

Use of a comprehensive Electronic Blood Transfusion System to improve the safety and quality of transfusion....and save money

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NHS
Blood and Transplant

Overview of hospital blood transfusion

- **High activity** (1.8 million units of red cells to 500,000 patients/year in the UK; 25,000 units of red cells/year in Oxford)
- **High cost** (£300+ million/year for the cost of blood in England; £4.5 million/year in Oxford; unknown costs for the transfusion process)
- **Not risk-free** (119 deaths due to transfusion in the last 6 years in the UK; 20 deaths due to ABO incompatible red cell transfusions in the last 20 years)

Where are we now?

- Evidence base for good transfusion practice getting stronger but more research needed
- Blood usage decreasing but national, regional and local audits consistently show inappropriate use of 15-20% red cells and 20-30% platelets/plasma
- Low uptake of methods to avoid use of blood
- Safety of hospital transfusion still an issue
- Poor education and training
- Lack of patient involvement
- Poor IT for blood safety and for providing data on blood usage

See NBTC Annual Reports

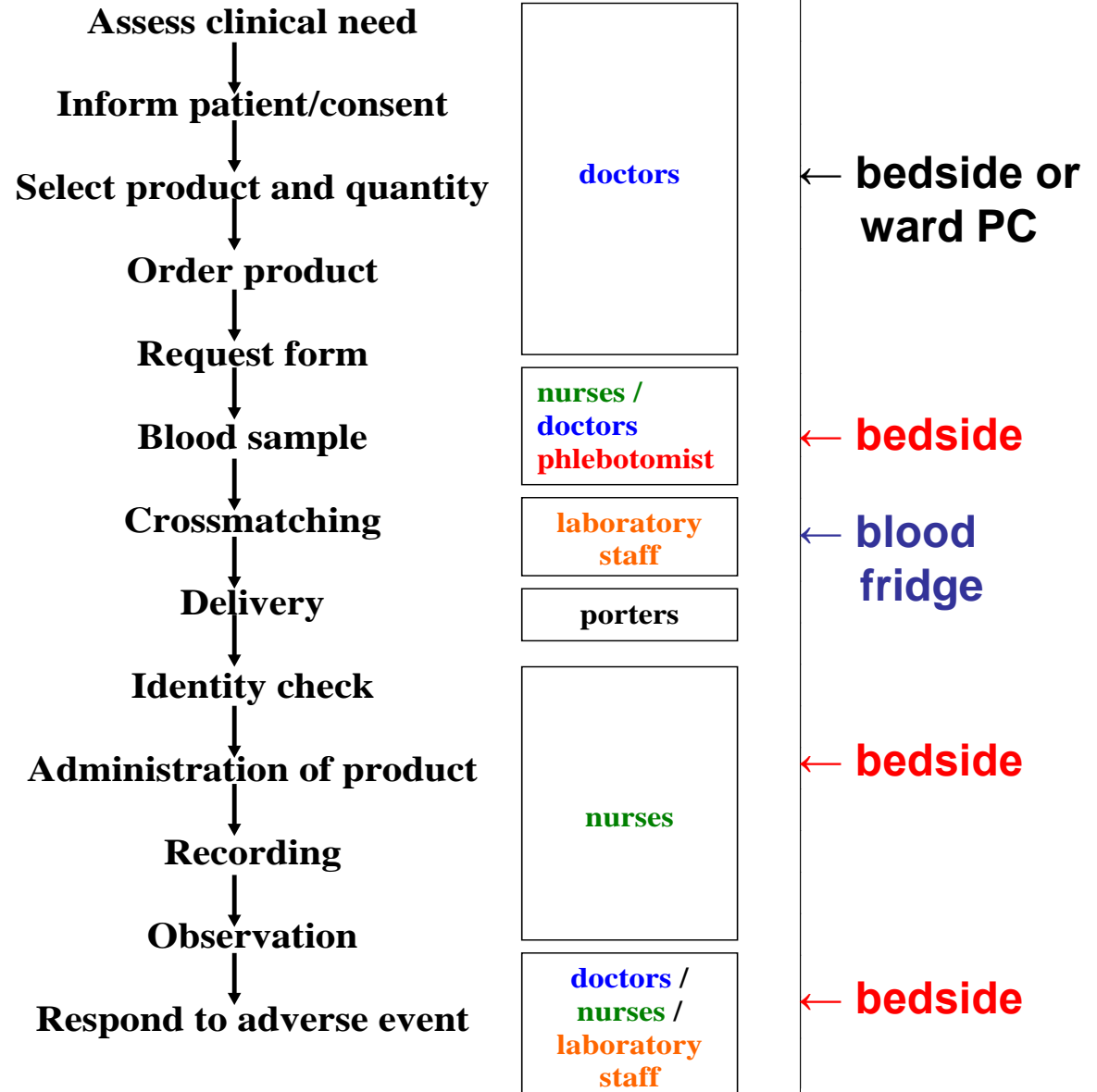
<http://www.transfusionguidelines.org.uk/Index.aspx?Publication=NTC&Section=27&pageid=1075>

Our vision for a high quality transfusion service

To develop and implement process change in hospital transfusion supported by IT to:-

- Enhance patient safety**
- Improve the patient experience**
- Reduce the administrative burden for our clinical staff**
- Achieve compliance with tightening statutory and governance requirements**
- Optimise our use of resources (reduce blood use and blood wastage)**

Hospital transfusion process



Standard pre-transfusion process



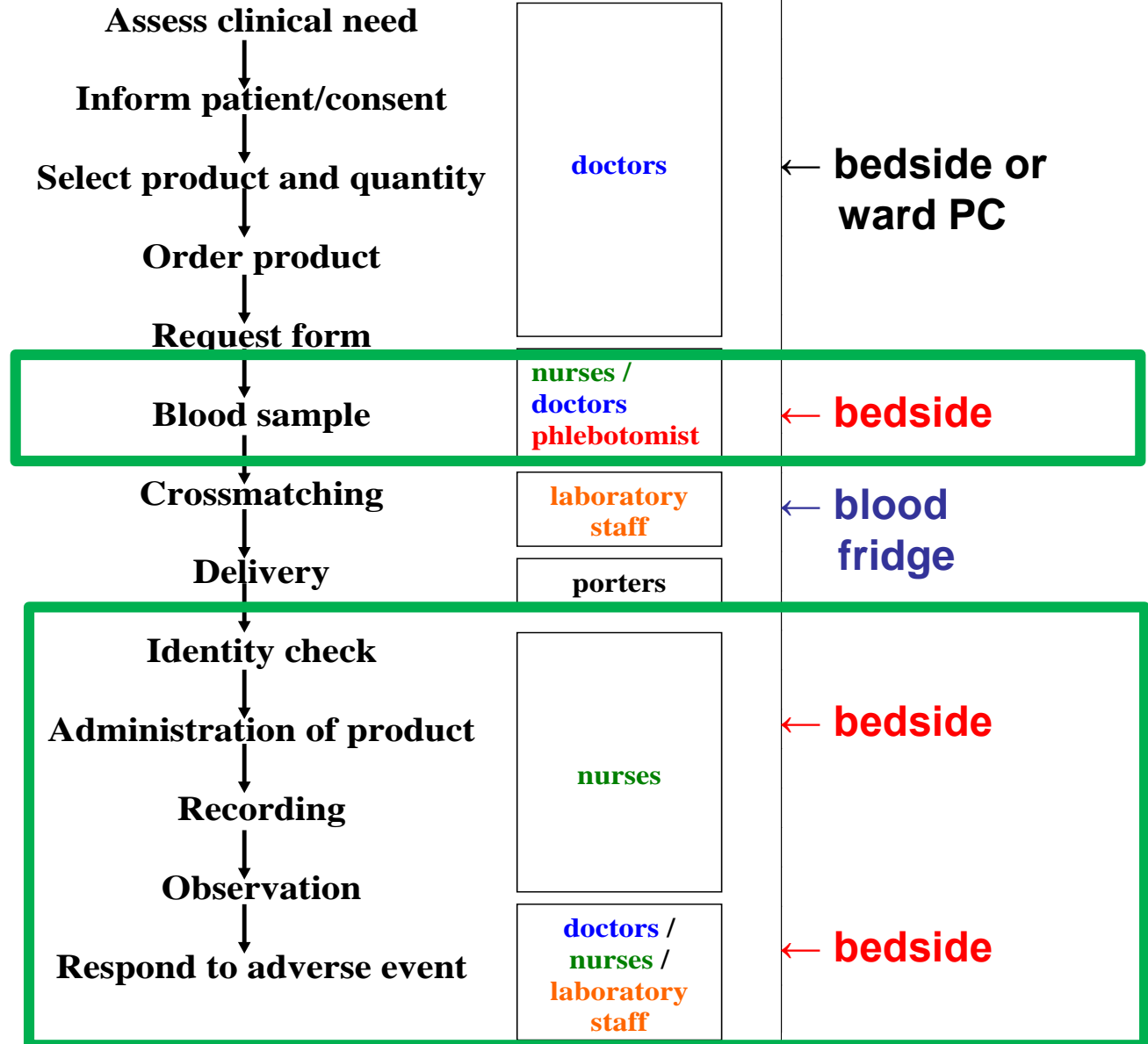
**Lots of paper work
(nursing and medical
notes, prescription,
observation chart,
compatibility report form)**

**2 nurses (1 nurse reading
information from blood
pack, 2nd nurse cross-
referencing with all the
different paperwork)**

**27 individual steps to be
carried out before safe to
commence the transfusion**

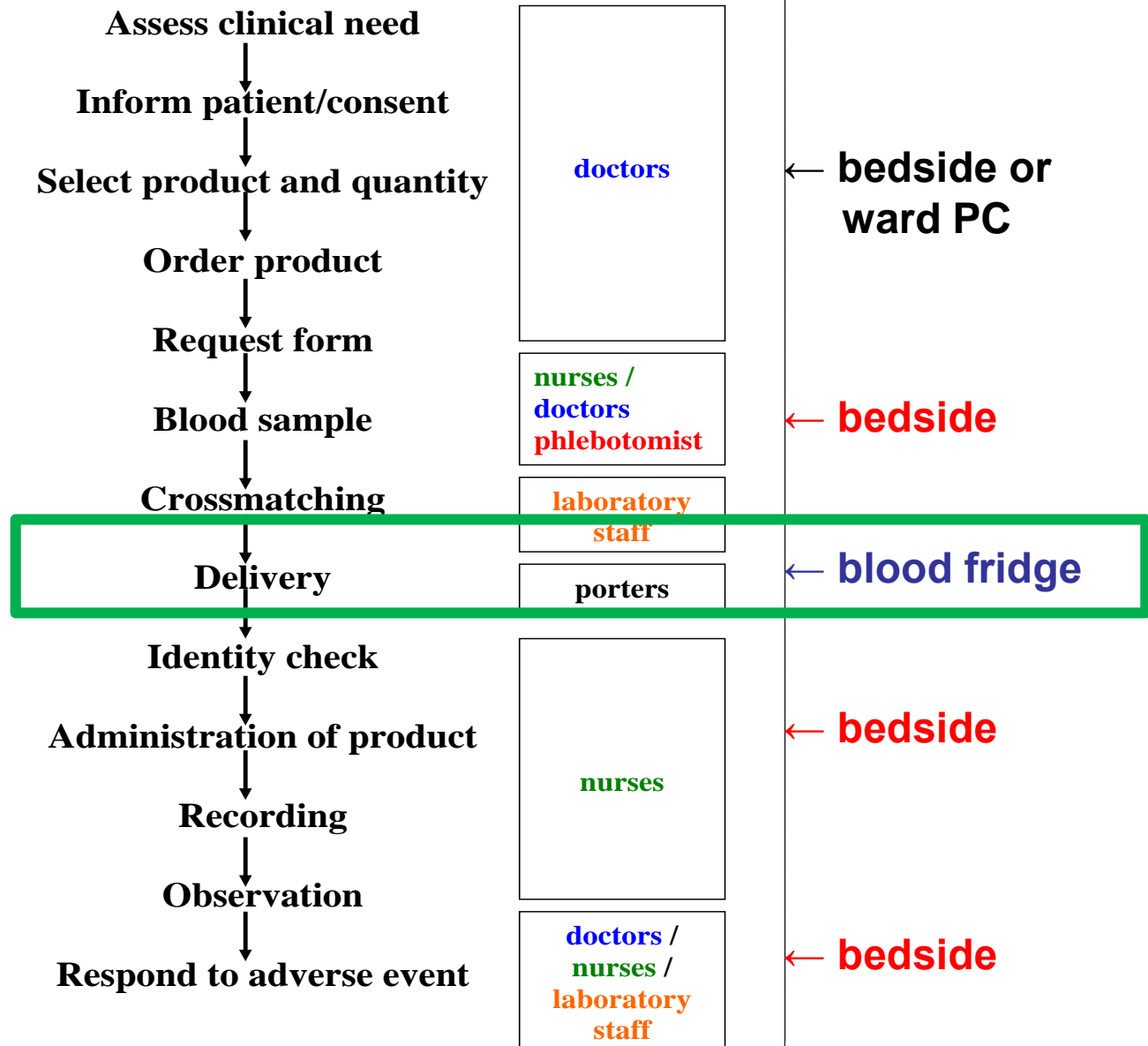
End-to-end electronic process for transfusion safety

Transfusion safety
at the bedside

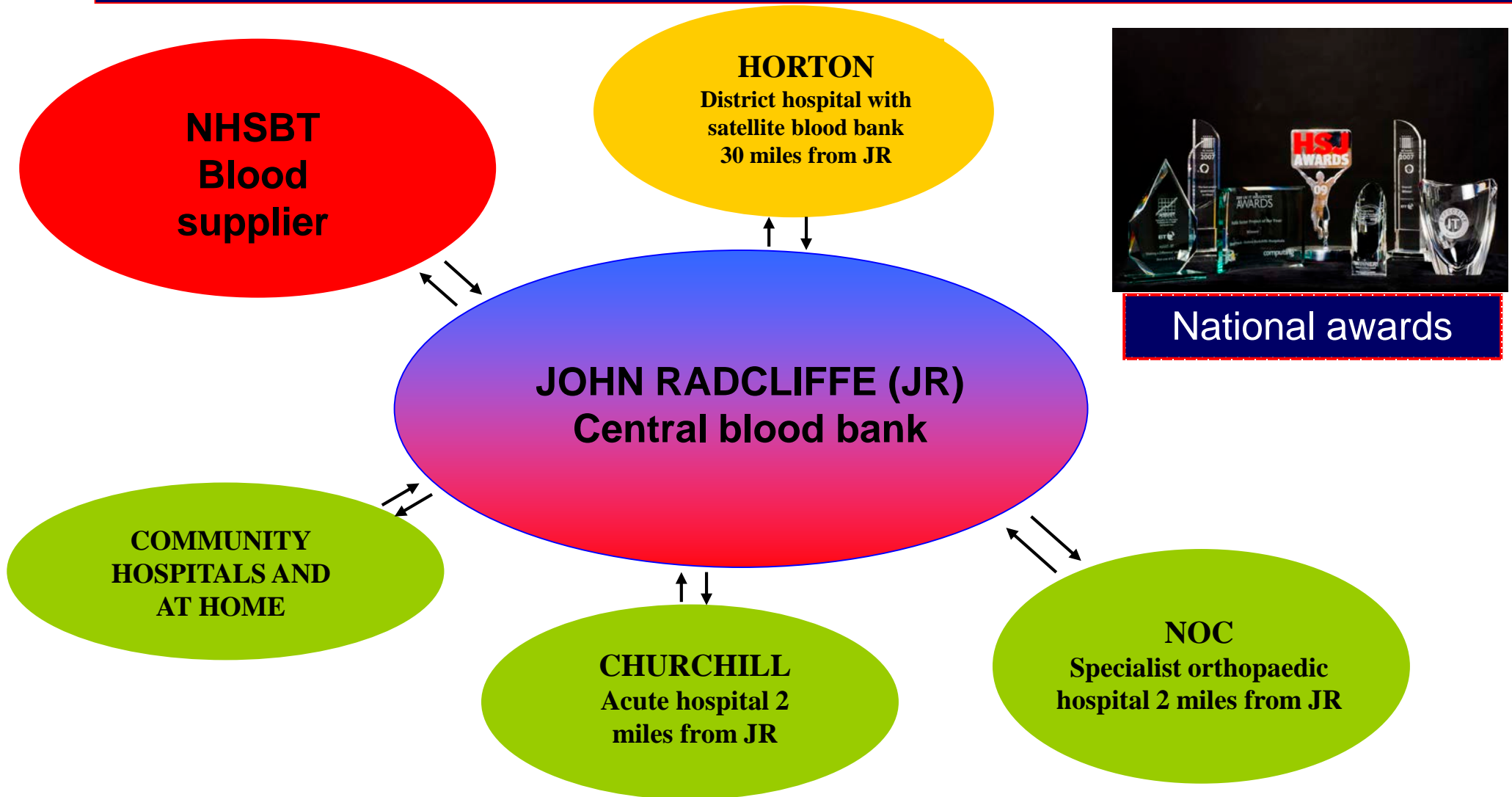


End-to-end electronic process for transfusion safety

Transfusion safety
at blood fridges



Oxford Centralised Transfusion Service



NHSBT: Reference RCI, H & I, SCI etc; blood product provision; electronic requesting of blood and diagnostic tests and issuing of reports; clinical and scientific advice.

JR lab: Hub: routine and urgent sample testing 24/7; product provision; antibody identification (all but very complex).

Spoke with lab: urgent requests; product provision.

Spoke without lab: product provision.

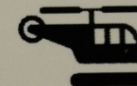
“Blood on Board”



Emergency staff ID - not for OUH use.

Hospital No: HEMS 9990000028

UNKNOWN, Hems
D.O.B: 01/01/1901
Sex: U



Main Menu

Collect Samples

Transfuse

Begin Tx

Verbally Confirm Patient ID

Hospital Nr: 10125158

Last Name: ZZZTEST

First Name: Janet

Birthdate: 01-Jan-1990

Gender: F

Cancel Next

Emergency Tx

Scan Compatibility Label

Or Tap Here To Give Emergency Blood

Cancel Back

Begin Tx

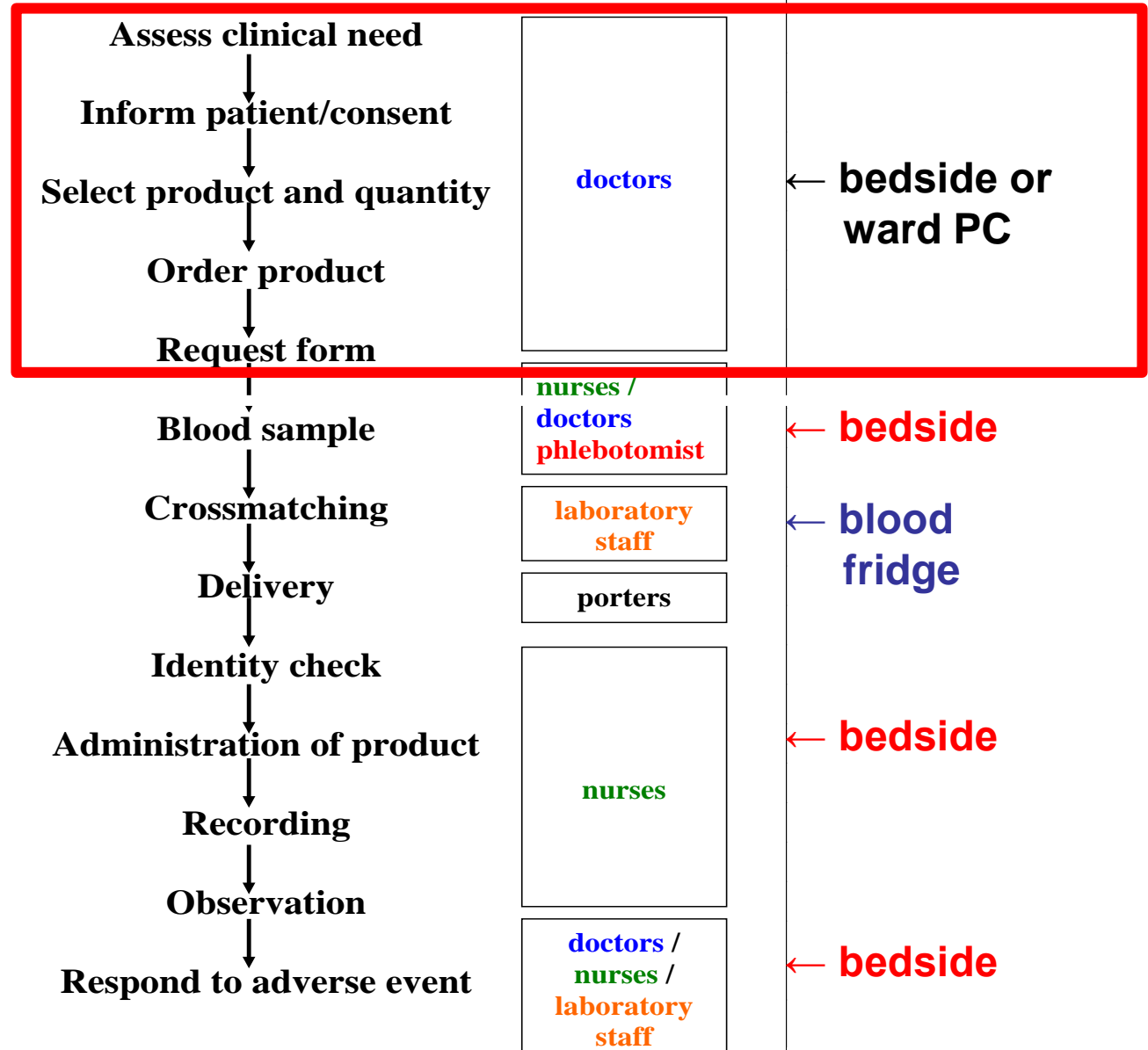
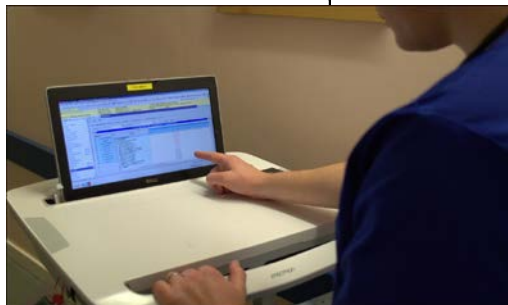
Scan Blood Unit ID

Cancel Back

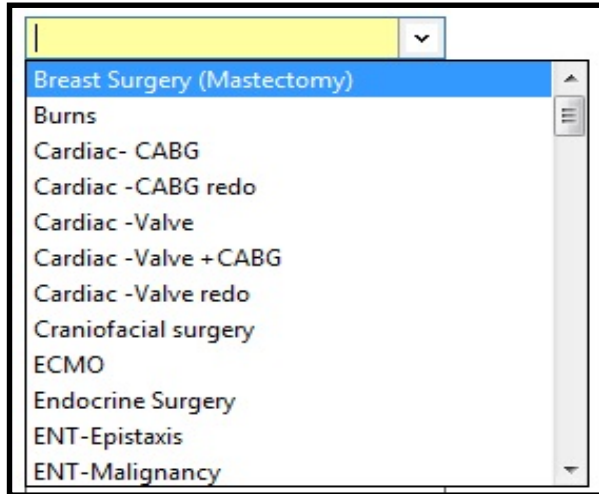


Development of electronic blood ordering

'Decision support'
for better practice



Electronic blood ordering and decision support

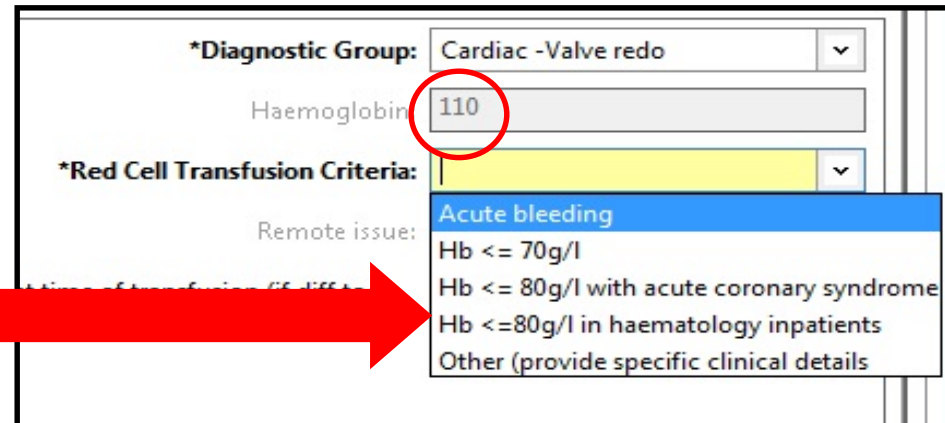


A screenshot of a software interface showing a list of diagnostic groups. The list includes: Breast Surgery (Mastectomy), Burns, Cardiac- CABG, Cardiac -CABG redo, Cardiac -Valve, Cardiac -Valve + CABG, Cardiac -Valve redo, Craniofacial surgery, ECMO, Endocrine Surgery, ENT-Epistaxis, and ENT-Malignancy. The 'Breast Surgery (Mastectomy)' option is currently selected and highlighted in blue.

1

Capture the diagnostic group

Automatic capture of the most recent relevant result



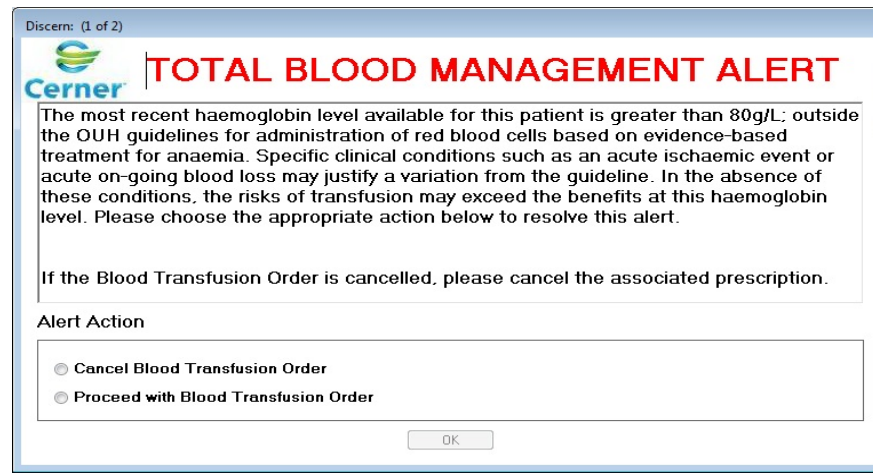
A screenshot of a form with the following fields: '*Diagnostic Group:' with a dropdown menu showing 'Cardiac -Valve redo'; 'Haemoglobin:' with a text input field containing '110'; and '*Red Cell Transfusion Criteria:' with a dropdown menu. A red circle highlights the '110' in the Haemoglobin field. Below the dropdown menu, a list of criteria is visible: 'Acute bleeding', 'Hb <= 70g/l', 'Hb <= 80g/l with acute coronary syndrome', 'Hb <=80g/l in haematology inpatients', and 'Other (provide specific clinical details)'. A red arrow points from the '2' step box to this form.

2

Select a reason for transfusion

3

Alert if transfusion not justified



A screenshot of a 'TOTAL BLOOD MANAGEMENT ALERT' dialog box. The header shows 'Discern: (1 of 2)' and the Cerner logo. The main text reads: 'The most recent haemoglobin level available for this patient is greater than 80g/L: outside the OUH guidelines for administration of red blood cells based on evidence-based treatment for anaemia. Specific clinical conditions such as an acute ischaemic event or acute on-going blood loss may justify a variation from the guideline. In the absence of these conditions, the risks of transfusion may exceed the benefits at this haemoglobin level. Please choose the appropriate action below to resolve this alert.' Below this, it says: 'If the Blood Transfusion Order is cancelled, please cancel the associated prescription.' The 'Alert Action' section has two radio buttons: 'Cancel Blood Transfusion Order' (selected) and 'Proceed with Blood Transfusion Order'. An 'OK' button is at the bottom right.

Reason (justification) for transfusion

Red cell concentrates

1. Acute bleeding*
2. $\text{Hb} \leq 70\text{g/l}$ (applies to most inpatients)
3. $\text{Hb} \leq 80\text{g/l}$ in patient with acute coronary syndrome
4. $\text{Hb} \leq 80\text{g/l}$ in haematology inpatients
5. Other (provide specific clinical details)

Fresh frozen plasma

1. Massive haemorrhage*
2. $\text{INR} \geq 1.6$ with bleeding
3. $\text{INR} \geq 1.6$ and pre-procedure
4. Therapeutic exchange*
5. Other (provide specific clinical details)

Reason (justification) for transfusion

Cryoprecipitate

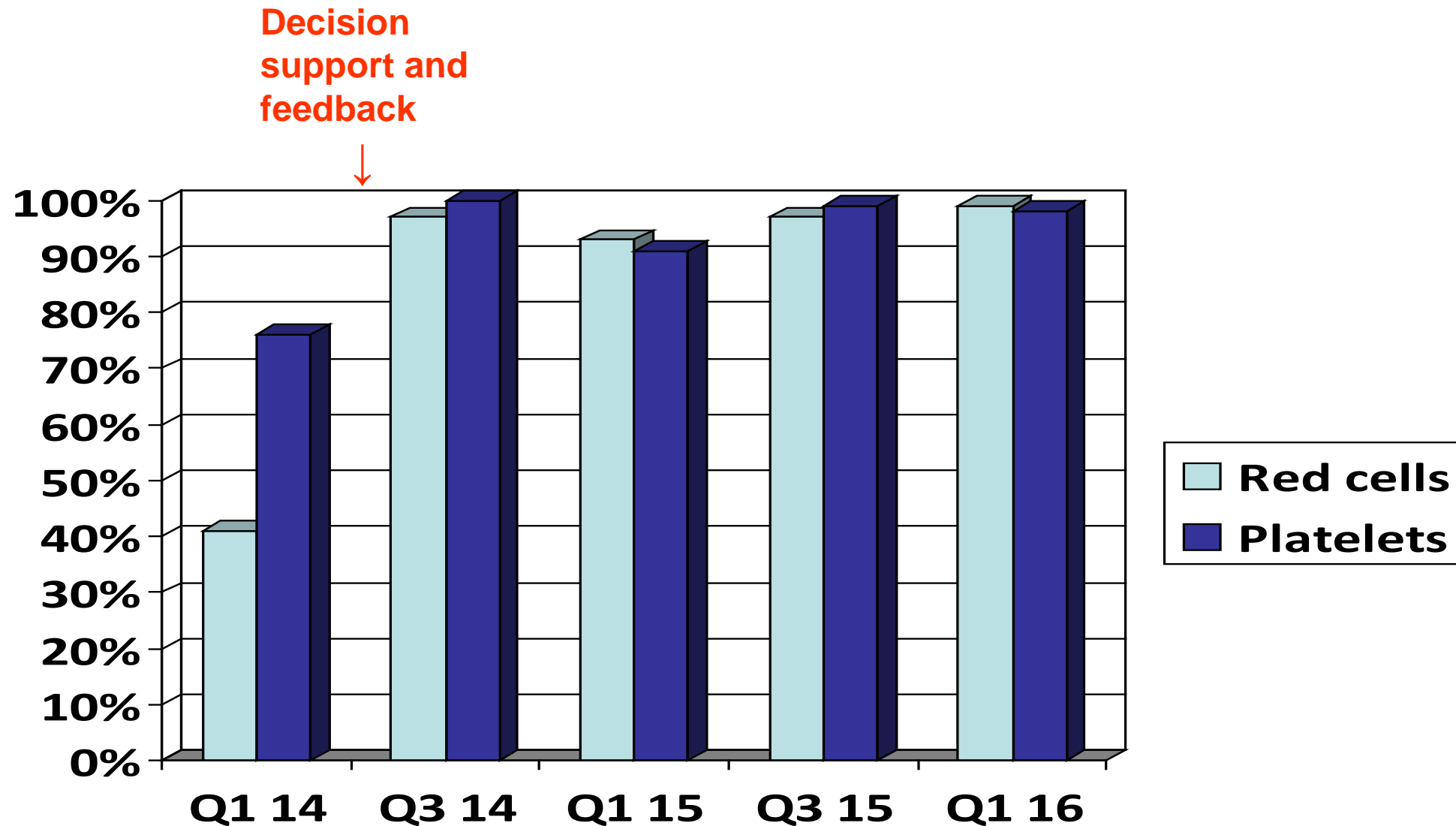
1. Massive haemorrhage*
2. Fibrinogen $\leq 1.0\text{g/l}$ & pre-procedure
3. Other (provide specific clinical details)

Platelets

1. Massive haemorrhage*
2. PLT count $\leq 10 \times 10^9/\text{l}$
3. PLT count $\leq 30 \times 10^9/\text{l}$ with clinically significant bleeding
4. PLT count $\leq 50 \times 10^9/\text{l}$ pre-procedure
5. Other (provide specific clinical details)

*=no alert regardless of antecedent laboratory value

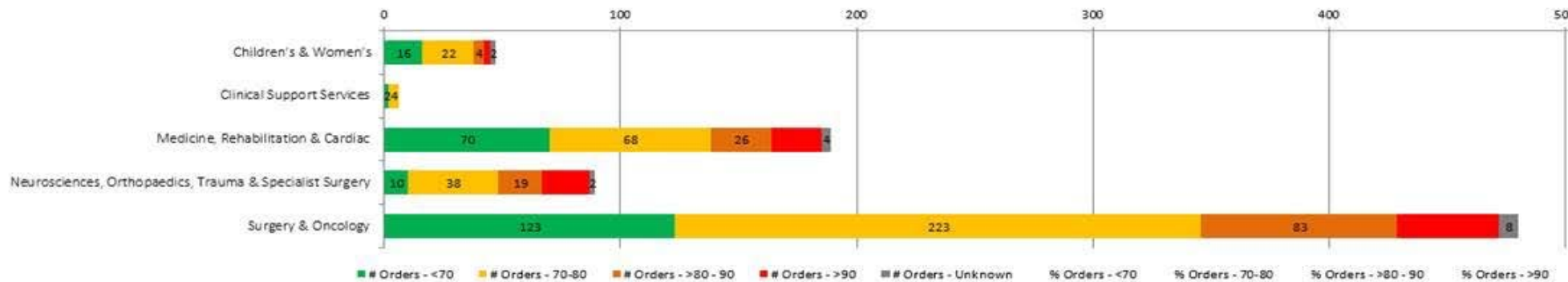
Compliance with agreed transfusion triggers in haematology improved from <50% to >90%



Feedback of data to clinical teams

(Red cell usage by OUH Division)

Number of RBC Orders by HB range
(Divisions by number of orders)



Order_Month 01/10/2015
TransfCriteriaInclusion Hb

Hb Prior to Order
Orders

% Orders

Div/Direc/Spec	<70	70-80	>80 - 90	>90	Unknown	<70	70-80	>80 - 90	>90	Unknown
Children's & Women's	16	22	4	3	2	34.04%	46.81%	8.51%	6.38%	4.26%
Clinical Support Services	2	4	0	0	0	33.33%	66.67%	0.00%	0.00%	0.00%
Medicine, Rehabilitation & Cardiac	70	68	26	21	4	37.04%	35.98%	13.76%	11.11%	2.12%
Neurosciences, Orthopaedics, Trauma & Specialist Surgery	10	38	19	20	2	11.24%	42.70%	21.35%	22.47%	2.25%
Surgery & Oncology	123	223	83	43	8	25.63%	46.46%	17.29%	8.96%	1.67%
Grand Total	221	355	132	87	16	27.25%	43.77%	16.28%	10.73%	1.97%

Feedback of data to clinical teams

(Red cell usage by OUH Specialty)



Reduction in OUH blood use and cost savings 2013 to 2016

	2013 (units)	2016 (units)	% OUHT change	% national change	Cost reduction
Red Cells	27,371	21,511	-21.4	-11.4	£760,405
Platelets	4193	3803	-9.3	-3.4	£139,635
FFP	5348	4397	-17.8	-20.8	£24,499
Cryo	269	598	+222	+13.0	+ £54,127
Total cost reduction					<u>£870,412</u>

How to ensure maximum impact?

- Regular (i.e. monthly) review of data on inappropriate transfusions with team of doctors ordering blood
- Identification and education of 'worst offenders'
- Quarterly reports to all clinical teams
- Addition of further field to identify the reason for override of alerts....

Comments box for overridden alerts

- **Instruction from senior clinician**
- **Recent point-of-care result (provide the result and the date and time)**
- **Disagree with recommendation (provide reasons)**
- **Additional patient co-morbidity (provide details)**
- **Other (provide details)**

Consent for transfusion

Discern: Open Record - ZZZTEST, JANET | (1 of 1)

 **!!!CAUTION!!!**

ZZZTEST, JANET does not have a valid consent for the use of blood products. Please discuss this with the patient, review and complete the necessary consent documentation BEFORE any planned transfusion is administered.

The clinician will be asked to complete consent at the point of G&S but it can be deferred to the point of prescribing

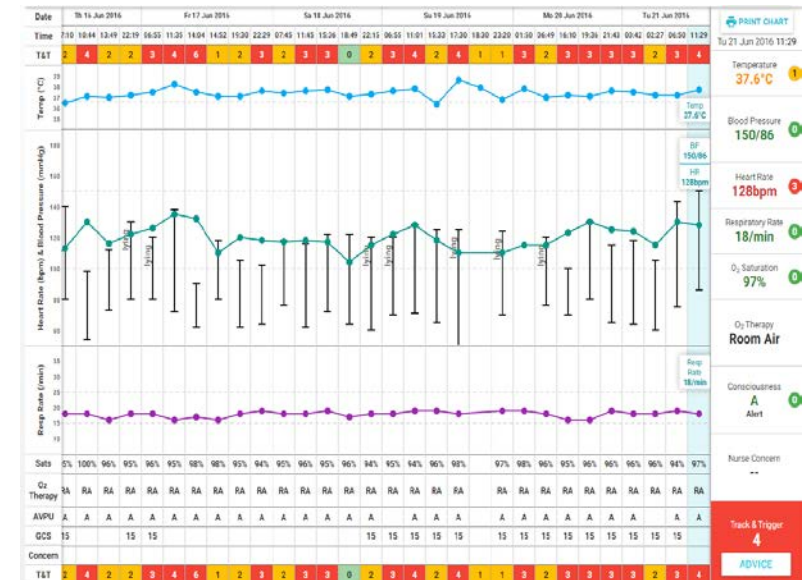
SEND and BloodTrack Alignment

- Patient observations are monitored during transfusion to assist with detection of an acute transfusion reaction
- Electronic bedside systems assist with patient observation recording during transfusion
- Currently high volume of duplication and inaccuracy using 2 systems to record observations



SEND and BloodTrack Tx Integration

- Sharing of hardware – reduce equipment at the bedside and increase efficiency
- All observations accurate and appear in one place for review at the bedside
- Interpretation of observations in context of recent transfusion to detect patient deterioration (development of “transfusion early warning score”)



NICE Quality Standards

- 1. People who may have or who have had a transfusion are given verbal and written information about the benefits and risks of transfusion**
- 2. People who receive a red cell transfusion are clinically reassessed and have their Hb checked after each unit**
- 3. Adults who having surgery and expected to have moderate blood loss are offered tranexamic acid**
- 4. People with iron deficiency anaemia are offered iron supplementation before and after surgery**

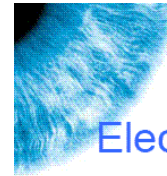
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Potential for all of these to be supported by IT

Guide for implementation of electronic transfusion process

- **New technology for transfusion endorsed by NHS QIPP and further national awards**



NHS
Evidence

Electronic blood transfusion:

Improving safety and efficiency of transfusion systems

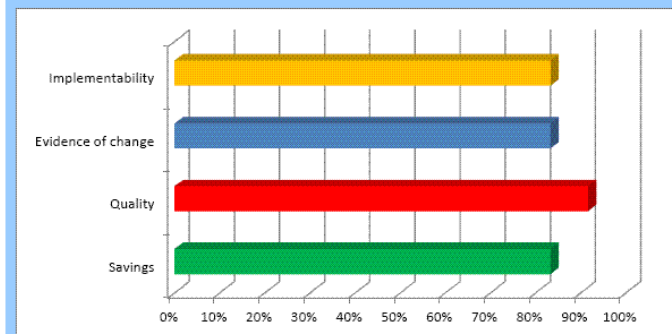
Provided by: Oxford Radcliffe Hospitals

Publication type: Quality and productivity example

QIPP Evidence provides users with practical case studies that address the quality and productivity challenge in health and social care. All examples submitted are evaluated by NICE. This evaluation is based on the degree to which the initiative meets the QIPP criteria of savings, quality, evidence and implementability; each criterion is given a score which are then combined to give an overall score. The overall score is used to identify the best examples, which are then shown on NHS Evidence as 'recommended'.

Our assessment of the degree to which this particular case study meets the criteria is represented in the evidence summary graphic below.

Evidence summary



<https://arms.evidence.nhs.uk/resources/qipp/29453/attachment>

Thank you

- **Funding: NHS Blood & Transplant and Oxford NIHR Biomedical Research Centre**
- **Research Nurses: Simon Noel, Juliet Smith, Sophie Staples**
- **Blood Transfusion laboratory: Julie Staves**
- **Oxford IT: John Skinner, Jonathan Kay, Paul Altmann**
- **Commercial partner: Haemonetics**

