

NATIONAL BLOOD STOCKS PROJECT End of Project Report

Dear Colleague,

On behalf of the National Blood Stocks Project Group we should like to present this report which consolidates the achievements of the Project and is a testament to the collaboration which has taken place between the National Blood Service and the Hospital sector during the last two years.

This collaboration has consisted of three phases which have involved 12 NBS centres and over 40 hospitals in the assimilation of a substantial quantity of data and information relating to blood stock management and wastage across the National Health Service.

The results of this Project have delivered significant insights into the current practice and processes governing the management of the blood supply and have demonstrated the potential for promoting change through a process of peer review.

The success of the National Blood Stocks Project has provided the foundation for the Blood Stocks Management Scheme (BSMS) which will be launched on 1st April 2001 and which will provide an opportunity for all hospitals and NBS centres to collaborate in the quest to deliver improvements in the way blood resources are managed.

These achievements have only been possible as a result of the enthusiasm and dedication of all those who have participated in the Project. Staff in hospital transfusion laboratories around the country have made a significant contribution to the success of this Project through their willingness to provide information relating to their own working practice and they deserve our congratulations and thanks for these efforts.

We should also like to acknowledge the contribution made by all NBS staff who have taken part in the Project particularly during a time of major change for the Blood Service.

Finally a debt of gratitude is owed to the Project Team, in particular those colleagues from the hospital sector whose dedication and commitment has provided evidence of the benefits of working in partnership and maintained the momentum necessary to secure the future of the Blood Stocks Management Scheme.

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1.0 Executive Summary

1.1 The National Blood Stocks Project was established in 1997 as a collaborative venture between the NBS and hospital sector to understand and achieve improvements in blood stock management.

1.2 The Project consisted of a series of three data gathering exercises which were undertaken during the period September 98 to February 00 and designed to accumulate daily information relating to blood stocks and wastage from a total of 40 volunteer hospitals and 12 NBS centres.

1.3 This information was supplemented by a hospital transfusion questionnaire and selected case studies investigating the factors influencing the transfusion of minor blood groups, reservation times, transfers between hospitals, theoretical returns from hospitals to centres and the use of ABO/Rh mismatched units.

1.4 Data was returned to individual hospitals with anonymised data from other participants for the purpose of comparing performance with peers. This revealed a significant variation in approach to stock and wastage management across the NHS as well as providing an insight to the complexity of issues influencing the dynamics of the blood supply within the context of the hospital transfusion laboratory.

1.5 The Project succeeded both in defining a set of stock and wastage parameters for daily monitoring and establishing an effective format for data feedback which had significant impact on stock management with peer review acting as the primary driver for change.

1.6 A series of national meetings involving all participants demonstrated continuing support for the Project and also provided an opportunity for refining the data management process.

1.7 The Project has revealed the potential for influencing practice and achieving improvements in blood stock management within the context of a small section of the NHS. Further progress may be made by expanding the scope of the Project to include participation from all hospitals and NBS centres.

1.8 The vehicle for taking forward the results of the Project will be the Blood Stocks Management Scheme (BSMS) which will be implemented in April 2001 and administered by the NBS. It will operate under the stewardship of a national steering group that will monitor performance and provide direction. It is anticipated that information provided to the Scheme will ultimately contribute to the establishment of benchmarks relating to transfusion practice which may provide the basis for national guidelines.

2.0 Background

2.1 In 1984 the Department of Health published a Health Circular calling for hospitals to establish more accurate record keeping in relation to blood stock and wastage management. It acknowledged the potential for improving blood usage and recognised the considerable cost to the NHS of the national blood supply chain.

2.2 Since that time the response has been variable with relatively few hospitals submitting details on a regular basis. At the same time demand for blood and blood products has continued to increase accompanied by more frequent national appeals in response to stock shortages. It became clear that more data was required in order to promote understanding of stock management dynamics in a way that would better inform on policy for efficient blood usage throughout the NHS.

2.3 In order to address these concerns the DoH/NBS launched an initiative in 1997 to promote greater compliance with HC (84)7. However an early review of data collection identified that very few hospitals were in a position to submit appropriate details and in addition that this initiative was negatively perceived by the hospital community as a somewhat heavy handed directive from the NBS to account for blood usage. Furthermore the NBS did not demonstrate any co-ordinated attempt to encourage compliance with the Circular or to collate or utilise information on a national basis.

3.0 Introduction

3.1 Out of concern for these issues the NBS established the National Blood Stocks Project in 1997 as a partnership venture with representation from the NBS and hospitals with a remit to better understand the factors affecting blood supply management and to ultimately optimise utilisation across the NHS through national recommendation and peer review.

3.2 The Project had the following objectives:

- *Understand the factors affecting red cell supply/demand relationships*
- *Optimise Hospital Blood Bank and NBS centre stock utilisation*
- *Propose criteria and operational practice for national use*
- *Suggest practice for improvement long-term in Hospital/NBS collaboration*

3.3 The work of the Project would potentially impact on many stakeholders, not all of whom would be able to participate in the initial study. It was therefore decided that work would be undertaken with a small cross section of hospitals to define data sets for submission on a daily basis that would inform on the dynamics of blood distribution and utilisation.

4.0 Project Design

4.1 Data Collection

4.1.1 The process of data collection took place during the period September 1998 and February 2000 and incorporated three phases with increasing levels of voluntary participation from hospitals and NBS centres:

Project Phase	Duration	Participation
1	1st Sept - 30th Nov 1998	22 hospitals 12 NBS centres
2	1st Apr - 30th June 1999	21 Phase 1 hospitals 12 NBS centres
3	1st Nov - 15th Dec 1999 10th Jan - 29th Feb 2000	39 hospitals (17 Phase 1 and 22 new participants) 15 NBS centres

4.2 Protocols

4.2.1 It was recognised that a comprehensive understanding of stock management could only be acquired through collecting a substantial amount of data over an extended period of time. Hospital IT system and resource constraints were taken into account when designing data protocols in order to ensure that the required information could be obtained satisfactorily.

4.2.2 Previous experience had shown that monthly data collection was of limited use in informing on issues associated with stock utilisation. The Project therefore defined a set of stock and wastage parameters for submission on a daily basis for the purpose of establishing baseline activity and monitoring fluctuations in the dynamics of stock management. Additional data requirements were identified as the Project progressed.

4.3 Data Input Requirements

4.3.1 The following daily data requirements were identified for Phases 1-3 of the Project:

Data Requirement	Comment
Issuable stock level	Available for issue (by blood group)
No. Red Cells requested	Submitted by hospital
No. Red Cells issued	Submitted by centre
Impact Assessment	Graded 0-3 according to definitions: 0 - No impact 1 - Minor impact 2 - Major impact 3 - Severe impact
Wastage	Submitted daily or monthly according to the following predefined categories: - time expiry - out of temperature in laboratory - out of temperature outside of laboratory - miscellaneous

4.3.2 These data sets were initially piloted during August prior to commencement of the first phase of the Project in September 1998.

4.3.3 During Phases 2 and 3 the existing daily data sets were extended to include the following elements:

Data Requirement	Comment
Allocated stock level	Stock not available for issue (for each blood group)
Impact assessment	Categories extended to include level 4 denoting hospital problems because of centre stock surplus

4.4 Hospital questionnaire

4.4.1 In addition a questionnaire was introduced for the purpose of building a hospital profile to inform on those factors impacting most significantly on local stock management policy.

4.5 Case Studies

4.5.1 A series of case studies was implemented for the purpose of providing more detailed information on specific areas of transfusion practice:

Case Study	Description	Project Phase
Hospitals		
ABO/Rh mismatching of units	Establish frequency and reasons for transfusion of group incompatible blood	2 & 3
Use of Minor Blood Groups	Encourage greater uptake of AB red cells	2
Reservation Times	Crossmatched blood held for 48 hours only	2
Transfers	Frequency and extent of stock moved between hospital sites	2
Delivery Frequency	Assess impact of	2
Returns	Assess potential for return of units surplus to blood bank requirements	2
Centres		
Stock Management	Assessment of stock lodgement and rotation procedures	2
Wastage	Use of age profiling techniques	2

4.6 Data Feedback

4.6.1 At the end of each data gathering exercise, data was analysed and returned to all participants. Stock data was expressed relative to the nominal 1 day stock value and presented against a background of anonymised data from other participants.

4.6.2 Wastage data was expressed as a percentage of total issues for each blood group and also subject to a breakdown according to each of the defined categories.

4.6.3 In response to comments from participants data presentation underwent further modification in order to promote more user friendly and informative feedback with each subsequent phase.

4.7 Communication

4.7.1 A series of national meetings was convened following dissemination of data after each Project phase. This provided an opportunity to assess the level of continuing support for the Project as well as informing the process for refining data gathering and reporting protocols.

5.0. Results

5.1 Key Findings from Phase 1

5.1.1 The first phase involved 12 NBS centres and 22 volunteer hospitals who were selected to ensure that a broad range of hospitals was represented. Data collection took place during a period when blood stocks were in short supply. A full analysis of all data submitted may be found in Report of Phase 1 activities (March 1999).

5.1.2 Use of Nominal 1 day Stock Index

5.1.2.1 The use of the nominal 1 day stock index was established as an effective method for standardising the interpretation of stock holding levels in hospitals and NBS centres. This value was derived by dividing total annual issues/receipts for centres/hospitals by 365.

5.1.3 Use of Impact Assessments

5.1.3.1 This was the first time that an initiative had been undertaken to quantify the impact of stock shortages and the outcomes on the hospital of failure to supply and provided real evidence to show that a shortfalls in supply produce a negative impact on hospital blood bank activity and management of patient transfusions.

5.1.4 Stock holding Levels

5.1.4.1 The data obtained revealed a wide variation in stockholding levels maintained by both hospitals and NBS centres reflecting significant differences in stockholding and requests/issues policy. The greatest variation was observed in the hospital sector where stock levels of O+ ranged between 2.8 and 11.8 days. For the same blood group NBS centres showed a narrower range between 0.8 and 2.4 days stock. However there were significant differences in stock levels between centres which reflected inequitable distribution and lack of co-ordinated approach to managing stock over a wider area.

5.1.5 Response to Blood Shortages

5.1.5.1 The process of monitoring stock on a daily basis revealed a flaw in the NBS strategy of restricting supply in response to dwindling stock levels in blood centres. Request /issue data revealed a general increase in hospital demand in response to perceived reduction in supply and this had no effect on reducing the number of units issued overall. However it did have an effect on the impact ratings assigned by hospitals which provide a strong indication of the effect of this response on increasing pressure on the supply chain. A concerted attempt on the part of NBS centres to meet all hospital requests demonstrated that demand subsequently drops back to normal levels as evidenced by reduced impact assessments.

5.1.6 Wastage

5.1.6.1 Wastage data revealed that approximately 50% of all units wasted were group AB. The major cause of wastage at both centres and hospitals was time expiry.

In addition there was significant wastage which occurred outside of the hospital transfusion laboratory where blood bank staff have little or no control of events.

5.2 Key Findings from Phase 2

5.2.1 This phase involved 12 NBS centres and 21 of the original 22 hospitals who took part in Phase 1. In this phase additional data was collated for allocated stock levels together with information from the case studies and hospital questionnaires. In contrast to Phase 1 this data gathering exercise took place during a period when blood stocks were maintained at satisfactory levels. A full analysis of all data submitted may be found in the Report of Phase 2 activities (January 2000).

5.2.2 Stock holding Levels

5.2.2.1 Despite high national stock levels, hospitals stock levels remained constant throughout the reporting period. On the other hand centre stock levels were significantly higher than Phase 1 and highly variable. The addition of the level 4 rating to the impact assessment categories provided a useful tool for evaluating the correlation between stock surplus and time expiry rates.

5.2.3 Wastage

5.2.3.1 Hospital data revealed that wastage levels were at levels similar to those reported during Phase 1. However higher wastage was reported by NBS centres and the significant variations between NBS Zones reflected the lack of protocols for the redistribution of national stock at that time.

5.2.4 Hospital Case Studies

5.2.4.1 Data submitted for the case studies revealed the extent of ABO/Rh mismatching where 12% of units transfused to group non-identical recipients involved group O Negative. Of this total 33% were transfused to avoid time expiry, 17% as a substitute to B Neg patients, and 12% were issued by the NBS when insufficient phenotyped units of other groups were in stock. Overall only 26% of O Negative units given to non O Negative patients was clinically justified.

5.2.4.2 The case study designed to assess the potential for promoting increased uptake of minor blood groups revealed an overall utilisation of 67% for group AB red cell units issued to hospitals who would not normally take blood of this group.

5.2.4.3 There was no significant demand for 'returns' from hospitals to centres as a result of overstocking and minimal losses were attributed to transfers between hospitals.

5.2.5 Centre Case Studies

5.2.5.1 An evaluation of stock management protocols in six blood centres indicated a broadly similar approach although the more consistent use of IT assisted techniques for age profiling stock might have a more positive impact on time expiry rates.

5.2.6 Hospital Questionnaire

5.2.6.1 An evaluation of qualitative information submitted in response to the hospital questionnaire resulted in a number of general observations:

5.2.6.2 Distance from blood centre influenced stock levels only in hospitals issuing less than 5000 units annually.

5.2.6.3 During shortages 63% hospitals routinely over order or make repeated orders to maintain ideal stock levels.

5.2.6.4 Those hospitals monitoring wastage through hospital HTC have a lower than average time expiry rate.

5.2.6.5 68% hospitals introduced changes in stock management as a result of involvement in the project and provides evidence that a process of peer review can have a positive impact on an area of activity.

5.3 Key Findings from Phase 3

5.3.1 In this phase data was collated from all NBS centres, and a total of 39 hospitals consisting of 17 previous and 22 new participants during a period when blood stocks were in plentiful supply. In addition to the daily data sets the hospital questionnaire was also completed by new participants. Data was requested from all participants for the ABO/Rh mismatching case study only. A full analysis of all data submitted may be found in the Report of Phase 3 activities (September 2000).

5.3.2 Stock and Wastage Data

5.3.2.1 The data obtained from hospitals was consistent with that obtained from previous phases and revealed that stock levels are maintained at a constant level irrespective of levels held within NBS centres.

5.3.2.2 Centre data revealed a more equitable distribution of blood stocks during this period and was attributed to a recent NBS initiative to establish a more proactive approach to stock equalisation.

5.3.3 Allocated Stock

5.3.3.1 The average ratio of issuable to allocated stock held in hospital blood banks was 1.8 although the data showed a considerable variation in the proportions of stock held in these categories (4.8 - 0.75). A number of hospitals encountered practical difficulties associated with reporting this value on a daily basis which was attributed to factors such as the number and location of satellite fridges.

5.3.4 Data analysis

5.3.4.1 A different format for data presentation was piloted in this phase which consisted of scattergraph charts to provide individual results in the context of anonymised data from all participants. Bar charts were also used to present a more detailed analysis of wastage data.

5.3.4.2 All participants were invited to comment on the revised reporting format in order to identify improvements and ensure that information was conveyed in the most informative and user friendly manner.

5.3.5 ABO/Rh Mismatching

5.3.5.1 More extensive data collated from the ABO/Rh mismatching case study was consistent with previous results and remains a source of concern against a problem of recurrent shortages of O Neg red cells.

5.3.6 Age of Issued Stock

5.3.6.1 The submission of level 4 impact assessments during this phase raised concern over the impact of surplus on hospital blood bank stock management. Some preliminary work was carried out in order to assess the age profile of stock issued to hospitals and may prove to be useful for future benchmarking purposes.

5.3.7 National meeting

5.3.7.1 The national meeting held at the end of Phase 3 consisted of a series of interactive workshops and presentations which were designed to fully engage participants in the process of identifying key factors impinging on areas of stock and wastage management for the purpose of enhancing the monitoring process and developing benchmarks.

6.0 Conclusions

6.1 The three Project phases yielded substantial amounts of data and information which provided an unprecedented insight to stock and wastage management in NBS centres and a cross section of hospitals.

6.2 The strategy of using a combination of data gathering mechanisms including daily data sets, case studies and questionnaires was effective in promoting understanding of the factors affecting stock management and providing a mechanism for monitoring the dynamics of stock movement throughout the NHS.

6.3 This initiative demonstrated the capability of the NBS and hospitals to collaborate in a challenging venture to gain knowledge and information relating to a highly complex area of activity. The success of this Project relied on the considerable dedication and honesty of participants in submitting data on a regular basis over a two year period.

6.4 The monitoring of stock and wastage data delivered an insight to baseline activity in the area of blood stock management in a number of stock holding sites and the data obtained provides a basis for developing benchmarks for improved practice.

6.5 The use of a system for reporting individual data against a background of anonymised data from other participants proved to be a highly effective mechanism for communicating information and a powerful tool for stimulating change in practice through a process of peer review.

6.6 Data reporting systems evolved through an iterative process involving consultation with participants leading to a proposal for a set of reports suitable for supporting continued data gathering initiatives. Some examples of these are shown in the following sections:

6.6.1 Stock data

6.6.1.1 Issuable stock data for each blood group is expressed as a daily stock index in a scattergraph linking each data entry compared to all other participants and compared to an average value.

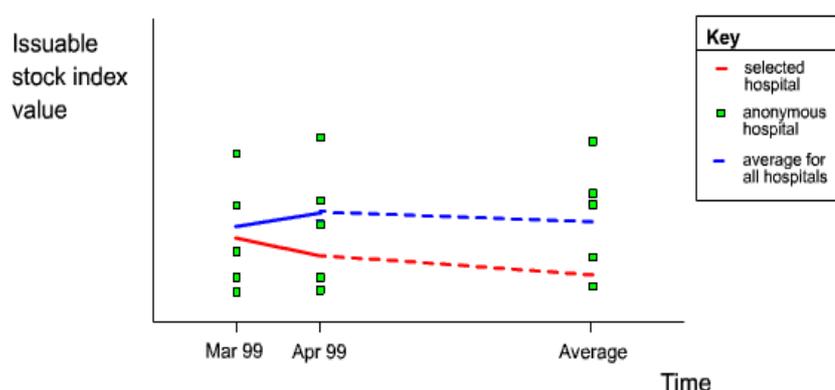


Figure 1

6.6.1.2 In addition number of O Neg units received by hospital to be expressed as a percentage of total.

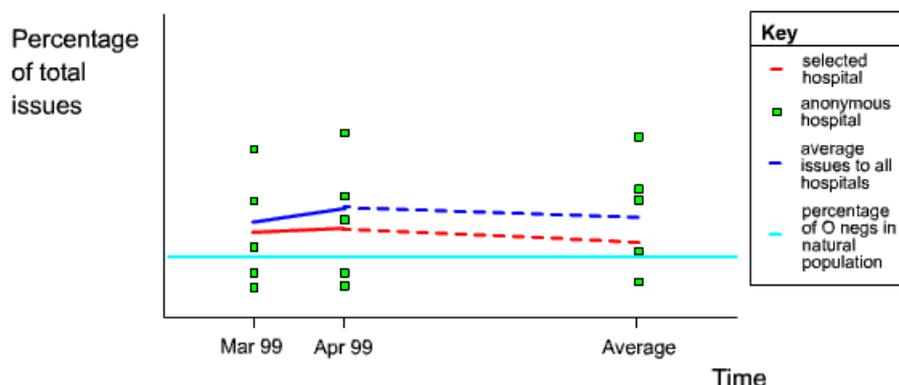


Figure 2

6.6.2 Wastage data

6.6.2.1 Wastage data is expressed as a percentage of units issued and displayed in three categories, combined O,A, & B, AB only and O Neg. The graph will be of a scatter variety with an average over a defined reporting period serving as a point of comparison.

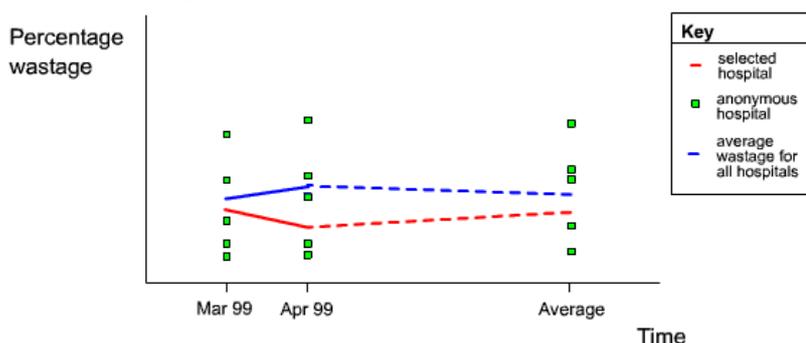


Figure 3

6.6.2.2 In addition wastage data will also be displayed graphically in a stacked bar format indicating the percentage wastage attributed to each of the defined categories.

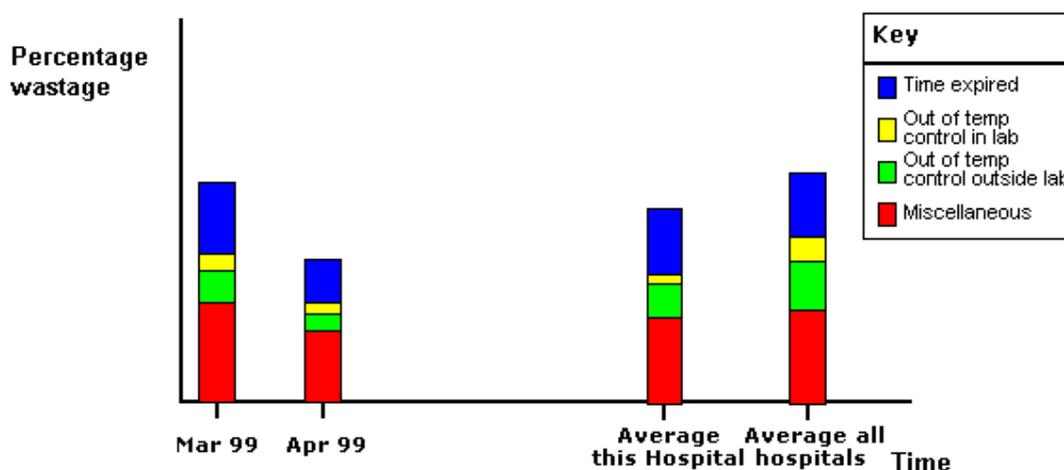


Figure 4

6.6.3 Age of Issued Stock

6.6.3.1 It is recommended that in future the report portfolio is extended to include an assessment of the age of stock issued to individual hospitals by the supplying NBS centre. This will be displayed in a scattergraph format and will inform users of the proportion of stock issued within a series of age ranges compared to an average of all hospitals.

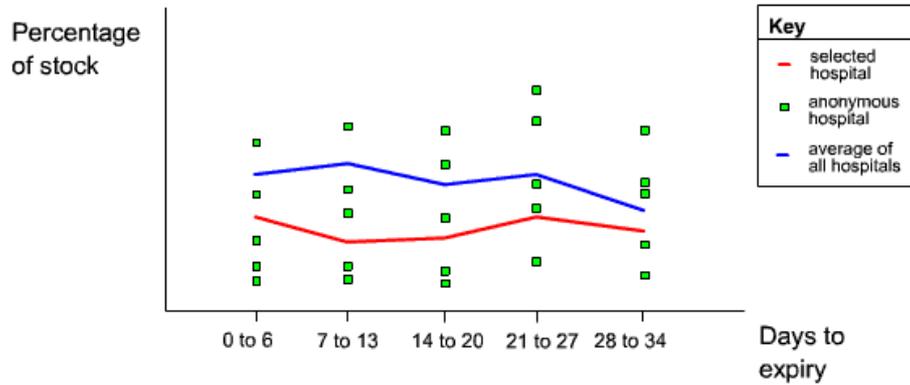


Figure 5

6.7 The extent and variety of information submitted to the project has revealed that it would be inappropriate to define numerical benchmarks to monitor performance at this stage. However, it is anticipated that the collection of more data and the enhanced profiling of hospitals will better inform this process which may bring about changes in stock management practice in the future.

7.0 Recommendations

7.1 The results of the Project indicate that major progress has been made towards identifying the factors affecting blood stock management and wastage throughout the NBS. However it is recognised that further collaboration is necessary if the process of developing benchmarks and national recommendations is to proceed.

7.2 The NBS Executive continues to support this collaboration by the NBS and hospitals and has undertaken to provide the resources required to ensure that the data gathering protocols of the Project phases are expanded into a mainstream operation which is capable of accommodating all hospitals and NBS centres.

7.3 It is recommended that formal closure of the Blood Stocks Project is immediately followed by an interim phase during which the Project group will deliver the implementation of the national scheme. This scheme will be known as the Blood Stocks Management Scheme (BSMS) and will be implemented on the 1st April 2001.

7.4 In laying the foundations of the BSMS, the Project group will consider a number of key areas including the recruitment of a Scheme manager and associated team for administering the Scheme, development of technology to support data management and the need for an effective publicity strategy which will maintain profile and promote participation.

7.5 The success of the BSMS will depend on the continued collaboration between the NBS and hospital sector. The running of the Scheme as a partnership venture has the potential to contribute to the increased efficiency of blood usage through the establishment of benchmarks relating to transfusion practice and national guidelines for implementation throughout the NHS.

7.6 As the scheme progresses the collection of more data relating to key areas of stock and wastage management will make it possible to develop numerical benchmarks against which performance can be measured.

Appendix 1

National Blood Stocks Project Group Membership

Terry Male	Project Director NBA, Director of Transition
Liz Reynolds	Project Director NBA, Director of Public & Customer Services
Stephan Bates	Transfusion Laboratory Manager, Cheltenham General Hospital
Bill Chaffe	Transfusion Laboratory Manager, William Harvey Hospital, Ashford
Mary Cutts	Hospital Liaison Manager, NBS Bristol
Dr. Robert Doughty	Project Manager, NBS
Julia Earley	Transfusion Laboratory Manager, Northwick Park Hospital/Hospital Services Manager NBS N. London
Adrienne Harper	Hospital Services Manager, NBS Sheffield
Dr. Sue Knowles	Consultant Haematologist, NBS London & S.E. Zone
Richard Lodge	National Blood Collection Co-ordinator, NBA
Dr. Mike Murphy	Consultant Haematologist, NBS Midlands & S.W. Zone
Stuart Penny	Head of Hospital Services, NBS London & S.E. Zone
John Revill	Transfusion Laboratory Manager, Leicester Royal Infirmary
Dr. Jonathon Wallis	Consultant Haematologist, Freeman Hospital, Newcastle
Ian Wilcox	Director of Quality, NBS Midlands & S.W. Zone