Electronic identification systems reduce the number of wrong components transfused

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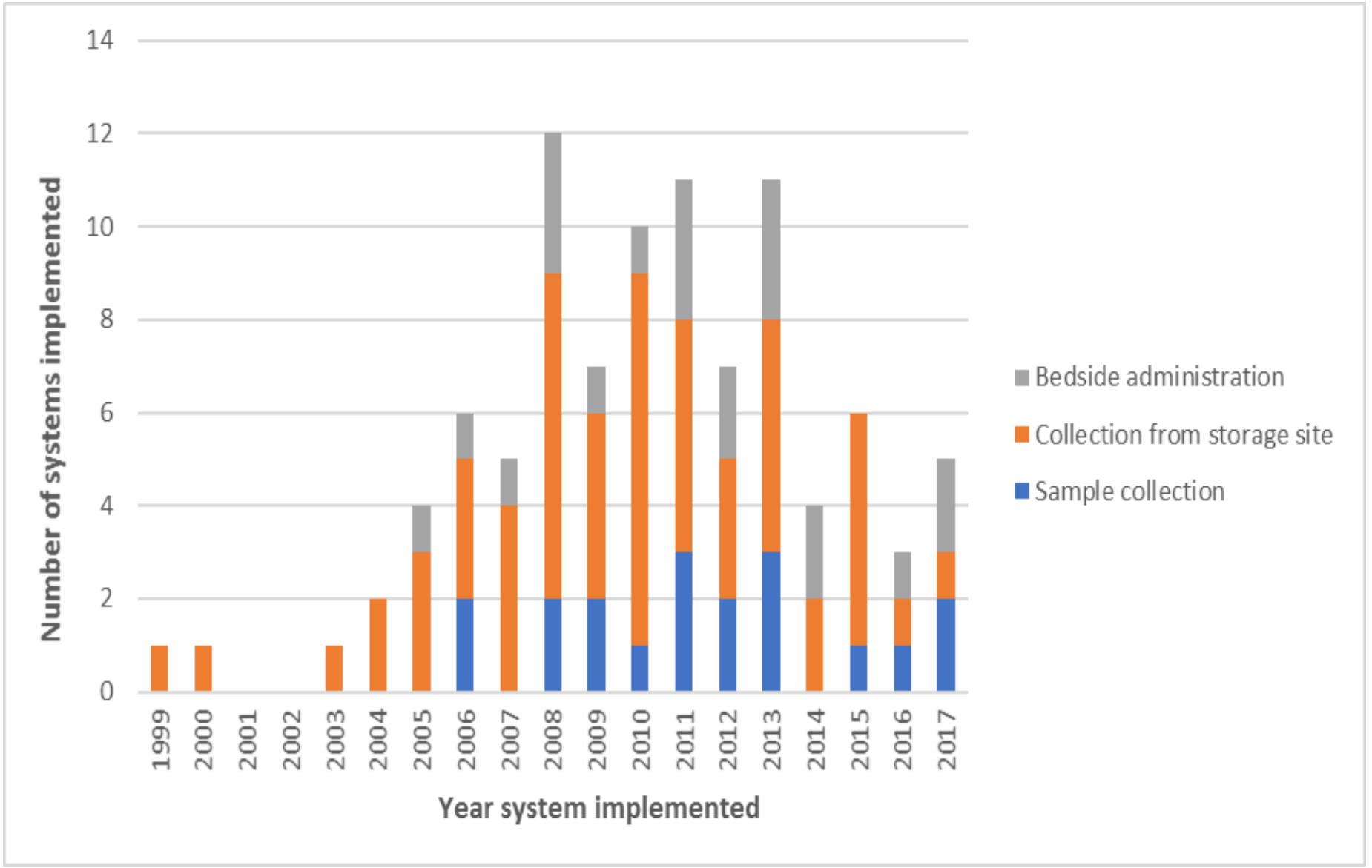
Aim of study

- **Survey hospitals reporting to SHOT about their use of manual and electronic processes for out of laboratory hospital transfusion procedures**
- **Analyse wrong component transfused (WCT) and near miss WCTs reported to SHOT in 2015 and 2016 to determine the number and proportion associated with manual and electronic processes**

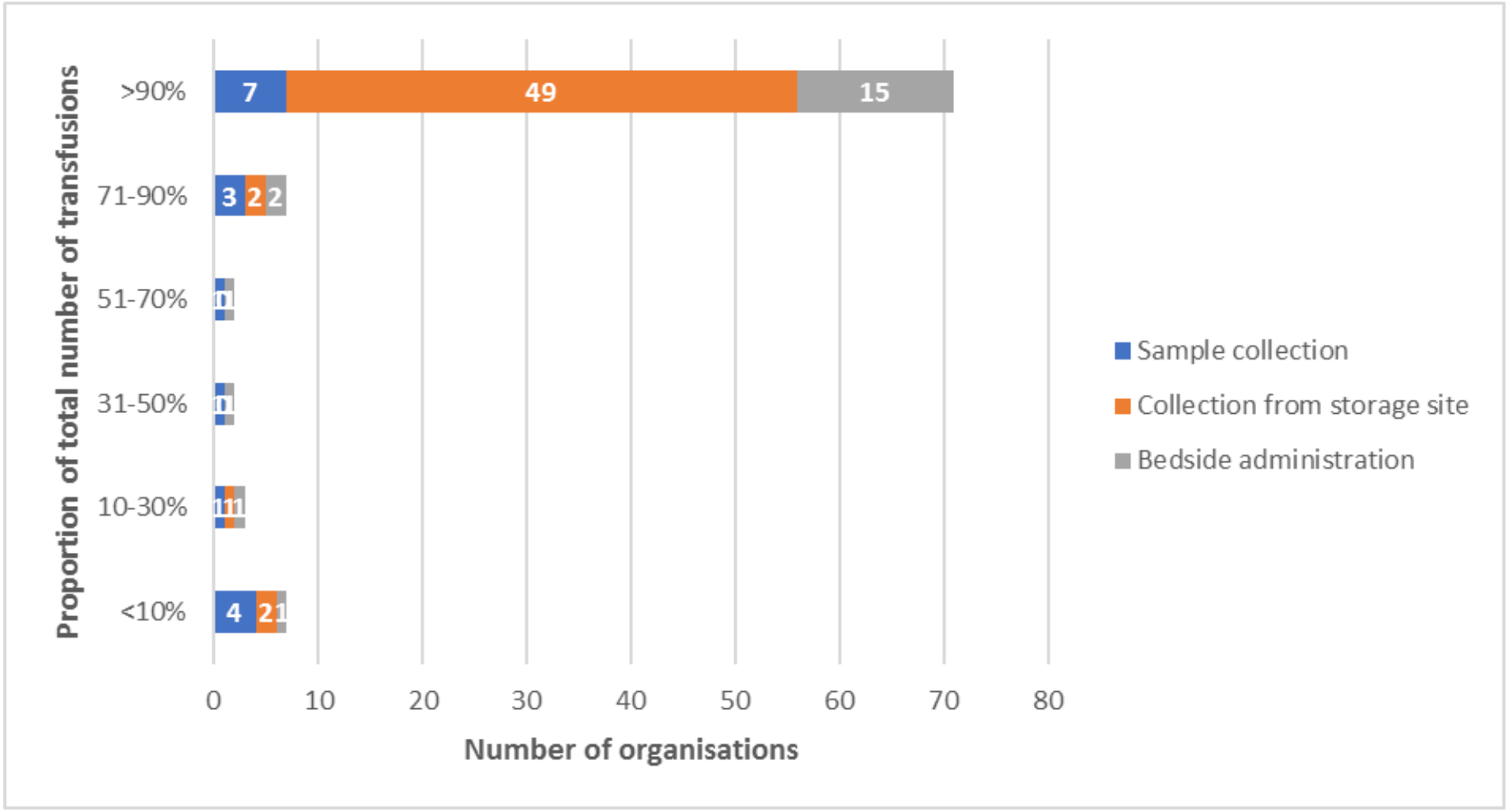
Survey of electronic identification systems (EIS)

- 93/222 (42%) hospitals responded
- Account for 38% of blood transfused in the UK in 2015 and 2016 (2 million blood components)

Number and type of each EIS implemented over time between 1999 and 2017



Hospitals with EIS don't use it for all transfusions: proportion of transfusions for each of the 3 types of EIS



Number of hospitals using manual and EIS processes and the number of blood components where they were used

Combinations of manual and EIS processes	Number of hospitals (93 hospitals)	Number of red cell units transfused using each system (1,946,386 units)
Manual throughout	33 (35.5%)	661,380 (34.1%)
Electronic blood sample and collection only	3 (3.2%)	23391 (1.2%)
Electronic blood collection only	36 (38.7%)	297944 (15.3%)
Electronic blood collection and administration only	5 (5.4%)	57745 (2.9%)
Hospitals that had all 3 clinical electronic blood systems	16 (17.2%)	352,932 (18.1%)
Number of red cell units that were transfused but without using an EIS	-	552,994 (28.4%)

Where the primary error occurred leading to a WCT

Step in the transfusion process primary error occurred	Number of WCTs	Process used at each step		
		Electronic	Manual	N/A
Request	4	-	-	4
Sample	3	-	3	-
Sample receipt	5	-	-	5
Testing	17	-	-	17
Component selection	8	-	-	8
Component labelling	1	-	-	1
Collection	15	3	12	-
Prescription	0	-	-	-
Administration	2	-	2	-
Miscellaneous	2	-	-	2

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Miscellaneous	2	-	-	2

Comparison of WCTs occurring with manual and electronic systems

Step in the transfusion process where the error occurred	WCTs associated with a manual process/number of units transfused	WCTs associated with an electronic process/number of units transfused	Crude odds ratio (95% CI), p-value
Sample collection	3/1,570,063 (0.0002%) 1 in 523,354 units	0/376,323	0.60 (0.03 to 11.54) p=1.00
Collection of blood from refrigerator	12/1,214,374 (0.001%) 1 in 101,195 units	3/732,012 (0.0004%) 1 in 244,004 units	0.41 (0.11 to 1.47), p=0.191
Blood administration	2/1,535,709 (0.0001%) 1 in 267,854 units	0/410,677	0.75 (0.04 to 15.58), p=1.00

Comparison of WCTs occurring with manual and electronic systems

One patient had renal impairment

Step in the transfusion process where the error occurred	WCTs associated with a manual process/number of units transfused	WCTs associated with an electronic process/number of units transfused	Crude odds ratio (95% CI), p-value
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Comparison of WCTs occurring with manual and electronic systems

All emergency transfusions of group O blood; no adverse events

Step in the transfusion process where the error occurred	WCTs associated with a manual process/number of units transfused	WCTs associated with an electronic process/number of units transfused	Crude odds ratio (95% CI), p-value
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Near miss WCTs using a manual process or EIS and the step in the transfusion process where the primary error occurred

Step in transfusion where the primary error occurred	No. of errors		
		Electronic	Manual
Sample	469	17	452
Blood bank	20	N/A	N/A
Collection	30	-	30
Administration	22	20	2
Other clinical steps	13	-	13
NA/unknown	17	-	-

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Comparison of near miss WCTs occurring with manual and electronic systems

	Near miss WCTs associated with a manual process/number of units transfused	Near miss WCTs associated with an electronic process/number of units transfused	Crude odds ratio (95% CI), p-value
Sample collection	452/1,570,063 (0.079%) 1 in 3,474 units	17/376,323 (0.004%) 1 in 22,137 units	0.16 (0.10 to 0.25), p<0.001**
Collection of blood from refrigerator	30/1,214,374 (0.002%) 1 in 41,379	0/732,012	0.03 (0.00 to 0.44), p<0.001*
Blood administration	2/1,535,709 1 in 767,854 (0.0001%)	20/410,677 1 in 20,533 (0.005%)	37.39 (8.74 to 159.99), p<0.001*

Comparison of near miss WCTs occurring with manual and electronic systems

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Omission of PPID and over-reliance on scanning

Limitations of the study

- **WCT and near miss WCT were rare outcomes even in this large 2-year dataset**
- **Study not powered to detect meaningful differences between these outcomes for EIS and manual processes, reflected in the wide 95% confidence intervals**
- **Not a comprehensive representation of practice in UK hospitals as the response rate to the survey was 42% representing 38% of blood components issued to UK hospitals in 2015 and 2016**

ANNUAL SHOT REPORT 2017

MHRA working with SERIOUS HAZARDS OF TRANSFUSION SHOT
Affiliated to the Royal College of Pathologists

Key recommendation

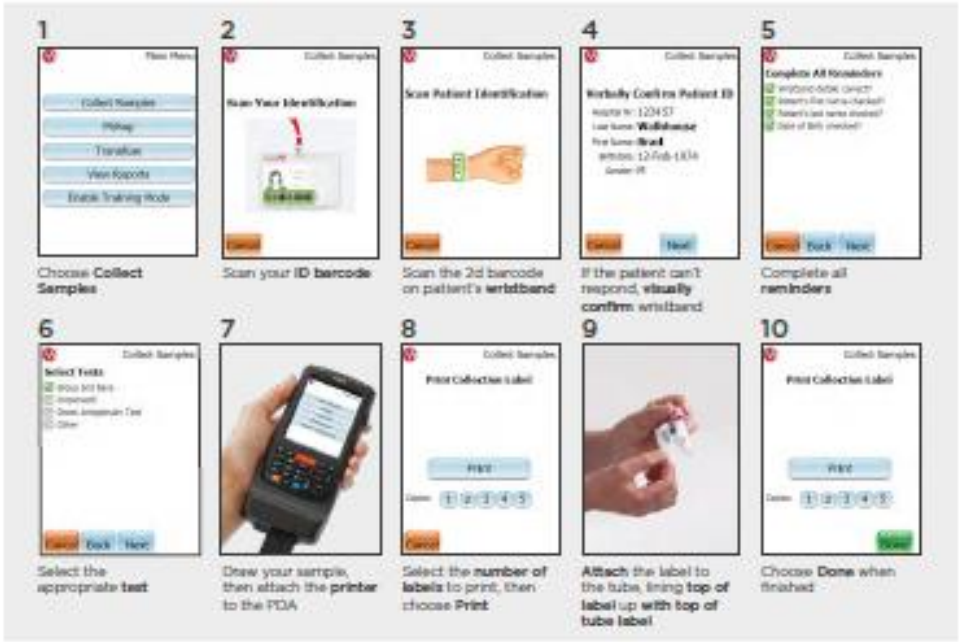
- Electronic blood management systems should be considered in all clinical settings where transfusion takes place
- This is no longer an innovative approach to safe transfusion practice, it is the standard that all should aim for
- Action: Hospital Chief Executives, Hospital Risk Managers and Hospital Transfusion Teams

Healthcare Safety Investigation Branch report on Wrong Blood in Tube (WBIT)

Key recommendation

NHS X (NHS digital) should take steps to ensure the adoption and ongoing use of electronic systems for identification, blood sample collection and labelling

FIG 12 EXAMPLE OF AN ELECTRONIC BLOOD SAMPLING AND LABELLING PROCESS



https://www.hsib.org.uk/news/hsib-highlights-impact-blood-sampling-errors-across-nhs/

Conclusions

- **This is the first multicentre study to demonstrate a lower incidence of WCTs with EIS v Manual process**
- **The successful implementation of EIS requires thorough training, continued support and monitoring of practice**
- **Implementation of EIS in the UK has been patchy and further efforts are needed to hasten it**

Example of comprehensive electronic transfusion process from Oxford

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

Turner CL, Casbard A & Murphy MF (2003) Barcode technology: its role in increasing the safety of transfusion. *Transfusion*. **43**, p1200-1209.

Davies A, Staves J, Kay J, Casbard A & Murphy MF (2006) End-to-end electronic control of the hospital transfusion process to increase the safety of blood transfusion: strengths and weaknesses. *Transfusion*. **46**, p352-364.

Electronic transfusion process

Less paperwork

1 nurse

16 individual steps to carry out before safe to commence the transfusion

Murphy MF, Staves J, Davies A, Fraser E, Parker R, Cripps B, Kay J & Vincent C (2009) How do we approach a major change program using the example of the development, evaluation, and implementation of an electronic transfusion management system. *Transfusion*. **49**, p829-837.

Murphy MF, Fraser E, Miles D, Noel S, Staves J, Cripps B, Kay J. (2012) How do we monitor hospital transfusion practice using an end-to-end electronic transfusion management system? *Transfusion.* **52**, p2502-2512.

‘Electronic Remote Issue’

(Staves et al. *Transfusion* 2008;48:415-424)

- Electronic issue: safe release of blood without a test of patient’s serum/plasma v. donor red cells by using blood bank IT to ensure that certain criteria are met
- ‘Electronic Remote Issue’: issue of *unallocated* blood from blood fridges remote from the transfusion laboratory by an electronic query of blood bank records and the printing of a compatibility label at the blood fridge
- Major benefit for blood banks serving multiple sites (as in Oxford) or a region

Staves J, Davies A, Kay J, Pearson O, Johnson T & Murphy MF (2008)
Electronic remote blood issue: a combination of remote blood issue with a system for end-to-end electronic control of transfusion to provide a “total solution” for a safe and timely hospital blood transfusion service. *Transfusion.* **48**, p415-424.

Electronic remote blood issue: near patient blood allocation using an automated blood storage system

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https://youtu.be/Dk6nIq4fSjM

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