk

1.6. Current status

Hospital participation during the year April 2002 – March 2003 is shown in Table 1. Participation by hospital category and the percentage of NBS issues to hospitals in each of these categories is shown in Table 2. Registrations increased by 28% during the second year of the scheme.

Table 1. BSMS registration April 2002 – March 2003

Date	**1st April 2002**	**31st March 2003**
No. of BSMS registered hospitals	179	230
% of hospitals (309 hospitals are supplied by the NBS)	58	74
% of NBS issues	66	84

Table 2. BSMS participation by hospital category and the percentage of NBS issues

Hospital category	**% of hospitals in each category**	**% of NBS issues**
Teaching hospitals	73	21
District General hospitals	82	61
Private hospitals	53	2

2. Key Observations

2.1. The Blood System

- There is a clear relationship between NBS stock levels, age at issue and time expiry wastage.
  - The average age of A, B & O blood at issue was five days older than during 2001-02.
  - The average age of O Neg blood at issue was the same as 2001-02.
  - Average NBS time expiry wastage as a percentage of issue increased from 0.07% in 2001-02 to 0.12% in 2002-03, a rise of 71%.
  - Average BSMS hospital time expiry wastage as a percentage of issue increased from 1.3% in 2001-02 to 2.3% in 2002-03, a rise of 77%.

2.2. Red cell demand

- No red cell shortages were declared by the NBS during the report period.
- Red cell demand was 0.9% lower than during 2001-02.

2.3. Red cell wastage

- 5,689 A, B & O red cell units were wasted in NBS Centres.
- 25,132 A, B & O red cell units were wasted in participating hospitals.
- NBS average A, B & O wastage as a percentage of issue was 0.29%.
- Average BSMS hospital A, B & O wastage as a percentage of issue was 2.8%.
- 'Time expiry' accounted for 82% of A, B & O BSMS hospital wastage, 'out of temperature control' for 9% of A, B & O BSMS hospital wastage, and 'miscellaneous' and 'out of temperature control in the laboratory' combined for 9% of A, B & O BSMS hospital wastage.

3. Challenges

Information from the first two years of the BSMS has led to the identification of a number of challenges both for stock management and to enable the BSMS to move forward. These are outlined below.

3.1. Stock Management Challenges

- Encourage blood transfusion laboratories and the NBS to take a pro-active approach to stock management.
- Increase understanding of the balance between supply and demand.
- Reduce NBS stock levels to an appropriate defined level.
- Encourage the development of policies and procedures for stock movement between hospitals.

3.2. BSMS Challenges

3.2.1. Participation

- Retain and improve on the current level of participation.
- Monitor activity and follow up inactive or lapsed participants.
- Ensure hospitals are familiar with the BSMS website and software and offer training as necessary.

3.2.2. Data Analysis

- Increase the scope of the data analysis to give a better understanding of the relationships between stock levels, age of blood at issue, and wastage; and also the balance between supply and demand.
- Examine algorithms for appropriate stock holding.

3.2.3. System supply and demand

- Promote further work to understand the blood supply system .
- With the NBS, explore alternatives to the NBS issues policy of 'first in-last out'.
- Investigate and understand fluctuations in demand patterns.

4. Red Cell Stock Management

4.1. Issuable Stock Index

The National Blood Service red cell issuable stock index (ISI) showed seasonable fluctuations over the year and variations between blood groups (Fig 1). NBS stock levels fell during and immediately following public holidays, during holiday periods in the summer, and at Christmas/new year because of a decrease in the number of donations during these periods. The inventory level for the whole year was maintained at a higher level than the previous year because of the uncertain international situation and the requirement to respond to local and national critical incidents. No red cell stock shortages were declared.

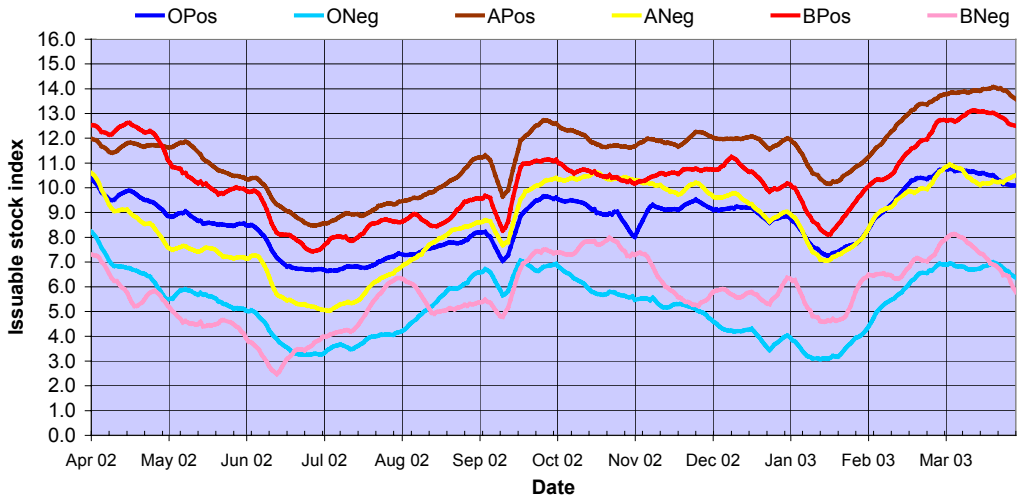

Fig 1. Variation in the average Blood Centre issuable stock index, April 2002 to March 2003

Similar seasonal patterns in stock fluctuations were seen in 2001-02 (Fig 2). Groups A Pos and O Neg showed the largest and smallest variation respectively. The ISI for A Pos showed an increase, depending on the month, of 3 – 5 over 2001-02; the ISI for O Neg was either equivalent to or lower than the previous year.

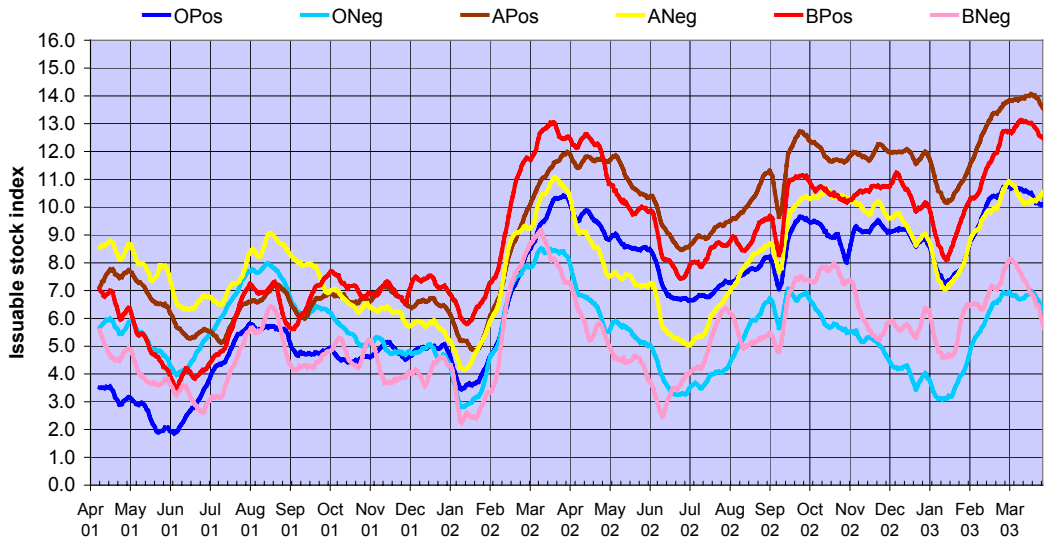

Fig 2. Variation in the average Blood Centre issuable stock index, April - March 2001-02 and 2002-03

Hospital inventory levels remained stable and showed little year on year change (Fig 3). The ISI for group A Pos was stable at between 5 and 6. The ISI for O Neg was higher than A Pos and relatively stable between 7 and 8.

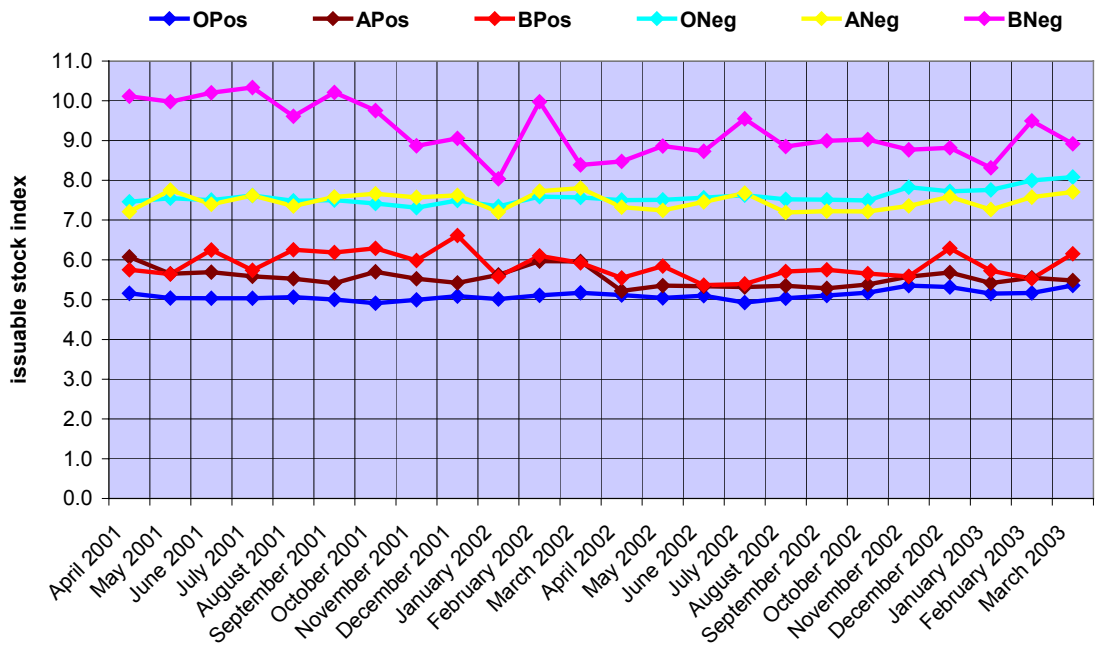

Fig 3. Average hospital monthly issuable stock index of blood groups A, B, and O for April 2001-March 2003.

There was some variation between the average ISI for each hospital cluster. The "High Teaching," "High DGH," and Private hospital clusters maintained the lowest ISI and the "Low Usage" hospitals the highest (Fig 4). The ISI of the "High DGH" and "Mod Usage" clusters followed similar monthly patterns. The "Low Usage" and "Private" cluster showed relatively high month to month variation. The "High Teaching" cluster was reasonably stable showing a slight decrease during the year.

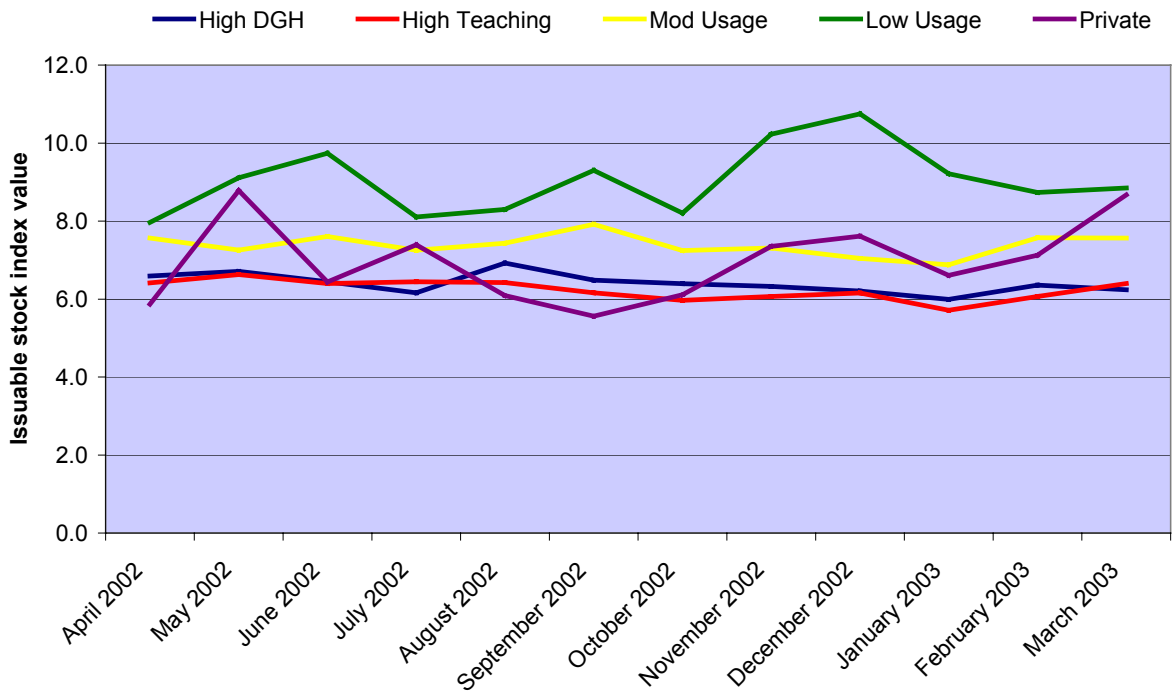

Fig 4. Average issuable stock index for each hospital cluster
High Teaching and High District General Hospitals (DGH) = > 11,000 red cell issues per annum
Moderate Usage = 6000 – 11,000 red cell issues per annum
Low Usage and Private = < 6000 red cell issues per annum

All hospitals must maintain a minimum stock cover for coping with emergencies. For low usage hospitals this equates to a higher ISI (days worth of stock) than in a high usage hospital. If additional stock is ordered for cover for a patient in a Low Usage hospital and is not used, the additional stock is less likely to be used by other patients and the relative stock level is likely to rise. Conversely in a high usage hospital there is more scope for using additional stock and a stock build is less likely. Thus in low usage hospitals the ISI is more variable on a month to month basis as seen in Fig 4.

4.2. NBS Issues

The NBS issued 2,177,568 adult red cell units (OPI units only; see appendix 4 for details) between April 2002 and March 2003 to all NBS customers. This was a decrease on the previous year of 0.9% adult red cell units (cf. 2,199,376 issues in 2001-02).

There was month to month variation in red cell issues from NBS centres (Fig 5). The variation is similar to that seen in 2001-02. The similarities were not so clear from April – August but the pattern in variation was almost identical from September – March. All hospital clusters exhibited similar monthly variation.

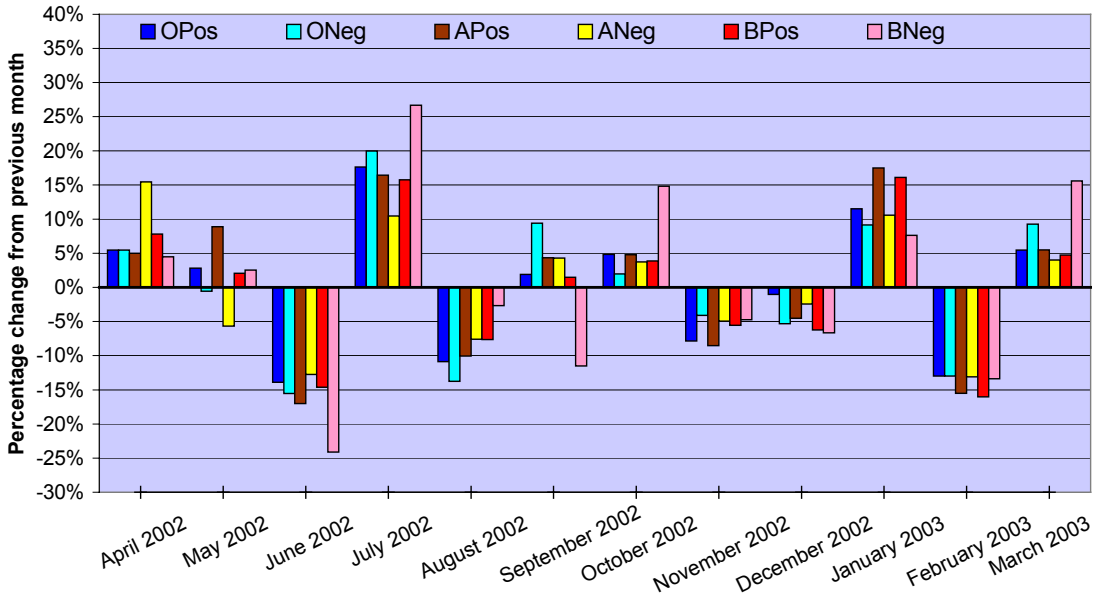

Fig 5. Percentage change in average NBS centre issues from previous month

The month to month variation in red cell issues affects all blood groups (Fig 5). The greatest month to month variation occurred between May and July 2002. The percentage change from May to June showed a fall of between 12 and 24% depending on the group with a consecutive rebound of between 10 and 25% from June to July. The large fluctuations from May – July were not seen in the same period in 2001-02; in June and July 2001-02 the changes were between 0 and 5%. Changes from December-February 2002-03 showed equivalently large swings to those observed in the same period in 2001-02. Group B Neg fluctuations were the most erratic with percentage changes ranging from 2.5% to 26%.

All hospital clusters show a fall and rebound in issues from May to July 2001-02 but not in the same period during 2002-03 (Fig 6).

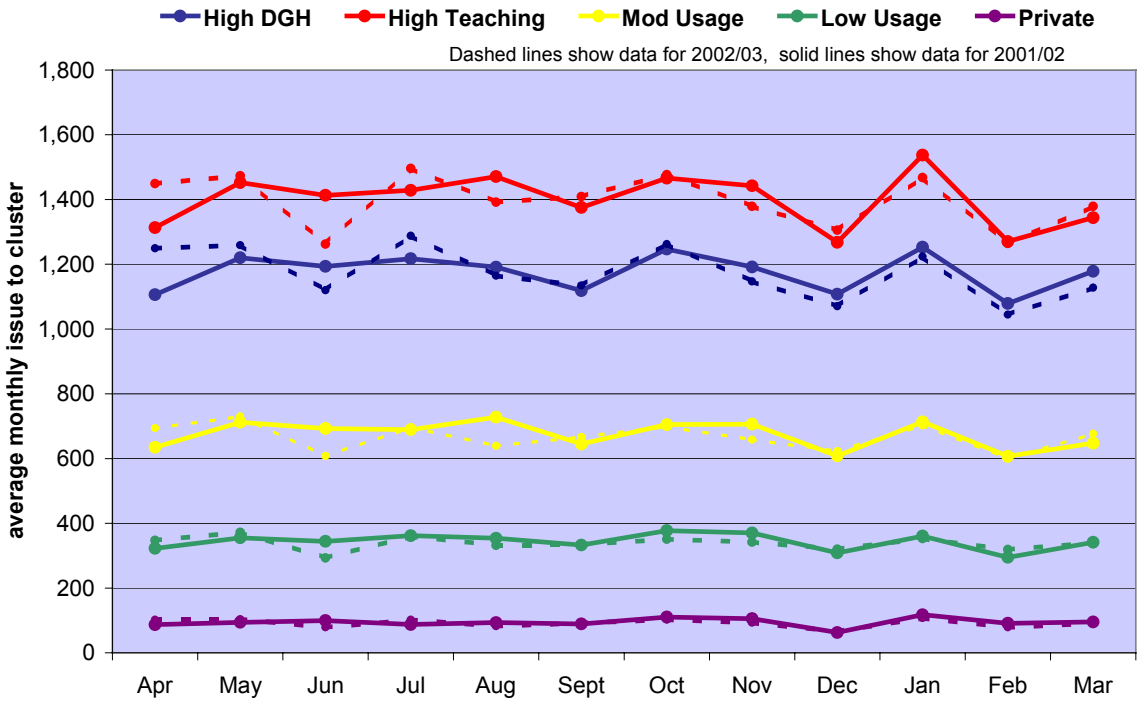

Fig 6. Average monthly issues to each hospital cluster for 2001-02 and 2002-03

4.3. Age of red cells at issue

The high NBS stock levels and the lower than expected red cell issues contributed to an increase in the age of blood at issue. This was demonstrated most clearly in group A Pos which had the highest stock levels during the report period and showed the greatest increase in age at issue from 2001-02. 50% of A Pos units were issued with at least 18 days to expiry during 2002-03 compared to at least 24 days to expiry in 2001-02, a difference of six days (Fig 7).

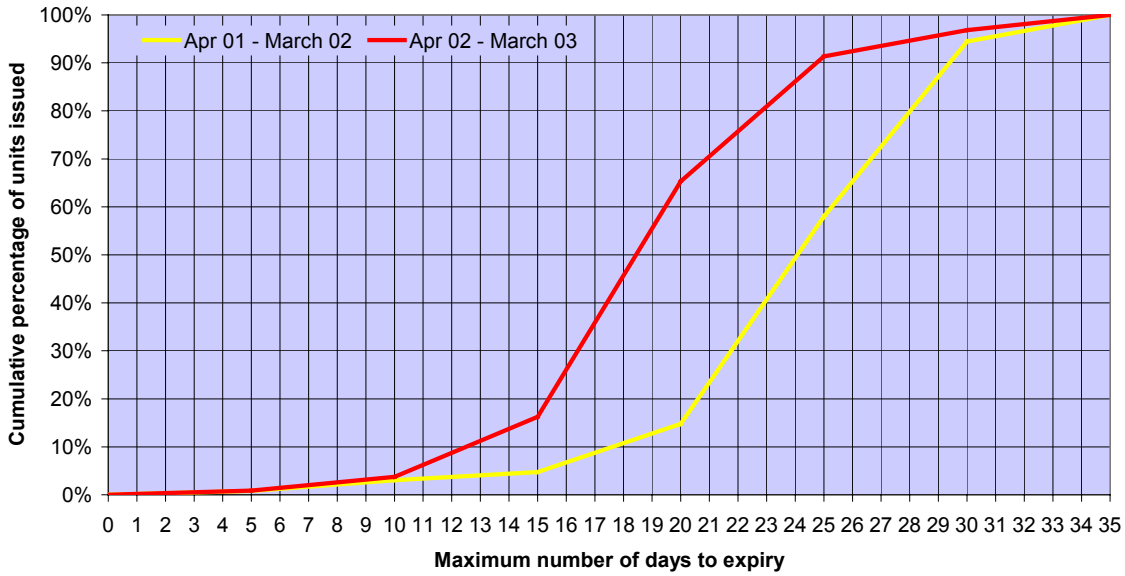

Fig 7. Average age distribution of group A Pos red cell units April 2002 – March 2003 with comparison to April 2001 – March 2002.

For group O Neg, the age of blood at issue during 2002-03 was the same as 2001-02 (Fig 8). This reflects the similar stock levels and fluctuations in O Neg ISI during 2001-02 and 2002-03.

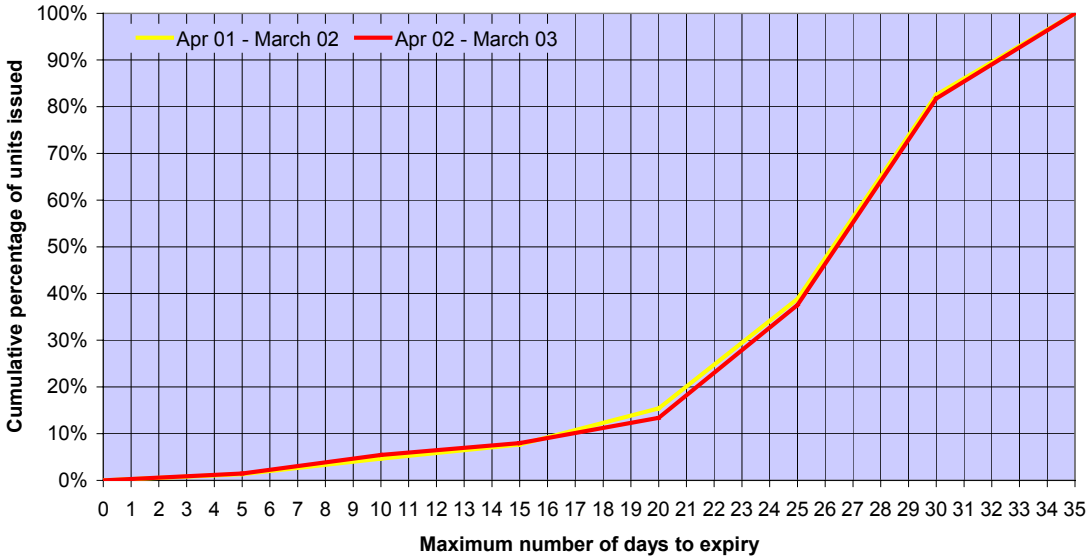

Fig 8. Average age distribution of O Neg red cell units April 2002 – March 2003 with comparison to April 2001 – March 2002.

The percentage of group A Pos issues with at least 25 days to expiry fell from a level of 40 - 60% during May 2001 - January 2002 to a relatively stable level of

around 5% during April 2002 - March 2003 (Fig 9). Concurrently there was a rise in the percentage of units with 11- 15 days to expiry and 16 – 20 days.

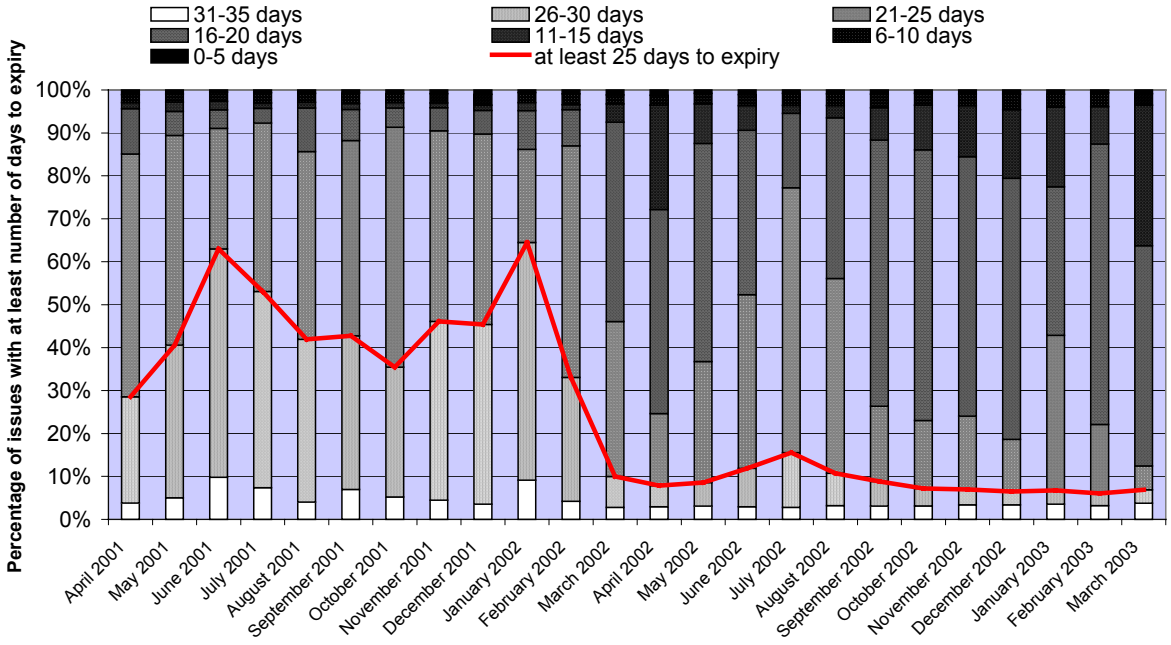

Fig 9. Percentage of Group A Pos issues with at least 25 days to expiry April 2001 – March 2003

The percentage of group O Neg issues with at least 25 days to expiry showed similar patterns for 2001-02 and 2002-03 (Fig 10). This reflects the comparable stock levels and fluctuations during these periods.

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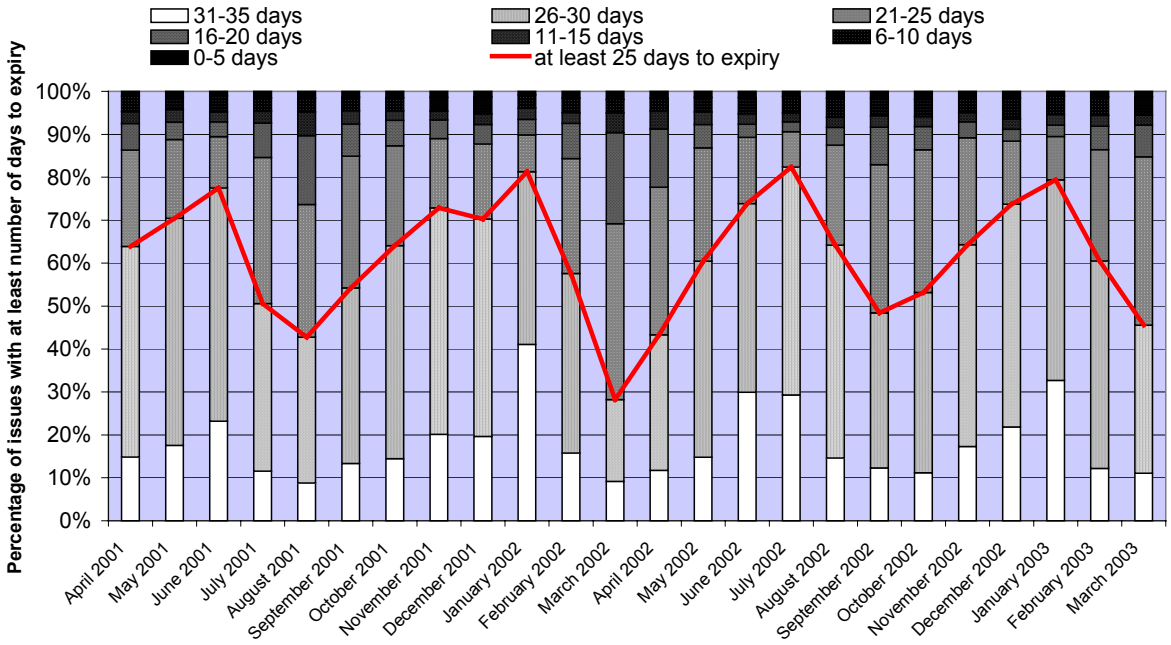

Fig 10. Percentage of Group O Neg issues with at least 25 days to expiry April 2001 – March 2003

5. Wastage

5.1. NBS Wastage

NBS wastage is separated into two categories; time expired and miscellaneous. Miscellaneous wastage is composed of any unit that is available for issue and has subsequently been discarded for a reason other than 'time expired'. This may include small numbers of pre-validation wastage that was discovered post validation e.g. pack label fault. Total NBS wastage is shown in table 3.

Table 3. Total NBS wastage

	A, B & O units	AB Units	All groups
Total	5,689	6,771	12,460

There was variation in wastage between NBS centres with two centres wasting between 1500 and 2500 units, four centres between 1000 and 1500 units, two centres between 500 and 1,000 units and two centres between 250 and 500 units. Five non-processing, small, satellite centres wasted less than 250 units. Some of this variation was due to large differences in the amount of group AB wastage between the centres. This occurs because the NBS does not re-distribute group AB units around the centres as it does with group A, B & O units. The donor population profile will determine the amount of group AB collected at each centre. Thus, those centres with a higher incidence of group AB donors will collect proportionately more group AB and consequently waste more group AB. Differences in total A, B & O wastage are related to the stock holding capacity of the centre, the local hospital demand profile, and the local donor population profile.

The average total number of A, B & O units wasted in all NBS Centres for each month during 2002-03 was 474 compared to 420 during 2001-02 (Fig 11).

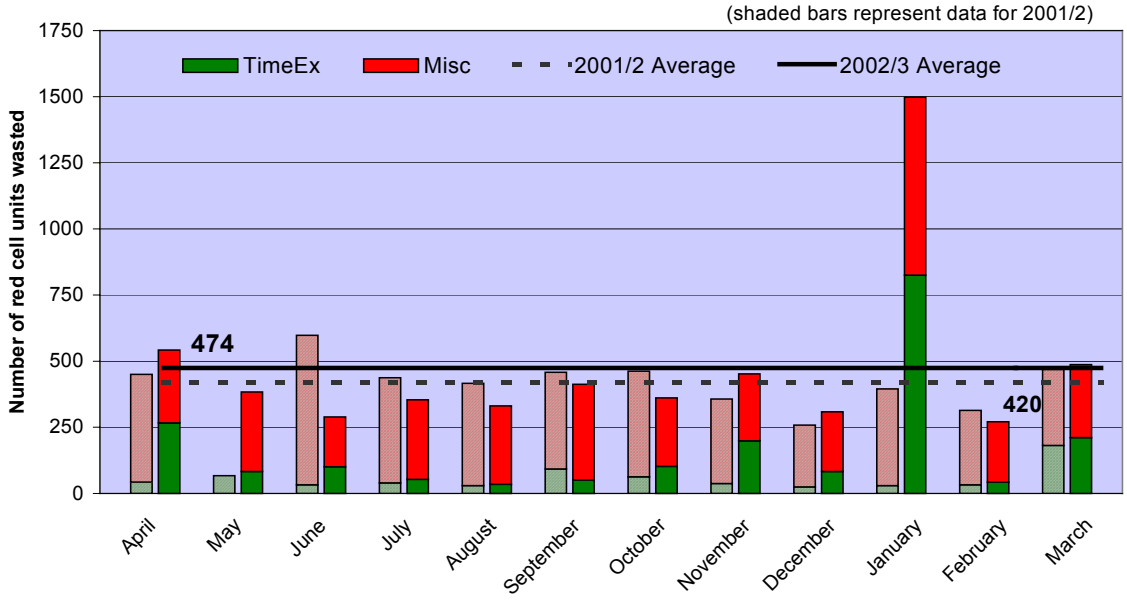

Fig 11. Total number of A, B & O units wasted by all NBS centres. May 2001 miscellaneous wastage (bag withdrawal) has been removed to allow easier comparison of data.

Average NBS wastage as a percentage of issue for A, B & O units was 0.29% in 2002-03 a fall of 0.01% over 2001-02 (Fig 12).

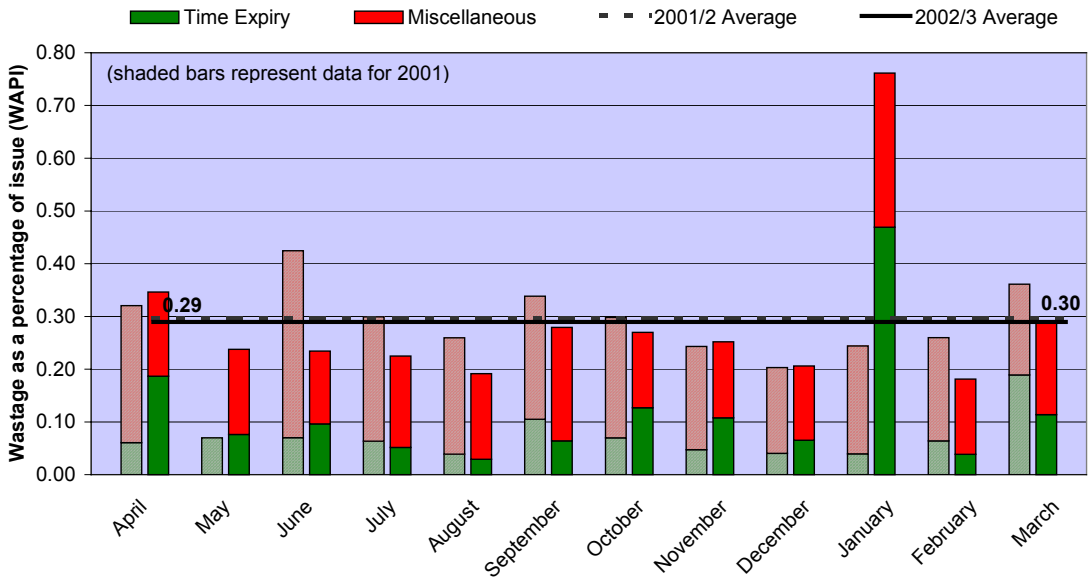

Fig 12. Average Wastage As a Percentage of Issue of A, B & O red cell units with comparison to April 2001 – March 2002. May 2001 miscellaneous wastage (bag withdrawal) has been removed to allow easier comparison of data.

Average wastage as a percentage of issue for group AB units increased in comparison to 2001-02 from 4.29% to 14.19%. The ISI of group AB Pos and AB Neg units increased from their 2001-02 level. Consequently group AB stock aged and time expiry wastage increased (Fig 13).

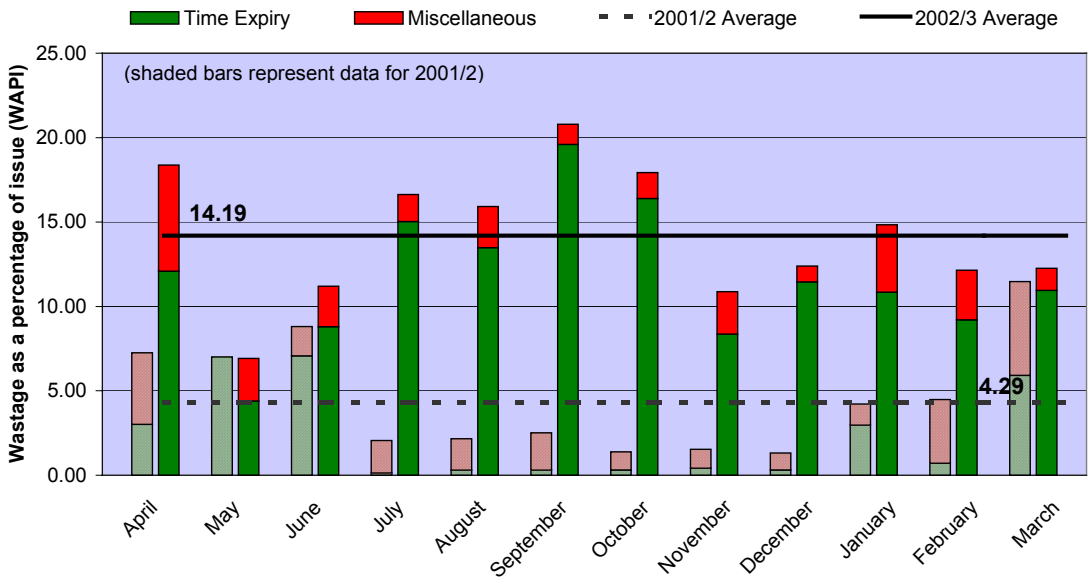

Fig 13. Average Wastage As a Percentage of Issue of AB red cell units with comparison to April 2001 – March 2002. May 2001 miscellaneous wastage (bag withdrawal) has been removed to allow easier comparison of data.

The high NBS stock level and associated ageing of the stock contributed to an increase in NBS time expiry wastage from 12% of total wastage in 2001-02 to 29.7% of total wastage in 2002-03. However, there was a decrease in miscellaneous wastage (Fig 14). Time expiry wastage during 2002-03 was highest in January 2003 when some stock was quarantined and removed from

circulation. This stock aged significantly before being released back and re-distributed. Given the high stock levels, many of the units were not issued and subsequently time expired leading to higher than expected wastage in January.

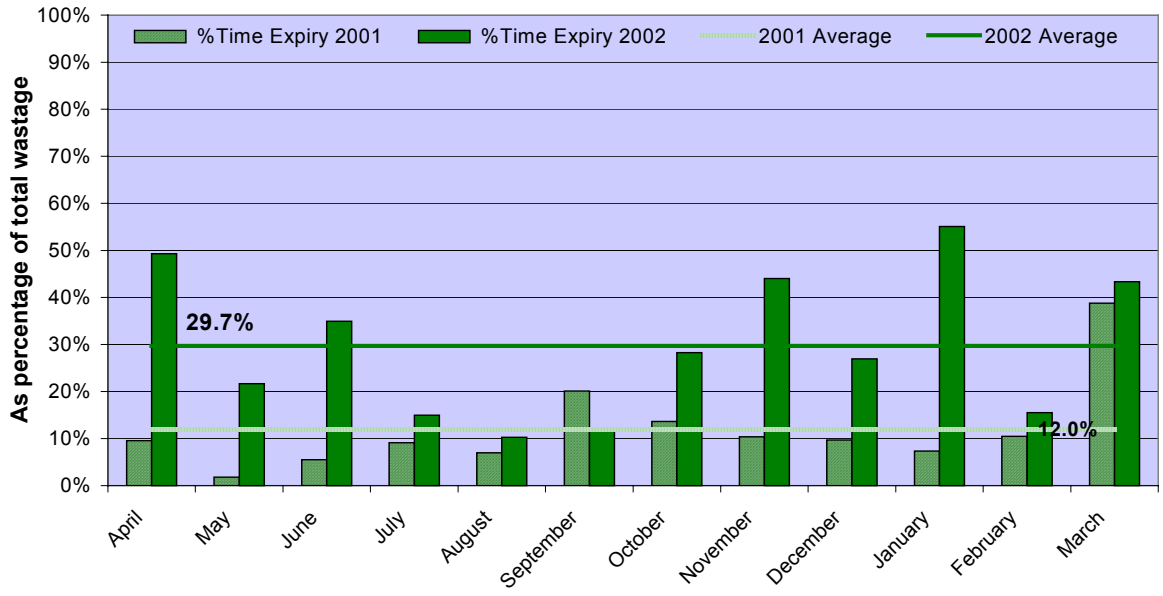

Fig 14. A, B & O time expiry wastage as a percentage of total NBS wastage

5.2. BSMS Hospital wastage

Total participant hospital wastage is shown in table 4 and is broken down by wastage category.

Table 4. Total BSMS hospital wastage by wastage category

	TIMEX	OTCIL	OTCOL	MISC	Total
Total	23,810	634	4,915	1,572	30,931
Ave. per BSMS participant	103	2.8	21.4	6.8	134.5

TIMEX; Time expired, OTCIL; out of temperature control in the laboratory, OTCOL; out of temperature control out of the laboratory, MISC; miscellaneous (any wastage that does not fit into the other categories)

Average hospital A, B & O wastage as a percentage of issue rose from 1.7% in 2001-02 to 2.8% in 2002-03 (Fig 15). Average AB wastage as a percentage of issue rose by 0.5% from 12.3% in 2001-02 to 12.8% in 2002-03. The increase in wastage was associated with the rise in the NBS stock level and older red cells supplied to hospitals.

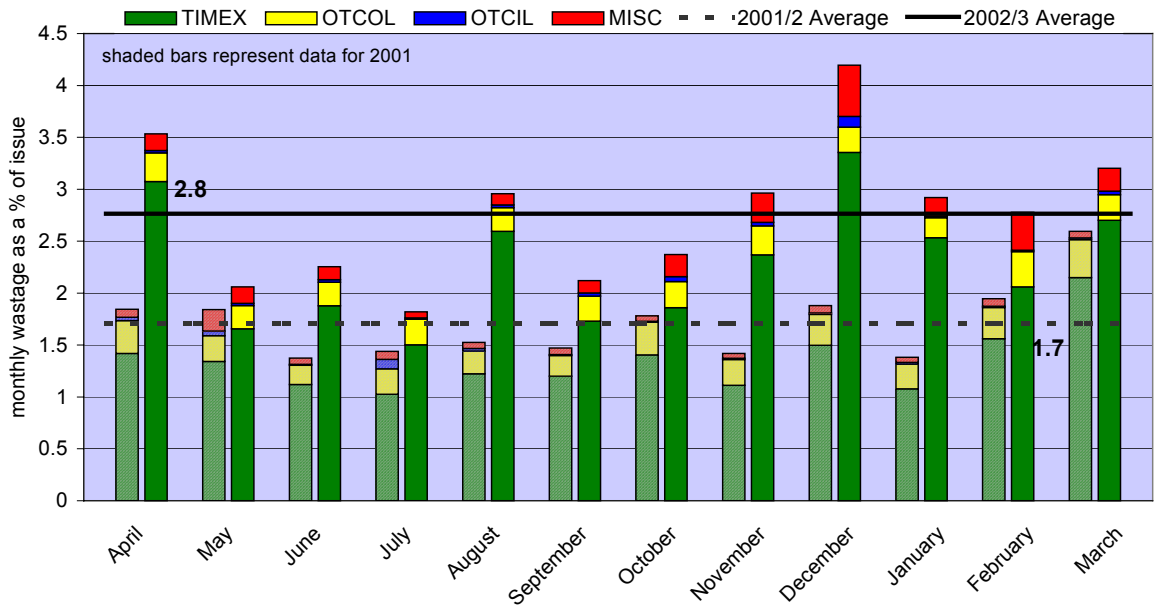

Fig 15. Average Wastage As a Percentage of Issue of A, B & O red cell units with comparison to April 2001 – March 2002.

Average wastage as a percentage of issue varies between the different hospital clusters. The “Low Usage” hospital cluster (<6000 red cell issues) has the highest average wastage as a percentage of issue and the “High DGH” and “High Teaching” cluster (>11000 units) the lowest wastage as a percentage of issue. Fig 16 shows each cluster and the trend for the “Low Usage” cluster against the trend for the other clusters. It demonstrates the higher level of wastage and a fluctuating trend in line with the higher NBS ISI.

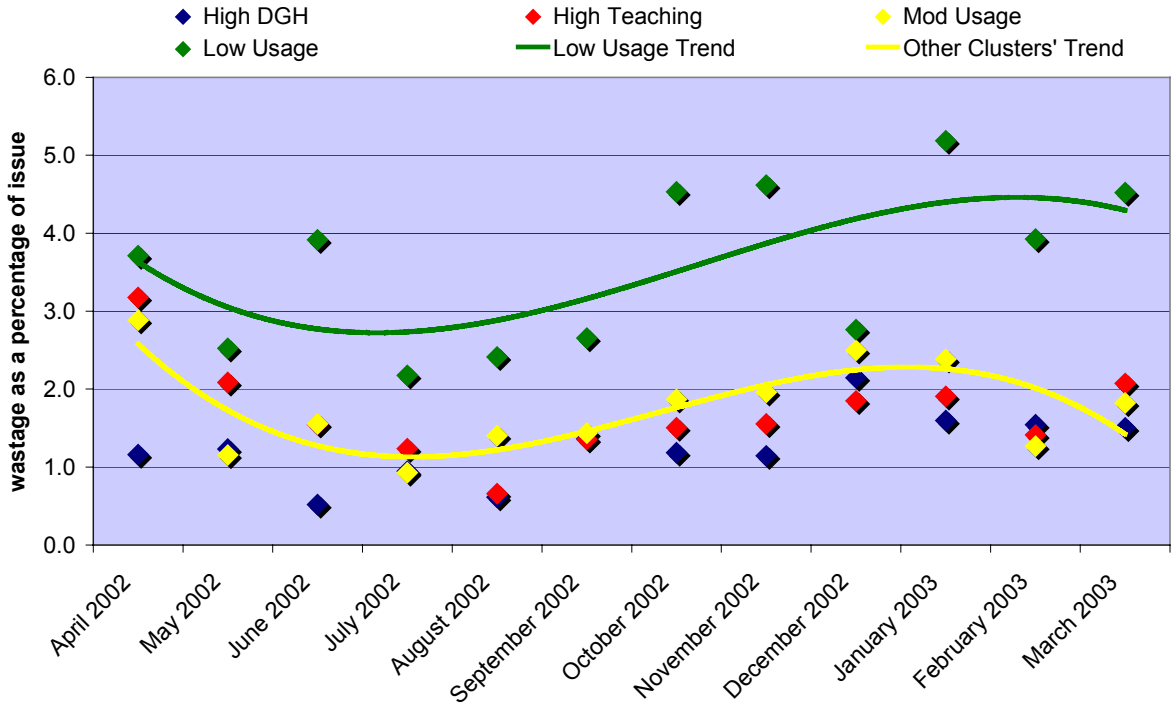

Fig 16. Average wastage as a percentage of issue for group A Pos units by hospital cluster

Fig 17 shows each cluster and the trend for the 'Low Usage' cluster against the trend for the other clusters for group O Neg. It again highlights the higher level of wastage in 'Low Usage' hospitals.

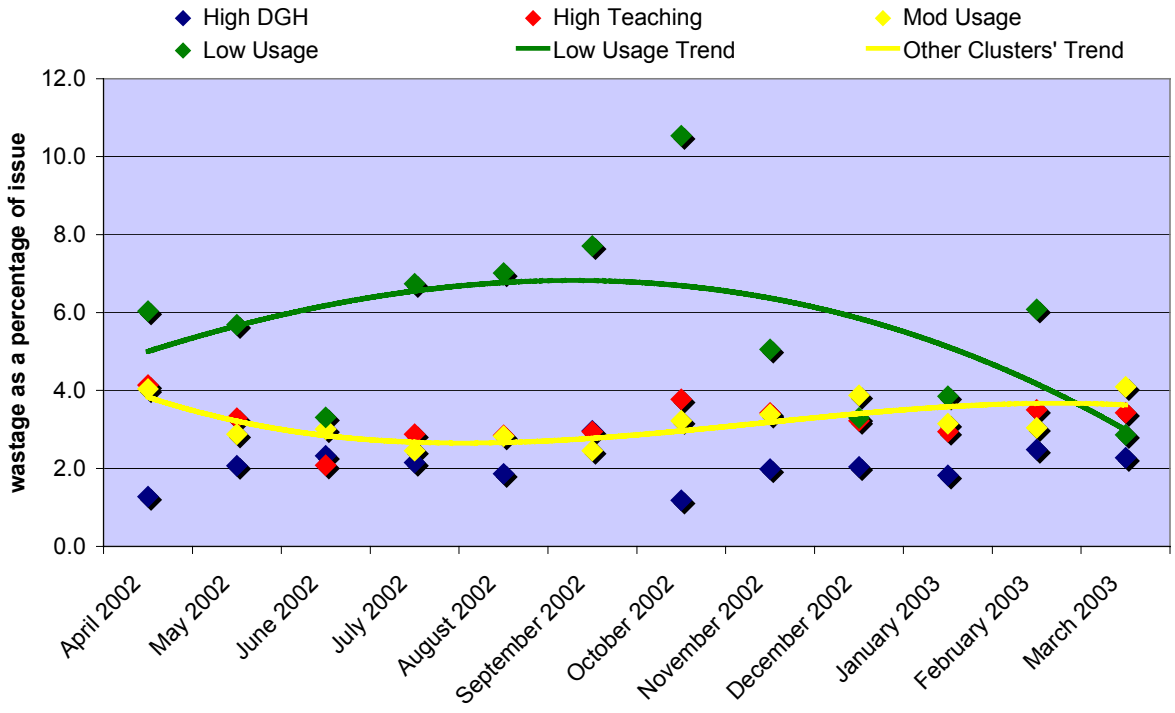

Fig 17. Average wastage as a percentage of issue for group O Neg units by hospital cluster

'Time expiry' wastage in hospitals accounted for 82% of all A, B & O wastage, 'out of temperature control outside the laboratory' wastage for 9% of all A B & O wastage, and 'miscellaneous' and 'out of temperature control in the laboratory' combined for 9% of all A, B & O wastage.

6. Blood Supply System Stock Management

6.1. Stock level and wastage

There is a relationship between the NBS stock level and time expiry wastage in hospitals and the NBS (Fig 18). Higher NBS stock levels lead to hospitals receiving blood with a reduced shelf life. When hospitals receive older blood they do not have sufficient days to circulate the units through the reserved/unreserved stock loop enough times for them to be used and the units are more likely to time expire. Hospital wastage seems to react predictably to changes in the NBS stock level.

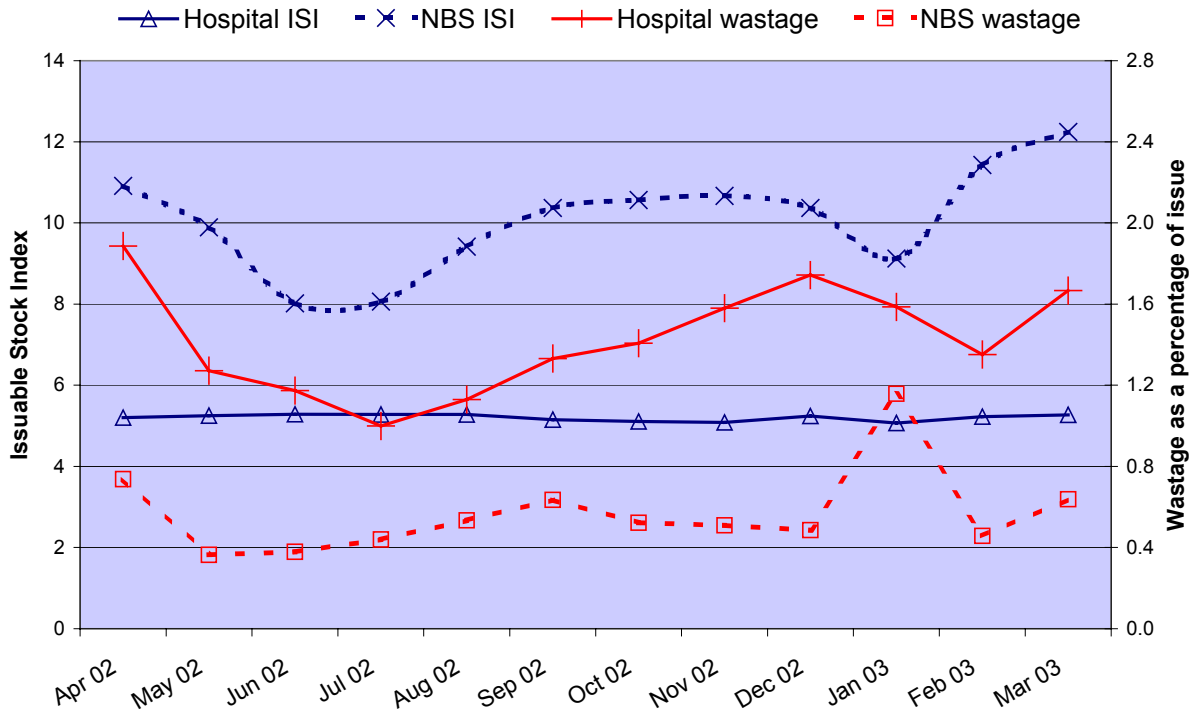

Fig 18. Total stock (ISI) held in all BSMS hospitals and in the NBS and the total wastage as a percentage of issue (WAPI) for all BSMS hospitals and for the NBS.

6.2. The relationship between the NBS stock level and time expiry wastage

An increase in the NBS stock level from one month to another causes a lagged increase in time expiry wastage across the blood supply chain the next month (because of the 35-day shelf life of red cells). Over the two years of the scheme, the lowest time expiry wastage occurred in July 2002 and corresponded to the lowest NBS stock level in June 2002. Conversely the highest levels were seen in April 2002 when NBS stock was at its second highest level for the year (Fig 19). Initial investigations indicate an exponential relationship between stock level and time expiry wastage. Thus, higher NBS stock levels are linked to proportionately more blood supply system time expiry wastage.

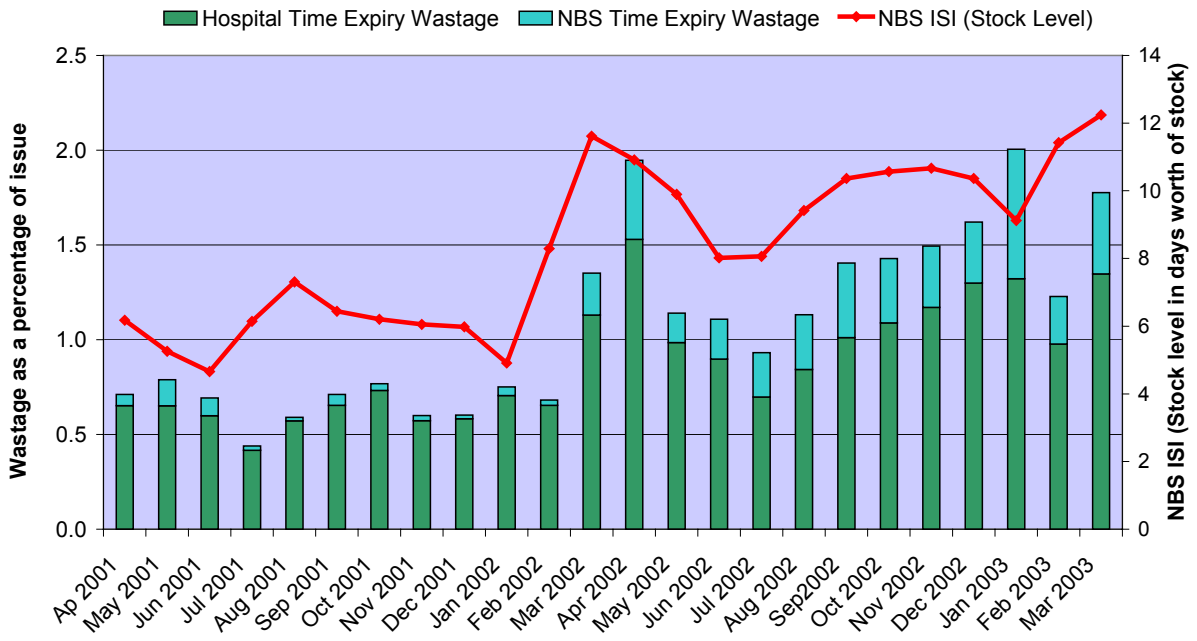

Fig 19. Time expiry wastage in the BSMS hospitals and the NBS, and NBS stock level from April 2001 to May 2003.

6.3. Blood Supply System wastage

Table 5. Total NBS and hospital wastage

	A, B & O units	Group AB	Total
BSMS Hospitals	25,132	5,799	30,931
NBS	5,689	6,771	12,460
Grand total	30,931	12,545	43,391

The total system wastage as a percentage of issue for BSMS hospitals and the NBS was 1.99%. The voluntary nature of blood donation and the erratic nature of supply and demand make the blood system unusual and benchmarking of wastage against other industries therefore more difficult. Milk is a short shelf life product in the consumer sector and in one supermarket group has a wastage rate of 0.5% of sales. Red cell wastage as a percentage of issue in the NBS (0.6%) is at a comparable level.

7. Discussion

7.1. Participation

Hospital participation in the BSMS increased by 28% during the second year of the scheme helped by HSC 2002/009; Better Blood Transfusion. One of the challenges for the scheme is to ensure that participants remain active and enter data on a regular basis. The BSMS management team is developing a strategy for handling inactive or lapsed participants.

7.2. NBS stock level

The NBS stock level was higher in April 2002 than in April 2001 and maintained a high level for the duration of the year. Stock was kept at this level because of the volatile international situation and the need to be able to respond to potential critical incidents.

The NBS stock level is affected by two factors at any one time; hospital demand and the number of blood donations. If hospital demand is low and donor collection is achieving its target the NBS stock level will rise. Conversely if hospital demand is higher than expected and donor collection is under target the stock level will fall. For 2002-03 hospital demand was 0.9% below the previous year. Hospital demand shows fluctuations, however data from the BSMS show that the total stock in hospitals remains relatively stable at approximately 5 days. Any variation in the stock level will be absorbed by the NBS resulting in an ageing stock profile.

7.3. The blood supply system

The BSMS is unique in that it has an overview of the blood supply system. Over the two years of the scheme it has become apparent that there is a direct relationship between the stock level in the NBS, the age of the red cell stock, the age of red cells at issue, and both NBS and hospital time expiry. Data show that there was an increase in the age of red cells at issue of approximately five days over the previous year and an associated increase in time expiry wastage in the NBS of 71% and in the BSMS hospitals of 77%.

In order to counteract the increase in time expiry wastage several approaches by both the NBS and hospitals can be taken. The BSMS and the NBS is currently examining the issues policy of ‘first in-last out’ to ascertain whether alternative policies would be more effective, appropriate and manageable, and lead to less hospital wastage at times of a stock build. The BSMS data management system gives appropriate NBS staff the opportunity to view the whole supply chain including anonymised hospital data and therefore the relationship between stock level and wastage. At times of a stock build and higher stock levels, a different approach could be used for red cell issues e.g. fresher blood could be issued to low usage hospitals thereby allowing them more opportunities for the blood to pass through the reserved/unreserved loop and reduce wastage.

Hospitals can organise red cell movements between sites. Some Trusts have already implemented this policy and move blood around their sites to ensure

increased potential for use of units approaching time expiry. Other arrangements including partnerships between private and NHS hospitals have been introduced to ensure more opportunity for use with a potential for less wastage. In some regions stock movement procedures between hospitals have been developed in conjunction with the supplying NBS centre. 'Out of temperature control outside the laboratory' (OTCOL) wastage continues to remain an area of concern and contributes to 9% of the total wastage. The introduction of information systems that monitor removal of red cell units from the blood refrigerator has led to an increase in OTCOL wastage in some of the sites that have implemented the system. The NBS national transfusion microbiology laboratory are proposing to undertake a study to examine the validity of the current maximum time limit of 30 minutes outside the refrigerator for a red cell unit.

7.4. Stock Management

Information from the scheme suggests that the more zealous the blood transfusion laboratory is in stock management the less wastage there is likely to be. There are many sites made up of both high and low usage hospitals where the number of units wasted per year is less than 4 units per month suggesting that low wastage is achievable.

As a result of participation in the scheme and the sharing of best practice several hospitals have implemented changes to stock management practice that are relatively easy to adopt. These include introducing a stock expiring notice board, stock movement or stock rotation and implementing stock management training. Some hospitals have recruited "Transfusion Practitioners" to assist with the 'out of the laboratory' aspects of stock management.

8. Inventory Practice Surveys

The 2002 Inventory Practice survey was designed to explore the participants use of the BSMS and included sections on how the BSMS was used, changes in inventory practice, initiatives introduced from HSC 2002/009, and crossmatch policies and procedures.

Key findings included:-

- Information extracted from the BSMS website is distributed and made available to a wide range of hospital personnel.
- All BSMS media was received well, particularly the News Sheet.
- 35% of respondents found participation in the BSMS *often* or *very useful*.
- Many respondents have changed inventory practice through participating in the BSMS.
- 60% of respondents have implemented or are planning to implement HSC2002/09 initiatives 'peri- and post-operative salvage' and 'lower Hb for transfusion'.
- 46% of respondents indicated that it is routine practice in their laboratory to crossmatch more than 24 hours in advance.

Further information on the Inventory Practice survey can be found on www.bloodstocks.co.uk

9. Publications and Presentations

9.1. Publications

2002

Chapman J.F. Cook R The Blood Stocks Management Scheme, a partnership venture between the National Blood Service of England and North Wales and participating hospitals for maximising blood supply chain management (2002) Vox Sanguinis **83**: 239 - 246

Chapman J.F. Hick R.S.J Blood Supply Management in England and North Wales – One years data from the Blood Stocks Management Scheme (2002) Vox Sanguinis **83**: Suppl 1 007

Chapman J. F. Hick R.S.J Red cell ordering practice and blood stock management training in 76 hospital blood transfusion laboratories (2002) Transfusion Medicine **12**: Suppl 1 P107

9.2. Presentations

2002

September Irish Haemovigilance Office Annual Conference, Galway

November Welsh Blood Service Annual Customer Meeting, Cardiff

2003

January Northern Ireland Transfusion Science Discussion Group, Belfast

February Croatian Institute of Transfusion Science Discussion Group, Zagreb

9.3. Educational Activities

2002-03

Presentations have been made at a number of meetings including:

- All NBS user group meetings
- NBS National Audit meeting
- NBS Public and Customer Services Directorate Senior Managers conference

10. Appendices

10.1. Appendix 1 Scheme Operation

10.1.1. The Data Management System

The methodology used by the Scheme is a sophisticated data management system (DMS) developed by the NBS information technology department that allows both data input and extraction. The DMS is a web application employing Active Server pages, Macromedia Generator for the production of graphical displays and a SQL Server database. Access to the BSMS DMS is provided via a secure Internet connection to an NBS server. User hospitals are given a personal account allowing them tailored access to the DMS. User hospitals can only enter data for their site. User hospitals can also view data relating to their local blood centre. All other data is anonymised.

10.1.2. Data Collection

Hospital participants submit stock data on the 'daily stock' data and 'wastage' pages.

Stock data submitted includes:

- The number of red cell units available for crossmatching (issuable stock level).
- Impacts – selected from a pre-defined list of options, the default of which is 'No impact'. Impacts are entered if there is a red cell shortage or if red cell stocks have a short shelf life.
- Comments.

Wastage data submitted includes:

- The number of red cell units wasted according to four categories; 'time expired', 'out of temperature control outside the laboratory', 'out of temperature control inside the laboratory' and 'miscellaneous'.
- Comments.

Allocated stock data includes:

- The number of red cell units crossmatched and at reserved status.

Blood centre stock and post validation wastage data is automatically uploaded from PULSE, the NBS integrated computer system on a daily basis. Blood centre wastage is collected according to two categories; 'time expiry' and 'miscellaneous'.

10.1.3. Data Extraction

Data extraction facilities allow users real-time data analysis and feedback through graphical displays. Graphs available include issuable stock index, wastage, shelf life of stocks, and O Neg as a percentage of blood issued from the blood centre to the user. For each graph the user hospital or blood centre is displayed against anonymised data from other hospital or blood centre participants. Users can benchmark themselves against other participants of similar hospital type, usage, or speciality. The graphs are used by participants

for assessment of performance against other users, and dissemination to laboratory staff and the hospital transfusion committee.

10.1.4. Management Arrangements

The NBS Executive is responsible for the Scheme to the National Blood Authority Board. A steering group provides strategic direction for the Scheme, monitors performance and is accountable to the NBS Executive.

An Operations group advises the Steering group on issues relating to the performance and direction of the processes by which the Scheme operates including IT issues.

The Scheme manager is responsible for ensuring the Scheme operates effectively and follows the directions set out by the Steering group.

There are hospital and NBS representatives on both the steering group and the operations group.

Details of the membership of both groups can be found in Appendices 2 and 3.

10.2. Appendix 2 Steering group members

Name	Representing	Contact details
Liz Reynolds	Chair	National Blood Service Oak House Reeds Crescent Hertfordshire WD1 1QH Tel: 01923 486 808 ✉: liz.reynolds@nbs.nhs.uk
Stephan Bates	Hospital BMS	Cheltenham General Hospital Stanford Road Cheltenham GL53 7AN Tel: 01242 274 327 ✉: stephan.bates@eqnhst.swest.nhs.co.uk
Bill Chaffe	Hospital BMS	Blood Transfusion Laboratory William Harvey Hospital Ashford Kent TN24 0LZ Tel: 01233 616 017 ✉: lipneas@msn.com
Judith Chapman	BSMS Manager	BSMS PO Box 33910 London NW9 5YH Tel: 020 8258 2942 ✉: judith.chapman@nbs.nhs.uk
Robert Hick	BSMS Data Analyst	BSMS PO Box 33910 London NW9 5YH Tel: 020 8258 2763 ✉: rob.hick@nbs.nhs.uk
Edwin Massey	NBS medical representative	National Blood Service Southmead Road BS10 5ND Tel: 0117 991 2048 ✉: edwin.massey@nbs.nhs.uk
Stuart Penny	Head of NBS Hospital Liaison	National Blood Service Colindale Avenue London NW9 5BG Tel: 020 8258 2957 ✉: stuart.penny@nbs.nhs.uk
Kanchan Rege	Hospital Haematologist	Hinchingbrooke Hospital Hinchingbrooke Park Huntingdon Cambridge PE 29 6NT Tel: 01480 416 155 ✉: KanchanRege@aol.com

Jonathan Wallis	Hospital Haematologist	Freeman Hospital Freeman Road Newcastle upon Tyne NE7 7DN Tel: 0191 273 8811 ext. 26489 ✉: jonathan.wallis@tfh.nuth.northy.nhs.uk

10.3. Appendix 3 Operations Group members

Name	Representing	Address
Judith Chapman	BSMS Manager and Chairperson	BSMS PO Box 33910 London NW9 5YH Tel: 020 8258 2942 ✉: judith.chapman@nbs.nhs.uk
Rob Hick	BSMS Data Analyst	BSMS PO Box 33910 London NW9 5YH Tel: 020 8258 2763 ✉: rob.hick@nbs.nhs.uk
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Emily Okukenu	Specialist Practitioner of Transfusion	Royal London Hospital Whitechapel Road London E11BB Tel: 0207 377 7682 ✉: emily.okukenu@bartsandthelondon.nhs.uk
Martin Coleman	NBS IT	National Blood Service Southmead Road Bristol BS10 5ND Tel: 0117 991 2417 ✉: martin.coleman@nbs.nhs.uk
Madaleine Gallagher	NBS Hospital Liaison	National Blood Service Bridlepath Leeds LS15 7TW Tel: 0113 214 8695 ✉: madaleine.gallagher@nbs.nhs.uk
Adrienne Harper	NBS Issues	National Blood Service Trent Centre Longley Lane Sheffield S5 7JN Tel: 0114 203 4892 ✉: adrienne.harper@nbs.nhs.uk
Ed Harvey	NBS Quality	National Blood Service Holland Drive Barrack Road Newcastle upon Tyne NE2 4NQ Tel: 0191 219 4414 ✉: ed.harvey@nbs.nhs.uk
Edwin Massey	NBS Medical	National Blood Service Southmead Road Bristol BS10 5ND Tel: 0117 991 2048 ✉: edwin.massey@nbs.nhs.uk

10.4. Appendix 4 Operational Performance Indicators

The BSMS classification of 'one red cell unit', in terms of counting issues and calculating age at issue, is defined according to a list of agreed products, termed 'operation performance indicators'. These include irradiated units and a number of other products that do not have a 35-day shelf life. Therefore, the reported age at issue may contain a higher percentage of units in the lower 0 - 10 day bands than may be expected.

Between 95 and 96.5% of reported units are standard 35-day red cells and 3.5 - 5% are irradiated units. Although the percentage of irradiated units reported has increased, it has not significantly affected the distribution of the reported age at issue (i.e. has not artificially decreased the average age at issue).