Technoleg Iechyd Cymru
Health Technology Wales

# Topic Exploration Report

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

1. Determine the quantity and quality of evidence available for a technology of interest.
2. Identify any gaps in the evidence/ongoing evidence collection.
3. Inform decisions on topics that warrant fuller assessment by Health Technology Wales.

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| **Topic:** | **Electronic blood management systems for blood transfusions** |
| **Topic exploration report number:** | TER264 |

## Introduction and aims

Health Technology Wales researchers searched for evidence on electronic blood management systems for blood transfusions.

Transfusion of an incorrect blood component is one of the two leading causes of death from transfusion reported to Serious Hazards of Transfusion (SHOT) in the UK. Positive patient identification is vital to ensure the right blood is given to the right patient.

Electronic transfusion systems use barcodes on the patient's wristband to confirm patient identity and matches these with patient details on the blood unit to ensure that the right unit is given to the right patient. The checking process uses a handheld scanning device and a mobile printer taken to the patient's side. BloodTrack (Haemonetics) is one such system, and is currently being used in various hospitals in the UK.

## Summary of evidence

Electronic blood management systems for patient identification are digital health technologies and were determined to be a Tier A system impact technology according to the Evidence Standards Framework for Digital Health Technologies. Technologies within this classification improved system efficiency and are unlikely to have direct and measurable individual patient outcomes. For technologies of this classification, it is recommended that published evidence is produced to demonstrate effectiveness of the technology.

### Secondary evidence

**UK guidance**

National Institute for Health and Care Excellence (NICE) guideline (NG24, 2015) recommends using a system that electronically identifies patients to improve the safety and efficiency of the blood transfusion process in adults and children over one year of age.

Electronic blood management systems are recommended by the SHOT haemovigilance scheme in the UK in all settings where transfusion takes place. It states that this is no longer an innovative approach to safe transfusion practice, it is the standard that all should aim for (Annual SHOT report 2019).

Guidelines from the Joint UK Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee (2020) recommends that at every stage of the blood administration process the key elements are positive patient identification, excellent communication and good documentation. These can be enhanced by the use of electronic transfusion management systems and barcode technology.

Vein-to-vein electronic blood management systems are recommended in the UK Transfusion Laboratory Collaborative standards (Chaffe et al, 2014).

The Healthcare Safety Investigation Branch in England (HSIB) recommended that the NHS should ensure the adoption and ongoing use of electronic systems for identification, blood sample collection and labelling.

HTW researchers identified three guidelines produced by the British Society for Haematology: guidelines produced in 2012 recommend that only one sample is required for transfusion if using a verified electronic system; guidelines published in 2014 and 2017 state that electronic patient identification procedures generally offer improved patient safety compared to manual transcription, but that they should be robustly designed and implemented.

*Patient safety*

The British Society for Haematology Guidelines (2017) reports on five primary studies investigating how electronic patient identification procedures generally offer improved patient safety compared to manual transcription.

*Wrong blood in tube (WBIT) incidence*

A systematic review by Cottrell et al (2013) identified the effectiveness of interventions to reduce WBIT incidence in red blood cell transfusion. WBIT is defined as blood is taken from the wrong patient and labelled with the intended patient's details, or blood taken from the intended patient but labelled with another patient's details. These interventions included unique patient identification processes such as wristband-coded mechanical barrier systems, confirmatory bedside blood grouping, labelling at the bedside, active surveillance of WBIT rates as a marker of transfusion safety with the inclusion of a process control tool contributing to the continual performance review of errors, a 'zero tolerance' policy for mislabelled samples, and training a limited number of dedicated staff to perform this task. The systematic review identified one UK hospital study which used an electronic transfusion system (Murphy et al, 2012): the pre-intervention WBIT rate was 1 in 12,322 samples over a one year period, and the post-intervention rate was 1 in 26,690. The overall finding was that all the identified interventions reduced WBIT incidence, but it was not clear which intervention was the most effective.

**Primary evidence**

*Time to access blood*

One study found that before implementation of BloodTrack, the median time to deliver urgently required red blood cell (RBC) units to the patient was 24 minutes. After its implementation, RBC units were obtained from the nearby blood refrigerator in a median time of 59 seconds (Staves et al, 2008). A case study conducted by Oxford University Hospitals, and published by NICE (2016), also found that BloodTrack reduced the time to make blood available. They reported the same findings as Staves et al (2008): before implementation, the median time to deliver RBCs to the patient was 24 minutes, and was 59 seconds after implementation.

*Blood waste*

The case study conducted by Oxford University Hospitals, and published by NICE (2016), found that BloodTrack reduced the amount of blood wastage from 42% to 20%.

*Re-bleeding patients*

The case study conducted by Oxford University Hospitals, and published by NICE (2016) found that blood samples rejected by the transfusion laboratory because of inaccurate, incomplete or illegible labelling decreased from 3.1% to 1.2%, greatly reducing the need for patients to be re-bled.

*Cost*

The case study reported by NICE, and conducted by Oxford University Hospitals (2016), stated that the costs at the time for the electronic transfusion management system were £350,000 per annum for the hardware, including bedside handheld computers, software, and some support with troubleshooting, training and monitoring of the correct use of the system. In addition, the Trust employs a senior manager to ensure the correct day-to-day running of the system, and a 0.4 whole-time equivalent nurse to train clinicians on the system.

The case study reports that the gross savings are £1,042,000. After taking account of a new managed service contract and a system manager, plus the cost of providing training to clinicians, the net savings are £625,000 or £101,000 per 100,000 population. A net productivity saving of £520,000 results from reduced laboratory and nursing time. A net cash saving of £105,000 occurs from reduced blood use and wastage, equivalent to around 10% of expenditure.

*Other outcomes*

We did not identify any studies for length of hospital stay.

*Ongoing studies*

We did not identify any relevant ongoing studies.

## Areas of uncertainty

HTW researchers identified evidence that BloodTrack has been/is being used in some English hospitals, but it remains unclear whether it is being used in any Welsh health boards. BloodTrack is composed of a few modules, some of which can be used to monitor patient vital signs. Clarification of the modules relevant to the Welsh NHS setting is required.

We only identified one relevant systematic review comparing different interventions (including electronic patient identification systems) to reduce WBIT incidence. The majority of the other studies identified were non-randomised controlled trials set in the UK and USA. Further information on cost effectiveness is needed, as HTW researchers identified one case study reporting on this.

## Conclusions

Numerous published UK guidelines recommend use of electronic blood management systems in settings where transfusions take place. Studies suggest that electronic blood management systems have been/are being used in England and may have favourable effects on patient safety, time taken to access blood, WBIT incidence, blood usage and wastage, and cost. However, this high-level search identified limited evidence for some of the clinical and cost outcomes, and did not identify any ongoing studies, suggesting a more detailed review may be warranted.

## Brief literature search results

| Resource | Results |
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| HTA organisations | |
| Healthcare Improvement Scotland | We did not identify any relevant evidence from this source |
| Health Technology Assessment Group | Mayo University Hospital Pathology Department User Manual (2018): https://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/mayo/laboratory-user-manual.pdf<br>*BloodTrack is the preferred mode of electronically managing the recording of transfusions* |
| Health Information and Quality Authority | We did not identify any relevant evidence from this source |
| EUnetHTA | We did not identify any relevant evidence from this source |
| International HTA Database | We did not identify any relevant evidence from this source |
| UK guidelines and guidance | |
| SIGN | We did not identify any relevant evidence from this source |
| NICE | NG24: Blood transfusion (2015): https://www.nice.org.uk/guidance/ng24<br><br>Oxford University Hospitals (2016) Quality and Productivity case series. https://www.nice.org.uk/savingsandproductivityandlocalpracticeresource?id=2339795 |
| Serious Hazards of Transfusion | Annual SHOT Report 2019: https://www.shotuk.org/wp-content/uploads/myimages/SHOT-REPORT-2019-Final-Bookmarked-v2.pdf |
| Healthcare Safety Investigation Branch | Investigation into wrong patient details on blood sample (2019): https://www.hsib.org.uk/investigations-cases/wrong-patient-details-blood-sample/final-report/ |
| The British Society for Haematology | British Committee for Standards in Haematology, Milkins C, Berryman J, Cantwell C, Elliott C, Haggas R, Jones J, Rowley M, Williams M, Win M (2012). Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories. Transfusion Medicine, 23(1), 3-35: https://doi.org/10.1111/j.1365-3148.2012.01199.x<br><br>Specification, Implementation and Management of Information Technology (IT) Systems in Hospital Transfusion Laboratories (2014): https://b-s-h.org.uk/guidelines/guidelines/specification-implementation-and-management-of-information-technology-it-systems-in-hospital-transfusion-laboratories/<br><br>Robinson S, Harris A, Atkinson S, Atterbury C, Bolton-Maggs P, Elliott C, Hawkins T, Hazra E, Howell C, New H, Shackleton T, Shreeve K, Taylor C (2017). The administration of blood components: a British Society for Haematology Guideline: https://b-s-h.org.uk/guidelines/guidelines/administration-of-blood-components/ |

| Secondary literature and economic evaluations | |
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| https://www.epistemonikos.org/en/ | We did not identify any relevant evidence from this source |
| https://www.tripdatabase.com/ | Joint UK Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee . Transfusion handbook. Safe transfusion – right blood, right patient, right time and right place (2020): https://www.transfusionguidelines.org/transfusion-handbook/4-safe-transfusion-right-blood-right-patient-right-time-and-right-place |
| Cochrane library | We did not identify any relevant evidence from this source |
| Medline (via Ovid or Pubmed) | Chaffe B, Glencross H, Jones J, Staves J, Capps-Jenner A, Mistry H, Bolton-Maggs P, McQuade M, Asher D. 2014. UK Transfusion Laboratory Collaborative: minimum standards for staff qualifications, training, competency and the use of information technology in hospital transfusion laboratories 2014. Transfusion Medicine, 24(6): 335-340: doi: 10.1111/tme.12153<br><br>Cottrell S, Watson D, Eyre TA, Brunskill SJ, Dorée C, Murphy MF (2013). Interventions to reduce wrong blood in tube errors in transfusion: a systematic review. Transfusion Medicine Reviews, 27(4): 197-205: https://doi.org/10.1016/j.tmrv.2013.08.003 |
| Primary studies | |
| https://www.epistemonikos.org/en/ | We did not identify any relevant evidence from this source |
| https://www.tripdatabase.com/ | We did not identify any relevant evidence from this source |
| Cochrane library<br>*Only include primary studies if there is insufficient secondary evidence* | We did not identify any relevant evidence from this source |
| Medline | Staples S, Noel S, Watkinson P, Murphy MF (2017), Electronic recording of transfusion-related patient observations: a comparison of two bedside systems. VoxSanguinis, 112(8): 780-787: https://doi.org/10.1111/vox.12569<br><br>Murphy, M.F., 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, 2502–2512. |
| Ongoing primary or secondary research | |
| PROSPERO database | We did not identify any relevant evidence from this source |
| Clinicaltrials.gov | We did not identify any relevant evidence from this source |
| Other | |

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| *Topic proposer* | Staples S, O'Callaghan C, Pavord S, Staves J, Murphy MF (2020). How to verify patient identity and blood product compatibility using an electronic bedside transfusion system. Transfusion: DOI: 10.1111/trf.16028 |
| *Manufacturer* | Staves J, Davies A, Kay J, et al. Electronic remote blood issue: a combination of remote blood issue with a system of end-to-end electronic control of transfusion to provide a "total solution" for a safe and timely hospital blood transfusion service. Transfusion 2008; 48:415-24. https://onlinelibrary.wiley.com/doi/full/10.1111/j.1537-2995.2007.01545.x |

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| **Date of search:** | *April 2021* |
| **Concepts used:** | BloodTrack, Electronic transfusion system, blood management, electronic patient identification |