Information Technology in Blood Transfusion
Friend or Foe?!

Dr Megan Rowley
Consultant in Transfusion Medicine
SNBTS at the Royal Infirmary of Edinburgh

IT is our friend, obviously!

- We couldn’t run a modern transfusion laboratory without IT
- IT supports healthcare systems by reducing/replacing manual processes
- IT provides an accessible, permanent record

We have learned that we can't manage without well designed, fully functional IT systems

Does transfusion IT get a perfect score?

IT can be a ‘foe’ sometimes

1. **We don’t always get the IT systems we need**
   - IT providers don’t listen to what we need
   - We can’t afford the systems we want
   - Excellent IT systems are no good to us if they don’t ‘join up’ with each other

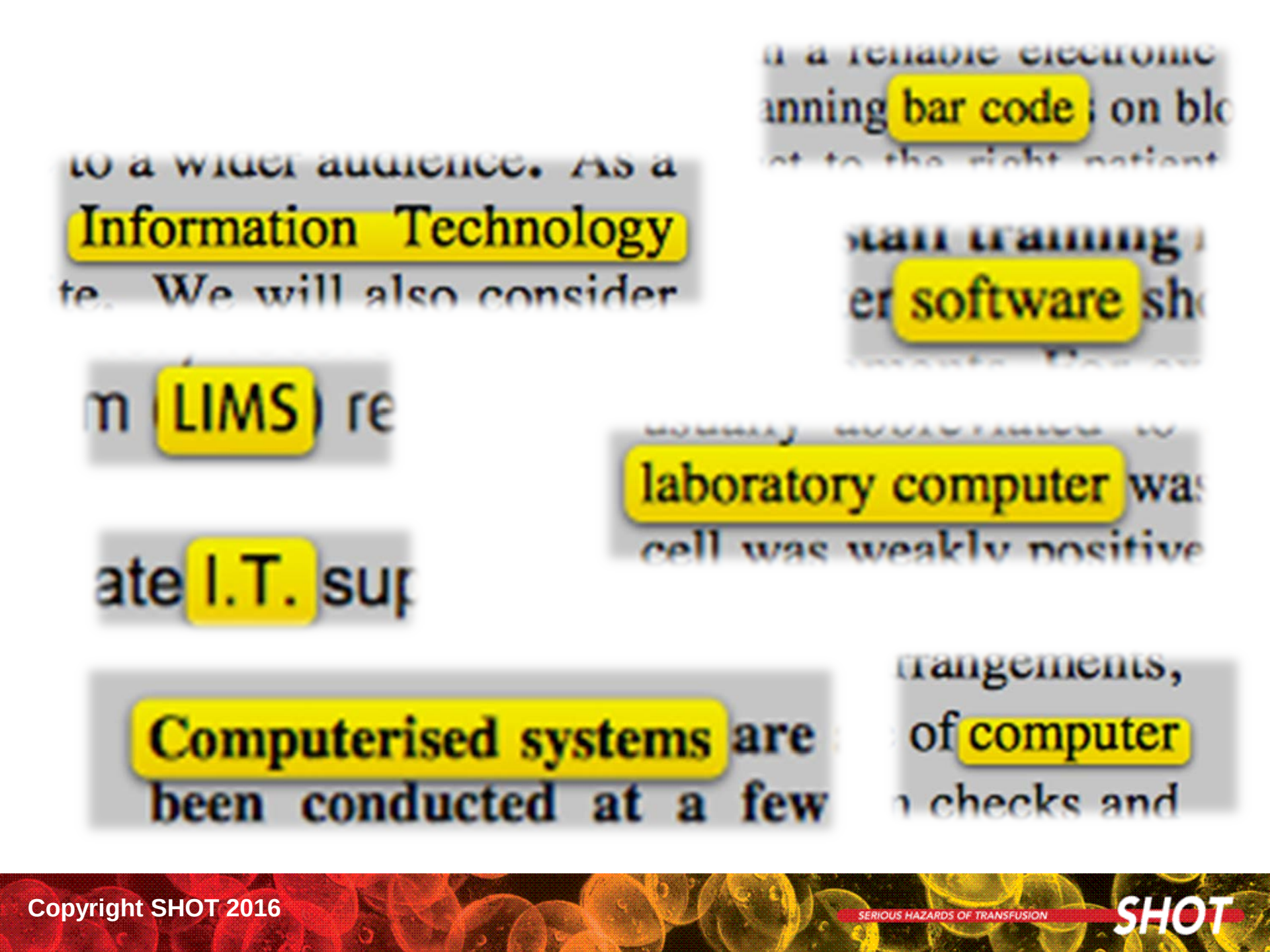
2. **Humans still have to operate IT systems**
   - We need training, we make mistakes, we get angry

3. **Data is no good to us unless it becomes information that we can use (easily)**

What has SHOT said about IT errors?

Defined as cases identified where IT systems:

- may have **caused** (or contributed) to the errors reported
- have been **used incorrectly** resulting in an error
- **could have prevented** errors but were not used or available



Historical blood bank records not checked

In one incident the records could not be checked at night because **computer records** were not accessible to the on-call laboratory staff

Recommendation

Access to previous transfusion laboratory records containing blood group and irregular antibody information should be available **at all times**

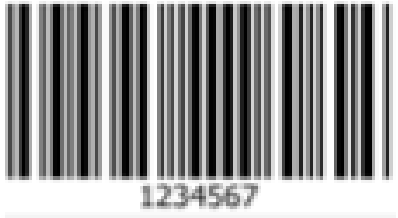
"Improving the safety of blood transfusion at the bedside"

WORKSHOP: Manchester Blood Centre

30th September 1999

Featuring:

- Mike Murphy & Brian McClelland
- Colin Clark Immucor Inc., Mike Wilks, Symbol Technologies, Lyn Sharman, Datalog International Ltd. Talking about barcode technology



"It was generally agreed that the day had been useful and that it should provide the impetus to move forward. The formation of a smaller group reporting to the SHOT Standing Working Group to develop pilot studies of the new technology seemed to offer the best solution"

2000

• Three three pilots of bar code technology in patient and blood component identification
• IT error: ABO IBCT. Implementation of new computer system - old historical record had not been merged with new.

Dr Derek Norfolk

- The 1998/99 SHOT Report called for the increased allocation of resources to develop electronic “positive identification” systems to control the clinical transfusion process.
- Computer-based systems, employing technology for positive identification, will soon control the clinical transfusion process “from vein to vein”
- It seems essential that as multiple electronic ID systems are introduced to the clinical workplace, they share common standards, hardware and computer-links wherever possible.
- All of those developing systems should communicate effectively and work in collaboration for the benefit of patients and staff alike

SHOT 1999-2000

This was in capital letters!!

INFORMATION TECHNOLOGY WILL PREVENT HUMAN ERROR

COMPUTERISED IDENTIFICATION SYSTEMS ARE AVAILABLE TO ENSURE SAFE TRANSFUSION AT THE BEDSIDE.
THESE SYSTEMS MUST NOW BE EVALUATED.

THE NHS IT STRATEGY SHOULD TAKE A LEAD IN ASSESSING THIS AREA OF NEW TECHNOLOGY

2001

- **SHOT identifies importance of IT in matching special requirements**
- ***NPSA* engages with SHOT which drives IT initiatives to improve bedside procedures and blood collection systems**

2 cases involved the issue of non-irradiated platelets where irradiated products were required. 1 of these errors was made by a BMS working out of hours who issued them despite a computer warning to the contrary.

There were 2 cases in which laboratory staff failed to issue CMV negative products despite computer warnings. Both these transfusions were routine but were issued by a BMS working out of hours

SHOT 2000/2001

Hospitals should implement systems to ensure that patients who need irradiated components always receive them.
Computer software should be improved to offer better warnings when the component does not meet requirements.

8% of hospital blood banks have no computer and 65% have no automation

Automation and computerisation can help reduce and perhaps even eliminate some errors, but are not infallible.
They may even introduce new unforeseen sources of error, require extensive validation and revalidation after upgrades

2002

- Second ***Better Blood Transfusion HSC***
- **Resources required for BBT2 include laboratory, bedside and 'audit' software**
- **IT saves!**

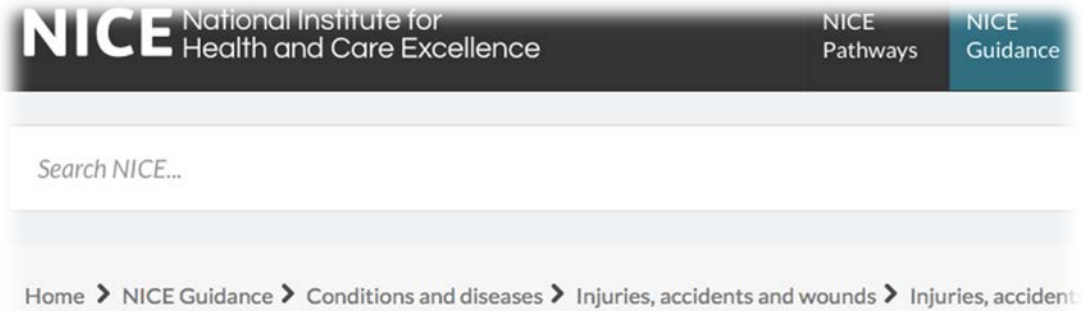
Blood was correctly grouped and screened but the wrong transfusion forms were put in with the wrong units so the form for ward A went with the unit for a patient on ward B.

When ward A scanned the unit using an electronic hand held barcode reader it was detected that it was the wrong unit for the patient on the form. Both units were recalled and reissued correctly.

An ABO incompatible transfusion was thus prevented by the use of an electronic barcode reader.

2003 - onwards

NHS Digital



Medicines & Healthcare products Regulatory Agency

MHRA Guidance on Electronic Issue (May 2010)

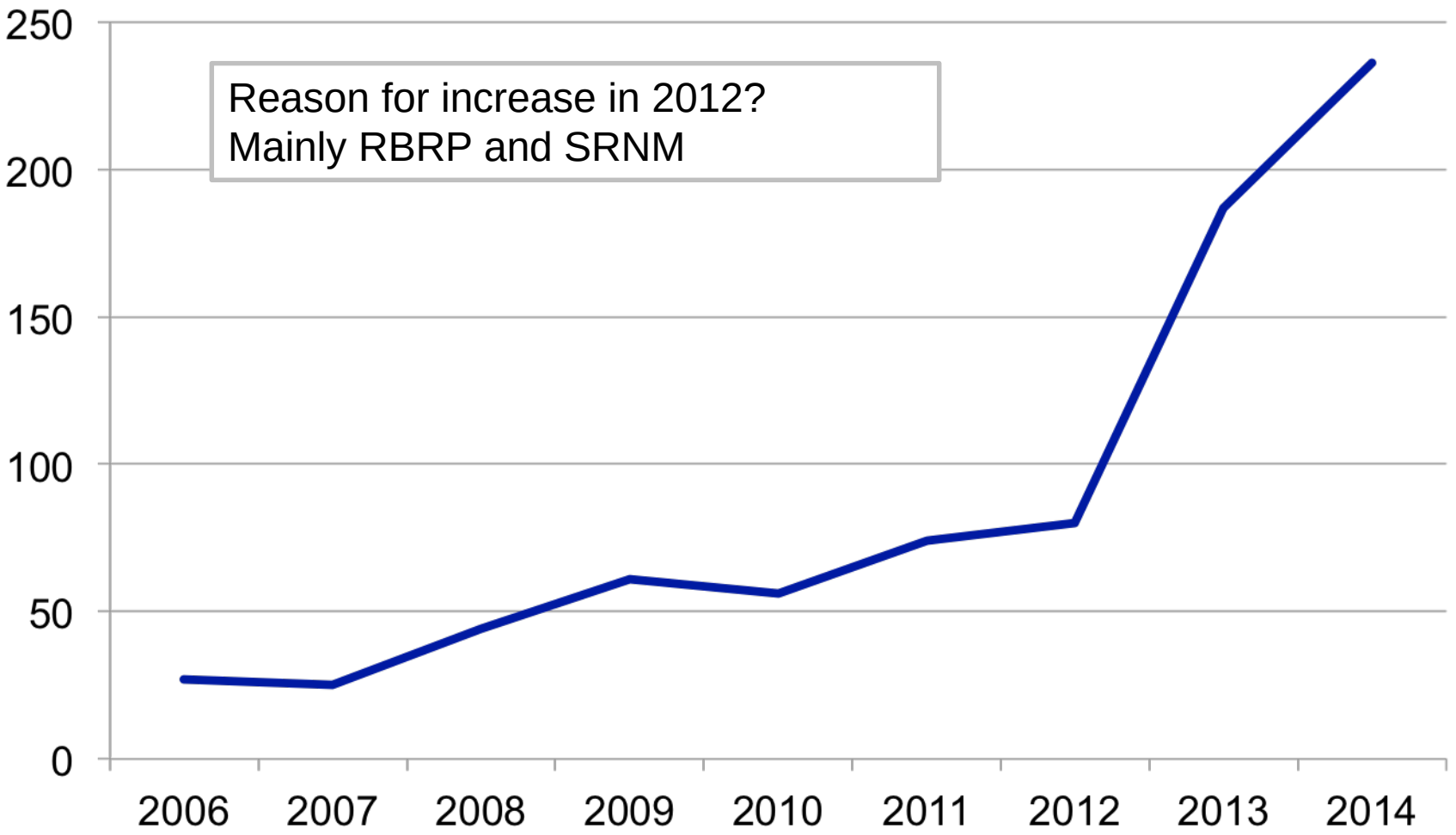
Error	No. of reports	Non-irradiated unit transfused	Antigen positive unit transfused	Non-CMV Neg unit transfused	Other
Records not merged	6	2	4	0	0
Computer system 'down'	6	3	1	1	1 (transcription error)
Historical record not consulted	3	2	1	0	0
Protocols for searching previous records insufficiently flexible	3	3	0	0	0
Ignored warning flag	2	1	1	0	0
Data not transferred from old system	1	0	0	0	1 (ABO mismatch)
Failure to update warning flags	1	0	0	0	1 (MB-FFP for a child)
Inappropriate electronic issue	6	0	4	0	2 Protocol violations

SHOT 2006

Detailed analysis of IT errors

SHOT Errors attributed to Information Technology 2006-2014

(excluding Anti-D and Near Miss catergories)



UK Transfusion Laboratory Collaborative: minimum standards for staff qualifications, training, competency and the use of information technology in hospital transfusion laboratories 2014

B. Chaffe,[1] H. Glencross,[2] J. Jones,[3] J. Staves,[4] A. Capps-Jenner,[5] H. Mistry,[6] P. Bolton-Maggs,[6] M. McQuade[7] & D. Asher[8]

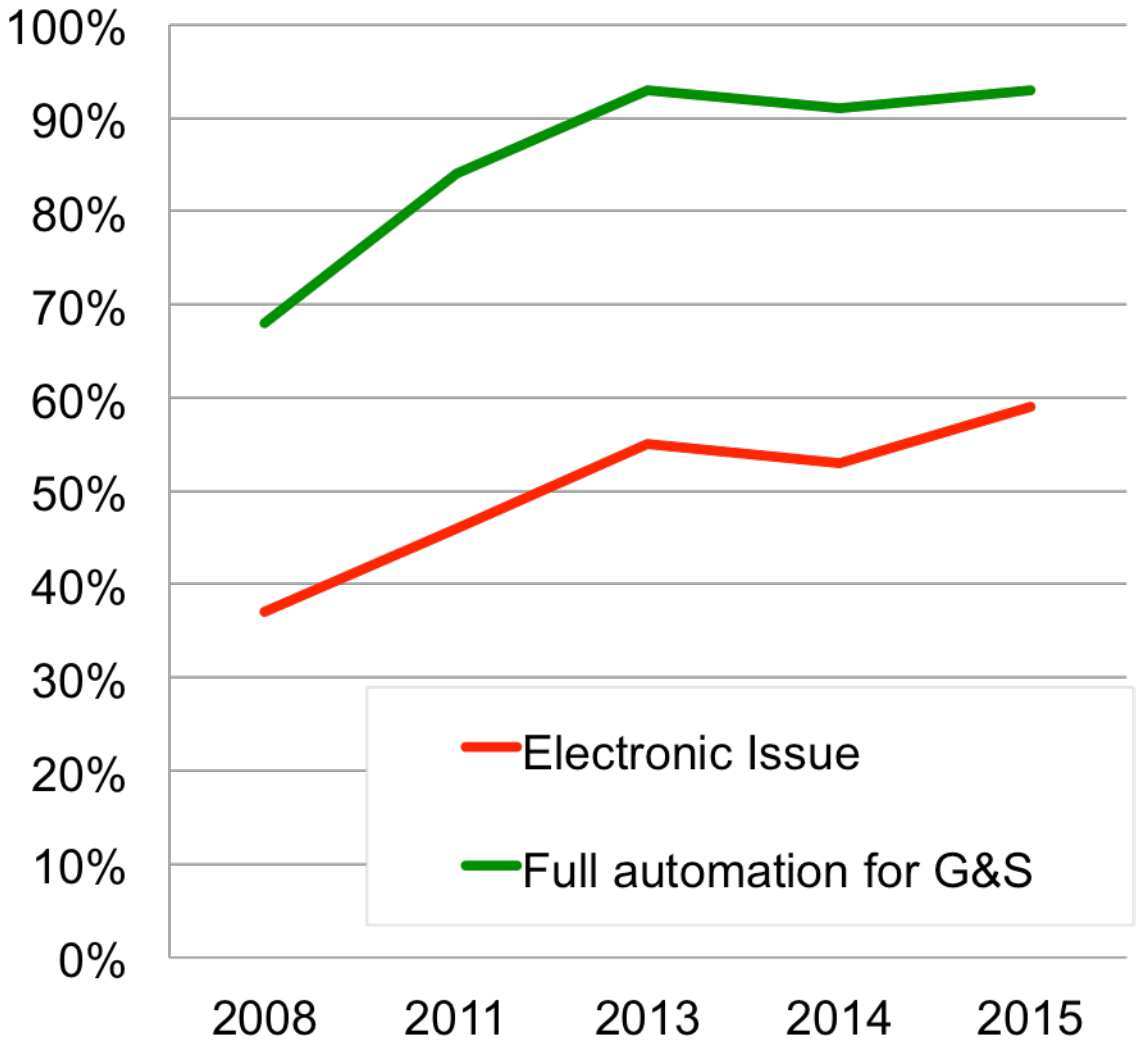
INFORMATION TECHNOLOGY

It is expected that:

1. All laboratories will have complete walk-away automation which is in use 24/7, with bidirectional interfaces to the LIMS. In the absence of complete automation, documented measures must be taken in order to mitigate procedural laboratory errors
2. Electronic issue of red cells will be introduced when the laboratory infrastructure is robust and supports this procedure
3. Where remote issue of components is being considered as part of service delivery, consideration will also be given to installing complete blood tracking (vein to vein) as an integral feature of this development

Original UKTLC minimum standards
Transfusion Medicine. 2009 Aug;19(4):156-8.

UK and ROI laboratories participating in UK NEQAS BTLP scheme



In **2015**, of those laboratories who responded (n=279):

- **100%** have a LIMS
- **11%** (31/279) have no automation for G&S during core hours
- **2%** (4/248) have no interface between the LIMS and automated analysers

NHSBT PBM survey 2015

73% of English Trusts who responded use these 4 LIMS providers (n=143)

  – WinPath, Telepath, Apex, Labcentre

- 64 (47%) of organisations plan upgrades or changes to their LIM systems in the future
- 130 (29%) use ordercomms for transfusion

NBTC survey of IT systems in Hospital Transfusion Laboratories 2011

47% (54/116) have blood tracking systems *(lower in 2007= 24%)*

- 83% were installed between 2005 and 2010.
- 54% of the rest are planning to install one within the next 2 years

19% (22/116) have electronic remote blood issue systems

- Only 4/21 issue the majority of RBCs remotely
- 14/21 (67%) issue less than 30% of RBCs remotely

16% (18/115) have bedside IT systems *(same as 2007)*

- 75% were installed between 2005 and 2010.
- 45% indicated that they are planning to install one in the next 2 years

PROMOTING

THE BENEFITS OF EXISTING IT SYTEMS

VALIDATING

IT SYSTEMS TO ENSURE THEY ARE WORKING CORRECTLY

TRAINING

ALL CLINICAL AND LABORATORY STAFF TO USE SYSTEMS CORRECTLY AND AS INTENDED

ENSURING ACCURACY

AND SECURITY OF DATA TRANSFER ACROSS ELECTRONIC INTERFACES

Promoting

The LIMS configured to ensure patient safety

- Prevent issue of ABO-incompatible blood
- Use computer algorithms to permit electronic issue
- Alerts, warnings and logic rules ensure specific requirements are met

National standardised specifications

- Compliance with regulations, guidelines and emerging clinical requirements.
- Structure the dialogue between suppliers & customers

Developing

Electronic blood management systems

- ‘vein-to-vein’
- giving the ‘right blood’ to the ‘right patient’
- Supported by NICE – model business case from Oxford

Joined-up IT systems

- Use of NHS (or CHI) number throughout
- Electronic transfer of information
- Access to information on patients with complex transfusion requirements
  - NHSBT SP-ICE

Data Accuracy and Security

Manual steps in the transfusion process can be minimised

- Electronic data transfer
- MHRA EI guidance - no manual step in the process

Computer records should be accessible and robustly linked or merged

- patients move from hospital to hospital
- hospitals and/or transfusion departments merge
- Data take-on with new computer systems

Human Factors

People circumvent the barriers and prompts put in place!

- Override or ignore error messages for ABO-incompatible blood or specific requirements
- Use other people's ID badges (or logon details) to gain unauthorised

Have been unable to issue blood because of unfamiliarity with IT systems

- results in delay
- Hit the emeregency button!

Systematic Misuse of ‘Emergency’ Bedside Check

- *A hospital audit noted that 273 units were transfused by 105 different staff bypassing the final bedside check because a beside tracking system had been set up to suit local preferences rather than as the manufacturer intended.*
- *Following year, using the same system, 162 units were transfused by 58 staff in the same (incorrect) way because the corrective action had not yet been implemented*

Validation

SHOT has repeatedly shown that incompletely validated systems can put patients at risk

Applies to new systems and when existing systems are upgraded

- Use a broad range of scenarios covering the whole spectrum of transfusion practice
- Costly and time consuming but essential

Training

Explain the purpose of flags, alerts and warnings

- designed to protect patients from human error
- Important to use systems correctly and as intended.

Cover routine and emergency situations

- IT systems support both safe and timely blood supply.

Friend or Foe?

Do healthcare IT systems deliver benefits to patients?

“With increasingly complex care the increasing reliance on IT in healthcare can threaten patient safety”

- IT systems are often built in a siloed fashion
- Given the complex interactions of patients across multiple care settings, this poses a challenge for interoperability
- A lack of cohesiveness and integration across systems can ……. increase the risk of patient harm.
- It is therefore essential to ensure that IT systems align with user needs and can communicate with each other
- IT systems can also become a burden for healthcare staff

Yu et al. 2016

Viewpoint paper

Health information technology: fallacies and sober realities

Ben-Tzion Karsh,[1] Matthew B Weinger,[2,3] Patricia A Abbott,[4,5] Robert L Wears[6,7]

- Health Information Technology adoption can improve patient and healthcare quality
- But HIT adoption is poor, does not always (reliably) improve care and may not reduce costs

J Am Med Inform Assoc 2010;17:617-623

“SAFETY CRITICAL COMPUTING”

- HIT may work well in one context or organisation but fail in another
- HIT may change how clinicians do their daily work and introduce new potential failure modes
- HIT should be considered “guilty until proven innocent”
  - “the burden of proof should fall on the vendor to demonstrate to an independent certifier or regulator that a system is safe, not on the customer to prove that it is not”

Summary

- In 2015, SHOT shows the **same pattern** of IT system errors
- The full benefit of IT systems has **not been realised**
- Healthcare staff need to understand **the limitations** of IT systems and **the consequences** of using them incorrectly

How can SHOT help?

SHOT BITES for TRANFUSION IT

- Messages for staff involved in transfusion
- Messages for Pathology IT and Hospital IT
- Messages for policy makers and IT suppliers

Thanks

- To Paula Bolton-Maggs and the fantastic SHOT team
- To all of you who report to SHOT and work make transfusion safer for your patients
- To the people who really understand technology and can work with us to solve our IT problems!