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Experience in using barcoded wristband systems

A Blood Bank Technical Specialist at a hospital in Illinois reports that they do not use a barcoded wristband system, but they are actively looking into available options. They 'need' to find a system that is **compatible with all areas of their hospital** including general laboratory, blood bank, pharmacy, and nursing services. The inquiring colleague is most interested in how such a system could **enhance safety** of their blood banking practices including the identification of crossmatch specimens and the linkage of recipients to transfused blood products. She is aware of the discussion in the paper in Transfusion Medicine Reviews (2003 Jul;17(3):169-80) entitled '[Patient safety and blood transfusion: new solutions](#)', but would like to **hear from institutions that have gained some experience** with a system in order to learn what works and does not work. Her laboratory is currently using a MISYS computer package. The hospital's local requirement is for each pre-transfusion sample to be identified with a handwritten label. Their process of documenting the identification process at the time of transfusion is also done manually.

The following comments have been received.

ADDENDA Feb. 19, 2005

1. **Professor Mike Murphy of the National Blood Service and John Radcliffe Hospital, Oxford, England** (attributions used with permission) reports that according to the the Serious Hazards of Transfusion (SHOT) scheme in the UK, ABO incompatible transfusion continues to be one of the most frequent serious incidents associated with transfusion (<http://www.shotuk.org>). Efforts in the UK to reduce the occurrence of ABO incompatible transfusion by education/training have been ineffective, and national and **local audits show that bedside checking is rarely carried out correctly**.

Dr. Murphy reports on his group's work on barcode patient identification in Oxford, which they believe provides **electronic control and documentation of the complete hospital transfusion process, and improves the safety and effectiveness of transfusion**. A project team was established in 2001, including participants from the John Radcliffe Hospital, the National Blood Service, and two commercial partners (Olympus and iSoft). A nurse from each clinical area involved in the project was assigned to provide input into the design of the system, effective liaison and training of colleagues, and two patients have recently joined the team to provide a patient perspective. A description of the initial work is provided in [Turner et al](#). Barcode technology: its role in increasing the safety of transfusion (Transfusion 2003; 43: 1200-9).

According to Dr. Murphy, the patients are provided with a **wristband with both eye readable identification details (ID) and in a portable data format (PDF) barcode**. PDF barcodes contain more data than linear barcodes. In this project, to comply with the requirements of UK guidelines for transfusion, they were used for all the patient ID fields required in transfusion guidelines i.e. Last name, first name, date of birth, gender and patient identification number. For blood sample collection for compatibility testing, the patient ID is confirmed by scanning the wristband barcode with a **handheld computer** and comparing it with the verbally stated patient ID. A sample label is printed by connecting the handheld computer to a small portable printer. The blood bank uses the barcode on the sample label to enter the patient's ID into the blood bank computer. After compatibility testing, a PDF barcode with the patient's ID is printed on the compatibility label attached to the blood bag, and the unit number is also included in the barcode. At the bedside, the handheld computer prompts the nurse through the process including scanning the barcodes on the patients' wristband, the compatibility label and the unit number on the blood bag to check they match. The handheld computer draws attention to any mismatch, and is also used to record the time of the start and completion of the transfusion, routine observations and any reactions. A report is printed for the patient's notes after the transfusion, and information is downloaded to the blood bank computer to complete the audit trail. The identification of staff is logged at every step using a barcode on the staff identification badge.

Dr. Murphy comments that the functionality of their system is increasing as the project progresses. It was introduced in the routine clinical setting of a hematology day case clinic for blood sample

collection for compatibility testing and bedside checking prior to the administration of blood. It was then adapted for the more acute clinical settings of a hematology inpatient ward and cardiac surgery where the electronic control of blood collection from blood refrigerators was incorporated.

Audit tools were developed based on hospital and national guidelines. **Significant improvements** were found in the clinical setting of hematology including an improvement from **11.8% to 100% in correct patient identification** ($p = < 0.001$). Similar improvements were found in the frequency of correct pre-transfusion observations, and the proportion of correctly labelled samples. Improvements of the same magnitude were found in cardiac surgery including urgent transfusions and the collection of blood from blood refrigerators.

Dr. Murphy also reports that the **staff prefer the 'automated' system** to standard procedures as the **handheld provide prompts for every step**, it is quicker, and it involves only one nurse rather than two. Patients are interested in the new procedure, and none have objected to barcoded wristbands.

The system is **being further developed for the electronic prescribing of blood** in critical care and hematology forcing adherence to guidelines for the appropriate use of blood, and to link the blood bank computer to other internal and external IT systems to provide robust documentation and data transfer of all information relevant to transfusion practice.

Further work is required on the development of such systems for transfusion (Murphy MF & Kay JDS. Barcode identification for patient safety. Current Opinion in Haematology 2004;11;334-338). Computerized transfusion aids cannot eliminate human error, but the less complicated and more 'user friendly' the procedure is, the less scope there is for error. Their **introduction should be accompanied by comprehensive education, training and continued support**. The costs of implementing such a system in a hospital mean that to become accepted, the technology likely needs to be multi-functional for other procedures requiring patient identification. Barcoding is currently the most widely used autoidentification technology. One disadvantage is that the barcode must be within the line of sight of the scanner. This may be a constraint in some clinical scenarios such as operating rooms. Radiofrequency identification (RFID) tags are an option to overcome this constraint.

ADDENDA Feb. 23, 2005

2. **A colleague in Denmark** asks Dr. Murphy what **safety procedures** have been established to avoid mistakes at the time that the wristband is initially assigned to a specific patient. In other words, how does Dr. Murphy's approach assure that the correct wristband has been placed on the correct patient at the very beginning of the identification process?
3. **Dr. Murphy responds** as follows: "The attachment of an identification wristband is obviously a key step, and usually involves **verbal confirmation** of identification details (surname, first name and date of birth) by the patient him/herself. **For unconscious patients**, confirmation of identification requires **written identification details** such as those in the hospital notes. Patients in the UK are not (yet) required to carry identification cards which would be useful for ensuring that this critical step is carried out correctly."

ADDENDA Feb. 24, 2005

4. **Editor's Note:** The webmaster believes that the news report from the Boston Globe [here](#) is germane to the current discussion on patient identification schemes. A printer-friendly version of this article may be found [here](#).

ADDENDA Apr. 11, 2005

5. The CEO of a [company in the Netherlands](#) that has an interest in improving patient safety reports that they **participated in a pilot study** to evaluate the use of barcoded wristbands for the identification of patients needing transfusion, and that **4 out of 3000 blood transfusions showed one or more errors in identification that if not detected might have caused blood to be given to the wrong patient**. Based on the pilot study, a company is discussing with hospitals the feasibility of using barcoded wristbands, not only for use in blood transfusion, but for collecting specimens for general laboratory testing (blood, urine). This same company also has an **interest in the use of RFID wristbands and RFID chips for blood bags**. They are aware of an RFID blood bag control system, but to put the RFID chips on the bag in the blood bank still requires that some technical issues be resolved; it is anticipated that this problem may be solved before the end of 2005. An RFID pilot study is being planned for blood bank and transfusion medicine application, and a demonstration system is already available.

ADDENDA Apr. 14, 2005

6. **A transfusion medicine colleague** reports that staff education is a critical component of implementing a barcode wristband system. He has observed wristband barcode systems that staff could 'work around', obviating the value of the system. **He emphasizes the importance of both**

staff education and software design. The latter can vary significantly between vendors.

Please submit comments to the [e-Network Forum](#).



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