Mayday Healthcare NHS Trust

Case Study:

Blood tracking to ensure right patient, right blood

About the Trust

Mayday Healthcare NHS Trust was formed in 1993 and provides hospital-based health services to around 330,000 people in and around Croydon and its neighbouring areas from four main sites.

Requirements

Mayday are running a 'Right Patient, Right Blood' project; the purpose of this is to provide equipment to help ensure that patients are tracked through the process of blood transfusion and that the right patient is given the right blood. The tracking process uses patient wristbands to hold patient information in Human Readable form, in 1D (linear) and 2D barcodes, as well as containing High Frequency programmable RFID tags. At any point of treatment, the patient's wristband will be scanned to confirm their identity.

Existing wristband printers would be replaced with new printers which are capable of printing the wristbands to a high quality and at the same time writing information to the RFID chip on the wristband.

In terms of RFID equipment, this would be a relatively large deployment and an important project from the perspective of equipment suppliers.

Existing printers receive information from the Patient Administration System via the network, and the new printers must plug-in to the network and receive similar data without significant change to the PAS system. Each wristband must contain unique identification for the patient, and this information is used to link in with other blood-tracking systems. The 2D barcode must replicate the information contained in the RFID chip, and in this way there will be redundancy to the data on the wristband : it could sustain damage to the 2D code printed or to the RFID chip, and the information could still be extracted.

A 1D barcode was required for use by consultants around the site to link into other information systems and, of course, normal printed ('Human Readable') information is also placed onto the label according to the agreed layout. Depending upon the information transmitted by PAS, the information on the wristbands would vary.

There were 2 types of wristbands, Adult and Child, utilising different materials and of different dimensions; both as agreed by NHS Connecting for Health (a requirement primarily driven by the National Patient Safety Agency).

Where patients have to undergo MRI treatment, the RFID wristband needed to be removed and a 'Skin Label' printed and produced. The RFID wristband could not be worn into such an environment so a paper-only label had to be produced temporarily.

There was also a requirement that the information stored within the RFID tag should confirm to GDTI-113, a standard defined by GS1 UK. This determined a data structure in which documents (of which the Mayday Patient Wristband was one kind) identified globally merely by reading the GDTI-113 number.

The Solution

The approach was to utilise Zebra R2844-Z printers which contain an embedded network interface card and RFID transponder along with the Zebra Basic Interpreter. By incorporating all these components, a single printer device could contain and run a custom-written application to listen for incoming network data from PAS, decipher the information, make various computations, then write (with write-protect followed by read-back validation) the RFID chip before printing and advancing the wristband.

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The Solution (contd.)

This write and read-back method guaranteed that the RFID chip on a wristband being printed did indeed contain precisely the information which had been written and printed. Any faulty RFID wristbands would be printed as VOID before limited re-prints were permitted.

Each HF RFID chip contained a unique 64 bit Tag Identity (MAC, or Media Access Control address) and this would be used as the basis for uniqueness, passing the 64 bit value into some computational logic to produce a GDTI-113 compliant number.

For the Skin Label printers, a variation of the application was deployed to Zebra LP-2844 printers together with a 2D image scanner. By scanning a wristband, the imager sent the 2D barcode data to the LP-2844 printer, and a new skin label was produced to replicate precisely the patient and barcode information from the wristband.

A number of technical challenges were encountered during the project. Firstly, the timescales were extremely tight and the detailed requirements required some refinement before implementation could commence.

Initially there did not appear to be sufficient space within the 896 bit chip, and critically there was no formally ratified standard for GDTI-113 within HF RFID tags. Also, the 1D barcode would not readily fit across the width of the wristband in all cases, whilst at the same time being readable to the equipment.

Issues were encountered with sensors in the printers not reliably seeing the markings on the wristbands, and this was especially problematic on the Child Wristbands, being of a different type of material and a with calibration marks printed differently.

By steadily analysing the issue and working with a number of relevant teams, the cause of each of these problems was identified and a solution was implemented. The GDTI-113 requirements were clarified in great detail and the codes computed and written to logical positions within the tag. The 1D barcode could be reduced by several redundant characters without impact in function and could therefore be accommodated across the label. Modifications to the R2844-Z printer sensor location allowed the child wristbands to be handled by the printer satisfactorily.

Benefits

Overall, The Barcode Warehouse was able to understand the requirement in great detail, to see the "big picture" of the technical challenges, to work with the client and client's partners and suppliers, to ultimately ensure that a workable solution was provided in good time.

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