GS1 UK

Enhancing patient safety in blood transfusion procedures

Introduction

Between 2012 and 2022, the organisation Serious Hazards of Transfusion (SHOT), reported an average of 87 instances each year, where transfusion errors had occurred. Such incidents known as wrong component transfused (WCT) errors include occasions where “a patient was transfused with a blood component of an incorrect blood group, or which was intended for another patient and was incompatible with the recipient, which was intended for another recipient but happened to be compatible with the recipient, or which was other than that prescribed e.g. platelets instead of red cells”[1].

At Royal Papworth Hospital NHS Foundation Trust (Royal Papworth), the trust uses GS1 standards for accurate positive patient identification. This enables staff to ensure the right blood type is matched, and administered, to the right patient before transfusion in order to reduce the risk of errors. With the patient verification process in place, the trust has been able to eliminate the risk of incompatible matching before a Never Event arises, as well as reduce the volume of wasted blood products in order to conserve vital stock.

Limitations of a manual check system

As a requirement of The Blood Safety and Quality Regulations 2005[2], the transfusion process requires full vein-to-vein traceability of the unit of blood, from donor to patient. The regulation defines traceability as "means the ability to trace each individual unit of blood or blood component from the donor to its final destination (whether this is a recipient, a manufacturer of medicinal products or disposal) and from its final destination back to the donor"[3].

Royal Papworth historically used a paper-based manual check system to manage transfusions which often led to several challenges. Blood could be traced until receipt in the hospital laboratory however, it became problematic to trace the blood to the patient once it had left the security of the laboratory and been collected for use. Laboratory staff were reliant on clinical staff returning the card with the patient details on it to acknowledge the transfusion was given, however cards sometimes went missing or were discarded for infection control purposes. This process made it extremely difficult to achieve complete vein-to-vein traceability and posed challenges for regulatory compliance.

An automated solution

The trust decided to implement an electronic tracking system, Haemonetics' BloodTrack, to automate processes and bring the data capture and verification steps to the patient beside. Blood units could then be scanned using the 2D barcode (which incorporated vital transfusion criteria including patient details, unit details and blood group details) produced by BloodTrack[i] . This would be used to cross-reference with the patient details captured in the GS1-compliant patient wristband. The GS1 Global Service Relation Number (GSRN), which included the NHS number, is encoded into a 2D DataMatrix barcode on the patient wristband, enabling accurate, positive patient identification prior to transfusion.

i. The 2D barcode is a system-generated barcode by BloodTrack which is used on the blood unit and the compatibility label. This meets expected MHRA standards but does not match, or need to comply with GS1 standards.
ii. The GSRN does not include a specification for gender allocation whereas the BloodTrack system required the gender allocation field for compliance with regulation. Gender information was captured directly in BloodTrack for inclusion in the electronic patient record. Staff would have to accept the message from the patient wristband without the gender part being essential in the message for it to be accepted otherwise, there would be a conflict.
iii. The rules for electronic issue state that a patient must have two confirmed group and antibody screens on record. There must never have been any unexpected antibodies detected and there must have been no manual edits during sample processing.
iv. The patient wristband is compliant with the NHS data standard for patient identification DCB1077.

Royal Papworth case study

GS1 standards support regulatory compliance

In order to comply with The Blood Safety and Quality Regulations 2005, the trust needed to ensure the right blood products could be tracked and traced to the right patient for full vein-to-vein traceability.

A significant amount of patient information needs to be captured due to various biological transfusion rules such as, patient gender[ii] or whether a female recipient is of childbearing potential. 2D barcodes were implemented to ensure all the data capture points could be encoded in the barcode for regulatory compliance. The details on the blood unit and patient wristband are then verified for a positive cross match before the transfusion can be authorised.

Limitations of a manual check system

1. A clinician decides that the patient requires a unit of blood and the patient agrees to receive it
2. The clinician writes the prescription and submits a request form for the patient to receive blood
3. Two samples are taken for testing so the blood can be grouped twice, on two different occasions for validation – known as the two-sample rule
4. The phlebotomist uses a visual check of the wristband and a verbal name identification check if the patient is awake
5. The samples are hand-labelled and received in the laboratory, where they are checked against the labelling information on the request form and entered onto the laboratory information management system (LIMS)
6. A second person verifies the sample to ensure that there are no errors in the request entry process
7. The sample is processed on the analyser which obtains the tests from the LIMS using barcode technology
8. The tests are validated by the biomedical scientist on the machine and exported into the LIMS
9. The system checks whether the series of transactions meet the rules for electronic issue[iii]
10. Once the blood group is authorised, the patient can then have blood issued – either by the biomedical scientist via the LIMS, or remotely by the ward staff by presenting a pick-up slip to the HaemoBank – Haemonetics' blood storage unit
11. The HaemoBank prints out a label with all the compatibility details encoded within the 2D barcode and the printed human-readable text for the patient identification details
12. The nurse takes the unit, applies the stickers to the tag, verifies labelling by re-scanning, and takes the unit back to the bedside
13. The bedside nurse uses their BloodTrack device to scan their own staff barcode, scan the patient's wristband (GSRN)[iv] , scan the unit, and scan the compatibility label. If all details match the procedure is safe to proceed. In the event of any mismatched information, the system alarm sounds to alert the staff of an error.
14. Once the blood is issued to the patient, a status message would travel back through BloodTrack into the LIMS to confirm the start of the transfusion and changes the status from issued to used

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Process benefits and key results

Enhance patient safety

The new system embeds safety protocols and competency assessments at each stage of the process to ensure that the right blood is given to the right patient. For example, at the patient bedside, the nurse uses their BloodTrack device to scan the staff barcode, scan the patient's wristband, scan the blood unit, and scan the compatibility label. If there are any mismatches, an audible siren sounds to warn the nurse not to proceed. If the checks are interrupted or an error occurs at any stage, the process is prompted to restart to minimise the risk.

Greater efficiency and staff satisfaction

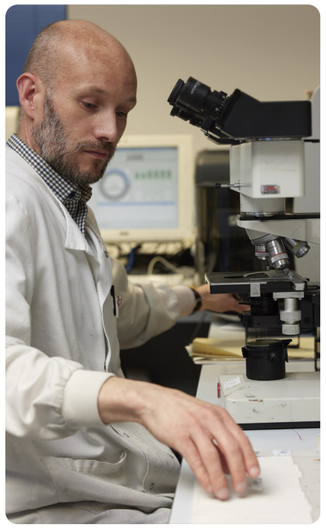
With the implementation of the new process, nurses reported a reduction in their workload and stress levels. The BloodTrack system is easy and intuitive to use, based on the simple task of scanning to validate information. Staff no longer had to worry about losing cards or making errors in documentation – improving both traceability and patient safety.

Plus, the system enables access to patient records and blood transfusion history remotely so all information needed for patient care is accessible to help inform clinical decision making. With the additional benefit of the system feedback alerts and guidance provided at each stage of the process, clinical staff were also afforded greater peace of mind due to the significant reduction in the risk of harm to patients.

Biomedical laboratory staff also experienced efficiency benefits as a result of improved blood unit traceability. Staff could better manage stock levels and blood distribution more effectively which improved inventory controls. Reports and audits were also generated automatically from data usage information which could be used for quality improvement and compliance purposes.

Better traceability

Before implementing the new automated process, Royal Papworth's manual tracking system limited the capacity for traceability. With the new system, together with the introduction of GS1 standards, the trust was able to track each unit of blood, in real time, to achieve 99.92% vein-to-vein traceability for regulatory compliance.



Improved stock management and reduced wastage

With the blood product supply chain, stock management is extremely critical and distribution is highly time sensitive. Blood products have a relatively short viable lifespan of 42 days4. Transport and storage is also required at low temperatures to extend the product lifecycle. It is also important for blood to be crossmatched accurately so it is given to the right patient and not intended for another.

Prior to BloodTrack, the trust had to stock 130 units a day, crossmatch them, and send them to theatres to ensure there was a sufficient stock supply required for the day's operations. However, 80% of the blood units were unused by the end of the day. Each unit would then need to be returned to the laboratory for storage and crossmatched again the following day. This resulted in several blood journeys and temperature excursions for each unit which was inefficient for staff and not optimal for the blood products. Inevitably, at the end of the five weeks, a proportion would end up being discarded despite efforts to minimise as much waste as possible.

Now with HaemoBank in place, the laboratory staff receive the theatre list every day so they know which blood groups are required for all patients in critical care or in surgery. HaemoBank is then stocked with the appropriate range of unit blood groups to meet theatre demand. As long as at least 60 units are available, the trust is able to meet the majority of transfusion needs.

Blood would only be stocked up once a day so it only has one journey. It is then not returned to the laboratory until it's near expiry. If it has not been used for routine use, the team will try to deliberately crossmatch the unit so it can be provided to someone else. With this approach, the trust has been able to reduce its wastage of blood to 0.5%, compared to the national average of 12%.

Results

Using the BloodTrack system, Royal Papworth have achieved the following results:

Reduction in blood wastage to 0.5%
compared to the national average of **12%** in England

Maintenance of over 99% traceability of blood stock
from donor to patient

Reduced allocation of O negative blood from 12.2%
of its total blood supply to **9%**

Decrease in wastage as a percentage of blood stock issue levels of 0.2%
compared to the cluster average for a moderate red cell user of **2.6%**

Blood issuable stock index reduced to 5.4 days
compared to the cluster average of **6 days**

“Using blood matching technology and the use of standards forms a significant part of the trust’s wider GS1 ecosystem and Scan4Safety initiative to support the provision of safer patient care.”

Andrew Raynes, chief information officer
Royal Papworth Hospital NHS Foundation Trust

Conclusion and next steps

Using blood matching technology and the use of standards forms a significant part of the trust’s wider GS1 ecosystem and Scan4Safety initiative to support the provision of safer patient care.

Royal Papworth’s experience demonstrates how using BloodTrack and GS1 standards can enhance patient safety, staff satisfaction, and operational efficiency. By using a 2D barcoding for labelling and GS1 GSRN for patient identification, the trust has been able to achieve 99.92% traceability of blood transfusions, prevent errors and blood unit mismatches, as well as optimise blood management.

The trust is now in the process of introducing a new LIMS to support their processes. Once this has been completed, the trust plans to explore the implementation of bedside collection and labelling. If the trust progresses to bedside collection with Blood Track, it will involve a scanned check of the wristband at the bedside to replace the visual check. This would prevent nursing staff from doing any labelling back at the nurses station, allowing them to stay at the patient bedside for duration of the process. This would reduce the potential for transcription errors and eliminate and challenges with handwriting legibility. Using the patient wristband for accurate, positive patient identification will also be an integral part of the process.

Following this, the trust plans to expand the use of wristband scanning and barcoding to other areas of care, such as medication administration and specimen collection.

Author

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References

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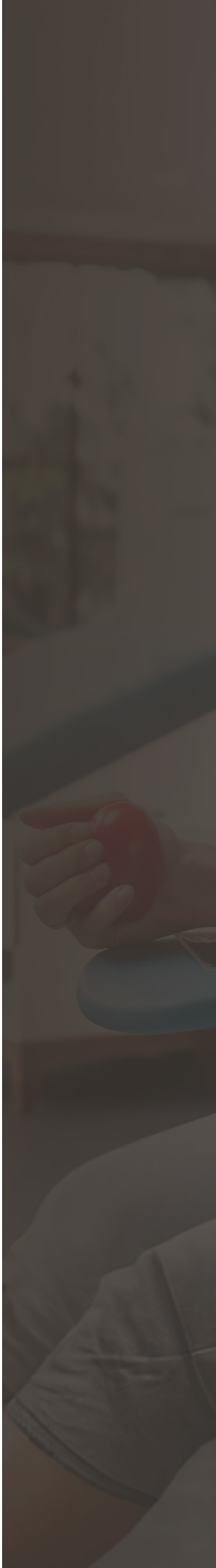

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