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Blood Matters

Information for hospitals served by NHS Blood and Transplant

NEXT EDITION

The next edition of Blood Matters will be in two parts, with section one focusing on new technologies and section two on advances in organ and tissue transplantation. Some of the areas that will be discussed are:

- Red cell typing using molecular biology in HDN
- Intrauterine transfusion
- Modifying the red cell surface to achieve an ABO universal supply
- Managing the risk of transmission of vCJD by blood and tissues
- New developments in tissue engineering
- Update on NHSBT Tissue Services restructuring
- Organ donation: matching supply to demand
- Cryopreservation of cartilage for transplantation

The next edition is due for publication in Spring 2008; if you would like to receive a copy and are currently not on the mailing list, please contact Charlotte Green (email charlotte.green@nhsbt.nhs.uk or by phone to 01865 440042).

Welcome From the Editor

It is a pleasure to be asked to be on the Editorial team of *Blood Matters* and I know that it will be hard task to maintain, let alone improve on, the high standards that Dr Angela Robinson has set in recent years. I wish to draw your attention to a number of recent changes on the Editorial Board. Dr Jean Harrison and Stuart Penny have now left the Editorial Board and I am extremely grateful to them for their invaluable contributions. We are joined on the Editorial Board by Dr Alistair Shepherd and Catherine Howell who bring a wealth of expertise and I look forward to working with them in future. In addition I am delighted to say that Dr Clare Taylor, who has recently been appointed as National SHOT Co-ordinator, has agreed to join the Editorial Board.

This Edition contains articles themed around Better Blood Transfusion and the appropriate use of blood. Derek Norfolk has contributed specific editorial comment on these contributions. In the next issue we will change tack and concentrate on new technological developments in the field of transfusion medicine and new developments in organ and tissue collection and transplantation.

We plan to carry out another survey, similar to the one conducted in 2003. On that occasion the readership was very supportive of the content and format of *Blood Matters* although only a small percentage of those to whom the survey was sent actually replied. This time the survey will be available on-line as well as in paper version and I would encourage you to let us have your views so that we can be as responsive as possible to your requirements.

We are considering updating the look of *Blood Matters*, incorporating the use of more colour whilst at the same time preserving its character and identity. Your feedback on this will be sought through the planned readership survey. A number of new features will be included in future issues and are currently under discussion by the Editorial Board. As always, we seem to work in times of both enormous organisational change and technological development. All of us on the Editorial Board will endeavour to make sure that *Blood Matters* fully reflects these changes in the world of transfusion medicine and that it continues to provide you with a ready source of useful information.

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Editorial Comment

As I write this editorial comment, the clinical transfusion community waits with bated breath for the release of the 3rd *Better Blood* Transfusion Health Services Circular by the Department of Health. Triggered by increasing concerns about the cost, availability and safety of blood, the first two HSCs led to a significant improvement in UK transfusion practice underpinned by the institution of *Hospital Transfusion Teams* and the appointment of Transfusion Practitioners in many hospitals. The last 5 years have seen an impressive 15% reduction in red cell use in English hospitals. Most of this reduction has been in surgical use, to the point that *medical* transfusions now make up at least 60% of transfusion episodes. However, there has been little, if any, reduction in the use of FFP and platelet transfusions despite an increasing recognition of the poor evidence base for the use of these components in clinical practice.

In this edition of Blood Matters, focussed on Better Blood Transfusion, we have a timely review by Mike Murphy and Catherine Howell of progress in implementing the recommendations of BBT2 since its release in 2002. Catherine also reports a survey of one of BBT2s crucial innovations, Hospital Transfusion Practitioners, and notes a worrisome erosion of posts and roles in the current difficult financial climate. Denise O'Shaughnessy reports on the excellent Chief Medical Officer's Seminar held in March 2007 to develop BBT3. This identified the key themes for the new HSC including the closer integration of the principles of BBT into NHS care, improving the safety and effectiveness of transfusion – especially in medical patients and obstetric practice, and developing the essential support and monitoring infrastructure to make this possible. Importantly, the Seminar identified increased patient and public involvement in the BBT initiatives as a priority. Developing an evidence base for clinical transfusion underpins many of these aspirations and we include articles about the Systematic Reviews Initiative by the Oxford team, a review of clinically focused research in transfusion medicine by Simon Stanworth and the use of blood in obstetrics by Sue Pavord. In targeting our limited resources it is important to know what we are doing badly, or well, at present. Hence, we publish three important audits on the use of red cells in medical patients in the N Thames region (we need better audit standards), the National Comparative Audit of Platelet transfusion (poor compliance with guidelines) and overnight transfusions (they don't facilitate early hospital discharge). In relation to implementing something we know to be effective, Joan Jones and Catherine Howell report on the new multidisciplinary UK Cell Salvage Action Group. Finally, Clare Taylor and Tony Davies write about developing the world-leading UK SHOT haemovigilance initiative and describe their new roles in the organisation. Many thanks to all the contributors for producing such stimulating and relevant articles.

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The Chief Medical Officer's Third Seminar on Better Blood Transfusion - 16th March 2007

The third Better Blood Transfusion (BBT) seminar took place at the Royal College of Anaesthetists. 120 participants were invited to represent the key users of the transfusion services including Obstetrics, Surgery, Medicine, Haematology and Critical Care, as well as the Executive and Blood Services of the devolved administrations. The objective of the seminar was to give users an input into the possible future aspects of the initiative and take-on-board any comments and suggestions. The meeting format was that of a plenary session, followed by audience participation workshops.

Sir Liam Donaldson, Chief Medical Officer for England (CMO) officially opened the meeting and chaired the morning session. He reiterated the success of the first two Health Service Circulars, but stressed that further work was required regarding transfusion safety and appropriate blood usage.

Looking back at the last 5 years, there has been an overall reduction in red cell demand by 15.7%, but this decrease has been seen mainly in surgery, leaving medical use still accounting for about 65% of usage. The CMO indicated that attention therefore should be concentrated on reducing inappropriate use in medicine. The focus however was not all on red cell usage. Recent audits indicated considerable inappropriate usage of fresh frozen plasma (FFP) and platelets and that these also need to be a focus for reduction.

The aims of the CMO's BBT3 conference could be summarised in five key points:

- To build on the success of the previous Better Blood Transfusion initiatives
- To monitor the use and effectiveness of blood transfusion
- To avoid the use and unnecessary use of red cell transfusion in medicine
- To use FFP and platelet transfusions according to guidelines
- To minimise the risks in the most vulnerable such as newborn babies and pregnant women.

The Deputy CMOs of the devolved administrations gave a summary of their own initiatives, including the e-learning package and on-line recording and assessment system in Scotland, the cell salvage programme in Wales and an appropriate use of red cells audit led by Dr Damien Carson in Northern Ireland.

The next part of the meeting covered the key issues with the review of BBT2. These included benchmarking and use of data, new challenges for transfusion safety, obstetrics and the use of anti-D. It focused on what resources are needed to achieve BBT, NHS Blood and Transplant (NHSBT) contribution, modernisation of the hospital transfusion service, and most importantly putting the patients at the heart of the BBT initiative.

There were then five workshops resulting in the following seven recommendations:

1. Ensure that Better Blood Transfusion is an integral part of NHS care

The 2006 audit of Trust compliance with the Health Service Circular 2002/009 'Better Blood Transfusion – Appropriate Use of Blood' demonstrates that many of the actions have already been implemented. Implementation of some of the actions has been aided by the information contained in the Department of Health Better Blood Transfusion Toolkit (2004) *www.transfusionguidelines.org/toolkit.*

The Hospital Transfusion Committee (HTC) and members of the Hospital Transfusion Teams (HTT) are key to drive the safe and appropriate use of blood at Trust level.

Education and training are key elements of safe practice and use of the learnbloodtransfusion e-learning package is recommended (*www.learntransfusion.com*).

Comparative audit can be used as evidence to help meet the NHS Standards for Better Health. The National Comparative Audit (a collaborative between NHSBT and The Royal College of Physicians) now conducts its audits through web-based questionnaires.

Participation in audit is essential to drive best practice and improve transfusion safety. It is acknowledged that there are competing demands on Trust Clinical Audit Departments and members of the Hospital Transfusion Team. However, blood transfusion audit needs to become an integral part of the hospital audit schedule.

2. Make blood transfusion safer

All aspects of the transfusion process should be risk assessed and audited regularly. The National Patient Safety Agency advocates the correct identification of the patient *www.npsa.nhs.uk*.

Transfusion Laboratories are regulated by the MHRA. There is an increasing concern about the number of laboratory incidents, so an initiative is being led by the Institute of Biomedical Scientists to better understand the optimum staffing levels and skill mix for Transfusion Laboratories.

3. Avoid unnecessary use of blood and components in clinical practice

The 2006 survey of compliance with BBT reports that 91% of Trusts have policies in place for red cell transfusions and 91% of all hospitals have pre-operative assessment (now a National Confidential

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Enquiry into Patient Outcome and Death (NCEPOD) requirement). However only 76% consider the topic of transfusion. There is a need to adapt local procedures to include blood transfusion to ensure that patients' haemoglobins are optimised prior to surgery.

Only 70% have policies for blood components, hence the focus on platelets and FFP in the 3rd HSC. An audit of the use of platelets has recently been reported and a national audit of the use of frozen plasma products is planned for 2008. The Department of Health Toolkit is currently being reviewed and new information added to support this new focus.

4. Improve safety of blood transfusion in obstetrics

This is a new objective and predominately a safety issue. It has been included in the new HSC as the number of adverse events relating to the use of anti-D is increasing (as reported by SHOT).

5. Increase patient and public involvement in BBT

This is one of the 7 pillars of Clinical Governance in the NHS plan. There is a range of patient information leaflets about blood transfusion provided to Trusts by NHSBT. A leaflet to address blood transfusion in the multi-transfused patient still needs to be developed. Building on the recent National Patient Transfusion Awareness Campaign, there is a need to build and sustain patient input into transfusion issues.

6. Monitoring of the arrangements for BBT

The effective use of data is fundamental to help improve transfusion practice. The need to ensure that services for Better Blood Transfusion are operating effectively and that they are part of local performance management arrangements is acknowledged.

7. External support required to deliver BBT

NHSBT plays a key role in supporting national, regional and local transfusion activities. NHSBT has committed its ongoing support for the safe and appropriate use of blood in its new strategic plan.

For a full meeting summary and to view the presentations from the CMO's Better Blood Transfusion Seminar, please visit the BBT Toolkit on the transfusion guidelines website *www.transfusionguidelines.org.uk*.

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Results of Questionnaire Surveys on the Implementation of the Health Service Circular 2002/009 'Better Blood Transfusion – Appropriate Use Of Blood'

Background

A survey in 2001 of the implementation of the HSC 1998/224 *Better Blood Transfusion* showed that most hospitals had established Hospital Transfusion Committees (HTCs), participated in the SHOT scheme, and had protocols for the administration of blood (Murphy *et al*, 2003). However, there was evidence of poor provision of training for clinical staff and patient information, few protocols for the appropriate use of blood, few audits of transfusion practice, and limited use of autologous transfusion.

A second UK CMOs' Seminar on blood transfusion *'Better Blood Transfusion'* was held in October 2001 with the objective of setting the agenda for NHS transfusion services, focusing on:-

- Providing better information to patients
- Avoiding unnecessary transfusion
- Making transfusion safer
- Ensuring *'Better Blood Transfusion'* is an integral part of NHS care

The Health Service Circular *'Better Blood Transfusion – Appropriate Use of Blood'* (HSC 2002/009) was issued in July 2002, detailing the actions required of NHS Trusts, the National Blood Service and clinicians to improve transfusion practice. It included an action plan and an ongoing programme for *Better Blood Transfusion* to be implemented in each Trust by April 2003.

The National Blood Transfusion Committee (NBTC) recommended that regular questionnaire surveys should be carried out to determine progress in the implementation of the recommendations in HSC 2002/009. Surveys were carried out in April 2003 and April 2004, and the results were published (Murphy & Howell, 2005). A further survey was carried out in November/December 2006 to inform the third *Better Blood Transfusion* Seminar held on 16th March 2007.

Results (see Table)

156/173 (90%) NHS Trusts responded to the 2006 survey. This was comparable to the 2004 survey, and a marked improvement on the response rate to the 2001 and 2003 surveys, largely due to the efforts of the NBS Transfusion Nurse Liaison team in encouraging hospitals to complete returns.

The questionnaire was completed by different groups of staff, most frequently by transfusion practitioners (47%) and haematologists (25%).

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The key results included:

- 149/156 (96%) of Trusts have Hospital Transfusion Teams (HTTs) with a lead consultant for transfusion, one or more transfusion practitioners and a senior biomedical scientist. However, the 2006 survey found that over 50% of lead consultants have no dedicated sessions for transfusion work. A separate recent survey of transfusion practitioners raised concerns that they are not being reappointed when they leave and that the role is being extended to include a greater proportion of direct clinical activities.

- Over 80% of nurses and doctors receive training in transfusion at their induction. 88% of nurses receive annual training, but only 54% of doctors. E-learning may be a vehicle for improving training; an e-learning package has been made readily available to Trusts at: *www.learnbloodtransfusion.org.uk*.

- Participation in local, regional and national audit have all increased. 96% of the Trusts responding to this questionnaire had participated in the national audit of bedside practice carried out by the Royal College of Physicians/National Blood Service national comparative audit of blood transfusion programme in 2005. This audit found evidence of improved bedside practice, but there were still too many patients (6%) with inadequate identification i.e. without wristbands, and too many (25%) not being adequately monitored during transfusions. 138/156 (88%) of Trusts indicated they have taken steps to improve bedside practice since the national audit.

- 149/156 (96%) of Trusts had policies for good blood usage in some but not all clinical specialties e.g. the use of red cell transfusions in surgery (58%) and critical care (70%), the use of platelet transfusions in haematology (78%), and the management of over-anticoagulation (80%).

- Although most Trusts (98%) have pre-operative assessment clinics, only 119/156 (76%) indicated that pre-operative assessment allowed the optimisation of blood counts and haemostatic function in advance of surgery.

- 78% of Trusts carry out intra-operative cell salvage, but only 36 Trusts (23%) salvage more than 100 units of blood/year.

- 144/156 of Trusts (92%) provide patients with written information, usually in the form of National Blood Service information leaflets, but only 16 Trusts (10%) estimated that more than 50% of transfused patients receive written patient information.

The results indicate progress in the implementation of Better Blood Transfusion between 2001 and 2006:-

- An increase in Hospital Transfusion Committees
- An increase in CPA accreditation
- An increase in Transfusion Practitioners
- An increase in the number of staff who have received transfusion training
- An increase in the development of protocols for the appropriate use of blood
- An increase in transfusion audit activity
- An increase in the number of Trusts indicating that patient information is provided to patients attending pre-assessment clinics

There is the need for further progress in the following areas:-

- Training of staff
- The development of HTTs in Trusts including a transfusion practitioner and lead consultant for Transfusion
- The development of protocols for the appropriate use of blood
- The provision of information to patients
- Intra-operative cell salvage

There was evidence of regional variation in the responses to most of the questions, particularly in the development of and support for HTTs, training, audit activity, the development of protocols for the use of blood, and the use of intra-operative cell salvage. The national and regional results are available on the National Blood Transfusion Committee section of *www.transfusionguidelines.org.uk*.

Conclusions

- There has been good progress in the implementation of some but not all of the recommendations in the action plan of the HSC 2002/009 *Better Blood Transfusion - Appropriate Use of Blood*.
- The detailed results have been provided to Regional Transfusion Committees for wider dissemination in a format to allow comparison with other Trusts and Regions. This information should be used to plan further local and regional initiatives to implement the *Better Blood Transfusion* action plan and improve transfusion practice.

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Progress on the implementation of "Better Blood Transfusion" since 2001 in NHS hospitals (2001 and 2003 surveys) and NHS Trusts (2004 and 2006 surveys).

	2001	2003	2004	2006
Completion of the questionnaire	220/320 (69%)	122/259 (47%)	160/169 (90%)	156/173 (95%)
Participation in SHOT HTC CPA accreditation	96% 91% 73%	100% 98% 87%	99% 99% 91%	95% 97% 91%
Training of staff:- Phlebotomists Porters Nurses Medical staff	 79% 47% 78% 21-48%	 97% 75% 52% 53%	 97% 80% 73% 60%	 74% 69% 83% 87%
Transfusion Practioner or equivalent Lead Consultant for Transfusion	14% -	50% 74%	68% 83%	92% 90%
Protocols for the transfusion process	98%	97%	98%	96%
Protocols for the use of blood:- Surgical blood order schedule	67%	87%	92%	97%
Red cell transfusion – critical care Red cell transfusion – surgery	34%	44% 34%	46% 39%	70% 58%
Over-anticoagulation	35%	73%	76%	80%
Hospitals/Trusts carrying out transfusion audit	79%	National – 92% Regional – 66% Local – 79%	National – 89% Regional – 74% Local – 89%	National – 98% Regional – 89.7% Local - 96.8%
Patient information	50% of hospitals indicated they provided written information, but only 8% of hospitals estimated that >50% of transfused patients received it.	52% of hospitals indicated it was offered to surgical patients attending pre-assessment clinics.	80% of Trusts indicated it was offered to surgical patients attending pre-assessment clinics.	92% of Trusts indicated that patients likely to receive blood are offered written information. 66% did not know how many Trusts received this information and only 11% of hospitals estimated that >50% of transfused patients received it.

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Cell Salvage

		2004		2006	
Use of intra-operative cell salvage		97/160	(61%)	121/156	(78%)
Number of units	<10	4/97	(4%)	3/121	(2%)
	10-19	10/97	(10%)	10/121	(8%)
	20-49	20/97	(21%)	12/121	(10%)
	50-99	7/97	(7%)	16/121	(13%)
	100-200	8/97	(8%)	18/121	(15%)
	>200	16/97	(16%)	18/121	(15%)
	Not known	32/97	(33%)	44/121	(36%)
Use of post- operative cell salvage		90/160	(56%)	100/156	(64%)
Number of units	<10	8/90	(9%)	5/100	(5%)
	10-19	5/90	(6%)	1/100	(1%)
	20-49	11/90	(12%)	5/100	(5%)
	50-99	7/90	(8%)	6/100	(6%)
	100-200	11/90	(12%)	12/100	(12%)
	>200	19/90	(21%)	20/100	(20%)
	Not known	29/90	(32%)	49/100	(49%)

Results of a UK Transfusion Practitioner Survey

The Transfusion Practitioner (TP) role was originally established in 2000 primarily as a nursing role focusing on education and training. The scope of the role has considerably expanded over the last few years, and TPs from a range of professional backgrounds now have a broad remit in driving the wider safe and appropriate use of blood agenda.

The number of TP appointments has significantly increased since 2001, when a survey of compliance with *Better Blood Transfusion* reported that 14% of respondents (69% of hospitals in England and North Wales) had a TP in post.

The 2006 re-audit of compliance with Better Blood Transfusion (in which 90% of NHS hospitals participated) indicated that 92% of them employed a TP.

However, as previously reported in an article on the role of the TP in the autumn 2006 edition (Issue 20) of Blood Matters, there are a number of concerns about the threat to the TP role. Issues regarding the impact of Agenda for Change and dilution of the TP role where there is pressure to do 'hands on' clinical and laboratory practice, are having an adverse impact.

Table 1

	% Participation	% Trusts/ Divisions with TP
England	95%	89%
Wales	83%	90%
Scotland	100%	93%
Northern Ireland	100%	82%

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To gain more detailed information regarding the exact number of TP appointments and more information on the current scope of the TP role, a questionnaire survey was sent to Trusts in England and North Wales in late 2006. The survey was produced in collaboration with the Chief Medical Officer's National Blood Transfusion Committee and the devolved administrations were invited to participate.

There was a high participation rate across the UK. The findings reported a high percentage of TPs in post within each country (table 1).

However, there was a significant variation in the whole time equivalents within Trusts/Divisions (range 0.2 – 3.0). There was no correlation between the size of the Trust (categorised according to the number of annual red cell issues) and the TP resource. A significant number of TPs cover multiple sites with the number of sites ranging from 1-12.

The results of the survey also indicated that TPs have an extensive remit to their role. In many Trusts/Divisions the focus has shifted from education and training, to supporting the introduction of alternatives to transfusion, activities to support compliance and policy and guideline development. As many as 18% of TPs have a dual role in a range of areas including haematology, anticoagulation, intravenous access team and laboratory roles.

The management reporting line for some TPs is unclear; whilst many TPs report to Directors of Nursing, Pathology Managers and Consultant Haematologists, several TPs indicated that they have multiple reporting lines which often led to conflicting priorities and a lack of 'ownership' of the role.

The key findings from the survey were presented at the *Better Blood Transfusion* seminar in March 2007. The need to reinforce the TP role was highlighted as essential for inclusion in the next Health Service Circular. A greater emphasis on the importance of TP resource being sufficient for the size of the Trust/Division was requested.

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SHOT - The Next Generation

SHOT, the Serious Hazards of Transfusion reporting scheme, has indisputably been at the forefront of haemovigilance both in Europe and worldwide, providing an excellent model for new systems in other countries. However haemovigilance in the UK is reaching a watershed, partly forced on it by the BSQR (Blood Safety and Quality Regulations) and the possibility of future regulation. In order to maintain its world class status SHOT has to evolve and encompass all the required strands of haemovigilance reporting.

There is an absolute requirement for a proactive, professionally led haemovigilance system in the UK which informs policy, guidelines, standards and clinical research. At the same time there is now a legal requirement for data on adverse incidents to be collected and forwarded annually to the EU Commission for trend analysis and international comparison – a role undertaken in the UK by the Medicines and Healthcare products Regulatory Agency (MHRA). Ideally a single system might be able to fulfil both the professional and regulatory role, but there are many legal and logistical impediments to achieving this. The continuing and future success of SHOT, however, depends on it being able to respond to a changing regulatory structure in the UK and the broadening international arena in which it must perform.

Following the impact of Agenda for Change, the SHOT office has been depleted of staff, with Hilary Jones, the Scheme Manager, being the sole full time member of staff remaining. However there are now two new members of the team; Dr Clare Taylor has been appointed to the post of National Medical Co-ordinator from mid-July 2007 following the retirement of Dr Dorothy Stainsby and Tony Davies has joined SHOT as Transfusion Liaison Practitioner, building on the excellent work of Rebecca Gerrard during her 2 year secondment, supporting clinical colleagues in hospitals to deliver better transfusion practice and effective haemovigilance.

Dr Taylor joined the National Blood Service as a Consultant in 1999, in a joint appointment with the Royal Free Hospital. Over the years she has become increasingly interested in and involved with haemovigilance, having joined the SHOT writing group in 2001, as well as continuing her direct experience of hospital and laboratory practice, through the hospital post and the Patient's Clinical Team (PCT) of the NBS. Dr Taylor now continues as Transfusion Consultant at the RFH, but has left the PCT in order to devote 3 days per week to SHOT.

In January 2004, as a member of the NHS Blood and Transplant Appropriate Use of Blood subgroup, Dr Taylor was tasked with setting up a group to examine the impact of the European Directive on hospitals. This became the Operational Impact Group, and Joan Jones, Manager, Hospital Transfusion Practitioner Scheme, Welsh Blood Service, (Chair of OIG) asked Dr Taylor to set up the OIG-Adverse Event subgroup specifically to evaluate the requirements of the BSQR in relation to adverse incident reporting. The AE subgroup was able to foster a more effective and symbiotic relationship between SHOT and the MHRA. The two haemovigilance systems currently run in parallel and are mutually supportive. Dr Taylor has

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been closely involved in developing the new database and on-line reporting system, SABRE (Serious Adverse Blood Reactions and Events), via collaboration between the OIG-AE and the IT department at MHRA and this has the potential for further enhancement and expansion. SABRE allows the collection of data to fulfil the specified legal requirements of the BSQR alongside the collection of detailed clinical data and narrative which is the cornerstone of SHOT investigation and analysis. The two systems co-exist and can share data, although the professional, academic and educative role of SHOT and the legislative role of MHRA remain quite separate. However there is regular contact between SHOT and MHRA on a day to day basis as well as through the OIG-AE.

In March 2006 Dr Taylor formalised her work with MHRA by becoming a contracted Consultant to advise primarily about haemovigilance issues and analysing the SABRE database. This dual role has further consolidated the relationship between SHOT and MHRA. The OIG-AE has disbanded, and the new AE subgroup of the MHRA Blood Consultative Committee, chaired by Dr Taylor, will take over many of the tasks of OIG-AE.

Tony Davies took up his post in May 2007. He brings in-depth experience both as a Transfusion Laboratory Manager and Transfusion Practitioner at Hope Hospital Salford, and will be working jointly between SHOT and the NBS Hospital Liaison team, also linking to the UK Better Blood Transfusion Network. The role is divided 'equally, but flexibly' between the two areas, which creates particular pressures with regard to time and workload management, as it would be quite easy to work full time exclusively on one or the other. In fact, many of the queries Tony receives cover both aspects of the role, and a typical phone call often goes something like; "…well, thanks for answering that question, and now with your SHOT hat on…" However this joint appointment allows Tony to develop the role and respond to the increasing requirement of reporters for real-time analysis and feedback relating to adverse events in transfusion, with discussion of learning points and potential corrective measures and sharing of experiences and practice between sites.

One enormous advantage is the ability to utilise the extensive Transfusion Practitioner and Hospital Liaison communication network in order to get important SHOT information to, and receive feedback from, end users quickly and effectively. There is a huge educational potential to the role, and SHOT hopes to produce more directly usable educational material in the future.

The current practical focus is to deliver the 2006 SHOT report, launched on 20th November in Birmingham. At the same time wheels are in motion to increase funding for SHOT (currently well below the levels for comparable haemovigilance systems abroad) and make further key senior appointments to the team, and a proper investment in IT so that data can be accessed, queried and analysed electronically. This will allow for full exploitation of SHOT's main asset, its 10 years of detailed data, a resource unparalleled anywhere in the world. There are also plans to broaden the remit of SHOT, including full Near Miss reporting, and inclusion of new categories such as TACO (transfusion associated circulatory overload) and inappropriate transfusion. Liaison and standardisation with haemovigilance systems in Europe and beyond will be pursued actively, with Dr Taylor already set to become Secretary of the EHN (European Haemovigilance Network) later this year.

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National Comparative Audit of Platelet Transfusion Practice in the UK

Introduction

In the year 2005-06 over 217 000 units of platelets were issued to hospitals in England, at a cost of £ 47.7 million. While platelet transfusion remains an essential part of modern healthcare, there are significant risks of blood component therapy (SHOT Reports 2003, 2004, 2005) and it is important to ensure appropriate clinical use.

The audit examined appropriateness of platelet use against audit standards drawn, where possible, from the current national guidelines (BCSH, 2003). The aim of the audit was to identify areas of practice for improvement, and to allow hospitals to compare their own practice with the national data.

Methods

All NHS trusts and independent hospitals in the UK were invited to participate in the audit. The target audit sample was 40 consecutive patients receiving a platelet transfusion - 10 intensive care unit (ITU) patients, 15 haematology, 10 cardiac and 5 cases from other medical or surgical disciplines, grouped as the miscellaneous category. Patients of all ages were eligible. Current practice was evaluated against the audit standards.

Audit Standards:

The audit standards used to determine appropriateness are summarised in the following table:

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Cardiac surgery:

- Patients undergoing cardiopulmonary bypass surgery should only receive platelet transfusion if there is uncontrolled, non-surgical, bleeding. *(Level of evidence - BSCH recommendation, Grade A, level 1b).*
- Platelet count should be checked before platelet transfusion is given.

Haematology:

- The threshold for prophylactic platelet should be a pre- transfusion count of ″10 x 10^9/L. This applies to all cases except patients with sepsis, acute promyelocytic leukaemia (APML), or abnormal clotting, where a pre-transfusion platelet threshold ″ 20 x 10^9/L is considered appropriate *(Level of evidence: BCSH grade A, level Ib).*
- Platelet transfusion is not necessary for bone marrow biopsy *(Level of evidence: BCSH grade C, level IV).*
- If platelet transfusion is given to raise platelet counts before an invasive procedure, a) pre-transfusion count should be less than 50, and b) post transfusion count should be checked *(Level of evidence: BCSH grade C, level IV)*

ITU:

- Routine prophylactic platelet transfusion should not be given unless a pre-transfusion platelet count is less than 30 x 10^9/L *(Audit Standard – BCSH guidelines do not define a threshold for this group of patients).*
- If platelet transfusion is given to raise platelet count before an invasive procedure, a) pre-transfusion count should be less than 50 x 10^9/L , and b) post-transfusion platelet count should be checked *(Level of evidence: BCSH grade C, level IV).*
- If platelet transfusion is given to control bleeding (excluding CNS and ophthalmic bleeding), pre-transfusion platelet count should be less than 50 x 10^9/L *(Level of evidence: BCSH grade C, level IV).*

Miscellaneous category:

- The threshold for routine prophylactic platelet transfusion (low platelet count, in the absence of bleeding or a clotting abnormality) in medical patients should be a pre-transfusion count of ″ 10 x 109/L *(Level of evidence: BCSH grade A, level Ib).*
- The threshold for routine prophylactic platelet transfusion in medical patients with a clotting abnormality (but no bleeding) should be a pre-transfusion count of ″ 20 x 10^9/L.
- Where platelet transfusion is given to raise platelet counts before an invasive procedure, a) Pre-transfusion count should be ″ 50 x 10^9/L (BCSH) , *and* b) Post-transfusion platelet count should be checked *(Level of evidence: BCSH grade C, level IV.*
- Where platelet transfusion is given to control bleeding (excluding CNS or ophthalmic bleeding), pre-transfusion platelet count should be <50 x 10^9/L *(Level of evidence: BCSH grade C, level IV)*

Audit sample

The audit examined platelet use in 4,421 patients, from 182 NHS, and 5 independent hospitals in the UK. The audit sample consisted of 2125 haematology patients, 912 ITU patients, 361 patients undergoing cardiac surgery and 1023 patients assigned to the miscellaneous category. Of 4,421 platelet transfusions audited, the reason for platelet transfusion was stated for 93% (4112/4421); of these 54% (2204/4112) were given for prophylaxis. Overall 70% (3148/4421) of platelet transfusions were given to haematology or ITU patients.

Key findings – National results

The audit highlights a significant lack of compliance with the current BCSH guidelines and other audit standards. Of 4,421 transfusions audited, appropriateness could be determined for 3,734 (84%) transfusions. Of 3,734 transfusions, 45% (1681/3734) did not comply with the audit standards. The main findings are summarised below for each audit category.

MAIN FINDINGS OF CARDIAC AUDIT

- Of 362 platelet transfusions given to patients undergoing cardiac surgery, appropriateness could be evaluated for 238 transfusions. Of these, 23% (54/238) did not comply with the audit standards. However, as the reason for transfusion was not documented for over 30% of cardiac cases, it is possible that this figure is an underestimate.
- 59% (174/293) platelet transfusions given to patients undergoing a cardiac procedure involving cardiopulmonary bypass (CPB) comply with the current BCSH guidelines as the reason for transfusion was to control bleeding.

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- 17% (61/361) of patients receiving a platelet transfusion did not have their pre-transfusion platelet count checked. Where a pre-transfusion platelet count was checked, it was done on the same day as transfusion in only 55% (198/361) of cases.

- 54% (21/39) of patients undergoing a surgical procedure that did not involve CPB, were given a platelet transfusion when a pre-transfusion count was > 80 x 10^9/L (well in excess of the recommended platelet count). The fact that 13/21 patients in the non-CPB category were not on anti-platelet drugs, makes it even more difficult to justify these transfusions.

MAIN FINDINGS OF HAEMATOLOGY AUDIT

- Of 2125 platelet transfusions given to haematology patients, 1867 transfusions could be evaluated for appropriate use. Of these, 43% (803/1867) did not comply with the audit standards.

- The majority (60%, 653/1090) of haematology patients who received platelet transfusion for routine prophylaxis (in the absence of any haemorrhagic manifestation or high risk of bleeding), were transfused when pre-transfusion count was > 10 x 10^9/L.

- The vast majority of patients who were not bleeding and did not undergo an invasive procedure, but had sepsis, were on antifungals (excluding prophylactic antifungal therapy) or had acute promyelocytic leukaemia (APML, n5), received prophylactic platelet transfusion when a pre-transfusion count was ≥ 20 x 10^9/L.

- 30% (448/1419) of inpatients receiving platelet transfusion did not have pre-transfusion platelet count checked on the same day.

- 16% (43/262) of patients who received prophylactic platelet transfusion prior to an invasive procedure, had a pre-transfusion count of ≥ 50 x 10^9/L, and post-transfusion count was not checked in 21% (54/262).

MAIN FINDINGS OF ITU AUDIT

- Of 912 transfusions given to ITU patients, 823 could be evaluated for appropriate use. Of these, 56% (463/823) did not comply with the audit standards.

- The majority (59%, 139/236) of patients, who received platelet transfusion in the absence of bleeding, or a planned invasive procedure, were transfused when pre-transfusion platelet count was ≥ 30 x 10^9/L.

- 42% (67/161) of patients who received platelet transfusion prior to an invasive procedure had a pre-transfusion count of ≥ 50 x 10^9/L.

- 46% (196/426) of patients who received platelet transfusion to control bleeding, had a pre-transfusion platelet count of ≥ 50 x 10^9/L.

MAIN FINDINGS OF THE MISCELLANEOUS CATEGORY AUDIT

- Of 1023 platelet transfusions given to patients in this category, appropriateness could be determined for 806 transfusions. Of these, 45% (361/806) did not comply with the audit standards.

- 35% (363/1023) of patients receiving platelet transfusions did not have a pre-transfusion platelet count checked on the same day as transfusion.

- The majority (66%, 107/161) of medical patients were transfused platelets for routine prophylaxis when the pre-transfusion platelet count was >10x10^9/L.

- 52% (57/130) of patients were given platelets transfusions to cover an invasive procedure despite the pre-transfusion platelet count being > 50 x 10^9/L.

- 38% (197/515) of patients who received platelets for a haemorrhagic manifestation had pre-transfusion platelet count of ≥ 50 x 10^9/L.

Discussion

The results show a significant non-compliance with the current guidelines in all clinical categories examined, highlighting the need to re-evaluate current platelet transfusion practice in all areas. Most notable non-compliance was observed in the setting of prophylactic platelet transfusions in haematology, ITU and medical patients who were thrombocytopenic but stable, with no evidence of bleeding. However, it should be noted that the observed non-compliance does not necessarily mean that all non-compliant transfusions were inappropriate, but rather that platelets were transfused at a higher threshold than that recommended in the guidelines. Likewise it is not possible to translate the level of non-compliance to an equivalent reduction in platelet use that might be achieved by improving compliance with the guidelines; however better compliance is likely to achieve a reduction in platelet usage and the associated cost, as well as improve platelet availability.

There are several reasons that might explain a degree of non-compliance with the recommended transfusion thresholds in the reality of clinical practice, as described in the recently published literature (Cameron *et al,* 2007; Greene *et al,* 2007; Bracer, 2007). However there is evidence that an overall reduction in platelet use may be achieved by adopting lower transfusion thresholds (Rubella *et al,* 1997; Heckman *et al,* 1997; Dietrich *et al,* 2005).

Recommendations

Based on the audit findings, the following recommendations were drawn and hospitals were asked to develop and implement an action plan to address recommendations 1 to 4.

1. Hospital Transfusion Committees must ensure that there are written local guidelines for the use of platelets in all clinical specialties where platelet transfusions take place.

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2. Hospitals must educate clinicians of all grades responsible for making the decision to prescribe platelet transfusions.

3. Hospitals should carry out regular (at least annual) audits of compliance with the guidelines.

4. Hospitals should consider the implementation of new technologies such as point of care testing using thromboelastography to help guide the appropriate use of platelet transfusions in cardiac, liver and vascular surgery and for other surgical procedures with high risk of bleeding such as multiple trauma, massive haemorrhage and high risk obstetric surgery.

5. The BCSH should consider developing comprehensive guidelines for the use of platelets in ITU and cardiac surgery, in collaboration with the British Cardiovascular and Intensive Care Societies.

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Acknowledgement
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National Comparative Audit of the Use of Blood in Primary, Elective, Unilateral Total Hip Replacement (THR)

Introduction

Orthopaedic surgery accounts for 10% of red cells used in hospitals. Several audits have shown that 10 – 15% of red cell transfusions could be avoided in the perioperative period.

Aims and Objectives

- Do a comparative audit of performance indicators i.e. percentage of patients transfused and average number of units transfused per patient in THR among hospitals.
- Look at the effect of preoperative haemoglobin, pre-transfusion haemoglobin, American Society of Anaesthetists score and the use of cell salvage on performance indicators.
- Audit orthopaedic transfusion practice.
- Present individualised data to participating hospitals.
- Make recommendations to reduce inappropriate transfusions.

Method

The target sample was 40 consecutive patients undergoing THR at each participating hospital. Two hundred & twenty-three hospitals submitted data on-line for 7465 cases.

1) KEY PERFORMANCE INDICATORS

Nationally 25% of patients undergoing primary THR were transfused in 2006 compared to 51% in 2000. Two thirds of patients transfused received 2 units and about one quarter received 3 or more units.

2) PERFORMANCE AGAINST STANDARDS

a) Rationale Statement

Better Blood Transfusion 2 (BBT2) recommends that hospitals should ensure there are adequate arrangements for the preoperative assessment of patients. For planned surgery this assessment should permit the diagnosis and correction of anaemia and optimisation of haemostatic function perioperatively.

CRITERIA

The hospital operates a pre-assessment Clinic
The Clinic has the facility to perform a FBC
The Clinic has a mechanism for referral and correction of anaemia

COMMENT

Virtually all hospitals state that they have a mechanism for identifying and correcting anaemia pre-operatively.

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RATIONALE STATEMENT

The Association of Anaesthetists of Great Britain and Ireland (AAGBI) recommends that patients should have a full blood count performed when they are placed on the waiting list for elective surgery. They also recommend that anaemia should be identified and corrected during the pre-operative period.

CRITERIA

- **Every patient has a full blood count performed before surgery.**

  In this audit 29% (2177/7414) of patients did not have a haemoglobin reported within 28 days before surgery.

- The patient has a recent pre-operative Hb of 12 g/dl or more.

  In the audit 15% (795/5237) of those patients tested had a haemoglobin of less than 12 g/dl.

COMMENT

Despite hospitals having the facility to identify and correct anaemia preoperatively, 15% of patients are admitted for surgery with a haemoglobin of less than 12 g/dl which increases the likelihood of receiving donor blood threefold.

RECOMMENDATIONS

- Hospitals should have a written policy for identification and management of anaemia in pre-assessment Clinics.
- At initial consultation surgeons must ensure that patients have a full blood count, and that anaemic patients are investigated and steps taken to correct the anaemia before surgery.
- General Practitioners referring patients for surgery should take measures to optimise the haemoglobin.

STANDARD STATEMENT

Postoperative patients who are asymptomatic are not transfused unless their pre-transfusion haemoglobin concentration is less than 8 g/dl.

b) Rationale Statement

BBT2 recommends that Trusts should ensure appropriate blood transfusion policies are in place, implemented and monitored. AAGBI recommends that haemoglobin concentrations should be monitored perioperatively and guide red-cell transfusion. BCSH Guidelines state, in patients who may tolerate anaemia poorly, that transfusion of red cells is indicated when haemoglobin is less than 8 g/dl. Symptomatic patients should be transfused.

Criterion 1 – Hospitals have a policy that a decision to transfuse a stable post-THR patient is based on the haemoglobin level.
Forty-seven per cent (91/195)of hospitals had a policy. Nationally the haemoglobin trigger was less than 8 g/dl for 19%(17/91) 8 g/dl for 54% (49/91)and above 8 g/dl for 9%(8/91) and within a range(7-9 g/dl) for 14%(13/91).

Criterion 2 – An Hb is done before transfusion.
There were 1330 patients transfused during days 1 – 14 after surgery. Of these 88% (1167) had a postoperative pre-transfusion haemoglobin tested.

Criterion 3 – The pre-transfusion Hb value is less than 8 g/dl.
Fifty-two per cent (604/1167) of Hb values were less than 8 g/dl.

COMMENT

Forty-eight per cent of patients transfused had a pre-transfusion haemoglobin greater than 8 g/dl and in some of these patients transfusion could have been avoided. However, it is possible that a minority of patients were transfused on the basis of symptoms, blood loss or co-morbidity.

RECOMMENDATIONS

Every hospital should have a transfusion policy to guide transfusion in the peri / post operative period based upon one or more of the following:

- Symptoms
- Haemoglobin concentration
- Estimated blood loss

Trusts should ensure that their prescribers are aware that it is not necessary to transfuse patients who are asymptomatic, not bleeding and who have a haemoglobin of greater than 8 g/dl.

c) Standard Statement

Patients who are transfused 2 or more units of blood and whose post-transfusion Hb is above 10 g/dl, may have been transfused excessively.

RATIONALE STATEMENT

Patients whose pre-transfusion Hb was <7.9 g/dl should not be transfused to achieve a “normal” Hb concentration. It is appropriate to use a one unit transfusion to exceed the transfusion threshold of 8g/dl (AAGBI 2001, British Orthop Assoc 2001).

The number of units transfused was known for 1314 out of 1330 patients transfused during days 1 to 14 after surgery. Seventeen per cent (229) received one unit, 70% (922) received two units and 12% (163) received three or more units.

Of those given two or more units, 65% (609/944) had a post-transfusion Hb level of 10 g/dl or more. The post-transfusion Hb was unknown for 141 cases.

COMMENT

The majority of patients who have received 2 or more units of blood may have been unnecessarily over-transfused.

RECOMMENDATION

In order to avoid over-transfusion, single-unit transfusions may be appropriate. Hospitals should review the number of units transfused against their patients’ post-transfusion haemoglobin at regular intervals.

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Conclusion

There has been improvement in transfusion practice but there is still scope for further improvement.

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North Thames Regional Audit of Red Cell Transfusion in Medical Patients

The appropriate use of blood components is under increasing scrutiny. Various initiatives and the introduction of national guidelines have resulted in a reduction in the use of red cells, especially for surgical patients. However, use of red cells in medical patients now accounts for about 60-65% of red cells transfused (Wallis *et al* 2006, Farren *et al* 2007 - this edition pg 4) so attention is now focused on this group. The North Thames Regional Transfusion Committee therefore carried out an audit of use of red cells in adult medical patients, against the British Committee for Standards in Haematology (BCSH) guidelines on the use of red cells. In addition, the local hospital transfusion team, (HTT), assessed the clinical appropriateness of each transfusion, using information from the patient's notes.

All hospitals with a blood bank in the North Thames region were invited to participate in the audit. Data was prospectively collected from 20 consecutive medical patients (identified through transfusion laboratory records) receiving a red cell transfusion. Data collection commenced on the 1st January 2007 for each participating site and ended when 20 cases had been audited, or on 31st January 2007. Patients under the age of 16 years old, maternity patients, and those with thalassaemia or sickle cell disease were excluded from the audit.

Audit standards

Audit standards were taken from the BCSH guidelines.

1. Patients should have Hb and MCV levels tested in the 7 days prior to transfusion

2. Patients should have Hb levels tested within 72 hours of transfusion

3. Patients should not be transfused if the Hb level is >10g/dl

4. Patients should be transfused if the Hb is <7g/dl

5. Patients should be transfused if the Hb is between 7g/dl and 10g/dl and the patient has symptoms of anaemia or has additional pathology such as heart disease or malignancy

6. Patients should be transfused after an acute blood loss of >1500ml. Transfusion after a smaller blood loss is probably not indicated unless there is existing pathology such as heart disease or pre-existing anaemia

7. Patients should not be transfused if there is an effective alternative to correct the anaemia.

Results

20 hospitals participated out of a possible 28 hospitals. In total there were 290 evaluable transfusion episodes. The mean age of the patients was 68 years. The majority of patients transfused were haemato-oncology patients, (109/290, 37.6%) and the primary reason for transfusion was stated as haematological malignancy, (69/290, 23.8%). See figures 1 and 2.

- The pre transfusion Hb had been checked in the 7 days prior to transfusion in the majority of patients, (289/290) (standard 1).

- 25.2% of patients did not have Hb checked post transfusion (standard 2).

- 7.3% of patients had a pre transfusion Hb greater than 10g/dl (standard 3).

- 17.3% of the patients transfused had a Hb less than 7g/dl (standard 4).

- 75.4%, (218 patients) had a pretransfusion Hb between 7 and 10g/dl, the largest group (standard 5). 160 of these patients were noted to have symptoms related to anaemia, and 150 of these were assessed as being appropriately transfused by the HTT. 58 patients had no recorded symptoms, but 53 of these were thought appropriately transfused by the HTT.

- 53 patients were transfused because of acute blood loss but the size of the bleed was only recorded in 26 patients, and only 5 patients had a blood loss greater than 1500ml (standard 6).

- An alternative method for correcting anaemia was attempted in 38 patients, (13.1%), see figure 3 (standard 7).

Appropriateness of transfusion. Evaluation against the standards showed that 45/290, (15.5%) transfusions were inappropriate. The HTT evaluated only 17 of the 290, (5.9%) transfusion episodes as being inappropriate, Most of the discrepancy arose from haemato-oncology patients, where 3 cases were deemed inappropriate by the HTT, compared with 15 against the standards.

Number of units transfused per episode. The number of units transfused was recorded in 284 episodes, (97.9%). A total of 684 units were transfused, with a mean of 2.4 per episode.

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Figure 1 Specialty distribution of transfused patients (n = 290)

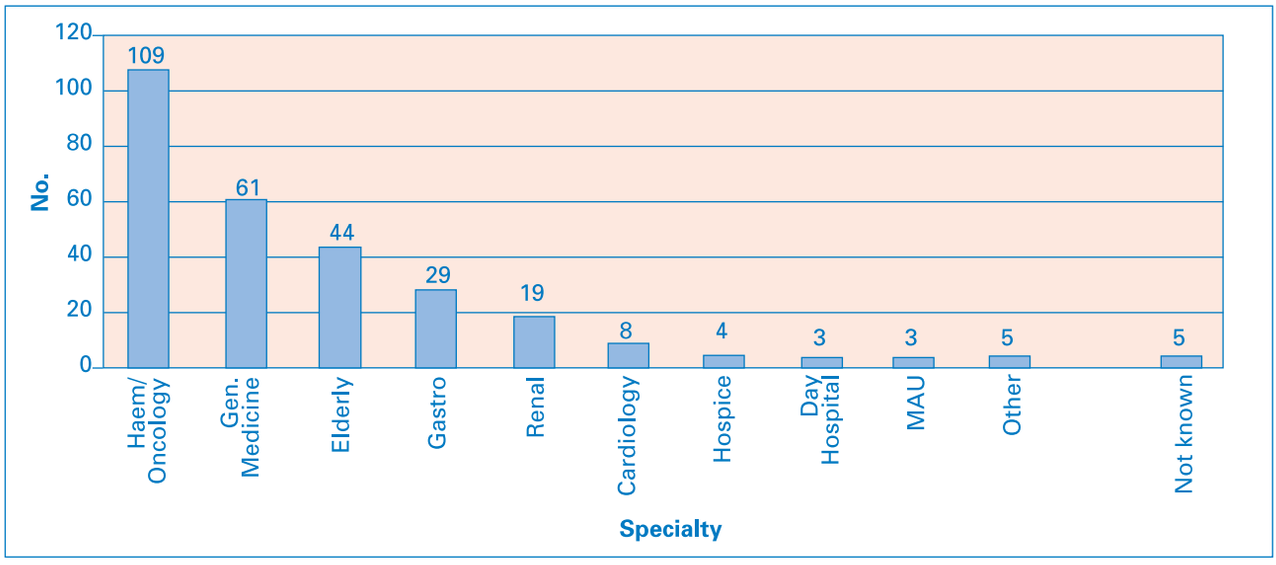


Figure 2 Primary clinical reason given for anaemia (n = 290)

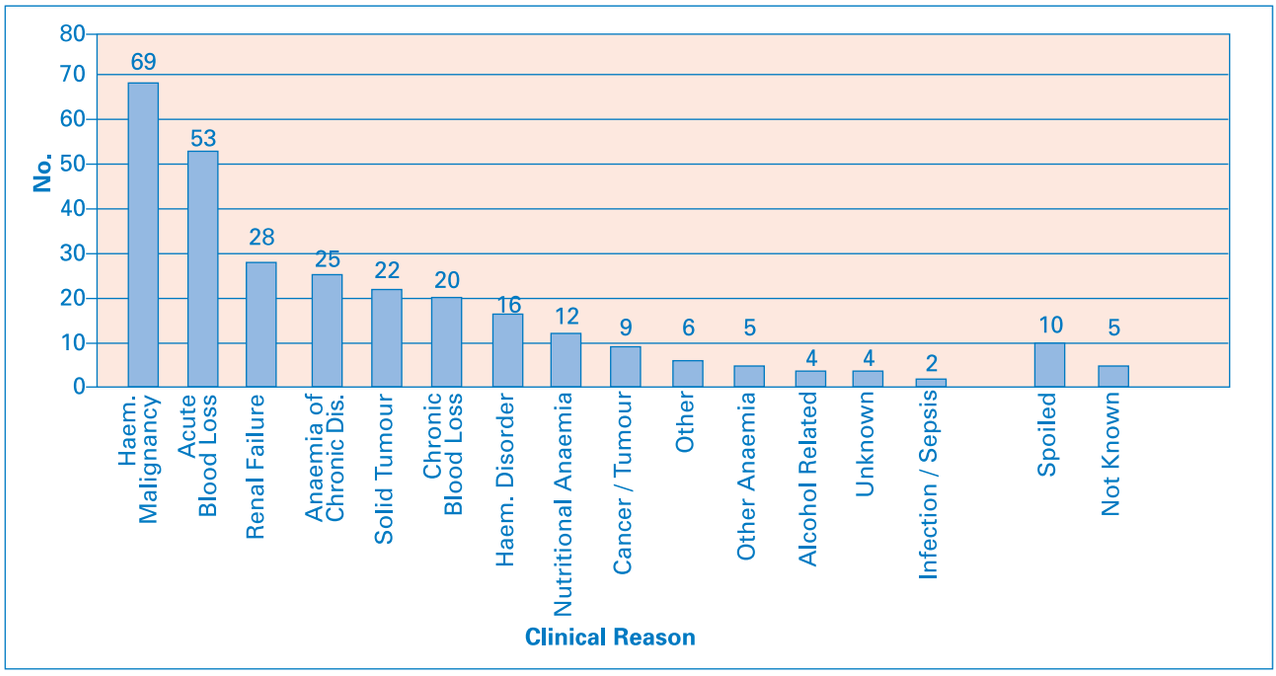
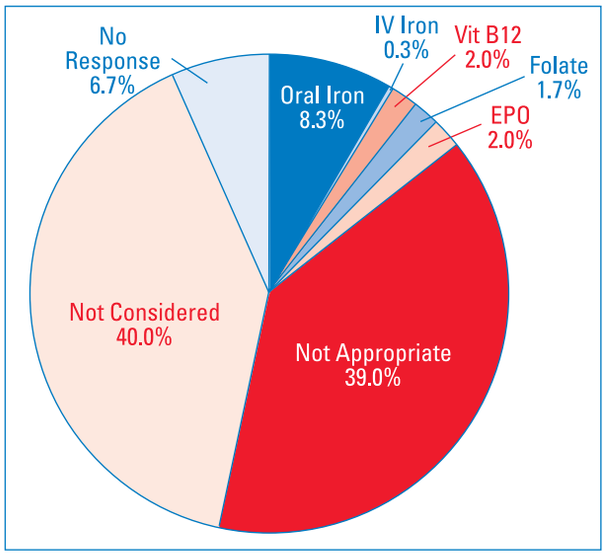


Figure 3 Use of alternative anaemia correction methods prior to transfusion (n = 290)



Post transfusion haemoglobin. This was available in 209 episodes. Mean post transfusion Hb was 10.2g/dl, range 6.3 – 14g/dl. Over 50% of patients had a haemoglobin greater than 10g/dl.

Conclusion. This audit has highlighted poor compliance with the standards, but also the difficulty of applying the standards to medical patients. Thelargest group is haemato-oncology patients. These patients may have a haemoglobin greater than 10g/dl or be asymptomatic when seen in clinic, but have a transfusion arranged because they are transfusion dependent on a predictable regime. This may explain some of the discrepancies between the HTT assessment of appropriateness, and the assessment against the standards. With bleeding patients it is sometimes difficult to assess the quantity of blood lost, whether or not the situation is ongoing, or whether there is acute on chronic blood loss.

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Compared with surgical patients, there are fewer alternatives to blood transfusion in medical patients, only 12 patients (4%) were transfused because of haematinic deficiency. Nevertheless, an alternative was not considered in 40% of cases.

Despite the difficulties in auditing blood use in medical patients, it is essential that patients are only transfused when necessary, because of the inherent risk of transfusion, and diminishing stocks. This audit has shown that in 50% of transfusions, the post transfusion Hb is greater than 10g/dl, which may suggest that some patients are over transfused: greater consideration should be given to the desired post transfusion haemoglobin. In patients with normal functioning bone marrow who are anaemic, a single unit transfusion may be sufficient for immediate symptomatic relief pending correction by slower methods, eg iron replacement. The greatest use of blood is in haemato-oncology patients, further detailed work should be done in this area, and use of erythropoietin clarified at a national level. Finally, audits rely on the quality of information available, but in 30.3% of cases, the clinical symptoms necessitating transfusion were not recorded in the patient notes, and not recorded on the proforma in a further 12.4%. Without this information it is impossible to determine the appropriateness of transfusion.

The results of this audit were presented at a regional update meeting and supported by expert educational sessions. A full report has been widely disseminated with individual hospitals being informed of their results.

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Overnight Transfusions Expose Patients to Unnecessary Risk and Seldom Facilitate Next Day Discharge

Introduction

SHOT highlighted the risks of overnight transfusion. Transfusions between 00:00 and 08:00 account for only 19% of all transfusions yet 37% of errors (in which the time was reported) were found to have taken place between 20:00 and 08:00. Of note, 48% of the overnight transfusions were stated to be routine. The SHOT report "Incorrect Blood Component Transfused Incidents" suggested that transfusion should not take place at night unless clinically indicated (SHOT report 2003).

The risks of overnight transfusion arise from the paucity of staff when compared to daytime to monitor patients and manage any complications that arise. Additionally, the darkness acts as a barrier to prompt detection of transfusion reactions. Setting up and monitoring a transfusion disturbs the sleep not only of the patient receiving the transfusion, but also of those nearby.

A reason offered for overnight transfusion is to enable patient discharge the following day. We examined the frequency of overnight transfusions as a proportion of all transfusions given. A snapshot study established that overnight transfusions were not uncommon and further investigation would be worthwhile. Fifty overnight red cell transfusions were then retrospectively assessed for clinical appropriateness. We also checked when the recipients were discharged.

Standards

'Overnight' was defined as commencing between 20:00 and 06:00 as between these times staffing levels are at their lowest. Appropriate transfusions were for patients who were experiencing:

- Active bleeding
- Symptomatic anaemia (e.g. severe shortness of breath/cardiac symptoms)
- Peri-operative blood loss

Inappropriate transfusions were for patients who:

- Were asymptomatic with a haemoglobin above the transfusion trigger (8 g/dl for general patients and 9 g/dl for those with cardiovascular disease)
- Had received one or more of units and could safety receive the remainder the following day

A further category was created for patients who were found to have no documentation surrounding the need for transfusion.

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Methodology

A snapshot study of a month looked at the total number of red cell units transfused (individual units), the number of patients transfused (transfusion episodes) and the proportion that took place overnight.

The full audit examined 50 sequential patients who received overnight transfusions identified from laboratory records. For these, the medical and nursing notes were scrutinised for evidence as to the reason for, and appropriateness of, each transfusion episode according to the stated criteria as well as the date of discharge. Actions were then identified and put in place. Six months later, a repeat snapshot study and audit were performed.

We attempted to identify any bottleneck in the transfusion process which might delay commencement of the transfusion. An IT tracking system would enable ready identification of a delay in any part of the process. In the absence of such a system we were only able to identify timings of certain points of the process namely – Full Blood Count authorisation, red cell issue, red cell collection and commencement of transfusion.

Results of first cycle

The snapshot showed 43% of red cell units were given to 40% of the transfused patients overnight.

The first audit (Figure 1) showed that only 20% of the overnight transfusion episodes were appropriate according to our criteria. Transfusions of patients with haemoglobins above the transfusion trigger accounted for 26% of cases. No documentation was found for 54% of patients. Furthermore, overnight transfusion did not seem to influence date of discharge (see Figure 3). Only 10% of the patients transfused were discharged the following day.

Recommendations and actions

The main action taken was to educate staff that inappropriate overnight transfusions compromised patient care and rarely allowed earlier discharge. A publicised change was also made to the blood transfusion policy.

Results of second cycle

The second snapshot showed only 12% of units being given to 14% of the transfused patients overnight.

Pleasingly the second audit (Figure 2) showed that the rate of appropriate transfusion rose from 20% to 60% and no patients were transfused above the transfusion trigger. A significant number of transfusions still had no clinical documentation. The next day discharge rate predictably fell slightly to 6%.

Figure 1 - appropriateness of overnight transfusion

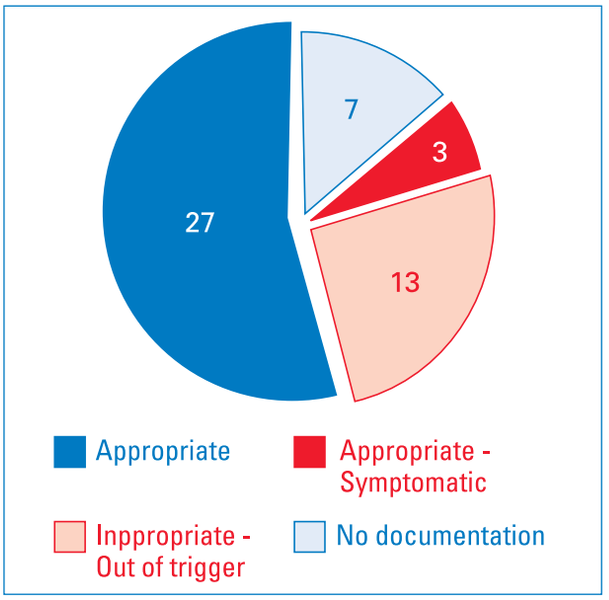


Figure 2 - appropriateness of overnight transfusion

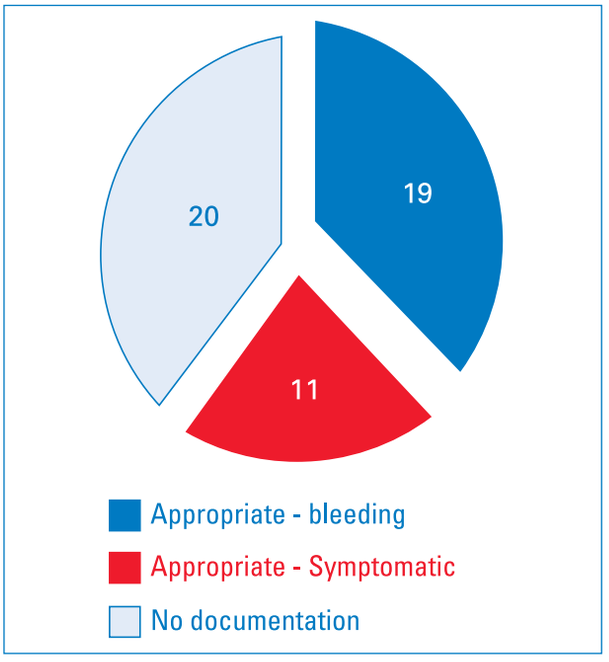
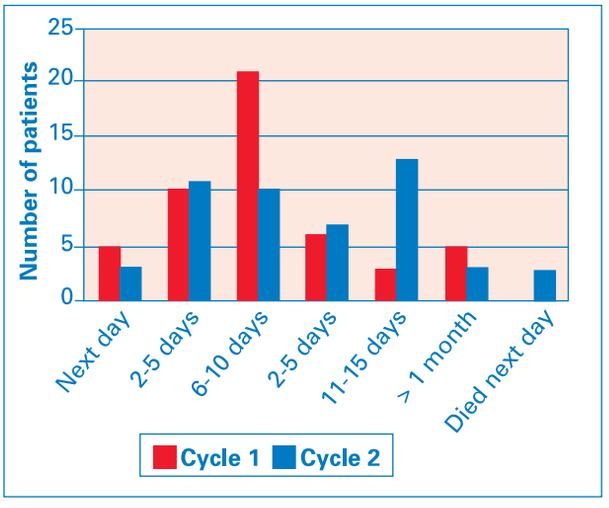


Figure 3 - days between completion of transfusion and discharge



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Discussion

It was evident that clinicians were unaware of the additional risks of overnight transfusion. When educated about this and of the lack of impact on discharge time, compliance with the amended blood transfusion policy increased. Disappointingly, several cases in each audit had no evaluable documentation. One may speculate that such cases might have fallen into the inappropriate category as one would hope that the appropriate indications would merit mention in the clinical record.

No obvious hold-up in the process to enable blood transfusion was identified therefore no straightforward interventions could be suggested to speed up the chain of events apart from general encouragement to maintain good communication between the laboratory and the ward.

Conclusion

Overnight transfusions expose patients to unnecessary risk and seldom facilitate next day discharge. No bottlenecks in the process leading to delay were identified. As with other multidisciplinary systems, individuals participating in the chain of service delivery (here specifically biomedical scientists, nursing staff and junior medical staff) should be empowered to stop unnecessarily risky and inappropriate practice.

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http://www.shotuk.org/shot%20report%202003.pdf

The Safe and Appropriate Use Of Blood In Obstetrics

Introduction

Increasing costs and potential for infectious and reactive complications of blood components requires that transfusion practice is carefully scrutinised. Potentially transmitted agents such as prions, with long incubation periods, would have even greater significance for obstetric patients, a cohort likely to survive for many years after the transfusion. Furthermore there is potential for transplacental passage of certain organisms to the fetus. In addition, transfusion-induced sensitisation to red cell antigens such as Kell and c confer a future risk of fetal haemolytic disease. Thus transfusion practice in obstetrics must be optimised and areas of inappropriate blood usage promptly addressed. Attention should be given to the management of antenatal and postnatal anaemia, unexpected massive haemorrhage and elective procedures where excessive blood loss is expected. Foresight and planning for these situations is essential to minimise transfusion requirements.

Iron Deficiency

A common setting for unnecessary blood usage is iron deficiency anaemia. This is highly prevalent in the obstetric population, with estimates of 18-20% and 40% of women entering pregnancy with no iron stores at all. Failure to identify patients at risk or to detect the condition in its latent stages may lead to inappropriate pre-delivery or post partum top-up transfusions. There is good correlation between the Hb at booking and that prior to delivery and therefore opportunities to discuss preventative measures, such as dietary and cooking modification and pregnancy spacing, should ideally be taken prior to conception.

Iron status is difficult to assess in pregnancy due to the normal “physiological” macrocytosis and haemodilution, causing a lower haemoglobin and haematocrit, and the rise in serum ferritin and fluctuations in serum iron levels as pregnancy advances. Serum ferritin remains the most useful laboratory parameter as low levels are diagnostic of iron deficiency and a higher cut off, than that used out-with pregnancy, increases the sensitivity of the test. A trial of oral iron therapy often confirms the diagnosis and avoids delays in treatment whilst awaiting results. Absorption of iron is optimised by taking it one hour before meals, with vitamin C usually in the form of fruit juice. Dietary advice should supplement prescribing but is not sufficient as sole therapy for patients with established iron deficiency. Malabsorption of iron is uncommon and “refractory” anaemia is usually due to non-compliance. These patients should be referred for further counselling but where there is absolute intolerance or non-compliance, parenteral iron therapy should be considered. Potential adverse effects must be discussed with the patient beforehand. Although modern parenteral iron preparations are much safer, injections should be administered where there are facilities for resuscitation in the event of anaphylaxis.

The effectiveness of such strategies for prevention and management of iron deficiency depends on good liaison and education for both patients and their midwives, supported by written information and clear local policies for diagnosis and treatment.

Post-partum anaemia

Another common area for inappropriate transfusion is the management of post partum anaemia, where it is often used to enable speedier recovery and discharge. The prevalence of this practice is currently being assessed by a national multicentre survey, but the perception is that this is often ill-considered and performed without providing written or even verbalinformation about the risks of transfusion. Oral iron supplements are sufficient in many cases and if taken correctly, increase Hb by approximately 2g/dl in

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3 weeks. An additional 3-6 months of medication is then required to replenish iron stores in preparation for the next pregnancy. Compliance is significantly aided by good counselling and explanation. Where a more rapid improvement in iron status is required, total dose intravenous iron infusion should be considered before resorting to blood transfusion, which should be restricted to cases of impending cardiac compromise or major obstetric haemorrhage.

Massive perioperative or periparturitional bleeding

This occasionally occurs in obstetric patients and proficiency in managing these episodes and use of blood components is imperative. Blood flow in the uterine spiral arteries increases from 15ml/min before pregnancy to around 700ml/min at term. Thus haemorrhage, often from uterine atony, can be sudden, massive and maybe underestimated, or even concealed in conditions such as placental abruption. Therefore staff need to be adept at recognising the need for early intervention. Successful management depends on good communication between all relevant clinical and laboratory staff. Local protocols should be developed to include the organisational aspects as well as restoration of blood volume and achievement of haemostasis. Where possible, group-specific cross-matched blood should be used, but an emergency supply of group O negative blood should be kept in an alarmed, controlled fridge on the delivery unit and used supplies promptly replaced. Coagulation tests should be actively monitored and fresh frozen plasma given to correct the prothrombin time and activated partial thromboplastin time and cryoprecipitate to replace fibrinogen, which can be very rapidly consumed during obstetric haemorrhage and disseminated intravascular coagulation. Recombinant activated factor VII has been successfully used in this setting, enabling avoidance of hysterectomy in many cases, although the potential for thrombosis should not be forgotten. Where there are known predisposing factors such as placenta praevia, retained placenta or ectopic pregnancy, procedures should be carefully planned and discussed in advance. Antibody screening should be performed to enable compatible blood to be provided rapidly and use of cell salvage considered. Autologous pre-deposit of the woman's own red cells is relatively safe in pregnancy and may be appropriate in certain cases, such as severe placenta praevia. Adopting systematic agreed treatment plans can make the treatment of massive haemorrhage and the utilization of blood products much safer for the patient as well as easier on the clinical and laboratory staff involved.

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In summary, minimising blood usage in the obstetric setting requires:

- Strategies for prevention of iron deficiency including dietary and cooking information.
- Improved awareness and response to early signs of iron deficiency in pregnancy.
- Consideration of alternative treatment options, such as parenteral iron, reserving transfusion for life-saving situations.
- Multidisciplinary development of rapid, organized and systematic protocols for the management of major obstetric haemorrhage.

Practical Aspects of the Administration of Blood – Where Is The Evidence? The Practice of Transfusion (POTS) Project

There have been no systematic reviews of the routine, practical aspects of the administration of blood. Yet it is the routine, practical aspects of the administration of blood that takes up considerable time and resources in all hospitals. There are national guidelines (BCSH 1999), but local regional and national audits in the UK indicate practice varies. Clinical staff are increasingly requesting details of the evidence that underpins the guidelines. Representatives from the UK Blood Services' Better Blood Transfusion Teams working with the NBS Systematic Review Initiative have systematically reviewed the evidence for practice in three key areas of the routine administration of blood.

Methods

Relevant evidence was identified through comprehensive searches of electronic databases: Medline (1966-2006); Embase (1980-2006); Cinahl (1982-2006); The Cochrane Library (2007: issue 2); websites of national and international blood transfusion organisations and transfusion medicine best practice and the websites of the US Centres for Disease Control and Prevention, the National Patient Safety Agency and the UK Serious Hazards of Transfusion Scheme. Reference lists of relevant papers were scanned and contact was made with transfusion medicine clinicians and scientists to identify additional evidence. All identified papers were assessed for project eligibility: eligible papers were quality assessed and data extracted by two members of the project team, working independently of each other.

A systematic review is "a review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from studies that are included in the review" (DARE 2002). Systematic reviews tend to be based on data from randomised controlled trials (RCTs). The uniqueness of the POTS project is that as expected, no RCT evidence was identified, instead evidence was derived from a range of sources: including expert opinion, guidelines, manufacturer's datasheets and *in-vitro* experiments.

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Findings and Implications

1. How often should blood transfusion sets be changed while a patient is being transfused? [Andrea Blest, Transfusion Practitioner, NHSBT.]

From 625 possible papers, 32 relevant papers were identified (11 clinical updates, 11 guidelines, 5 manufacturer's datasheets, 3 standards, 1 Department of Health report & 1 expert opinion). Recommendations varied widely: there was no pattern in recommendation by paper type, date or country of origin. Recommendations for change ranged from 4 to 48 hours and 'every unit' to 'several units'.

There is no 'new' evidence to challenge current recommendations. Any future research should consider the type of filter, the age of blood and the speed of transfusion as they all could effect the frequency of change of a blood transfusion set.

2. Blood transfusion administration: 1 or 2 person checks – which is the safest method? [Douglas Watson, Clinical Trials Co-ordinator, Scottish National Blood Transfusion Service.]

From over 1200 hits, 7 relevant papers were identified (3 studies of error reporting, 2 guidelines, 1 transfusion overview and 1 haemovigilance overview). Four papers supported 1 person checks and 3 papers supported 2 person checks.

The equivalence in findings suggests the need for a randomised controlled trial to assess the safety of one versus two person checking. Even with the introduction of electronic methods for patient identification checking, such a trial is needed.

3. Drugs and blood transfusions: dogma or evidence based practice? [Dr Joanne Murdock, Consultant in Transfusion Medicine, Northern Ireland Blood Transfusion Service.]

From over 13,000 hits, 12 papers were identified (11 *in-vitro* studies and 1 case report). The papers addressed the co-administration of red blood cells (RBCs) with opioids (7 papers), antimicrobials (3), iron chelators (2), and co-solvents (1). The outcomes measured were haemolysis and agglutination. With the exception of the observation of haemolysis with high dose of opioids in 3 studies, the co-administration of RBCs and these drugs was considered safe.

The limitations of these findings are that the poor clinical applicability of the *in-vitro* studies hampers the direct transposition of the data to clinical practice. Evidence of in-vitro safety does not equate to evidence of *in-vivo* safety. Further a lack of clinical reporting of reactions in patients cannot be taken to indicate safe practice. Further research would be required to confirm the clinical safety of these in-vitro findings.

Overall Conclusion

These systematic reviews have confirmed that the evidence base for the routine, practical aspects of blood transfusion is poor. Where evidence does exist, it is not necessarily directly related to practical aspects of transfusion practice or is 'out-of-date'. The findings do not indicate a need to change current practices, but do indicate areas for future research that will both increase the evidence base and address currently unanswered questions.

Overall, assessment of methodological quality was limited by the lack of validated assessment resources. Assessment criteria were adapted and created for use in this project. Methodological quality of the available evidence was generally poor.

The POTS systematic reviews will be made available through the UK Blood Services website (*www.transfusionguidelines.org*).

Two additional reviews are in development:
"What is the maximum time that a unit of red blood cells can be left out of the fridge before it becomes unsafe?" and "Can drugs be co-administered with intravenous fluids?" Details of these reviews have not been covered in this article.

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2. Database of Abstracts of Reviews of Effects (DARE). Centre for Reviews and Dissemination, University of York. *(http://www.york.ac.uk/inst/crd/index.htm)*

Supporting an Increased Use of Intra-Operative Cell Salvage in the UK

Maintaining an adequate supply of allogeneic red cells is increasingly challenging due to the declining donor base and the potential future deferral of donors due to the perceived theoretical risk of the transmission of vCJD. Intra-operative cell salvage (ICS) is an effective alternative to blood transfusion, however it is not widely used and has been implemented as part of a co-ordinated programme more effectively in some hospitals than in others. The reasons for this are multi factorial and include:

- Some hospitals offer a well-organised and well-staffed service for a variety of different patient groups (including provision of an out of hours service). However many hospitals offer a limited service that fails to develop.
- Lack of national guidance, training and support networks to drive implementation.
- Constraints with finance.

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- Lack of awareness of ICS as an effective alternative to donor blood by many NHS staff.

A co-ordinated drive is needed to facilitate the wider implementation of ICS and development of a supporting infrastructure will help to make it happen. There is a need to better understand the level of activity in hospitals, as well as where and by whom it is being used.

A multi-disciplinary UK Cell Salvage Action Group has been established to develop "tools" to assist hospitals in developing a quality service, where provision of one is appropriate. The group has been formed with representation from the UK Blood Transfusion Services and hospitals. It reports to the NHS Blood and Transplant Appropriate Use of Blood Group and to the respective national clinical groups in the devolved countries.

Following an initial meeting in September 2006, the group identified the following priority workstreams needed to support current services and to allow services to develop:

- *Policy and framework documentation* to include development of:
  - Generic hospital policy for ICS
  - Generic business case
  - Guidance for an "out of hours" framework
- *Practical documentation* to include:
  - Development of an ICS machine specification / manufacturer overview for hospitals to use when considering purchasing machines
  - Development of technical fact sheets including information on swab washing, use of filters, reinfusion of salvaged red cells
  - Development of a standard UK label for salvaged blood
- *Education tools* comprising of:
  - A generic education package in the form of a workbook
  - Set of generic PowerPoint slides for trainers
  - Review of the Competency Assessment Workbook for use in ICS (originally produced in 2006)
- *Audit* to include.
  - Development of a UK audit form and audit tools
  - Exploring the mechanism and funding streams for an online database to record ICS activity in the UK
- *Patient and public information*
  - Development of a patient information leaflet
  - Posters to sell the benefits of this technique within the NHS

Development of information on quality systems, clinical guidelines and specific guidance on the use of ICS in paediatrics was identified as part of the longer-term workplan for the group.

Each workstream has an identified working lead, and considerable progress has been made within the group in meeting its initial objectives. Sign off of the following tools is planned at the autumn group meeting:

- Generic ICS policy which will be able to be edited and allow organisations to add their own specific information
- Standard UK label for salvaged blood that has been developed in collaboration with intra-operative cell salvage equipment manufacturers
- Technical factsheets for machine operators
- Updated competency assessment framework workbook

All tools will be available on the Department of Health Better Blood Transfusion Toolkit *www.transfusionguidelines.org.uk.*

To establish current baseline ICS activity in the UK, a questionnaire survey was recently sent to Trusts/Divisions in the UK. 212 questionnaires were sent with 153 returned (72%). Of those questionnaires returned from the NHS, 66% replied that ICS was used within their organisations, however, the variation in use was significant. ICS appears to be used for a range of specialties, including elective and emergency surgery and in many hospitals it is available for use 24/7. Further information was sought on the specialties using ICS, who operated the machines, the number of machines available and the number of consumables used annually. A full report will shortly be available.

There is a need for co-ordination of skills and knowledge to help drive the wider implementation of ICS in the UK. The outputs from the UK Cell Salvage Action Group should help support the provision of integrated and effective services for patients.

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Support for Clinically Focused Research by the National Blood Service

One of the objectives of research and development in the NBS is to develop the evidence base for the clinical use of blood and blood products. This review will provide an update on clinical research as currently supported through the NBS. Clinical research can be broadly considered as primary or secondary. Primary research refers to clinical studies where data is collected directly from 'research subjects'. Secondary research involves the summation of evidence, often collected from primary research. The inter-relationship between primary and secondary research in the context of a research cycle is depicted in Figure 1.

The National Blood Service (NBS) has a commitment to clinical research through the current structures of the NBS/MRC Clinical Studies Unit (CSU) based in Cambridge and the NBS Systematic Reviews Initiative (SRI) based in Oxford. Both units support transfusion-orientated research by anyone within the NBS and, more broadly, the NHS. The work of the two units overlaps, with many studies having been initiated following a review carried out by the SRI. Both units have steering committees with independent (non-NBS) members to help provide direction and accountability.

The CSU was established as a partnership between the NBS and the MRC Clinical Trials Unit, London whereby the NBS has access to staff who have successful experience of designing and running large clinical trials. This includes the CSU statistican who is based at the MRC. This link ensures access to wider NHS support for clinical research through the National Institute for Health Research (NIHR) and the UK Clinical Research Network (UKCRN). The CSU provides the basic infrastructure to support investigators wishing to conduct high quality trials in transfusion medicine, with help for development of study outlines, grant applications, management of funded studies and collation and analysis of data for studies within the CSU portfolio. CSU trials should comply with current MRC best practice, GCP and other regulatory guidelines. Assistance with provision of randomisation procedures, standardised study documents and data reporting procedures is also given together with advice on trial management; with steering and data monitoring committees in place, where appropriate, to ensure trials are adequately run and supervised.

The NBS SRI remit is to increase the evidence-base for the practice of transfusion medicine through the assessment and writing of systematic reviews on the safety and effectiveness of the use of blood products. Systematic reviews critically appraise and evaluate (usually) randomised trials using scientific-based methodology which is deemed to be more objective and less biased to interpretation than traditional reviews. The assessment of published and unpublished trials is important in generating ideas and designs for new clinical studies. Systematic reviews were drivers for the design of a trial of prophylactic platelet transfusions in patients with haematological malignancies, and large observational studies of FFP in different clinical settings. Strategies for effective web-based dissemination are also being explored by SRI in close association with JPAC (Joint UKBTS/NIBSC Professional Advisory Committee). The SRI section of the JPAC website (www.transfusionguidelines.org.uk) was launched in March 2005 to improve access to citations for systematic reviews. A database is being developed to house and present references for the RCTs identified by systematic reviews and handsearching of transfusion medicine literature, and critical appraisals from the SRI's "review of reviews" project will be made available online. A further emphasis for the SRI is the dissemination of their output within the NBS and, more widely, to the UK health services and international readers.

There are several strands of work (recently) published or currently in the SRI portfolio, including systematic reviews on:

- Updates on evidence of effectiveness of FFP and platelets
- Erythropoietin in anaemia associated with cancer;
- Recombinant factor VIIa for the prevention and treatment of bleeding in patients without haemophilia;
- Plasma exchange in the treatment of thrombocytopenic purpura;
- Immunoglobulins: management of patients with Primary Antibody Deficiencies;
- Granulocyte transfusions: for preventing and treating infections in patients;
- The efficacy and safety of stem cells used to treat acute myocardial infarction;
- Transfusion management of upper gastrointestinal haemorrhage;
- Bone marrow harvest versus peripheral stem cell collection for haemopoietic stem cell donation in healthy donors;
- Processed versus fresh frozen bone for impaction bone grafting in revision hip arthroplasty. (Cochrane, on-going)
- 'Practices of transfusion': reviews to cover issues about the routine, practical aspects of the administration of blood. Please see article *Practical Aspects of the Administration of Blood - Where is the Evidence?* on pages 20-21 in this edition.
- A project to evaluate "Determinants of physicians' transfusion prescribing behaviour" – this is being undertaken in collaboration the Institute of Health and Society, University of Newcastle and psychology staff at the Health Services Research Unit, University of Aberdeen.

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There are several types of funded studies currently in the CSU portfolio, including:

1. Epidemiological studies e.g. a study designed to investigate whether there is a link between transfusion and transmission of Creutzfeld–Jakob disease (CJD). This study has identified the first four cases world-wide of transfusion–transmitted vCJD infection. Another study is looking at which transfusion recipients receive blood transfusions and is monitoring their long-term survival.

2. Multi-centred clinical outcome based surveys of blood component usage in specific clinical settings, usually with the aim of establishing baseline data to power future clinical trials e.g. the frequency of post-operative complications after elective surgery in patients with sickle cell disease; the relationship between coagulopathy, bleeding and FFP use in adult and paediatric intensive care units.

3. Studies which assess new NBS components. For example, small scale non-randomised studies of new components in volunteers or patients, which seek to provide safety data for larger studies/trials e.g. a new optimised granulocyte component derived from pooled buffy coats; recovery and survival of radiolabelled platelets in plasma or various additive solutions. A clinical study to evaluate the safety of a new prion filter designed to remove infectious prion particles from red blood cells is underway as part of the Prion Reduction Programme.

4. Larger randomised studies to evaluate clinical outcomes in patients given new NBS components are also being conducted as a final step in the operational evaluation of proposed new technologies to improve blood safety e.g. a clinical study in patients given bacterially screened 2-5 vs 5-7 day old platelets which is being carried out as part of the Platelet Process Improvement Project.

5. Randomised multi-centre trials to establish efficacy of existing blood components. The impetus for these trials has come from the findings of SRI systematic reviews. The generic question for these trials is 'In the clinical setting defined for each study, does treatment with a particular blood component (of specified characteristics) result in an improved clinical outcome for the patient, as defined in each setting?' e.g. the need for prophylactic platelet transfusions in patients with haematological malignancies; defining the thresholds for platelet transfusions in neonates, whether or not to give prophylactic red cell transfusions to sickle cells patients before undergoing elective surgery.

The infrastructure is in place to support a continued programme of clinical research work, through systematic reviews and clinical studies. We have established links with other research networks to adopt our trials e.g. the UK Cancer Research Network and the US Sickle Cell Disease Clinical Research Network Additionally, systematic reviews have been planned as joint collaborations between SRI and other groups, e.g. Health Technology Assessment Group, Birmingham; British Society of Gastroenterology; Primary Immunodeficiency Group, UK. As this article has tried to illustrate, the national structure of Blood Transfusion Services now offers great potential for clinical research in the UK. Any interested staff are invited to discuss thoughts or ideas with staff in NBS CSU or SRI, from whom outline proposal forms can be provided. Potential Investigators need to be prepared to spend time developing their ideas into study proposals, which will undergo external peer review. Systematic reviews at these earlier stages can also help tackle design issues, based on experience from the relevant literature.

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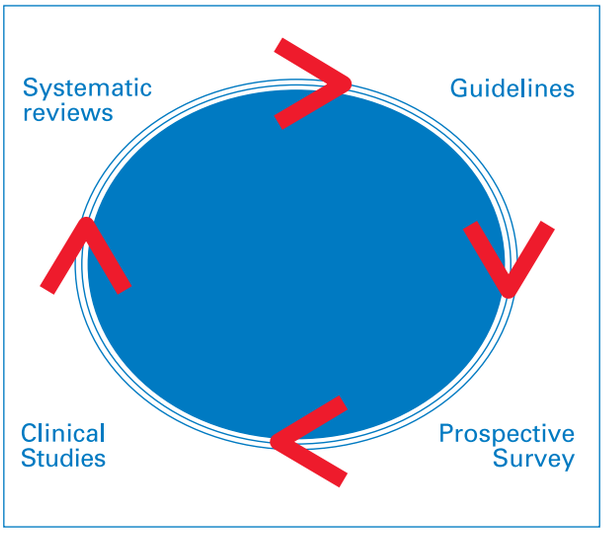
Fig. 1 – Cycle of Evidence Base



The Value of Near Patient Testing (NPT)

What is near patient testing?

NPT is the ability to attain rapid, correct analysis of biochemical or haematological patient parameters within a time frame that allows appropriate therapy. It is widely used within many intensive care units (ICUs) and operating theatre suites but usually only for the measurement of arterial blood gas analysis (ABG's). Although ABG analysers also produce a Hb concentration, there are reservations about using this parameter following several SHOT reports of dangerous mistransfusion related to erroneously low readings. Small dedicated Hb analysers, such as the Hemocue, do produce convenient and precise measurements in the clinical setting. Perhaps if we are to use haemostatic blood products in a more rational therapeutic manner this is the model that could be followed.

What are the available haematological near patient tests?

ABG's	- ionised calcium
Hemocue	- haemoglobin
PT, APTT	- static test of coagulation

There are a number of commercial devices that will measure these parameters rapidly (< 1 minute) in small devices that can be used with minimal volumes of blood near patients. Often known as point of care testing (POCT).

Thromboelastography (TEG) - dynamic measure of coagulation:

There are two commercial available devices that are easy to use and give a rapid (10-20 minute) view of coagulation. TEG has been shown to direct physician prescribed haemostatic therapy in an appropriate manner in bleeding patients and to predict the need for haemostatic replacement therapy. At present, standard TEG's are unable to look at platelet function in patients taking anti-platelet medications.

Platelet function analysis: There are number of devices that look at the ability of platelets to aggregate, they use different complex methodologies and are not widely used.

What are the disadvantages of NPT?

Accuracy of results is a significant drawback to POCT. PT tests have been shown to be reliable, APTT results are very variable. TEG is still operator dependant and requires analysis whilst analysis of platelet function is not a common parameter to non-specialist clinicians.

To assure valid results all machines need regular quality control. This requires the movement of laboratory staff around a hospital or the training of non laboratory staff to expand their roles within outpatient departments, ICU's or theatre suites. There are machine and disposal costs that will be reproduced within an organisation. Most of the above devices excluding ABG machines are not networked in to any patient data system. This may result in loss of data, inability to track data and audit of change in practice.

What are the advantages of NPT?

If main pathology laboratories are distant from acute care sites in hospital, NPT can reduce turn around time. If quality controlled, accurate and networked, NPT can revolutionise transfusion practice allowing acute care physicians to treat coagulopathic and bleeding patients in real time. It allows national guidance on the transfusion of FFP, platelets and in patients with a massive bleed to make sense. Important national publications giving guidance on the transfusion of haemostatic blood products all discuss the importance of result directed therapy. This is only possible if the turn around time is quick. NPT is one way to get a rapid turn around time.

NPT engages prescribing clinicians who are not haematologists and this is likely to lead to discussion about problem patients in a more rational manner. If the results from NPT are incorporated into local clinical guidelines for the management of transfusion of blood and haemostatic component therapy, patients may benefit by less or appropriate transfusion therapy. There may be considerable cost savings after an initial capital outlay, as expensive transfusion therapy is reduced.

Ideal NPT system

Any NPT system must be centrally located and accessible to acute care staff. The machines should be quality controlled by laboratory staff and participate in external quality assurance schemes where available, have a simple networked interface and be easy to use by non-laboratory staff. They must give accurate, reproducible and easy to understand results that can be viewed across a hospital's geography.

Future developments

NPT may have a role in the pre-operative preparation of patients for surgery. Reliable measurement of haemoglobin in either general practice or hospital outpatients would identify anaemic patients prior to operative listing. There are developments within the area of TEG that may allow the prediction of platelet function. This may benefit patients on anti-platelet medications with in situ coronary stents presenting for non-coronary surgery.

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DIARY DATES

2008

- 5 February, **Doctor, Have I Inherited a Blood Disorder?**, Royal Society of Medicine, London. Further information: *email victor.mo@rsm.ac.uk*
- 28 – 29 March, **AABB Spring Conference**, Orlando, Florida. Further information: *www.aabb.org*
- 31 March – 1 April, **Introduction to Immunology**, University of Warwick. Further information: *www.warwick.ac.uk/go/biosciencesshortcourses* or *email s.j.hicks@warwick.ac.uk* tel 024 7652 3540.
- 3 – 4 April, **9th Annual NATA Symposium**, Centro de Congressos de Lisboa, Portugal. Further information: *www.nataonline.com*
- 7 – 9 April, **British Society for Haematology 48th Annual Scientific Meeting**, SECC Glasgow. Further information: *www.b-s-h.org.uk*. *Abstract deadline: 8th January*
- 15 May, **British Society of Blood and Marrow Transplantation Scientific Day** (including **Spring Open Meeting**), Institute of Physics, London. Further information: *www.bsbmt.org*
- 7 – 12 June, **XXX International Congress of the ISBT**, Macao, China. Further information: email *isbt.macao@eurocongres.com*
- 10 – 14 August, **XXII International Congress of the Transplantation Society,** Sydney, Australia. Further information: *www.transplantation2008.org*
- 16 October, **British Society of Blood and Marrow Transplantation Education Day** (including **Autumn Open Meeting**), RIBA, London. Further information: *www.bsbmt.org*
- A series of **Blood Stocks Management Scheme Regional Open Meetings** are planned for 2008. The dates and venues are listed below. Further details will be made available in early 2008. Website: *www.bloodstocks.co.uk*
  - 23 April, Manchester Blood Centre
  - 30 April, Birmingham New Street
  - 7 May, Oxford Science Park
  - 14 May, Newcastle Blood Centre
  - 21 May, Colindale Blood Centre

A full diary of events and training courses can be viewed on the following websites:

www.transfusionguidelines.org.uk
www.blood.co.uk/hospitals

CPD QUESTIONNAIRE

Q1 **Primary, Elective, Unilateral Total Hip Replacement**

a) Nearly all hospitals have a mechanism to correct pre-operative anaemia.
b Over 90% of patients had haemoglobin reported within 28 days before surgery.
c) Less than 5% of patients had a pre-operative haemoglobin less than 12 g/dL.
d) Very few hospitals operate a pre-assessment clinic.

Q2 **Primary, Elective Unilateral Total Hip Replacement - Post-operative Transfusion**

a) Over half of hospitals had a policy for a transfusion trigger based on haemoglobin levels in an asymptomatic patient.
b) Nearly 98% had a post operative haemoglobin deferral prior to a post operative transfusion.
c) Only 52% of transfused patients had a pre-transfusion haemoglobin less than 8 g/dL.
d) Those transfused two or more units, 40% had a post-transfusion haemoglobin less than 10 g/dL or more.

Q3 **BBT3**

a) There has been a continued increase in Red Cells demand over the last 5 years.
b) About 65% of Red Cells are used in Medical – rather than Surgical - cases.
c) Over 90% of hospitals consider the topic of transfusion at the pre-operative assessment.
d) Over 90% of Trusts have policies in place for all blood component transfusions.

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Q4 HSC 2002/009 – 2006 Survey

a) Over 90% of Trusts had a Hhospital Transfusion Team which included a lead consultant with dedicated sessions for transfusion work.
b) Annual training in transfusion is achieved by over 80% of doctors.
c) Over 90% of patients are adequately monitored during transfusion.
d) There were 6% of patients with inadequate identification.

Q5 HSC 2002/009 – 2006 Survey

a) Over 90% of Trusts had policies for good blood usage in all clinical specialities.
b) Over 90% of Trusts had a policy for good use of platelets in Haematology.
c) Over 90% of Trusts optimised blood counts at haemostatic function in pre-operative assessment in advance of surgery.
d) Of the Trusts carrying out intra-operative cell salvage, our half salvaged more than 100 units blood/year.

Q6 Safe and Appropriate use of Blood in Obstetrics

a) Up to 40% of women enter pregnancy with no iron stores.
b) Oral Iron is insufficient in many cases.
c) Haemorrhage is often slow, slight and easily recognised.
d) Recombinant activated factor VII is not useful in massive obstetric haemorrhage associated with disseminated intravascular coagulation.

Q7 Red Cell Transfusion in Medical Patients

a) The majority of patients transfused were General Medical.
b) One quarter of patients did not have Haemoglobin checked post transfusion.
c) Less than 5% of patients had a pre-transfusion Haemoglobin greater than 10 g/dL.
d) Over 90% had inadequate records in the patient notes indicating that the clinical symptoms necessitated a transfusion.

Q8 Overnight Transfusion

a) Less than 10% of transfusions are between 0:00 and 08:00.
b) Restricting overnight transfusions significantly delays next day discharge by greater than 10%.
c) Education regarding the compromise to patient care, along with an appropriate blood transfusion policy, can effect change.
d) All cases notes had written indications for transfusion.

Q9 Patient Transfusion Practice

a) Over 90% of platelet transfusions were deemed appropriate
b) Over 80% of cardiac cases had a platelet count checked on the same day as the transfusion.
c) Over half of cardiac cases undergoing a surgical procedure that did not involve cardiopulmonary bypass, had platelet transfusion with a platelet count greater than 80x10 g/dL.
d) Over half of haematology patients received a platelet transfusion for routine prophylaxis with a pre-transfusion platelet count less than 10 x 10 g/dL.

Q10 The Practice of Transfusion Project

a) There are many, robust studies that inform the guidelines in the practical aspects of the administration of blood.
b) The question 'how often should blood transfusion sets be changed while a patient is being transfused?' has much evidence with a consistent answer.
c) Co-administration of Red Blood Cells with some drugs has extensive in-vivo safety studies.
d) More relevant research is required in order to recommend guidelines in the practical aspects of the administration of blood.

The NBS is part of NHS Blood and Transplant.
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