

# Improvement of drug inventory management through GTIN and mobile system at the Seoul National University Hospital

## ABSTRACT

In Korea, the Ministry of Health and Welfare (MOHW) has mandated the use of the Global Trade Item Number (GTIN) in pharmaceutical products starting January 1st, 2010. In response to the new policy, the Seoul National University Hospital (SNUH) began to develop a real-time inventory management system that uses Personal Digital Assistants (PDAs) to read the GTINs printed on drug packaging. The system is designed to control inventory movement, by reading information assigned to the bar code of inbound/outbound sheet with a PDA, which will show a drug list on its screen and compare it against the GTIN affixed to the pharmaceutical packaging. Development of a GTIN-compliant system led to improved job satisfaction of employees at the SNUH as it helped them prevent medication error and reduce the time in drug inventory management.



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## About SNUH

The 125-year history of the SNUH (Seoul National University Hospital), a total care general hospital with 1,625 beds, can be traced back to 1885 when it was established as the first national western-style hospital in Korea, Gwanghyewon. In January 2008, the SNUH established the Division of Pharmacy Inventory Control under its Logistics Management Department to promote efficiency in inventory & purchasing functions and build expertise in drug management.



## Background

The Division of Pharmacy Inventory Control provides pharmaceutical products to the Main Hospital, the Children's Hospital, the Healthcare System Gangnam Center and the Clinical Research Institute. Its Medical Information System established an on-line connection among the Division of Pharmacy Inventory Control, EZMEDICOM (contracting agent) and vendors. The SNUH has also in place an international standardised classification system, the UNSPSC (United Nations Standard Products and Services Code), as well as an international standardised attribute system, the GDAS (Global Data Attribute System).

The hospital controls drug inventory by using item codes in its integrated logistics system and manages prescription and dispensing by using drug codes in the OCS (Order Communication System). When the Logistics Management Department was established in early 2008, the SNUH adopted item codes by assigning a 13-digit serial number with prefix 2005 to every pharmaceutical product in use. GTINs were allocated to products that were newly introduced or changed of contract terms since 2008.

As of the end of 2010, the SNUH keeps an inventory of 2,005 items and runs on a purchasing budget of KRW 123 billion. With the exception of narcotics, inventory management is on a consignment-basis, which means that the hospital will use drugs that are deposited to the inventory by the wholesalers and make deferred payment twice each month.

In Korea, national university hospitals can purchase pharmaceuticals only through an annual bidding process. Subsequently, the SNUH commits to yearly contracts based on unit price. If a contract brings change in the pharmaceutical manufacturer, drug code of the product will stay the same regardless of the brand name or package unit. In contrast, item code needs to be reallocated whenever there is a replacement of the manufacturer, and thus requires continuous updating of bar code information.

Moreover, there were other issues to the use of item codes, as open bidding results in frequent change of the brand name, being prone to medication errors coming from similar appearance & packaging, and tracking & tracing issues for problematic pharmaceuticals in use. Thus, the SNUH came to seek an efficient improvement measure.

Also to be noted is the announcement by the Ministry of Health & Welfare on "Pharmaceuticals Standard Code: Guidelines for Use and Management of Drug Bar codes," which was released on January 15, 2008. The ministry mandated use of pharmaceuticals bar code labels from January 1, 2010, pursuant to Article 75, Provision 1, Paragraph 9 of the Pharmaceutical Affairs Act Enforcement Rule. This announcement led to the establishment of a GTIN inventory management system at the SNUH.

## System overview

In order to develop a GTIN-based program, the hospital needed to create a bar code information database. On GTIN labeled drugs, bar code information was collected at every packaging unit level of a single item code and matched against its conversion volume. The SNUH's PDA devices can read bar code information at the primary (GTIN-13, GTIN-14) and secondary levels and non-GTIN bar codes in bulk package such as those used in the manufacturing country of a pharmaceutical product. When a product carries a non-GTIN label, the bar code information was registered before use in the SNUH database. Also, the hospital made it a requirement for all vendors to attach GTIN to their products after the annual contract system was introduced in 2009. Raw materials for hospital formulary and compounding drugs have been newly applied with the bar code label requirement. Since May 2009, the SNUH has exerted efforts to collect and verify bar code information on new product releases and added the information to complete its database establishment. The IT team then developed a GTIN inventory management program and conducted an operational review before its completion in September. Program implementation began with narcotics and was expanded to other drugs in November.

Figure 1: Inbound Control Workflow



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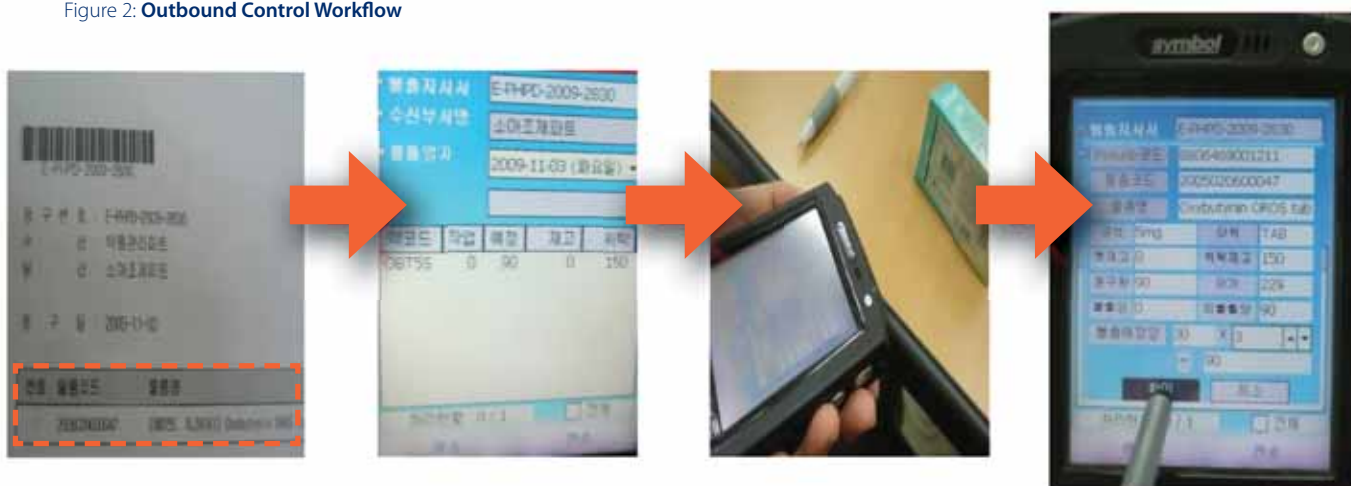
### 1. Inbound Control Program

- The PDA screen will show an incoming list after reading the bar code information in the inbound sheet.
- The PDA will then read the GTIN of the inbound drugs. If the bar code matches the information in the database, the PDA screen will display product information and volume. The user will confirm with the click of a button when the information is correct. Afterwards, the PDA will display the confirmed drug in a shady color and show a list of unconfirmed items underneath.
- After the pharmaceuticals are all confirmed, the user can press the "submit" button to complete the inbound control activity. The program was designed in a way that makes it easy for the user to keep control of the volume, by displaying a drug by its conversion unit and box volume when the PDA reads its GTIN.

### 2. Outbound Control Program

- The PDA screen will show an outgoing list of drugs after reading bar code information in the outbound sheet.
- The PDA will then read bar code information printed on the packaging of the outbound drug. If input data is identical to the actual bar code information, the PDA screen will display product information, volume and stock. The user can click the "confirm" button if the stock volume is correct. Afterwards, the drug will be displayed in shady color with the number of unconfirmed products shown beneath it.
- The user will press the submit button to complete outbound activity when inspection is done. The outbound control program allows for a real-time inventory check-up, by showing the volumes of outbound products against outstanding inventory on the same PDA screen.

Figure 2: Outbound Control Workflow



### Benefits

The GTIN inventory management program allows the hospital to control drugs at the entry point, in an effort to enhance patient safety. Moreover, reduced time in inventory movement and drug management, such as inventory check-up and shelf-life control, can lead to higher efficiency in drug management work and enhanced job satisfaction at the employee level. The program relieves much of the administrative burden associated with labor-intensive manual tasks, thus contributing to prevention of musculo-skeletal disorders in employees. Furthermore, the GTIN program promotes timely and efficient management of pharmaceuticals logistics, thereby enhancing satisfaction also at the patient level.

### Next steps

Some of the drugs have GTIN information on the unit of use packaging but not on the shipper case. It creates inconvenience as the shipper case packaging needs to be removed every time to access the GTIN. Tracking & tracing of drugs in use will become much easier when encoding the expiration date and lot number in GS1 DataMatrix becomes mandatory in 2013, as the SNUH will

be able to control shelf-life and manage inventory at the lot level. Moreover, the SNUH will continue to pursue for a more efficient program, developing further from the current PDA-based technology to include other reading formats as well.

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Ms. Kim, Kwi-suk joined the SNU Hospital's Pharmacy Division 27 years and 6 months ago. Since August 2008, she has been responsible for management of drug movement, inventory, narcotics and dangerous materials. She is a pharmacist specialising in nutrition support pharmacotherapy and the Chairperson of the Editorial Committee for the Korean Society of Health-System Pharmacists.