Cytostatic treatment and bedside scanning: Improving patient healthcare at Geneva University Hospitals

ABSTRACT

Treatment of patients suffering from cancer requires the use of special medication, customised for the individual patient. At Hôpitaux Universitaires de Genève [Geneva University Hospitals] (HUG) in Switzerland, the high number of patients, who need such a specialised treatment, results in the preparation of over 14,000 cytostatic drugs per year. To improve patient care processes, HUG has developed tools to support this very critical medication process. The overall objective, from the beginning, was to provide safer care as well as responding to security concerns for the technicians and nurses, who have to prepare and administer these potentially hazardous drugs.

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Process enhancements

Cytostatics are high-risk medications, proportional to their efficiency against combating the disease. Risk management for cancer chemotherapy has evolved over time at HUG:

First of all, since 2005, cytostatics are electronically prescribed by physicians, by integrating a number of factors and patient information, allowing them to select the best protocol to apply. The amount of available clinical data has increased over the last decade, which has allowed prescriptions to be more specific and medication to be increasingly customised. Physicians have to be able to efficiently manage all this data. Considering the high-risk of prescription errors, a template 'order-set' and an 'electronic prescription system' was developed, integrating medication schemas based on the best evidence. This first step has allowed HUG to leverage collective experiences and to reduce the potential of prescription errors.

Secondly, between 1999 and 2002 all the drug compounding processes in the hospital pharmacy were centralised.
Thirdly, a computerised solution was implemented to support the production of cytostatics, bridging the electronic prescription to the computer-supported manufacturing process.

Last, but not least, information is now automatically captured at the point-of-care. Cytostatics have a potentially very short lifecycle, in addition to other characteristics, which make them unique in the medication process. The need to capture that the right medication (in its right dosage) is going to be administered to the right patient at the right time by the right route of administration (the so called "5 patient rights") is crucial. This step required the bags, containing the cytostatics, to be specifically labelled and for the patient and the caregiver to be identified in such a way that automatic data capture can be processed.

Risk analysis to support solution choice

Administering cytostatics to patients has been analysed carefully to select the best and most efficient solution. The strategic approach was built on the three pillars proposed by the Joint Commission International (JCI, 2001):

- Prevention - based on a risk analyses, processes are formalised, staff are trained;
- Diagnosis - based on the incident reported, root incident causes are analysed;
- Treatment - corrective measures are put in place.

Because of the low rate of incidents, and therefore the difficulty to measure improvement, a prospective risk analysis has been conducted. Several methodologies for risk analysis have been explored; FMECA (Failure Mode Effect and Criticality Analysis) was selected as the most appropriate. FMECA has been used for various high-risk care processes, including parenteral nutrition or chemotherapy.

The analysis was used to provide evidence about enhancements of the initial actions (prescription protocols and centralisation of production), and to anticipate the benefit of information technologies in the prescription, production and administration processes.

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Implementation of IT at the point-of-care

A multidisciplinary team has been set up to conduct the risk analysis. The team determined the potential failures in the processes (split into 5 phases) and their criticality. Looking at the point-of-care, the risk analysis has identified how the final check, at the point-of-care, is complex.

It includes the following control points:

- Control Patient ID: Patient – Protocol – Product
- Control Product ID: Protocol – Product
- Control Dose: Protocol – Product
- Control Route: Patient – Protocol – Product
- Control Day: Protocol – Product – Calendar
- Control Expiration: Product – Calendar
- Control Conservation: Product – Conservation

Automatic Identification and Data Capture (AIDC) provides more efficiency than check lists, by documenting the processes at the same time. The reduction of the criticality at the patient's bedside with bedside scanning, provided the following estimates:

- wrong patient: 75% reduction
- wrong administration route: 50% reduction
- wrong flow rate: 50% reduction
- wrong administration day/time: 50% reduction
- wrong drug or drug expired: 50% reduction

To enable the AIDC solution, it was decided to use GS1 Identification Keys and the GS1 Application Identifier (AI) System. The latter did not provide an AI to capture expiry date and time, and therefore – together with the Hospital of Dijon in France, HUG submitted a Change Request to GS1, which was approved in 2005. Cytostatics are now labelled with a single GTIN (Global Trade Item Number), a serial number (which is a sequential number, delivered by the software managing the manufacturing processes) and an expiration date and time.

In a first stage, RFID tags have been tested because of the ease in capturing information they carry, and because staff identification badges already included an RFID tag. At the time of the first tests, technology raised unexpected barriers; tags on the staff badges were on a different frequency to the tags on the cytostatics' label. As the hospital uses a large number of PDAs, it provided the opportunity to use them for data capture. The RFID reader, plugged into the existing PDAs, only read one frequency. Additionally, PDAs were at that time very insensitive in their wireless connection, which caused connectivity disruptions.

Tests made, with voluntary staff, demonstrated that the new processes were meeting their expectations, when used in optimal conditions. In the wards, the connectivity issues were of concern and lead to a reconsideration of the hardware solution.

After this learning, it was decided to implement a system using bar codes, marking the bags with a GS1 DataMatrix (2D bar code) as well as marking the patient wristbands. Staff are recognised with their log-in. Instead of PDAs, laptops are used on trolleys, as their robustness in wireless connection is stronger, compared to PDAs.

Conclusions

To ensure end-user buy in, the implementation of bedside scanning for cytostatics took many months. Nurses were involved in several trials to measure and monitor their satisfaction level and understand their expectations. Currently a project addresses the impact of ergonomic and acceptance to process compliance in the cancer chemotherapy process at the patient bedside.

Learning by doing has been one of the key benefits of the project. Safer, and better documented, processes provide the patients with the care services they expect from a leading hospital. Learning by doing is also the tagline of HUG's communication with its suppliers, as it has now demonstrated that GS1 bar codes can be read in hospitals when care processes present a certain level of risk. Suppliers understand this as well as health authorities; recently a recommendation for the labelling of injectables has been adopted by both manufacturers and hospital pharmacists, with the support of Swissmedic (the Swiss surveillance authority for medicines and medical devices). At HUG, cost effectiveness of point-of-care bar code verification has been demonstrated in the domain of the cytostatics. Further projects are planned, using GS1 Standards, for example controlled products (narcotics). Other hospitals visit HUG to see how the loop has been closed for the benefit of the patients.

ABOUT THE AUTHORS

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Christian Hay currently works for GS1 Switzerland and GS1 Global Office. Educated as lawyer, he worked for the pharmaceutical branch since mid of 1980s in various positions. He was involved since the early stages in GS1 standard deployment in the Swiss healthcare. Christian is board member of the Swiss Medical Informatics Association and has recently been elected Chair of IHE-Suisse.