Norway

Lovisenberg Diaconal Hospital achieves significant efficiency improvements and traceability for surgical equipment

Challenge

Lovisenberg Diaconal Hospital in Norway needed to streamline its processes associated with the handling of surgical equipment. Highly trained surgical staff was spending valuable time on manual tasks like sorting, packaging and the replenishment of equipment used in surgical procedures.

Approach

Staff in the Surgical and Sterile department collaborated with GS1 Norway and APX Systems to develop and implement a traceability solution based on GS1 standards. The system has automated the department's surgical, ordering, replenishment and recall processes for impressive improvements.

Staff training time reduced from 1 year to 3 months

Traceability and transparency through the whole supply chain, from manufacturer to patient

Manual ordering process that once took 2 hours per day is now automated, taking only minutes with increased quality

Increased patient safety and quality assurance

Marit Glende Johnsen & Fredrik W. Goborg

Lovisenberg Diakonale Sykehus

Established in 1894, Lovisenberg Diaconal Hospital is publicly financed, but operates as a non-profit facility by two trusts. The Surgical department competes for patients with all publicly funded orthopaedic hospitals in Norway and, therefore, relies on its flawless professional and clinical reputation to continually attract patients. To improve efficiencies and patient safety, the hospital wanted to improve and streamline the handling and traceability of its surgical equipment.

Streamlining traceability with GS1 standards

Started as a pilot project in 2013, GS1 standards were implemented and fully operational in the Surgical and Sterile department by spring 2017. During this timeframe, representatives from the hospital, APX Systems, a solution provider, and GS1 Norway collaborated to develop the traceability system.

Healthcare professionals in the department prioritised the needs that had to be addressed, and then shared their ideas and suggestions with APX Systems and GS1 Norway as part of a joint team effort to identify a potential solution and outcome.

APX Systems developed the solution supported by GS1 standards, helping the department to successfully transition from manual registrations and operations into digital scanning and tracking.

Medical device management in a hectic environment

Surgical nurse Marit Glende Johnsen was Head of the Surgical and Sterile department until 2019. She recalls that the surgical staff spent a significant amount of time executing manual, non-value added routine work, especially when it came to sorting and packaging instruments. Being part of the surgical staff demands a high degree of proficiency, with specific skills that take a substantial amount of time to master. Trained staff is, therefore, difficult to replace and must be retained. Ms. Glende Johnsen noted that these manual tasks took available surgical staff away from other critical responsibilities in the department.

Another daily challenge faced by the staff was the replenishment and re-ordering of components and implants after surgeries. Each implant surgery often requires a large number of different types of medical devices, components and instruments, comprised of an immense set of variables. Therefore, it's crucial that the warehouse is able to supply operating theatres with the right medical devices, components and instruments—at the right times and in the right amounts.

> "We needed to optimise our warehouse volumes—not only for purely economic reasons, but to also make the best use of available physical storage space."
>
> **Marit Glende Johnsen**
> Former Head of Surgical & Sterile Department
> Lovisenberg Diaconal Hospital

It is important that the department promptly replenish all the components that have been used during a surgical procedure, so that all needed items for scheduled future surgeries are always available.

Until the implementation of GS1 standards, replenishment was a manual routine that consumed a considerable amount of time. Hours were spent on ordering the right items, as well as on the tedious work of checking and registering items when they arrived at the hospital's warehouse. This was done by comparing the purchase order and suppliers' packing lists with the delivered items manually.

Healthcare personnel were spending time doing simple, time-consuming manual warehouse routines and administrative tasks such as receiving, stocking, picking, packing and dispatching. These manual processes resulted in a high-level risk of human errors.

There was an important need for a solution that would keep track of devices and components. "We were continuously trying to figure out how to better manage the proper supervision of packaging components, how to keep a lean and manageable inventory, as well as just understand where the various components were, at any given time," says Ms. Glende Johnsen.

By implementing GS1 standards, the department wanted to realise the following improvements:

- Tracking and tracing medical equipment, as well as how to correctly package the right components
- Streamlining the scanning and integration of data throughout several, different working processes
- Storing processed data

- Achieving an automated digital ordering system, especially for prosthetic surgery that requires daily orders that are complex and, when manually executed, result in a very high risk of human error
- Integrating data with the hospital's electronic health record (EHR) system and Norway's national quality registers
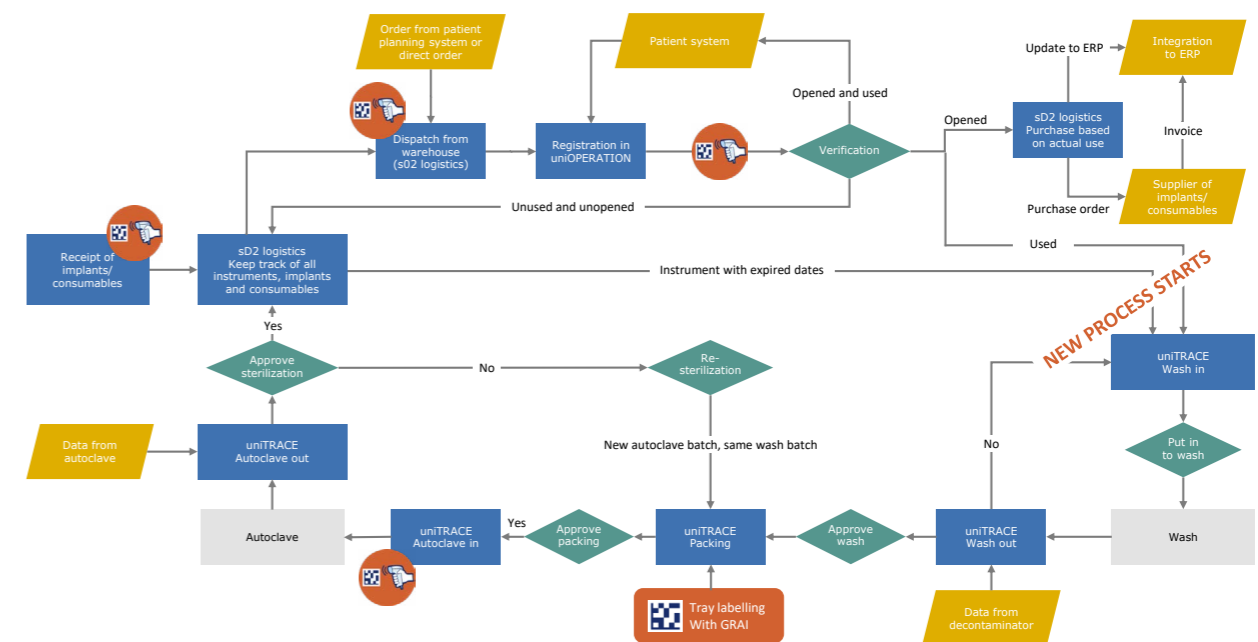- Tracking implants and medical supplies, according to the EU's Medical Devices Directive

Figure 1: Tracking system for sterile equipment in CSSD, including warehouse management, registration in operation and purchase of goods used in operations

Initiating the implementation of the GS1 identification standards

The traceability solution was implemented in the entire Surgical and Sterile department by 2017. The system relies on GS1 standards for the identification of surgical equipment, providing data that can be automatically updated throughout the system, and then subsequently routed to relevant directories and registers. APX Systems also brought to the project its comprehensive expertise about logistics, traceability and GS1 standards.

A fundamental requirement of the solution is the GS1 Global Returnable Asset Identifier (GRAI) that enables the tracking of trays with individual medical instruments throughout the Surgical and Sterile department. By scanning

the GRAI, staff can collect data at both the decontamination and autoclave points in the process.

> "The suppliers product catalogues were in urgent need of GTIN codes. We implemented them with the help of APX Systems."
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> Former Head of Surgical & Sterile Department
> Lovisenberg Diaconal Hospital

Sterile equipment, implants and consumables are registered via scanning the GRAI barcode in the operating theatres and automatically uploaded to systems like the hospital's EHR system, the Norwegian Arthroplasty Register and other relevant registries.

Other equipment and components are uniquely identified based on GS1 standards like the Global Trade Item Number® (GTIN®) encoded in GS1 barcodes such as the linear GS1-128 and two-dimensional (2D) GS1 DataMatrix barcodes.

As equipment and components are delivered to operating theatres, each item's barcode is scanned to extract and store information about that item—its GTIN, batch number, serial number and expiration date. At the same time, the expiration date is automatically checked to ensure the item has not expired and can be used.

Information about items—either used in operating theatres or just opened—is also utilised in the replenishment process to verify the need to purchase these used items. Item data automatically helps to create purchase orders that are then sent to the appropriate suppliers for fulfilment. This automated replenishment process ensures that the correct items are ordered for delivery to the hospital's warehouse.

Healthcare staff can now easily monitor the ordering process and know when to expect equipment deliveries. In addition, many tasks are now delegated to other roles since they no longer require a highly skilled and trained healthcare professional.

> "It is of utmost importance that we have the tracking system, and the GTINs, because when we utilise this system, all information is automatically routed to the national quality registers, as well as being transferred to our hospital's EHR system."

Marit Glende Johnsen
Former Head of Surgical & Sterile Department
Lovisenberg Diaconal Hospital

Benefits from the deployment of GS1 barcodes

The benefits of the GS1 standards implementation have been substantial, including:

- There has been a reduction in staff training time from 12 months to 3 months, for each healthcare professional.

- The time spent ordering medical equipment has been reduced. Manually ordering medical devices and products once took up to 2 hours per day, but now only takes minutes with the automated process.

- The traceability solution automatically uploads equipment and component data to Norway's national implant registers and the hospital's EHR system, giving healthcare professionals access to valuable statistics and historical data used for clinical studies and further improvements of medical protocols—increasing the quality of surgeries and patient safety.

- Medical devices and implants used in surgeries can be traced back to specific patients. Identifying the right patients in case of medical equipment recalls was once done manually before implementing GS1 standards. This could take days, but now takes only minutes.

- Traceability of surgical equipment throughout the department has significantly increased safety during the sterilisation process.

"During the process of implementing the new processes and the traceability solution with GS1 standards, we saw the importance of contacting all of our suppliers in order to implement and streamline with the use of GS1 standards," explains Ms. Glende Johnsen. "The suppliers' product catalogues were in urgent need of GTINs so we implemented them with help from APX Systems."

"Today, we scan everything we use during a procedure and when that is done, the information is automatic transferred to the EHR, in a readable pdf-type file,"

"This is extremely helpful for us in case a supplier contacts us regarding the recall of a batch of implants or other kinds of medical devices. We can now readily log on to the APX Systems solution and search the batch number to locate whether there are any hits or uses of that particular batch in our department. We can even trace the implant of a medical device directly back to the specific patient."

"The suppliers' product catalogues were in urgent need of GTINs so we implemented them with help from APX Systems."

Ms. Glende Johnsen also underlines that invoicing and accounts payable are other areas where the traceability solution has led to impressive improvements. Having a large amount of vendor invoices and packing slips in need of her approval was both impractical, time consuming and led to potential errors. Now, Ms. Glende Johnsen just needs to access information via her computer to see if equipment has been ordered and received.

"Our administrative workload is so much lighter," Ms. Glende Johnsen explains. "We only have to scan the equipment's barcode

one time and it is then directed to anywhere we would want the information to be stored and shared."

Mr. Fredrik Goborg, APX Systems representative, explains why the system combined with GS1 standards provides many advantages for the Surgical and Sterile department. "The combined efforts of GS1 and APX Systems is streamlining all processes with no bottlenecks. The system is fully integrated with the hospital's complex hardware and software already in use at the hospital."
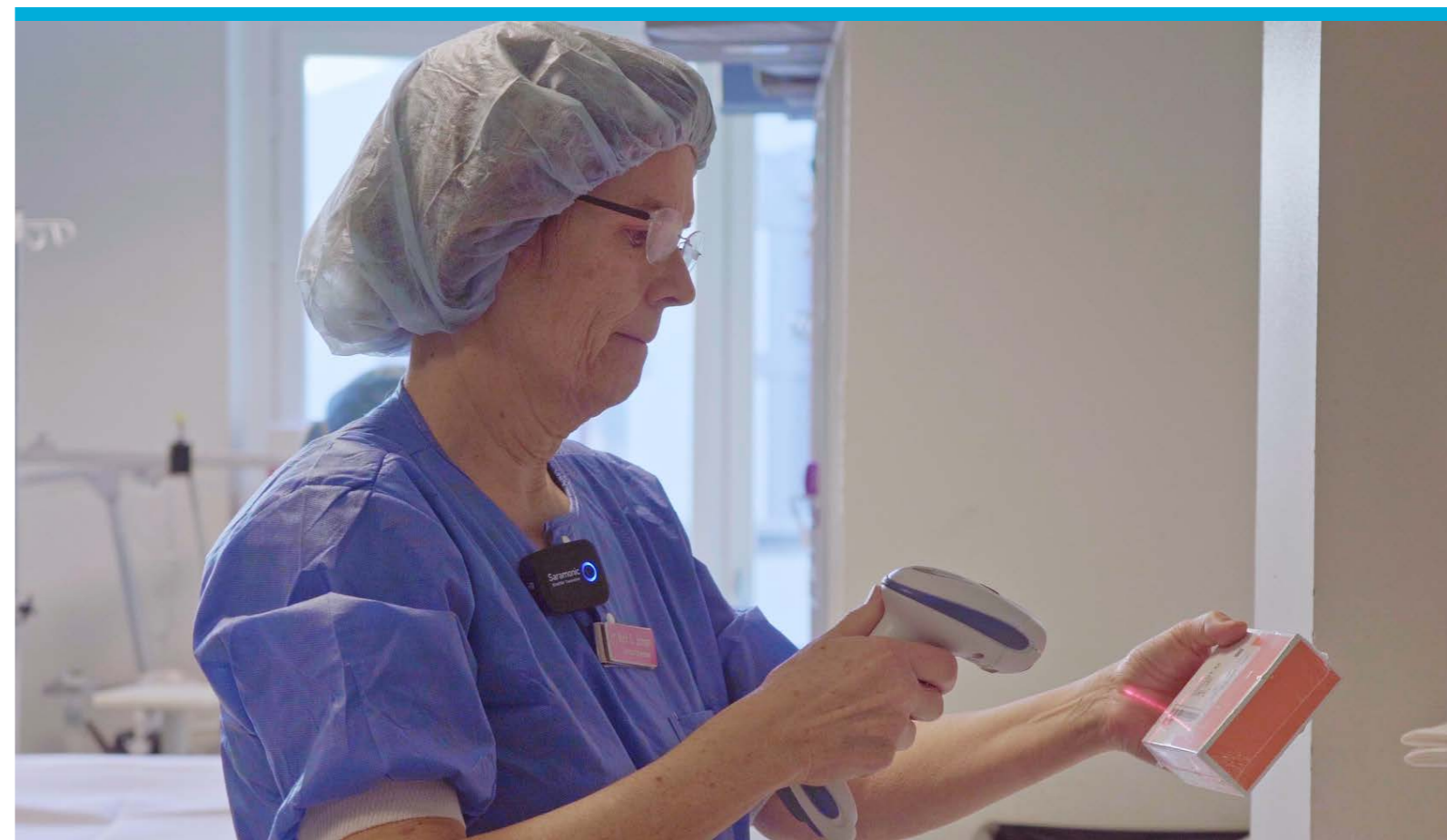
Quality assurance with traceability

Requiring the use of a GS1-128 barcode or GS1 DataMatrix on all medical devices, components and instruments coupled with a new and innovative Warehouse Management System (WMS) has more than met the requirements of medical staff. It has also produced added value by reducing training time for the staff along with a much more productive workday.

The solution also meets the requirements of traceability addressed in the new EU medical device regulations.

"Lovisenberg Diaconal Hospital depends on providing the utmost quality in everything we do. Our patients have to choose our services specifically, or else they will be transferred to one of the public hospitals," says Ms. Glende Johnsen. "This means we need to make continuous improvements."

"It is of utmost importance that we have the tracking system, and the GTINs, because when we utilise this system, all information is automatically routed to the national quality registers, as well as being transferred to our hospital's EHR system," emphasises Ms. Glende Johnsen. "If there is an increase in certain complications, we can easily seek out what kind of components have been used by monitoring potential anomalies in these registers."

"The collaboration between GS1 and APX Systems is unique," continues Ms. Glende Johnsen. "We scan each of the components with a single scan in the operating theatre. After that, the components can be traced in any area— inventory, patient journals, registers, invoicing and any other area of choice."

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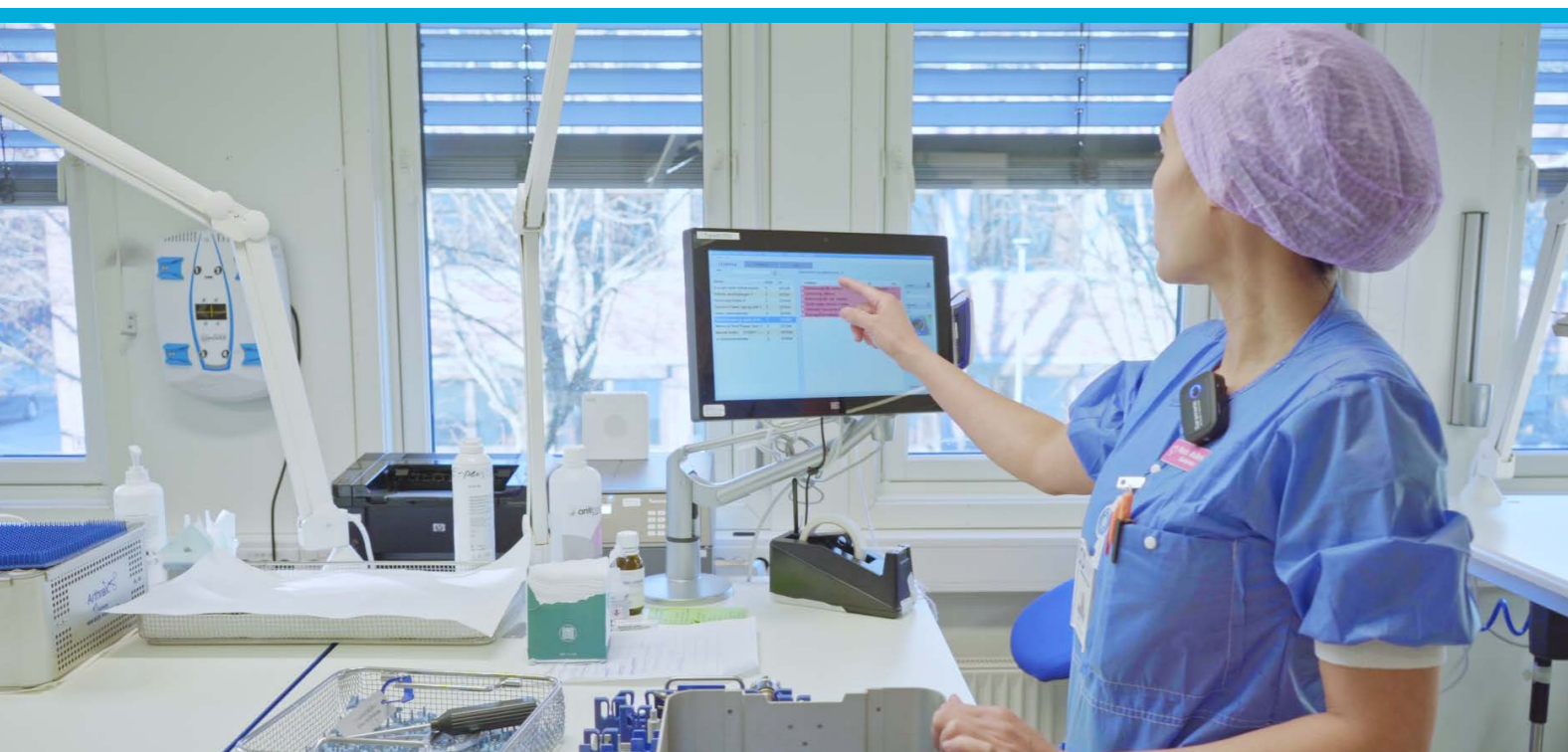
About the authors

Marit Glende Johnsen,
Former Head of Surgical and Sterile Department
Lovisenberg Diaconal Hospital

Marit Glende Johnsen was Head of Lovisenberg Diaconal Hospital's Surgical and Sterile department until 2019 and currently provides consultation services to the department. She was the initiator in the development and implementation of the GS1 standards-based solution, including collaboration with APX Systems, which made the transition highly successful.

Fredrik W. Goborg
Key Account Manager
APX Systems

Fredrik W. Goborg has 30+ years within the computer industry. Last 10 years working in APX Systems with logistics and tracking systems. The areas are in health-vertical and also other verticals, like the food-industry. For the project at Lovisenberg, Fredrik W. Goborg was the project leader and continued as main contact for the hospital after the project was put in full production.

About the organisations

Lovisenberg Diaconal Hospital was established 1894 and is located in the Norwegian capital of Oslo. It is the leading hospital in Norway in the department of prosthetic surgery and complex shoulder surgery, and in the field of complex nose and sinus surgery, as well as in paediatric surgery.

The Surgical department consists of 12 operating theatres, which perform 38 surgeries per day. They handle predominantly orthopaedic cases; at least eight arthroplasties on a day-to-day basis, in addition to arthroscopic shoulder and knee surgery. It also has a substantial ENT-department that handles sinus surgery, as well as nose and ear surgery. In addition, they perform hernia and gall bladder surgeries.

lovisenbergsykehus.no

APX Systems delivers intelligent system solutions, including software and hardware for production and logistics needs. The company is located in Oslo, Norway and has departments in Oppdal and in Colombo, Sri Lanka. Within the health sector, APX Systems provides solutions—uniTRACE, uniOPERATION and uniORDER for sterile departments. These are used in several hospitals in Norway and Sweden, and are in demand rom several countries worldwide. The solution includes full equipment tracking in a sterile department with extraction of data from decontamination and autoclave. Sterile equipment, implants and consumables are registered in the operation theatre, and automatically updated to systems like EPJs, implant registers and other systems.

www.apx-systems.com