

# **National Comparative Audit of Blood Transfusion**

**2008 Bedside Transfusion Re-audit**

**April 2009**

St. Elsewhere's NHS Foundation Trust

## **Acknowledgements**

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## How to use this report

This report can be useful in assisting you to evaluate the quality of the administration of red blood cells in your hospital.

The evidence base for the audit is principally the 1999 BCSH guidelines, *Guidelines for the administration of blood and blood components*. **Transfusion Medicine**, 1999, **9**, p23. Additionally, standards are derived from two other sources:-

*Handbook of Transfusion Medicine*, **The Stationery Office, 2007 p20**. ISBN-10 0 11 322677 2

*Safer Practice Notice 14*. **National Patient Safety Agency 9 November 2006**. p5

The report is divided into discrete sections, the first of which focuses on the safety of bedside transfusion practice. It looks at whether the transfusion recipient is wearing adequate identification for the transfusion, if that identification is being checked prior to transfusion, and if the patient is being monitored by having pulse, temperature and blood pressure documented.

The results for the audit are shown as national results with your own results displayed alongside for comparison purposes. By looking at these results you can judge for yourself how safe aspects of transfusion practice covered by this audit are. You should bear in mind, though, that practice may vary from that suggested by the guidelines because you have a local policy that differs from the published guidance. Before dismissing any results as not applicable to you because of policy differences, you should first ask if your policy facilitates the safe and effective checking of patient identity and monitoring of the patient during transfusion.

Where possible, at Section Three, trends in national findings are shown for the period 1995 to 2008.

## **Executive Summary**

237 (2.6%) of 8965 patients were transfused without wearing a form of identification. This puts them at risk of being misidentified and therefore potentially able to receive blood, medications, investigations and treatments intended for another patient.

In the 220 cases where reasons are known why blood was transfused when a patient was not wearing a form of identification, the majority relate to staff either not initially attaching it to a patient (129) or not replacing it once removed (50). Hospitals should focus their efforts on reducing this unacceptable practice in order to reduce the risk to their patients.

A small but significant number of patients are being placed at risk because the detail which could positively identify them, and prevent their being misidentified as another patient with similar details, is missing. None of these patients were unknown to the staff and it is probable that the missing details were available to update and so fully complete the identification, but this was not done. Once again the risk lies not only with transfusion, but also with possible misidentification while administering medications.

The fact that the audited transfusions had proceeded in the absence of some patient identifiers suggests that some staff are unaware of, or ignoring, the potential risk to the patient. There were instances of patients wearing completely blank wristbands, with details presumed to have washed off, and in one instance the patient was noted to be very confused and unable to state date of birth.

Some staff are transfusing patients even though some of the details on the identification, unit of blood or prescription do not match. The bedside check is the final chance to identify errors which may have occurred earlier in the transfusion process. If this check is not carried out correctly, the possibility of 'wrong blood' being transfused is increased.

10% (891) of patients were put at risk of an undetected transfusion reaction, or delay in detecting a reaction, because baseline observations were not recorded prior to starting the transfusion. Practitioners agree on the importance of these observations, so hospitals should endeavour to ensure that they are performed and recorded for all patients undergoing transfusion.

Observations during blood transfusion were not done for 12% (1118) of patients, placing them at risk of an undetected transfusion reaction, even if they had baseline observations recorded. It is acknowledged that practitioners cannot always perform the first set of observations at exactly 15 minutes. However, for more than a thousand patients in this audit, observations were done later than 30 minutes after the transfusion started. Over one-third of patients did not have their observations checked at the end of the transfusion. These results suggest that there is not widespread support for the recommendations in the BCSH guidelines on blood administration and raises the question of what is an optimal way to monitor a transfused patient.

4% (271/767) of staff administering blood to patients at the time of audit stated they had not received any transfusion training.

## Recommendations

- **Hospitals should consider that any patient transfused without wearing a form of complete and correct identification has been placed at serious risk and should investigate the circumstances, taking corrective action where necessary.**
- **Hospitals should endeavour to ensure that all patients undergoing a blood transfusion have pre-transfusion observations recorded in accordance with guidelines.**
- **Hospitals should consider that patients are at risk of undergoing an undetectable transfusion reaction if they are not regularly observed and appropriately monitored during blood transfusion.**
- **Clear guidance should be developed for the optimal way to observe and monitor a patient during a transfusion, supported by evidence where available or consensus statements where not.**
- **Hospitals should ensure any clinical member of staff involved in blood transfusion is trained and competency assessed according to Better Blood Transfusion and National Patient Safety Agency recommendations. Training should include appropriate patient's identification, regular monitoring and observations.**

## **Introduction**

A series of national audits of bedside transfusion practice have been carried out since the mid 1990s with the last performed in 2005 <sup>(1,2)</sup>. Those audits demonstrated that while most National Health Service (NHS) Trusts have policy documents for the administration of blood that are in keeping with the British Committee for Standards in Haematology (BCSH) guidelines <sup>(3)</sup>, compliance in practice with these standards was poor. In particular, it highlighted that a small proportion of patients receiving blood were extremely vulnerable to errors due to lack of adequate identification and observations. Serious Hazards of Transfusion (SHOT) is a confidential reporting scheme set up to identify adverse outcomes from transfusion <sup>(4)</sup>. SHOT started collecting data in 1996 and annual reports since then have repeatedly shown that failure of the bedside check is the single most important error in the transfusion process leading to the wrong blood being given to the wrong patient.

## **Aims of the audit**

The key aim of this re-audit has been to determine whether the BCSH guidelines for the administration of blood are being followed at the bedside, and see to what extent practice has improved. The 2008 re-audit has looked at key aspects of the previous audit with the omission of some aspects that were not felt to be informative. Some changes have been made to improve on the previous audit and gather additional information.

With respect to the audit of transfusion episodes, the specific objectives were to audit:

- Wearing of identification such as wristbands
- Completeness and accuracy of information on identification
- Reason for not wearing identification during transfusion
- Presence of alternative forms of identification
- That the date and time of transfusion have been recorded
- That observations have been recorded before, during and after the transfusion

## **Methods**

Transfusions were audited between September 1<sup>st</sup> 2008 and January 19<sup>th</sup> 2009

### **Site selection and response**

330 hospitals (217 NHS and 113 Independent) in England, Scotland and Wales were invited to take part. Of these 207 NHS hospitals (96%) and 57 (51%) Independent hospitals contributed data on 8965 transfusions with a median of 37 cases per site (inter-quartile range 19-50 cases). The sample of NHS sites included treatment centres and hospitals from a Primary Care Trust.

**Table 1 – Participation rate**

Country	Status	Number of sites	Median number of cases per site	Total cases
England	NHS	180	40	6943
	Private	54	14	894
	<i>Total</i>	<i>234</i>	<i>35</i>	<i>7837</i>
Scotland	NHS	11	38	448
	Private	2	5	5
	<i>Total</i>	<i>13</i>	<i>36</i>	<i>453</i>
Wales	NHS	16	41	675
	Private	1	-	-
	<i>Total</i>	<i>17</i>	<i>41</i>	<i>675</i>
Total	NHS	207	40	8066
	Private	57	14	899
	<i>Total</i>	<i>264</i>	<i>37</i>	<i>8965</i>

### **Case selection and quotas**

Participating hospitals were asked to audit 40, 50 or 60 transfusions, depending on their red blood cell usage. We did not specify the time at which cases should be audited, but it is probable that most were audited within normal working hours. This is likely to have resulted in an under representation of emergency transfusions.

### **Use of the tool and guidance notes**

The audit of transfusion episodes was carried out using an audit tool based on BCSH guidelines for blood administration. Transfusion episodes were identified prospectively through the transfusion laboratory and the first part of the audit tool was completed at the bedside while the transfusion was being administered. The rest of the audit tool was completed retrospectively after the transfusion had finished.

### **Risk assessment of transfusion episodes**

Two major risks associated with blood transfusion can be assessed from the audit data - the risk of receiving the wrong unit of blood, and the risk of suffering an unobserved transfusion reaction, or one which is noticed later than if guidelines were followed. Assessment of risk has been modified since the 2005 re-audit to take account of the changing environment in which patient care is delivered. The primary focus on risk in this report focusses on failures in the identification process, since this is a key concern in the latest SHOT report, which states "...the failure of bedside checking procedures ... would have prevented wrong blood being administered in all the clinical cases reported this year", and is the principal message in the National Patient Safety Agency's *Safer Practice Notice 14* <sup>(5)</sup>.



**Data entry, cleaning and validation**

Transfusion episode data was entered onto a web-based audit tool, and data was cleaned by members of the Project Group prior to analysis and reporting.

**Better Blood Transfusion (BBT)**

Where appropriate we have used data from the 2008 BBT survey to enhance this report. The findings are reported in Section Two – Supplementary Findings.

## Section One – Principal findings

This section contains the results from the audit, showing national and, where helpful, local figures for your hospital / Trust. We present the data as they relate to the standards we set for the audit. A full set of standards and the evidence base from which they are derived appears in Appendix A.

**Standard One** - A patient having a blood transfusion is wearing a form of identification.

### Rationale and risk statement

*To avoid being given blood intended for another recipient, guidelines state that a patient has a form of identification physically attached to their person. Nursing practitioners universally endorse this view. Patients are not always able to communicate their identity, so attaching a form of identification prevents them from being misidentified.*

*The risk in not attaching a form of identification to a patient before transfusion is that, however familiar that patient may be, there is the possibility that the patient may be misidentified because adequate verbal checks are not carried out or if the patient becomes unconscious and is therefore unable to confirm their identity. Identification is not only used for blood transfusion – unidentified patients are at risk of receiving drugs or undergoing investigations and procedures intended for another patient, perhaps with severe consequences.*

**Table 2 – n and % of patients wearing a form of identification (Q9)**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q9	Is a form of identity being worn?	97.4	8728	<b>88</b>	<b>36</b>

### **Comment**

Although there appears to be a steady improvement in the numbers of patients with a form of identity compared with previous audits, (see table 32, Section Three), a significant number are transfused without wearing a form of identification.

### **Recommendation :**

**Hospitals should consider that any patient transfused without wearing a form of identification has been placed at serious risk and should investigate the circumstances, taking corrective action where necessary.**

Reasons why a patient is not wearing a form of identification

It is helpful to understand why patients are not wearing a form of identification for their transfusion so that hospitals can take appropriate action to improve practice. The table below shows the reasons given for patients not wearing identification.

**Table 3 – Reasons given for patients not wearing identification (Q22)**

	National (237)		Site variation	Your Hospital (5)
	%	N		
	Known =	220		
Not put on by nursing staff	59	129	77 sites	<b>3</b>
Taken off by patient	9	20	18 sites	<b>0</b>
Taken off by staff and not replaced	23	50	35 sites	<b>1</b>
Carried by patient but not worn for transfusion	2	5	4 sites	<b>0</b>
Other	7	16	15 sites	<b>0</b>
Don't know	7	17	13 sites	<b>1</b>

**Comment**

In the 220 cases where reasons are known why blood was transfused when a patient was not wearing a form of identification, the majority relate to staff either not initially attaching it to a patient (129) or not replacing it once removed (50). Hospitals should focus their efforts on reducing this unacceptable practice in order to reduce the risk to their patients.

<p><b>Standard Two</b> - The patient's identification contains the patient's first name, last name, date of birth and NHS or local identification number</p>
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Rationale and risk statement

To avoid being given blood intended for another recipient, guidelines insist that a patient's identification contains sufficient information to be able to ensure that the patient identified for transfusion is the correct one. To this end 4 demographic identifiers, date of birth, first name, last name and NHS or local identification number are the minimum which should be available on the identification. Opinion differs on the value of including the gender on the identification, so it has been omitted from this question.

The risk in not having 4 demographic identifiers is that 3 of them are susceptible to duplication, whereas the NHS or local identification number, being unique, is not. Having the unique identifier alone, however, is not sufficient, because it is also necessary to ask the patient to confirm identity before transfusion starts, and the patient would not be expected to know their NHS or local identification number.

**Table 4 – Demographic data present on identification**

		National (8728)		Site variation	Your Hospital (36)	
		%	N		%	N
Identification contains:						
Q14	Last name	99.9	8719/8725	N=6 not present from 6 sites	100	36/36
Q15	First name	99.8	8705/8725	N=20 not present from 16 sites	100	36/36
Q16	Date of birth	99.0	8635/8725	N=90 not present from 40 sites*	94	34/36
Q17	NHS number	21	1794/8653		0	0/36
Q20	If no NHS number was used:		6859			
	Hospital number	97.5	6687		100	36
	Other emergency number	0.5	31	16 sites (1 with 9 cases)	0	0
	No number used	1.6	108	56 sites	0	0
	Not stated	0.5	33	25 sites	0	0
Last name, first name, date of birth, and <b>any</b> ID number		97.6	8417/8627	N=210 not all present from 87 sites**	94	34/36

\*includes 1 site with 21 cases & 1 site with 20 cases. \*\* includes 1 site with 23 cases & 1 site with 22 cases.

**Comment**

A small but significant number of patients are being placed at risk because the detail which could positively identify them, and prevent their being misidentified as another patient with similar details, is missing. None of these patients were unknown to the staff and it is probable that the missing details were available to update and so fully complete the identification, but this was not done. Once again the risk lies not only with transfusion, but also with possible misidentification while administering medications.

The fact that the audited transfusions had proceeded in the absence of some patient identifiers suggests that some staff are unaware of, or ignoring, the potential risk to the patient. There were instances of patients wearing completely blank wristbands, with details presumed to have washed off, and in one instance the patient was noted to be very confused and unable to state date of birth.

**Standard Three** – The patient’s identity is checked prior to transfusion by asking the patient to state full name and date of birth wherever possible and checking these against the identification worn. If the patient cannot respond, the identity details on the identification are checked with the prescription and the unit of blood.

Rationale and risk statement

See statement for Standard Two

Denominators for Tables 5 -7 comprise those patients with the details present on their identification and for Tables 6 and 7 with the details also present on the unit of blood (Table 6) or the prescription (Table 7):

**Table 5 –Patient’s details on identification match with patient statement (Q54-56)**

		National		Site variation (if not matching)	Your Hospital (matches)	
		%	N		%	N
Q54	First name matches	99.6	7306/7333	27 cases from 20 sites	100	31/31
Q55	Last name matches	99.6	7255/7286	31 cases from 28 sites	97	30/31
Q56	Date of birth matches	99.7	7143/7165	22 cases from 18 sites	100	28/28
Q54-56	First name, last name, date of birth all match*	99.1	7081/7147	66 cases from 41 sites	97	28/29

Denominators exclude patients unable to give their details, or if this was not known

**Table 6 –Patient’s details on identification match with unit (Q24-28)**

		National		Site variation (if not matching or not present on unit)	Your Hospital (matches)	
		%	N		%	N
Q24	First name matches	99.8	8532/8553	21 cases from 17 sites	100	36/36
Q25	Last name matches	99.8	8496/8510	14 cases from 13 sites	100	35/35
Q26	Date of birth matches	99.8	8386/8400	14 cases from 13 sites	97	33/34
Q27	NHS number matches	99.9	958/959	1 case from 1 site		/0
Q28	Other number matches	99.7	7220/7239	19 cases from 15 sites	100	36/36
Q27-28	Any* ID number matches	99.8	7878/7897	19 cases from 15 sites	100	36/36
Q24-28	First name, last name date of birth, and any* ID number all match**	99.3	7679/7736	57 cases from 40 sites	97	33/34

\*in some cases both NHS and another number were used and a ‘match’ for such cases is where any one of these numbers provided a match.

\*\*denominator is where first name, last name, date of birth and any ID number were all present on the identification and on the unit of blood

**Table 7 –Patient’s details on identification match with prescription (Q39-43)**

		National		Site variation (if not matching or not present on prescription)	Your Hospital (matches)	
		%	N		%	N
Q39	First name matches	99.6	8538/8569	31 cases from 22 sites	<b>100</b>	<b>36/36</b>
Q40	Last name matches	99.8	8509/8527	18 cases from 16 sites	<b>100</b>	<b>36/36</b>
Q41	Date of birth matches	99.7	8165/8189	24 cases from 21 sites	<b>97</b>	<b>31/32</b>
Q42	NHS number matches	99.7	1300/1304	4 cases from 4 sites		<b>/0</b>
Q43	Other number matches	99.6	7110/7136	26 cases from 24 sites	<b>100</b>	<b>36/36</b>
Q42-43	Any* ID number matches	99.6	7936/7964	28 cases from 26 sites	<b>100</b>	<b>36/36</b>
Q39-43	First name, last name date of birth, and <b>any*</b> ID number all match**	99.0	7576/7653	77 cases from 47 sites	<b>97</b>	<b>31/32</b>

\*in some cases both NHS and another number were used and a ‘match’ for such cases is where any one of these numbers provided a match.

\*\*denominator is where first name, last name, date of birth and any ID number were all present on the identification and on the prescription

**Comment**

It is evident from Table 4 of this report that some staff are proceeding to transfuse in the absence of full patient details which are used to positively identify the patient. Tables 5, 6 and 7, though, indicate the more serious practice of staff proceeding with the transfusion even though some of the details on the identification, unit of blood or prescription do not match.

The bedside check is the final chance to identify errors which may have occurred earlier in the transfusion process. If this check is not carried out correctly, the possibility of ‘wrong blood’ being transfused is increased. Staff have the opportunity to delay the transfusion until these errors have been rectified, but these opportunities are not being taken, placing the patient at risk. Further, if some patient details are missing from the identification, this increases the risk of misidentification if staff transfuse in the presence of mismatching details.

In its 2007 report, SHOT <sup>(4)</sup> notes the continuing incidence of ‘wrong blood’ events, and perhaps failure to provide complete identification details and to correct mismatches is a contributory factor to this statistic.

**Q63. Details of mismatches**

Mismatches fell into 3 distinct categories: Incorrect spelling of names, incorrect date of birth and incorrect (and often incomplete) patient local identification numbers.

Responses to this freetext question were revealing – auditors tell of patients having given up trying to get details corrected and so were responding to incorrect details.

**Standard Four** – Pulse, temperature and blood pressure are measured before a unit of blood is transfused

*Rationale and risk statement*

*One way of detecting a transfusion reaction is to observe for a change in the patient's observations after the transfusion has started, but to be able to do this it is necessary to take a set of observations before the transfusion starts, to form a baseline.*

*The risk of not performing pre-transfusion observations is that it may be more difficult to detect a rise in pulse or temperature without knowing what those parameters were before transfusion started.*

**Table 8 – Pre-transfusion observations (Q73-75)**

	Monitoring within 60 minutes before the transfusion started	National (8965)		Your Hospital (41)	
		%	N	%	N
Q73	Pre-transfusion <b>BP</b> recorded	90	8034	<b>98</b>	<b>40</b>
Q74	Pre-transfusion <b>pulse</b> recorded	89	8016	<b>95</b>	<b>39</b>
Q75	Pre-transfusion <b>temperature</b> recorded	89	7958	<b>95</b>	<b>39</b>

BP, pulse or temperature was recorded for 90% (8074)

**Comment**

10% (891) of patients were put at risk of an undetected transfusion reaction, or delay in detecting a reaction, because baseline observations were not recorded prior to starting the transfusion. Practitioners agree on the importance of these observations, so hospitals should endeavour to ensure that they are performed and recorded for all patients undergoing transfusion.

**Recommendation :**

**Hospitals should endeavour to ensure that all patients undergoing a blood transfusion have pre-transfusion observations recorded in accordance with guidelines.**

**Standard Five – Pulse and temperature are measured 15 minutes after the transfusion starts**

***Rationale and risk statement***

See Standard Four for rationale. The risk of not performing observations after the transfusion has started is that a potential transfusion reaction will go undetected. There is no clear evidence though for when these observations should be performed.

**Table 9 – Pulse and temperature taken (Q76-77)**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q77	<b>Temperature</b> was recorded after transfusion started	86	7690*	<b>83</b>	<b>34</b>
	<i>Temperature was recorded:</i>				
	15 minutes or less after	56	4290	<b>62</b>	<b>21</b>
	16 – 30 minutes after	29	2244	<b>32</b>	<b>11</b>
	31 – 60 minutes after	10	762	<b>6</b>	<b>2</b>
	> 60 minutes after	5	394	<b>0</b>	<b>0</b>
Q76	<b>Pulse</b> was recorded after transfusion started	87	7762*	<b>78</b>	<b>32</b>
	<i>Pulse was recorded:</i>				
	15 minutes or less after	57	4428	<b>63</b>	<b>20</b>
	16 - 30 minutes after	29	2224	<b>31</b>	<b>10</b>
	31 – 60 minutes after	10	741	<b>6</b>	<b>2</b>
	> 60 minutes after	5	369	<b>0</b>	<b>0</b>

\*360 (pulse) and 367 (temp) patients had delays recorded of over 4 hours and were in effect recoded as NOT having been recorded after transfusion started

Either Temperature or Pulse was recorded for 88% (7847)

**Comment**

Observations during blood transfusion were not done for 12% (1118) of patients, placing them at risk of an undetected transfusion reaction, even if they had baseline observations recorded. While there is debate around how easy it is to achieve the first set of observations at 15 minutes as the BCSH 1999 guidelines <sup>(3)</sup> recommend, practitioners are united on the importance of taking observations after a transfusion has started, as a means of monitoring the patient’s progress. It is acknowledged that practitioners cannot always perform the first set of observations at exactly 15 minutes. However, for more than a thousand patients in this audit, observations were done later than 30 minutes after the transfusion started.

**Hospitals should consider that patients are at risk of undergoing an undetectable transfusion reaction if they are not regularly observed and appropriately monitored. In the absence of any other guidance patients should be monitored according to the current guidelines.**



<b>Standard Six</b> – Pulse, temperature and blood pressure are measured at the end of each transfused unit
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***Rationale and risk statement***

*Just as a baseline set of observations is needed before transfusion of a unit of blood starts, it is necessary to perform a set after the transfusion of that unit has ended. This serves two purposes: it confirms that there has been no significant change in observations since the transfusion of that unit started (which could indicate a transfusion reaction) and serves as a baseline for the transfusion of the next unit.*

*The risk is similar to that described for other standards.*

**Table 10 – Post-transfusion observations (Q82-84)**

	<b>Monitoring no more than 60 minutes after the Transfusion Finished</b>	National (8965)		Your Hospital (41)	
		%	N	%	N
Q82	Post transfusion <b>BP</b> was recorded	62	5582	<b>66</b>	<b>27</b>
Q83	Post transfusion <b>pulse</b> was recorded	62	5591	<b>63</b>	<b>26</b>
Q84	Post transfusion <b>temperature</b> was recorded	62	5521	<b>63</b>	<b>26</b>

BP, pulse or temperature was recorded for 63% (5631)

**Comment**

Over one-third of patients did not have their observations measured at the end of the transfusion.

**Can patient be readily observed?**

BCSH guidelines state “visual observation is often the best way of assessing patients during transfusion. Transfusions should be given in clinical areas where patients can be readily observed by members of the clinical staff”.

**Table 11 – Ability to be readily observed**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q7	Can this patient be readily observed at all times by members of the clinical staff?	64	5769/8949	<b>90</b>	<b>37/41</b>
Q8	If no (Q7), is the patient observable by other patients?	52	1638/3126	<b>50</b>	<b>2/4</b>

**Comment**

Table 11 shows that in the opinion of the auditor only 64% of patients could readily be observed. In certain hospitals patients are in side wards and cannot be observed at all times, and since the last BCSH guidelines were published the design of hospitals has changed and many more are being built with single rooms. Care provided within Independent hospitals is invariably in single rooms. Even if we accepted that other patients ever could act as a proxy for trained staff and alert nurses if a transfused patient became distressed, auditors report they felt this would be possible only for a small

proportion of patients. This finding underwrites the recommendation that the optimal way to monitor a patient should be devised. Further, hospitals should ensure they are providing adequate levels of care so that patients are monitored in accordance with guidelines.

**Clear guidance should be developed for the optimal way to observe and monitor a patient during a transfusion, supported by evidence where available or consensus statements where not.**

**Worse Case Scenario**

We consider that a transfusion “Worse Case Scenario” is one where the patient is not wearing a form of identification and has not had any observations taken before, during or after the transfusion.

**Table 12 – Worse Case Scenario**

Worse Case Scenario	National (8965)		Site variation	Your Hospital (41)
	%	N		
No identification and no pre-transfusion observations	0.5	42	33 sites (1 with 5 cases)	1
No identification and no observations before, during or after transfusion*	0.1	12**	10 sites (1 with 3 cases)	1

\* any delay of >4 hours during transfusion was recoded as being not done.

\*\* all these had no observations before Transfusion whilst status during and after transfusion was not known (and assumed not done).

**Comment**

It is reassuring that the quality of practice is generally sufficiently high to ensure that very few patients fall into the “worse case” scenario. Nevertheless, each patient that does fall into this category has experienced a major failure of care and the hospitals with such cases should strenuously investigate the reasons for staff disregarding transfusion administration guidelines.

## Section Two – Supplementary findings

### Better Blood Transfusion (BBT)

Health Service Circular HSC 2007/001 <sup>(6)</sup> sets out requirements for the safe and appropriate use of blood by healthcare providers. A survey of compliance with BBT was conducted in 2008 and some relevant statistics have been included here to support the findings of this audit. The use of these statistics is to provide evidence that certain aspects of service provision are in place and therefore provide the infrastructure within which good transfusion practice could be expected to flourish. Only national results are used, based on responses to the survey, which covered both NHS and Independent hospitals in England and North Wales.

**Table 13 - Does your Trust have a Transfusion Practitioner?**

Yes	No	No response
90% (177/196)	9% (18/196)	1% (1/196)

**Table 14 - Is there a Trust policy covering the transfusion process from sampling to administration?**

Yes	No	No response
97% (191/196)	0%	3% (5/196)

**Table 15 - Is there a clear reporting line to the Chief Executive via a Senior Trust Manager such as the Medical Director?**

Yes	No	No response
96% (189/196)	3% (5/196)	1% (2/196)

**Table 16 - Does your Hospital Transfusion Team (HTT) have an action plan for 2008/09?**

Yes	No	No response
68% (134/196)	28% (55/196)	4% (7/196)

**Table 17 - Did the HTT produce an annual report for 2007/08 for consideration by senior management?**

Yes	No	No response
58% (113/196)	38% (75/196)	4% (8/196)

**Table 18 - Is training taking place at induction and regularly thereafter for nurses?**

Yes	No	No response
93% (182/196)	4% (8/196)	3% (6/196)

**Table 19 - Are patients who are likely to need blood offered written information?**

<b>Yes</b>	<b>No</b>	<b>No response</b>
96% (182/190)	2% (4/190)	2% (4/190)

**Table 20 - If yes (table 19), approximately what % of patients receive information prior to transfusion?**

<b>Categories of response</b>	<b>Response from site</b>	
<b>100%</b>	9%	(17/196)
<b>75%</b>	12%	(23/196)
<b>50%</b>	6%	(11/196)
<b>25%</b>	8%	(16/196)
<b>Don't know</b>	55%	(107/196)
<b>No response</b>	11%	(22/196)

**Table 21 - Which information leaflet is offered to patients?**

<b>Categories of response</b>	<b>Response from site</b>	
Trust	19%	(25/129)
Speciality specific	13%	(17/126)
NBS	95%	(174/183)

\* Figures do not add up to 100% because some sites offer more than one leaflet.

**Table 22 - How are patients made aware of the need to wear an identity name band and be correctly identified at all stages of the transfusion process?**

<b>Categories of response</b>	<b>Response from site</b>	
By the use of patient information leaflet on blood transfusion	62%	(121/196)
Trust leaflet on patient ID	10%	(19/196)
As part of the routine Trust procedure for blood transfusion	77%	(150/196)
Other	11%	(21/196)

## Supplementary Findings from 2008 Bedside Transfusion re-audit

### Description of sample

8965 transfusions were audited in 264 sites. **You audited 41 episodes.**

The table below describes if those transfused were inpatients or day cases, the clinical speciality caring for the patient and the median age of the patient.

**Table 23 – Description of sample**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q1	In-patient	78	7036	<b>95</b>	<b>39</b>
	Day-case	22	1929	<b>5</b>	<b>2</b>
Q2	Clinical specialty:				
	Medical	30	2675	<b>34</b>	<b>14</b>
	Surgical	18	1583	<b>27</b>	<b>11</b>
	Haematology	17	1492	<b>10</b>	<b>4</b>
	Oncology	8	736	<b>0</b>	<b>0</b>
	Orthopaedic	15	1356	<b>12</b>	<b>5</b>
	Obstetrics	2	174	<b>2</b>	<b>1</b>
	Gynaecology	2	223	<b>5</b>	<b>2</b>
	Cardiac	3	293	<b>0</b>	<b>0</b>
	Paediatrics	2	163	<b>7</b>	<b>3</b>
	SCBU	1	89	<b>2</b>	<b>1</b>
	A&E	1	82	<b>0</b>	<b>0</b>
	Other*/Unknown	1	99	<b>0</b>	<b>0</b>
Q66	Median age (IQR) of patient	M=71y	57-81y n=8952	<b>Median=70y n=41</b>	

**Table 24 - Where the patient was at the time of the transfusion**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q4	A&E	0.7	59	<b>0</b>	<b>0</b>
	Assessment / admissions unit	6	575	<b>10</b>	<b>4</b>
	Day care unit	19	1718	<b>0</b>	<b>0</b>
	Intensive care	10	895	<b>7</b>	<b>3</b>
	Recovery	1	95	<b>0</b>	<b>0</b>
	Theatre	1	123	<b>0</b>	<b>0</b>
	Ward	61	5488	<b>80</b>	<b>33</b>
	Other	0.1	12	<b>2</b>	<b>1</b>

**Table 25 - Form of identity**

Q10	National (8728 with ID)		Site/location variation	Your Hospital (36)	
	%	N		%	N
Identification band	98.8	8619		<b>97</b>	<b>35</b>
Photo ID	0.3	23	13 sites. Haematology 12 cases, surgical 7 cases	<b>0</b>	<b>0</b>
ID badges	0.1	11	10 sites. Medical 4 cases, haematology 4 cases	<b>0</b>	<b>0</b>
Other	0.2	17	13 sites. SCBU 11 cases	<b>3</b>	<b>1</b>
Not stated	0.7	58	45 sites.	<b>0</b>	<b>0</b>

**Table 26 - Nature of identification details**

Q12		National (8728 with ID)		Your Hospital (36)	
		%	N	%	N
	Hand written onto the identification	73	6394	<b>100</b>	<b>36</b>
	Printed directly from an electronic system onto the identification on request	13	1160	<b>0</b>	<b>0</b>
	A printed addressograph label stuck to the identification	13	1099	<b>0</b>	<b>0</b>
	Other	0.1	13	<b>0</b>	<b>0</b>
	Not stated	0.7	62	<b>0</b>	<b>0</b>

Denominators exclude patients unable to give their details:

**Date of transfusion documented**

BCSH guidelines require that the date of transfusion should be recorded.

**Table 27 - Date of transfusion recorded**

Q69	Is the date of transfusion documented?	National (8965)		Your Hospital (41)	
		%	N	%	N
		97	8706	<b>78</b>	<b>32</b>

**Start and stop time documented**

BCSH guidelines require that the start and stop time of transfusion should be recorded.

**Table 28 – Start and stop times**

Q70	Is the start time documented?	National (8965)		Your Hospital (41)	
		%	N	%	N
		98.0	8783	<b>98</b>	<b>40</b>
Q80	Is the stop time documented?	67	6037	<b>68</b>	<b>28</b>

### Training in blood transfusion

Those staff who were caring for the patient at the time of the transfusion were asked when they had last received transfusion training. One of the limitations of our audit method was that it may not be the case that the nurse who was asked this question at the time of audit was the nurse who performed the identification process on the patient and started the transfusion.

**Table 29 – Transfusion training\***

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q78 When did you (healthcare professional caring for patient at time of audit) last receive training in blood transfusion?		86 known	Known for 7678	<b>98</b>	<b>40</b>
<b>If known:</b>	Within last year	52	3955/7678	<b>93</b>	<b>37</b>
	> one year but within 2 years ago	34	2578/7678	<b>8</b>	<b>3</b>
	More than two years ago	11	874/7678	<b>0</b>	<b>0</b>
	No training received	4	271/7678	<b>0</b>	<b>0</b>

\* At the time of this audit the numbers of staff who have been competency assessed in blood transfusion was being audited as part of a survey of Better Blood Transfusion recommendation implementation.

### Use of electronic systems

Hospitals were asked if they have in use an electronic system for matching the patient's identification with the unit of blood and, if so, whether that system was used for the transfusions they audited.

**Table 30 - Electronic systems**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q79	System used in the hospital	12	1047/8707	<b>0</b>	<b>0</b>
	Used with audited patients	68	710/1047		<b>/0</b>
	Not used with audited patients	32	337/1047		<b>/0</b>

### Special requirements

As a further measure of patient safety the auditor was asked to check that if a patient had been prescribed "Special requirements" (e.g. irradiated or CMV negative blood), then that product was given. It is acknowledged that this question was not designed to discover which patients needed special requirements, but merely that, if prescribed, whether it was given.

**Table 31 – Special requirements**

		National (8965)		Your Hospital (41)	
		%	N	%	N
Q64	Prescription indicates special requirements?	6	521/8954	<b>12</b>	<b>5/41</b>
Q65	If yes, did blood meet those requirements?	99.2	493/497	<b>100</b>	<b>4/4</b>

## Section Three – National Trends (1995 to 2008)

**Table 32 – Comparison of bedside transfusion practice between 1995 and 2008 for English NHS sites** <sup>(1,2)</sup>.

AUDIT		1995	*1998	2003	2005	2008
Hospitals		44	23	160	211	180
Cases audited		2088	979	5014	6764	6943
% (n) with identification**		Not asked	72	90	94	98 (6771)
% (n) of identifications with complete surname, first name, DOB, ID #		Not asked	Not asked	86	91	98 (6574/6715)
% (n) with pre Transfusion observations recorded	Temp	78	89	74	90	89 (6183)
	Pulse	77	87	76	91	90 (6236)
	BP	75	81	75	91	90 (6234)
% (n) with temp <=30 mins***		49	57	58	64	73 (5075)
% (n) with pulse <=30 mins***		51	Not asked	59	65	74 (5152)
% (n) with no obs recorded during transfusion		14	9	12	13	12 (847)

\*Includes two Welsh and one Northern Irish hospital which could not be identified from the aggregated data available.

\*\*For identification read wristband in previous audits.

\*\*\*<30m saying <15m is now the recommendation

### Comment

There have been notable improvements since 1995 in the percentage of patients with identification (90% to 98%), in identifications having complete surname, first name, DOB and identification number (86% to 98%), in pre-transfusion observations (75% to 90%), and for observations within 30 minutes during transfusion (59% to 73%). The audits before 1995 were run with smaller numbers of hospitals participating and the trends before 1995 are less interpretable. The rate for no observations being recorded during transfusion appear to have remained stable (at around 1 in 8 patients) throughout the time period covered by these audits.



## Conclusions

Patient safety is paramount during the provision of medical treatment including blood transfusion and the first essential step to ensuring patient safety is to correctly identify the patient undergoing treatment. This applies whether the patient is to receive a simple dose of painkiller or is to have radical surgery – failing to identify the patient properly runs the risk of giving treatment to someone other than for whom it was intended. Adverse events from blood transfusions are thankfully rare. SHOT reports 332 instances (nearly 60% of all reports in 2007) where an incorrect blood component was transfused. Of these only 46 related to the patient receiving ‘wrong blood’, and while there were no deaths as a consequence, there was still harm done to some patients as a result of poor practice. 12 patients received ABO incompatible red cell transfusions in 2007 and this indicates unacceptable practice.

Since the administration of blood was first audited in 1995, the percentage of patients who wear a form of identification for their transfusion has increased markedly from 72% to 98%, but we have not yet achieved the wearing of identification for all patients. There has been a similarly encouraging increase in the % of identifications with complete details, but not every form of identification is complete, and staff are transfusing in the absence of data which could irrevocably confirm that the correct patient is being transfused. Hospitals must make every effort to reduce this unacceptable practice.

The British Committee for Standards in Haematology provides valuable guidance on transfusion practice. For some of those guidelines, and in particular those related to patient observations, there is a significant level of non-compliance. A contributory factor may be the lack of evidence for the guidelines and absence of explanation for the stated rationale. There remains active debate about the optimal monitoring and observation surrounding the transfusion of blood. In addition, technical and environmental changes are now challenging these guidelines and practitioners eagerly await the revised version. Those responsible for producing guidelines must be sure that their recommendations are based on evidence where possible or consensus agreement where not. As healthcare monitoring continues to grow in the UK, healthcare providers will be under increasing pressure to divert scarce resources to improving practice, and initiatives such as this National Comparative Audit will have an important role to play. Healthcare providers must be assured that participation in future rounds of this audit will repay the time and effort they will invest.

## **Recommendations**

- **Hospitals should consider that any patient transfused without wearing a form of identification has been placed at serious risk and should investigate the circumstances, taking corrective action where necessary.**
- **Hospitals should endeavour to ensure that all patients undergoing a blood transfusion have pre-transfusion observations recorded in accordance with guidelines.**
- **Hospitals should consider that patients are at risk of undergoing an undetectable transfusion reaction if they are not regularly observed and appropriately monitored during blood transfusion.**
- **Clear guidance should be developed for the optimal way to observe and monitor a patient during a transfusion, supported by evidence where available or consensus statements where not.**
- **Hospitals should ensure any clinical member of staff involved in blood transfusion is trained and competency assessed according to Better Blood Transfusion and National Patient Safety Agency recommendations. Training and competency assessment should include appropriate patient's identification, regular monitoring and observations.**

## References

1. Murphy MF, Wilkinson J, Lowe D, Pearson M. National audit of the transfusion process. *Transfusion Medicine*. 2001; **11**: 363-30.
2. Taylor CJC, Murphy MF, Lowe D, Pearson M. Changes in practice and organisation surrounding blood transfusion in NHS trusts in England 1995-2005. *Quality & Safety in Health Care* 2008; **17**: 239-243.
- 3 Guidelines for the administration of blood and blood components. *Transfusion Medicine*,1999,**9**, p231
4. <http://www.shotuk.org/SHOT%20Report%202007.pdf>
5. *Safer Practice Notice 14. National Patient Safety Agency 9 November 2006. p5*
6. Better Blood Transfusion. *Health Service Circular HSC 2001/001* Department of Health

## Appendix A – Audit standards

No.	Standard	Source(s)
1	A patient having a blood transfusion is wearing a form of identification	<i>Guidelines for the administration of blood and blood components. (BCSH) <b>Transfusion Medicine</b>, 1999,9, p231</i>
		<i>Handbook of Transfusion Medicine, <b>The Stationery Office, 2007 p20. ISBN-10 0 11 322677 2</b></i>
		<i>Safer Practice Notice 14. <b>National Patient Safety Agency 9 November 2006. p5</b></i>
2	The patient's identification contains the patient's first name, last name, date of birth and NHS or local identification number	As above
3	The patient's identity is checked prior to transfusion by asking the patient to state full name and date of birth wherever possible and checking these against the identification worn. If the patient cannot respond, the identity details on the identification are checked with the prescription and the unit of blood.	As above
4	Pulse, temperature and blood pressure are measured before a unit of blood is transfused	<i>Guidelines for the administration of blood and blood components. (BCSH) <b>Transfusion Medicine</b>, 1999,9, p232</i>
		<i>Handbook of Transfusion Medicine, <b>The Stationery Office, 2007 p20. ISBN-10 0 11 322677 2</b></i>
5	Pulse and temperature are measured 15 minutes after transfusion starts	<i>Guidelines for the administration of blood and blood components. (BCSH) <b>Transfusion Medicine</b>, 1999,9, p232</i>
6	Pulse, temperature and blood pressure are measured at the end of each transfused unit	As above

## Appendix B – Audit tool



### National Comparative Audit of Blood Transfusion



#### Patient audit tool

##### PART A

###### *Patient location*

1. Is this patient an in-patient or a day case?      Inpatient       a day case

2. What is the Clinical Speciality caring for the patient? (Tick one appropriate option)

Medical       Surgical       Haematology       Oncology

Orthopaedics       Obstetrics       Gynaecology       Cardiac

Paediatrics       SCBU       A&E       Other

3. Other clinical speciality

4. Where was the patient at the time of this transfusion? (Tick one appropriate option)

A&E       Assessment / admissions unit       Day care unit       Intensive care

Recovery       Theatre       Ward       Other

5. If you selected “Ward”, please give details of the ward speciality

6. If you selected “Other”, please give details

7. Can this patient be readily observed at all times by members of the clinical staff? Yes  No

8. If no, is the patient observable by other patients? Yes  No

*Identifying the patient*

9. Is a form of identity being worn? Yes  No

***If yes, please tick one or more from the options below or state details of Other: If no, go to Q22.***

**10. Form of identity:**

Identification band

Photo ID

ID badges

Other

**11. Other (please state)**

**12. Are the patient details on the identification:**

Hand written onto the identification?

Printed directly from an electronic system onto the identification on request?

A printed addressograph label stuck to the identification?

Other

**13. Other (please state)**

***Does this identification contain the patient's***

14. Last name? Yes  No

15. First name? Yes  No

16. Date of birth? Yes  No

17. NHS Number? Yes  No

18 If you ticked "No" to questions 14 and 15 and 16 and 17, is it because this is an unknown patient? Yes  No

19. Does this identification contain the patient's gender? Yes  No

20. If NHS number is not on the identification, is another number on the identification used for the patient ID?

No number used

Hospital number used

Other emergency number used

21. If any additional number or identification band is used, please give details

22. If no form of identification is in place, identify, if possible, the reason why:

Don't know

Not put on by nursing staff

Taken off by patient and not replaced

Taken off by staff and not replaced

Carried by patient but not worn for transfusion

Other

23. Other (please state)

**PLEASE NOTE: Only use this table if you answered 'Yes' to Q14-17 or Hospital Number or Other Emergency Number was used (Place a tick in each box as appropriate)**

		First name	Last Name	Date of Birth	NHS number	Other number
<b>Unit of blood</b>	Attached to the unit & matches	24	25	26	27	28
	Attached to the unit but does not match	29	30	31	32	33
	Not present on the unit	34	35	36	37	38
<b>Prescription</b>	On the prescription & matches	39	40	41	42	43
	On the prescription & does not match	44	45	46	47	48
	Not present on the prescription	49	50	51	52	53
<b>Patient's statement</b>	Matches what patient says including checking that spelling is correct	54	55	56		
	Does not match what patient says	57	58	59		
	Patient unable to state	60	61	62		

63 Details of mismatch(es)

**Special requirements**

64. Does the prescription indicate that the patient needs special requirements? Yes  No

65. If yes, does the unit of blood meet those requirements? Yes  No

66. What is the patient's year of birth?

67. What was the prescribed transfusion rate or duration of transfusion for this unit of blood?

*About the unit you are auditing*

68. What is the date on which this unit is being transfused?



69. Is that date documented? Yes  No

70. Is the start time documented? Yes  No

71. If yes, what is the unit start time?  
*hh:mm (Please use 24 hour clock)*

72. Is there a signature of the person administering the blood? Yes  No

***Pre-transfusion observations***

73. Was a pre-transfusion BP recorded within 60 minutes before the transfusion start time? Yes  No

74. Was a pre-transfusion pulse recorded within 60 minutes before the transfusion start time? Yes  No

75. Was a pre-transfusion temperature recorded within 60 minutes before the transfusion start time? Yes  No

*After the current unit began transfusing:*

76. When was the first pulse reading recorded?  
*(state time or write DK)*

77. When was the first temperature reading recorded?  
*(state time or write DK)*

***Questions for the auditor to ask healthcare professional caring for the patient at the time of audit***

78. When did you last receive training in blood transfusion?  
*Approximate time ago in months is acceptable if date not known*

79. If the hospital uses an electronic system to match patient's identification with the unit of blood, was that system used for this particular transfusion? Yes  No  System not used

**Unit Donation No.**

*Please write the donor unit number here. You will need it for the next part of the audit form*

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**PART B**

**80. Is the stop time documented?**

Yes  No

**81. If yes, what is the stop time? (hh:mm)**

*After the current unit had finished transfusing:*

**82. Was a post-transfusion BP recorded no more than 60 minutes after the transfusion end time?**

Yes  No  Don't Know

**83. Was a post-transfusion pulse recorded no more than 60 minutes after the transfusion end time?**

Yes  No  Don't Know

**84. Was a post-transfusion temperature recorded no more than 60 minutes after the transfusion end time?**

Yes  No  Don't Know

## Appendix C – List of participating hospitals

Aintree University Hospitals NHS Foundation Trust  
Airedale NHS Trust  
Ashford and St Peters Hospitals NHS Trust  
Aspen Holly House Hospital Essex  
Barlborough NHS Treatment Centre (Partnership)  
Barnet Hospital  
Barnsley District General Hospital  
Barts and The London NHS Trust  
Basildon and Thurrock University Hospitals NHS Foundation Trust  
Basingstoke and North Hampshire Hospital NHS Foundation Trust  
Bedford Hospital NHS Trust  
Birmingham Women's NHS Foundation Trust  
Bishop Auckland General Hospital  
Blackpool Fylde and Wyre Hospitals NHS Foundation Trust  
BMI Bishops Wood Hospital Northwood  
BMI The Priory Hospital Birmingham  
BMI Fawkham Manor Hospital Longfield  
BMI Winterbourne Hospital Dorchester  
Bolton Hospitals NHS Trust  
Borders General Hospital Melrose  
Brighton and Sussex University Hospitals NHS Trust  
Bronlais District General Hospital Aberystwyth  
Buckinghamshire Hospitals NHS Trust  
Burton Hospitals NHS Trust  
Calderdale and Huddersfield NHS Foundation Trust  
Central Middlesex Hospital  
Charing Cross Hospital  
Chase Farm Hospital  
Chelsea and Westminster Hospital NHS Foundation Trust  
Chorley and South Ribble Hospital  
Christie Hospital  
City Hospitals Sunderland NHS Foundation Trust  
Clatterbridge Centre for Oncology NHS Foundation Trust  
Colchester Hospital University NHS Foundation Trust  
Conquest Hospital  
Countess of Chester Hospital NHS Foundation Trust  
Darent Valley Hospital  
Darlington Memorial Hospital  
Derby City General Hospital  
Derbyshire Royal Infirmary  
Dorset County Hospital NHS Foundation Trust  
Dorset PCT  
Dumfries and Galloway Royal Infirmary  
Ealing Hospital NHS Trust  
East Lancashire Hospital NHS Trust  
Eastbourne District General Hospital  
Fairfield General Hospital Bury  
Fairfield Independent Hospital St Helens  
Frimley Park Hospital NHS Foundation Trust  
Gateshead Health NHS Trust  
Glan Clwyd Hospital  
Glasgow Royal Infirmary  
Gloucestershire Hospitals NHS Foundation Trust

Good Hope Hospital Sutton Coldfield  
Great Ormond Street Hospital For Children NHS Trust  
Guys and St Thomas NHS Foundation Trust  
Hammersmith Hospital  
Harrogate and District NHS Foundation Trust  
Heartlands Hospital Birmingham  
Heatherwood and Wexham Park Hospitals NHS Foundation Trust  
Hemel Hempstead Hospital  
Hereford Hospitals NHS Trust  
Hinchingsbrooke Hospital  
HMT Claremont Hospital Sheffield  
Homerton University Hospital NHS Foundation Trust  
Hull and East Yorkshire Trust  
Inverclyde Royal Hospital  
James Paget University Hospitals NHS Foundation Trust  
Kent and Canterbury Hospital  
King Edward VII's Hospital Sister Agnes London  
Kings College Hospital NHS Foundation Trust  
Kings Mill Hospital Sutton in Ashfield  
Leeds Teaching Hospitals NHS Trust  
Lincoln County Hospital  
Liverpool Heart and Chest Hospital NHS Trust  
Liverpool Women's Hospital  
Llandough Hospital  
Macclesfield District General Hospital  
Manchester Royal Infirmary  
Manor Hospital Walsall  
Medway NHS Foundation Trust  
Mid Cheshire Hospitals NHS Foundation Trust  
Mid Essex Hospital Services NHS Trust  
Mid-Yorkshire Hospitals NHS Trust  
Milton Keynes Hospital NHS Foundation Trust  
Morrison Hospital Swansea  
Neath Port Talbot Hospital  
Nevill Hall Hospital Abergavenny  
Newham University Hospital NHS Trust  
NHS Lothian  
NHS Tayside  
Norfolk and Norwich University Hospital  
North Bristol NHS Trust  
North Cheshire Hospitals NHS Trust  
North East London Treatment Centre (Partnership)  
North Manchester General Hospital  
North Middlesex University Hospital NHS Trust  
Northampton General Hospital NHS Trust  
Northern Devon Healthcare NHS Trust  
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust  
Northwick Park Hospital  
Nottingham City Campus  
Nuffield Health Bristol Hospital  
Nuffield Hospital Bournemouth  
Nuffield Hospital Brighton  
Nuffield Hospital Cambridge  
Nuffield Hospital Glasgow  
Nuffield Hospital Guildford

Nuffield Hospital Hampshire  
Nuffield Hospital Leeds  
Nuffield Hospital Plymouth  
Nuffield Hospital Tunbridge Wells  
Nuffield Hospital Warwick  
Nuffield Hospital Woking  
Nuffield Hospital Wolverhampton  
Nuffield Hospital York  
Nuffield Orthopaedic Centre NHS Trust  
Oxford Radcliffe Hospitals NHS Trust  
Papworth Hospital  
Peterborough District Hospital  
Pilgrim Hospital  
Poole Hospital NHS Foundation Trust  
Portsmouth Hospitals NHS Trust  
Prince Charles Hospital Merthyr Tydfil  
Prince Philip Hospital Llanelli  
Princess of Wales Hospital Bridgend  
Princess Royal University Hospital Orpington  
QEII Welwyn  
Queen Elizabeth Hospital NHS Trust  
Queen Elizabeth The Queen Mother Hospital  
Queen Margaret Hospital Dunfermline  
Queen Mary's Sidcup NHS Trust  
Queen's Medical Centre Campus  
Ramsay Ashtead Hospital Surrey  
Ramsay Fulwood Hospital Preston  
Ramsay Mount Stuart Hospital Torquay  
Ramsay Oaks Private Hospital Colchester  
Ramsay Pinehill Hospital Hertfordshire  
Robert Jones and Agnes Hunt  
Rochdale Infirmary  
Royal Alexandra Hospital Paisley  
Royal Berkshire NHS Foundation Trust  
Royal Brompton and Harefield NHS Trust  
Royal Cornwall Hospitals NHS Trust  
Royal Devon and Exeter NHS Foundation Trust  
Royal Free Hospital  
Royal Glamorgan Hospital Llantrisant  
Royal Gwent Hospital Newport  
Royal Hampshire County Hospital  
Royal Liverpool Children's NHS Trust  
Royal Manchester Children's Hospital  
Royal Marsden NHS Foundation Trust  
Royal National Orthopaedic Hospital NHS Trust  
Royal Oldham Hospital  
Royal Preston Hospital  
Royal United Hospital Bath  
Royal West Sussex NHS Trust  
Royal Wolverhampton Hospitals NHS Trust  
Salford Royal NHS Foundation Trust  
Salisbury NHS Foundation Trust  
Sandwell and West Birmingham Hospitals NHS Trust  
Scarborough General Hospital  
Sheffield Children's NHS Trust

Shrewsbury and Telford Hospital NHS Trust  
Singleton Hospital Swansea  
South Devon Healthcare NHS Foundation Trust  
South Tees Hospitals NHS Trust  
South Tyneside District Hospital  
Southend University Hospital NHS Foundation Trust  
Southern General Hospital  
Southport and Ormskirk Hospital NHS Trust  
SPIRE Alexandra Hospital Chatham  
SPIRE Bushey Hospital  
SPIRE Cambridge Lea Hospital  
SPIRE Cardiff Hospital  
SPIRE Cheshire Hospital Warrington  
SPIRE Dunedin Hospital Reading  
SPIRE Fylde Coast Hospital  
SPIRE Gatwick Park Hospital  
SPIRE Harpenden Hospital  
SPIRE Hospital Leicester  
SPIRE Leeds Hospital  
SPIRE Little Aston Hospital Sutton Coldfield  
SPIRE Methley Park Hospital Leeds  
SPIRE Murrayfield Hospital Wirral  
SPIRE Portsmouth Hospital  
SPIRE Roding Hospital Ilford  
SPIRE Southampton Hospital  
SPIRE St Saviours Hospital Hythe  
SPIRE Sussex Hospital  
SPIRE Thames Valley Hospital  
SPIRE Tunbridge Wells  
SPIRE Washington Hospital  
St Anthony's Hospital North Cheam  
St Mary's Hospital Isle of Wight  
St Mary's Hospital Paddington  
St. George's Hospital  
Stepping Hill Hospital Stockport  
Surrey and Sussex Healthcare NHS Trust  
Sussex Orthopaedic NHS Treatment Centre (Care UK)  
Swindon and Marlborough NHS Trust  
Tameside Hospital NHS Foundation Trust  
Taunton and Somerset NHS Foundation Trust  
The Cheshire and Merseyside NHS Treatment Centre  
The Dudley Group of Hospitals NHS Trust  
The Hillingdon Hospital NHS Trust  
The Horder Centre  
The Ipswich Hospital NHS Trust  
The London Clinic  
The Luton and Dunstable Hospital NHS Foundation Trust  
The Princess Alexandra Hospital NHS Trust  
The Rotherham NHS Foundation Trust  
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust  
The Royal Liverpool and Broadgreen University Hospitals NHS Trust  
The Royal Surrey County Hospital  
The South West London Elective Orthopaedic Centre  
The Walton Centre For Neurology and Neurosurgery NHS Trust

The Whittington Hospital NHS Trust  
Trafford Healthcare NHS Trust  
University College London Hospitals NHS Foundation Trust  
University Hospital Lewisham  
University Hospital of Hartlepool  
University Hospital of North Durham  
University Hospital of North Staffordshire NHS Trust  
University Hospital of North Tees  
University Hospital of Wales  
University Hospitals Bristol NHS Foundation Trust  
University Hospitals of Leicester NHS Trust  
University Hospitals of South Manchester NHS Foundation Trust  
Wansbeck General Hospital  
Watford General Hospital  
West Middlesex University Hospital NHS Trust  
West Suffolk Hospital NHS Trust  
West Wales General Hospital Carmarthen  
Western Infirmary  
Weston Area Health NHS Trust  
William Harvey Hospital  
Wirral University Teaching Hospital NHS Foundation Trust  
Withybush General Hospital Haverfordwest  
Wrexham Maelor Hospital  
Wrightington Wigan and Leigh NHS Trust  
Yeovil District Hospital NHS Foundation Trust  
York Hospitals NHS Foundation Trust  
Yorkhill Hospital