

Project Prometheus: Electronic administration within the blood transfusion chain

ABSTRACT

The implementation of an electronic blood transfusion administration record, utilising Bar code Point of Care technology (BPOC) in the blood transfusion process can dramatically improve patient safety and prevent the wrong blood products from being administered to a patient. The way this solution is designed and developed is crucial for the acceptance and implementation in our healthcare organisation. This article outlines how we used the principles of Agile Software development and Lean Thinking to build a software system based on a root cause analysis of the blood transfusion process.



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Background

In 2008, Erasmus Medical Centre, Rotterdam (the Netherlands) started this initiative to improve patient safety and reduce the “wrong patient” events. Based on information from the nursing staff and the risk management system, the BPOC implementation was considered crucial for the blood transfusion process.

The Dutch TRIP foundation (Transfusion Reactions in Patients) reported 190 events in 2008 for the 11 participating hospitals.

Wrong Patient Event	2008
Blood to wrong patient	57
Near accident	53
Incident	80

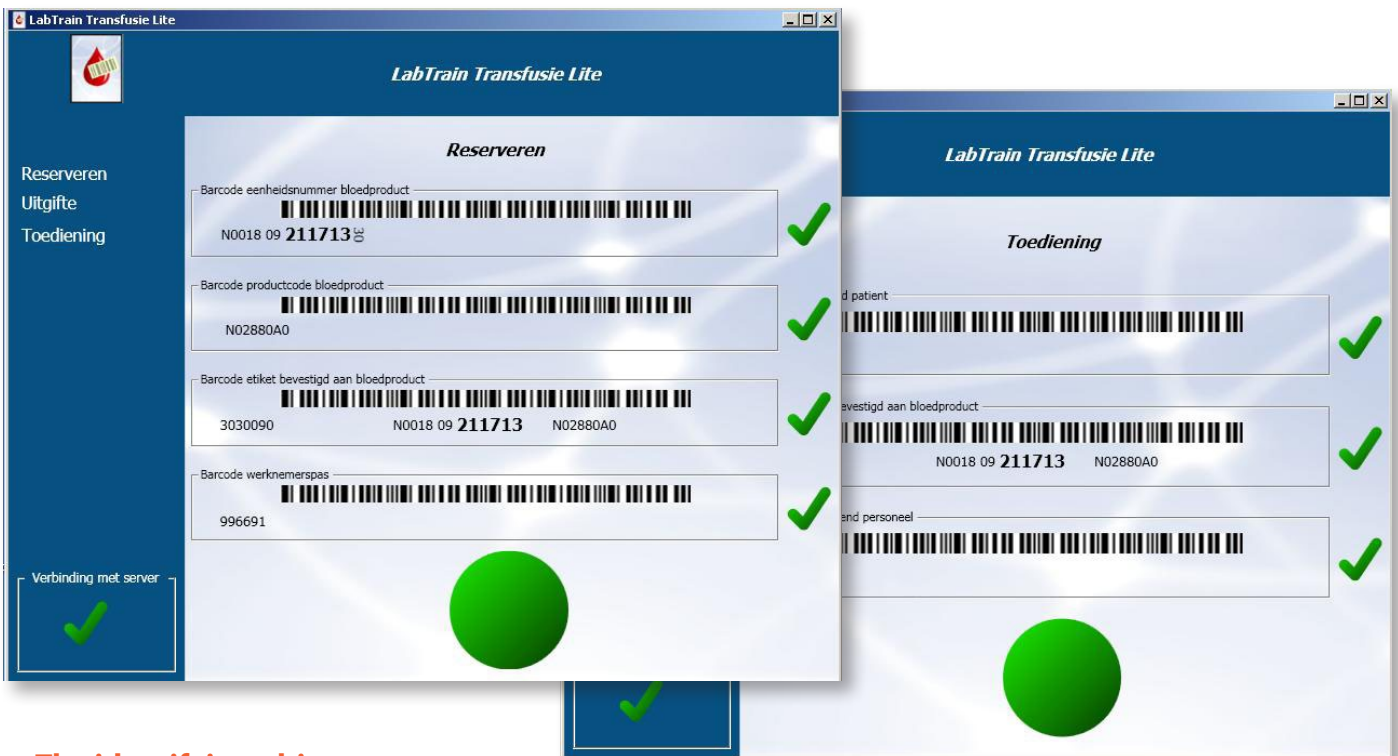
Source: ISBN/EAN: 978-90-78631-07-1 TRIP report 2008 – Hemovigilantie.

The utilisation of a BPOC system is based on six components:

- The Information System (IS)
- The healthcare processes
- The interface between IS and device
- The objects
- The scanning device
- The identification technique

Information system and healthcare processes

Erasmus MC’s longstanding relationship with Bodégro, their module LabTrain blood transfusion software, made implementing very easy and flexible. System development and implementation based on Agile Software Development guaranteed maximum input from nursing staff and an expected outcome of the software. The system provided supply chain data and information that was never captured before. We provide data about the reservation process within the transfusion lab, the distribution process to the clinic and the administered blood products to the patients. The system was built and tested in a period of 2 months and implemented in mid of 2009.



The identifying objects

The blood products are all compliant with the standard ISBT-128. Since the patient is one of the other identifying objects, one of the preconditions for this project is a patient identification wristband based on standard specifications. The GS1 Standard provided the GSRN in combination with the GS1 DataMatrix two dimensional (2D) bar code with several Application Identifiers. Quality improvements in Lean Thinking are managed by Small Group Activities (SGA). With the SGA we started the vendor selection for the identification of wristbands and printers and several vendors were tested. Within the specifications, the SGA was flexible to determine the outcome. By the end of 2008 the vendor was selected for this project. The identification wristband was such a success for this project; in October 2009 it was implemented throughout Erasmus MC.

The interface and the scanning devices

With the SGA the healthcare processes were visual mapped, both inside the transfusion lab and ward. These processes and the SGA specified the solutions. In several iterations the project team delivered the prototypes to be tested by the SGA. For the success of this project we chose to be independent from wireless data communication. This interface will be introduced in a later stage. Several scanners and devices were tested and a few “solutions” failed horribly.

The identifying technique

At this stage the Erasmus MC followed the international GS1 Standards in healthcare. The GS1-128 symbology provided the necessary identifiers for matching several items (e.g. patient

ID, Unique Device (Product) Identifier...). The benefit of the 2D DataMatrix code is that all this information is contained in a very small bar code (approximately 1cm by 1cm).

The benefit of breaking down this project in modular components is the possibility to experiment with different devices, ID techniques and interfaces, through time. The main goal is constant improvement of patient safety and as long as the current solution is the best we will stick to that solution. But as wireless data communication or RFID improves, patient safety will be discussed again within the SGA.

Post-Prometheus implementation: Small Group Activities

By monitoring and analysing our process data, and through direct observations (Gemba), we are able to identify the root cause of adverse events. We are able to monitor the amount of mismatches in the three stages of the blood transfusion process. If other steps are necessary to improve patient safety we are also able to base these steps on qualitative process data.

It was imperative, as part of the transfusion process, to ensure each blood product is matched with a patient by BPOC. This strategy is supported by the medical staff and the hemovigilance officer. This new process will make the current labour-intensive process of the four-eye principle redundant. The hemovigilance officer is currently rewriting the procedure. Based on 37,000 transfusions per year we will increase quality and save time of the overloaded nursing staff.

The importance of a standardised automatic identification system

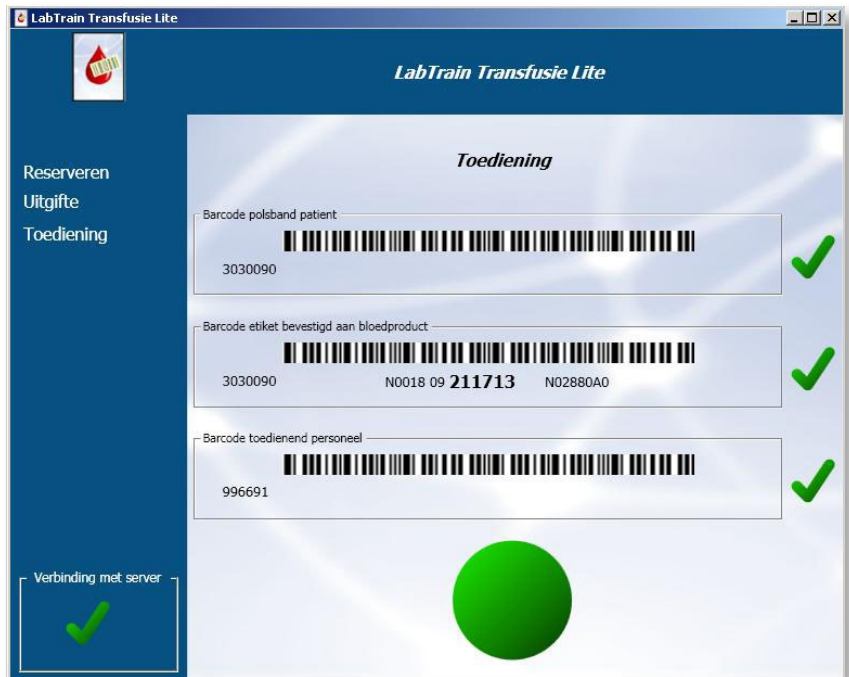
A standardised system for the identification of medical devices consisting of implants and disposables is very important. Erasmus MC has checked the availability of bar codes on the medical devices according to the GS1 Standards and the outcome of the research shows the following results:

- 2004 - 60% have a bar code of which 20% are GS1 (33% overall)
- 2006 - 85% have a bar code of which 34% are GS1 (40% overall)
- 2008 - 90% have a bar code of which 42% are GS1 (47% overall)

In cooperation with GS1 Netherlands, the quality of the existing bar code was verified. Of the medical devices, which have a bar code, the quality was below acceptance level. A lot of them do not meet the requirements of the GS1-128 Standard. These suppliers have been notified and a substantial amount of them have improved their quality significantly.

A few other results:

- Only 18 % of the bar codes have a Lot Number and Expiry Date
- 28% have a bar code with an E-F qualification according to the CEN-ANSI standard
- 27% do not have bar codes or use an internal code



Suppliers who don't use GS1 Standards (for healthcare) should be encouraged to do so. Only then can the healthcare community benefit from the patient safety improvements that the system has to offer, not to mention the logistic efficiency and cost savings this implies. Looking at the results mentioned above, we have a long way to go, nevertheless on a train that has already left the station. Please get onboard now!

REFERENCES

- Patient wristbands requirements by the United Kingdom National Patient Safety Agency
- Patient wristbands requirements by Australian Commission for Safety and Quality in Healthcare
- www.youtube.com/ezwarter

ABOUT THE AUTHOR

Erik Zwarter is the project manager Healthcare Logistics in the Erasmus Medisch Centrum. He has been active for several years in process optimisation, based on Lean Thinking. Zwarter led several EPD implementations and project teams. He is now responsible for implementing BPOC and an automatic identification standard within Erasmus MC for domains such as Logistics, Pharmacy and Healthcare.

He is active in GS1 Healthcare and chairman for the GDSN work team Netherlands and member of the steering committee of ZorgDAS. He has spoken nationally and internationally on bedside scanning, bar coding of medical devices and BPOC, amongst others.

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