The Use of Red Blood Cells in AAA Surgery

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2. EXECUTIVE SUMMARY

This study looked at patients undergoing surgery to repair an abdominal aortic aneurysm (AAA) throughout the calendar year 2004. The aim was to see how many units of red blood cells (RBCs) were used by the patients.

32 patients underwent AAA repairs in 2004. The results showed that patients experiencing emergency surgery used twice as much blood as those having elective operations. I.E. Elective patients used an average of 5.2 units of RBCs, and emergency patients an average of 10.8.

Historical data for 2003 and 2002 were examined for comparison. Fewer patients had been operated on, 17 in each year, but a similar pattern of RBC usage was observed.

As blood use is substantial in AAA surgery, introducing intraoperative cell salvage (ICS) would appear feasible.

It is recommended that a multi-disciplinary working party be convened to introduce ICS to Wycombe; and that RBC usage data for other surgical specialties, such as orthopaedics and urology, be obtained to facilitate this process.

3. INTRODUCTION

Vascular surgery, and specifically repair of abdominal aortic aneurysms, has been identified as a field in which the use of intraoperative cell salvage (ICS) might be effective. The Department of Health circular Better Blood Transfusion (DH, 2002) recommended that Trusts look at introducing ICS to reduce their use of donated blood. Prior to considering ICS at Wycombe Hospital, it is necessary to look at the existing use of blood in this speciality.

3.1. Background

Donated blood is a limited resource, and future shortages are likely. There have been changes in the donor inclusion criteria, such as the exclusion of donors who themselves had received a transfusion, and the percentage of the eligible population willing to give blood is only 6%.

Additionally, the transfusion of donated blood is itself not without hazard. It has been shown from the SHOT (Serious Hazards of Transfusion) Reports (Stainsby et al, 2003 & 2004) that administering the ‘wrong blood’ to patients is by far the largest problem reported. Other risks include patients having an adverse reaction to a unit of donated blood, acquiring an infection or new antibodies. All of these scenarios can cause serious morbidity, and possibly be fatal.

Therefore, it can be seen that minimising the use of donated blood would be beneficial. So this study was set up to establish the current situation. Having some figures on existing use is necessary for discussing with other teams (for example, trauma and orthopaedics, anaesthetics) whether introducing ICS, as recommended in BBT, would be appropriate.

3.2. Introduction

Data for Red Blood Cell (RBC) usage in AAA repair for 2002 and 2003 had already been obtained from the Blood Bank computer system. A search was set up for all episodes logged as AAA repair, but this proved to be less than accurate. Often doctors would write “?AAA” on the blood request card when the diagnosis was unknown, the patient would be logged under AAA in Blood Bank, but not adjusted when the doctors refined their opinion. Blood Bank figures also count those patients admitted with a diagnosis of AAA, but who unfortunately die before they reach the operating theatre. Although this is in itself interesting information, the study is concerned with blood use in theatre so these patients should ideally be excluded if they can be identified. This meant the Transfusion Nurse had to carefully examine all entries to weed out the ‘false AAAs’. So for 2004, a better method was needed.
3.3. Aims
The aims of the study were to:

2. Note the outcome in terms of survival or death

A secondary aim was to look at historic figures for 2002 and 2003 for the purposes of comparison.

3.4. Methods
Names of patients undergoing AAA repair were obtained from the operating theatre database. The study was started in March 2004, so the theatre database administrator provided retrospective data from January 2004 and thereafter sent names to the Transfusion Nurse as and when they happened. Data for RBC usage was then looked up on the Blood Bank computer system. Only blood used peri-operatively, or immediately post-operatively, was recorded, as the purpose of the study was to examine RBC usage in the light of a possible introduction of intra-operative cell salvage.

Survival, or otherwise, was checked via the hospital Patient Administration System (PAS) after 30 days had elapsed. The 30-day time period was chosen because this is a nationally recognised standard (National Confidential Enquiry into Patient Outcome and Death).

4. DEFINITIONS & TERMS USED

4.1. Statistical Definitions
4.1.1. Median
The median is the number in the middle of a set of ranked numbers, that is, half the numbers have values that are greater than the median and half have values that are less than the median. It is found by calculating the \( \frac{1}{2}(n+1) \)th value, where \( n \) is the number of data items in the set. The advantage of the median is that, unlike the mean, it is not affected by extreme values.

4.1.2. Mean (Average)
The arithmetic mean of a number of observations is calculated by adding up the values of all the observations and dividing this total by the number of observations. The mean is denoted by the mathematical symbol \( \bar{x} \).

4.1.3. Mode
The mode is the most frequently occurring, or repetitive, value in an array or range of data.

5. RESULTS
32 patients were operated on in 2004, 22 elective surgery and 10 emergency.
17 patients were operated on in 2003, 7 elective and 10 emergency.
17 patients were operated on in 2002, 8 elective and 9 emergency.

5.1. 2004
The 22 elective patients
- Used between 0 and 18 units of red blood cells (RBCs)
- The average was 5.26 units of red blood cells per patient
- And the median was 5 units

21 patients survived surgery and one died

The 10 emergency patients
- Used between 5 and 27 units of RBCs
- With an average of 10.8 units per patient
- And a median of 8.5

7 survived and 3 died
The 2004 data is shown in detail in Appendix 1.

5.2. 2003
17 patients were recorded as having had an AAA repair, 7 elective and 10 emergencies.

All the elective patients survived surgery, but 6/10 of the emergency patients died. It is possible that 1, or more, of the emergency patients died before surgery commenced; but this information is not available from the Blood Bank computer system.

The 7 elective patients
- Used between 0 and 7 units RBCs per patient
- With an average of 4.14 units/patient
- And a median of 5

The 10 emergency patients
- Used between 0 and 30 units RBCs per patient
- With an average of 11 units/patient
- And a median of 6
5.3.  2002
17 patients were recorded as having had an AAA repair, 8 elective and 9 emergencies. All the elective patients survived surgery, but 6/9 of the emergency patients died. It is possible that 1, or more, of the emergency patients died before surgery commenced; but this information is not available from the Blood Bank computer system.

The 8 elective patients
- Used between 0 and 6 units RBCs per patient
- With an average of 4.13 units/patient
- And a median of 4.5

The 9 emergency patients
- Used between 0 and 34 units RBCs per patient
- With an average of 7.78 units/patient
- And a median of 4

6.  SUMMARY of RESULTS

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7.  CONCLUSIONS & DISCUSSION

The results from this study show that substantial amounts of donated blood are used in aortic aneurysm repair, with emergency patients using twice as much as elective patients. The 2004 figures show that most patients used 6 units of RBCs, which is roughly 1500 ml, so thus implying that ICS could well be a feasible option at Wycombe.

Reports from the literature suggest that using intraoperative cell salvage in aortic surgery to reduce the need for donated blood is most effective when blood loss is high: >20% of blood volume (Torella et al, 2001), >1000 ml (Wong et al, 2000), > 800 ml (Wong et al, 1999). Other authors have considered the economics: Goodnough et al (1996) found that ICS was only cost-effective where blood loss was >\(\geq\) 1000 ml, but Haynes et al (2002) concluded that costs were neutral, even if surgical activity was low.

ICS is also recommended for use in cardiac surgery, orthopaedics, obstetrics and gynaecology, and urology (Thompson, 2005 (p81); Scottish Intercollegiate Guidelines Network [SIGN], 2001). The first of these is not undertaken at Wycombe, but orthopaedic surgery, urology and obstetric/gynaecological procedures are. Colleagues at Stoke Mandeville hospital already use ICS for spinal surgery and Total Hip Replacement Revision procedures. The effects on use of donated blood have not yet been formally evaluated, but anecdotal reports are favourable.

It would appear prudent to seriously consider introducing intraoperative cell salvage to Wycombe Hospital.
8. RECOMMENDATIONS

1. Data on blood usage in Revision Hip surgery, urology and obstetrics/gynaecology is collected from the Blood Bank computer system

2. A multi-disciplinary working party is established to introduce the use of intraoperative cell salvage into theatres at Wycombe.

9. ACKNOWLEDGEMENTS

Many thanks to:
- Nowrina Khan, Theatre Database Administrator for Wycombe Hospital, for supplying patient data for 2004.
- Linda Witney, Blood Bank Manager, for sourcing data from the Blood Bank computer system.
- Anne Trenwith and Ann Clark, haematology clerks; and Denise James and June Pilkington, haematology secretaries, for checking patient details on PAS.

10. REFERENCES


National Confidential Enquiry into Patient Outcome and Death http://www.ncepod.org.uk/studies.htm


# Appendix
## AAA Cases 2004

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<th>Age</th>
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