

Healthcare provider implementation

Antonius Hospital makes safer medication administration a priority

The traceability of medication in the pharmaceutical sector—from production to use by patients—is important to ensure medication safety. This is why GS1 barcodes are increasingly being used at the lowest or single-unit level for medication administration. Antonius Hospital, with locations in Sneek and Emmeloord in the Northern part of the Netherlands, has implemented GS1 standards to enable the registration and administration of medicines to patients. The hospital has found that investing in GS1 standards encoded in GS1 DataMatrix barcodes is worth it for a multitude of reasons.



By Michiel Duyvendak

Preventing errors

Antonius Hospital offers a wide range of services: hospital care, home care, emergency care, care mediation and home services through a hotel arrangement. The hospital works with 3,500 people daily to provide reliable healthcare services to the population of Southwest Friesland, the Noordoostpolder, Urk and the Wadden Islands, Vlieland and Terschelling.

“In August 2011, we began the project called ‘Registration of the administration of medication by means of barcodes,’” says Michiel Duyvendak, Hospital Pharmacist at Antonius Hospital. “The aim was to prevent registration errors as much as possible. Safe medication and therefore patient safety are our key concerns.”

According to an analysis of data maintained by the Netherlands’ national register of medication incidents (maintained by the KNMP/NVZA), more than 30 percent of medical incidents are related to errors in administering medication.

“Research has shown that serious administration errors can be prevented by as much as 50 percent by using barcode verification during administration,” Duyvendak says.

Investing in change

In 2011, Antonius Hospital transitioned from a paper-based environment to one that is paperless. “This was a great opportunity for implementation of our medication administration project,” says Duyvendak. “Our motto is: ‘Just do it. Don’t wait till all problems have been ironed out.’”

Duyvendak was able to persuade the hospital’s Board to back the project. “I found it was useful to share our vision as widely as possible. It also helped to reach agreement with officials such as the information manager and security officer.”

In addition, the support of the Board made it possible to cut costs. The staffing costs were covered by the existing personnel budget. Bedside computers were already listed in the digital dossier. Duyvendak continues, “We did have to request a budget for the barcode scanners, while the wireless network was included in the project budget.”

Barcodes at the single-unit level

The hospital’s barcode-based administration registration system went “live” at the end of 2011.

“Each dose of medication, at the lowest level of registration, already has or is assigned a barcode in the hospital,” explains Duyvendak. “For example, consider a packaged, singular pill. When it is issued by the pharmacy, the GS1 Global Trade Item Number® (GTIN®) encoded in the GS1 DataMatrix barcode on its packaging is scanned and sent to the appropriate ward. Then the GS1 identifier encoded in the barcode on the patient’s wristband is scanned just before the medication is administered.”

“The display on the computer screen confirms that the right medication is being administered at the right time to the right patient. Finally, the medication issued by the pharmacy is scanned once more and registered in the system, together with information such as the batch number and the expiry date.”

The barcode-based administration registration system used at the Antonius Hospital has made the administration of medications safer, improving patient safety.

“Medication is easily traced and verified now, but there is still room for improvement,” says Duyvendak. “If the hospital staff forgets to scan the medication, a pop-up appears on the screen when medication has not been scanned. This is very useful, since the nurse who has to administer the medicine cannot avoid seeing it.”

“In the original version of the system, the nurse had to click on the pop-up to get rid of it. This involved putting the scanner down and using the mouse to remove the pop-up before continuing the procedure, which was inconvenient. The system has now been modified so that the pop-up disappears when a specific barcode is scanned. This is much more user friendly, and motivates nurses to use the system.”

The use of GS1 standards and barcodes has also improved managing the inventory of pharmaceuticals at the hospital. Digital ordering and decision-support software now provide time for applying barcodes.

“In the final analysis, the success of the system depends on how easy it is to work with at the patient’s bedside,” says Duyvendak. “Apart from the user friendliness of the software, the reliability of the Wi-Fi network is also crucial. Nurses cannot be expected to work with a system that is constantly breaking down.”

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Michiel Duyvendak, Hospital Pharmacist at Antonius Hospital

Pharmaceutical product management

Pharmaceutical product management has proven to be one of the main challenges in this project—knowing which products have barcodes applied and, of those, which ones work and are effective.

“Together with GS1 Netherlands, we checked all 2,600 pharmaceutical drugs that we use to determine which manufacturers maintain and use GS1 standards correctly. We designed a barcode label based on GS1 standards for the products that did not have one. To make sure that the software works properly uniform standards for barcodes are necessary. Only then reliable checks can be done; nurses cannot be confronted with medication that cannot be recognised.”

“We work hard to convince the industry about the necessity of using standards. We are also trying to move the industry to apply GS1 standards in barcodes on each single unit of use for medicines. But we still assign barcodes on medication on a daily basis—totalling more than 200,000 single doses a year. Of course, it would be best if the manufacturers provided all products with a barcode based on this standard. Unfortunately, the industry has not yet reached this stage.”

Duyvendak notes another challenge: “Some products have a barcode, yet the supplier changes the code without informing us. The result is that the medication is no longer recognised when its barcode is read. To deal with this problem, we keep a log of the registration scans and give products one of our own codes when they are not recognised. Logging also makes it possible to print out reports that show when the system is or is not working, and whether it is in use.”

Legislation and safe medication

The Dutch healthcare sector has opted to use the GS1 DataMatrix for the unique identification of pharmaceutical drugs. It is also possible to include additional product information encoded in the GS1 DataMatrix barcode like the batch/lot number, expiry date and more.

The NVZA (Dutch Association of Hospital Pharmacists) aims to introduce the use of the GS1 DataMatrix for all medications used in hospitals, down to the single-dosage level, to make the administration of medication as safe as possible. "EMR providers must also support the use of GS1 standards in the different steps of the process from pharmacy to patient," says Duyvendak. "European legislation supports the use of the GS1 DataMatrix. But unfortunately not on a single-unit of use package."

The European Parliament and the Council of Ministers recently decided that all medication must comply with the European Commission's Falsified Medicines Directive (FMD), effective 9 February 2019. This directive aims to ensure that patients are never supplied with fake medicines that attempt to be passed off as real, authorised products. Manufacturers can comply with the FMD by providing each package containing a given product with a unique serial number. The GS1 DataMatrix can also be used for this purpose. However, a barcode applied on a single-unit package – the lowest level – is needed to ensure safe medication when an administration registration system is used.

Time and patience

Duyvendak recognises that change takes time and patience. "We are making significant changes in our hospital operations, which are long-term projects. After six years, we have made significant progress; yet, it can be slow. For this reason, I find it is important to share our experiences so that others can learn and perhaps implement changes faster."

"I am sort of a 'standards evangelist' and take any opportunity to share our experiences and vision at conferences and webinars. But as a small hospital, we cannot change the world. We are also part of a group that works on GS1 standards adoption together with the Ministry of Health and GS1 Netherlands to see how we can implement GS1 standards and barcodes on medication in

all hospitals. A report has already been sent to the Dutch House of Representatives with recommendations for implementation. The next step is to consider how we can further implement GS1 standards and barcodes on medication together with the industry and how we can free up the needed investment."

Duyvendak hopes that the industry will adopt GS1 standards and barcodes for single-unit use of packaged medication. This is much more efficient and less error prone. "But that will cost the industry money, so that will not be easy. The industries that invest in this should be rewarded and not be punished because their products are somewhat more expensive."

Worth the investment

Even though it is a long-term project, Duyvendak recommends other hospitals "just do it." "It does not cost that much more in addition to the infrastructure that is already required at beside. By using automated controls, keeping records and working becomes much more efficient, which provides time for applying barcodes. Also, focus on the user friendliness of the system for nursing. Finally, don't wait endlessly until everything is taken care of 100 percent, because we have to break the circle. Our patients have a right to good and safe care."

According to Duyvendak, GS1 standards and barcodes on medication are important for hospitals, but also for other healthcare organisations. "Care is shifting to the home; therefore, home care providers should work with GS1 standards-based systems. Now, they check medication manually, but automated verification with barcode scanning is better. It is efficient, effective and safer for the patient."

“ We started by implementing the GS1 DataMatrix. The use of this barcode makes it possible to check for expiration dates and record batch numbers for biologically produced medicines. This contributes to an increase of patient safety and a decrease of administrative burden.”

Michiel Duyvendak, Hospital Pharmacist at Antonius Hospital

Duyvendak is already looking ahead:

Benefits associated with the project for medication administration using GS1 standards include:

- ✓ Medication safety at the point of care
- ✓ Faster and more precise recalls at single-dose level, if ever needed
- ✓ Batch numbers of biologically produced medicinal products are being recorded to enable the traceability of these products and prevent the potential spread of contamination
- ✓ Solutions support the continuum of patient care.

Useful tips from Antonius Hospital

- 1) Just do it!
- 2) Involve the nurses who are present at the patient's bedside
- 3) Pay adequate attention to the user-friendliness and compatibility of the automated system.

About the Author



Michiel Duyvendak is a hospital pharmacist working at Antonius Hospital Sneek/Emmeloord, with responsibility for Pharmaceutical Care in the hospital and nursing homes along with Logistics, Medication Safety and Electronic Medication Records (EMR). He is also an active member of the Dutch Association of Hospital Pharmacists (NVZA) and a liaison to the European Association for Hospital Pharmacists. Michiel is project leader of the project, "Registration of the administration of medication by means of barcodes." Michiel and Antonius Hospital received an award for this project from GS1 Netherlands in March 2017 based on their best-practices example for hospitals in the Netherlands.

About Antonius Hospital

Antonius Hospital has two locations in Sneek and Emmeloord and Home Care Southwest Friesland with 36 neighbourhood care teams. It offers a wide range of services: hospital care, home care, emergency care, care mediation and home services through the hotel. Antonius serves approximately 3,500 people daily. Both hospital and home care are accredited by NIAZ.

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