Seoul National University Bundang Hospital
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Profile
Founded in 2003, Seoul National University Bundang Hospital (SNUBH) located in Seoul, Rep. of Korea is a tertiary hospital that has been progressively adopting information technology for better patient care.

Currently, SNUBH operates 1,324 inpatient beds and 864 doctors and 1,909 nurses are in charge of patient care. SNUBH strives to lead the world’s medical standard by providing optimal medical treatment under a patient centric environment and to become a hospital most trusted by our patients.

The clinical data warehouse, health information exchange and closed-loop medication administration system using RFID and barcode technology were the central features of SNUBH’s EMR system. It is also the first hospital outside the US to receive Stage 7 revalidation the 3rd in a row, meeting the new criteria set up by HIMSS Analytics.

Date Stage 7 was achieved: June, 2019

The Challenge

Case #1. The effect of Closed-loop medication administration & HIMSS 2019 award
The Purpose of the case study is to analyze the occurrence rate of medication administration error (MAE) alerts and the risk factors that cause errors. By upgrading the PDA system, SNUBH was able to reduce the preventable errors, as well as eliminate a number of manual entry processes for improving patient safety.

Case #2. Effective Data Management of Medical Implants Subject to Tracking and Control
Since medical implants (medical materials) subject to follow-up can cause fatal harm to the human body due to the side effects or defects during use, the KFDA implemented the ‘Continuous monitoring system for tracking devices to be managed’ in 2017 to enable tracking of the patients.

48 different types of medical implants require monitoring by hospitals among the 52 KFDA designated implants including pacemakers, stents, bioprosthetic valves and silicone gel breast implants as of 2018. Hospitals can now directly submit implant procedure information into the system.

SNUBH developed a tracking and management system for human implanted medical devices to improve the documenting rate from 25.8% to whole information documenting for human subject materials to be tracked.
**Case #3. Effect of health promotion using a patient portal**

SNUBH offers “Health4U” Personal Health Record (PHR), a patient portal where patients can check and manage their medical history or health records on their own. In the patient portal, patients can view their medical or examination records and review their prescribed drug information, medication administration time and dosage. On patient portal patients can input their lifestyle information such as amount of exercise, blood sugar level, and blood pressure for management at home.

**Implementation Overview**

**Case #1. The effect of Closed-loop medication administration & HIMSS 2019 award**

Starting in June 2018, SNUBH introduced a PDA device only dedicated to health-care and conducted a new POCS (Point of Care System) implementation project. The advanced POCS was implemented after designing, introducing, testing, conducting user education, and stabilization process based on the analysis of the requirements of each department in the hospital. The upgraded system improved work efficiency, prevented medical errors, and promoted resource utilization. In addition, we expanded the POCS making it real-time and interfacing it to the HIS.

**Case #2. Effective Data Management of Medical Implants Subject to Tracking and Control**

SNUBH implemented a system to manage medical materials and medical devices subject to tracking and control by KFDA. The upgraded system was able to input the LOT & Serial Number using barcode on the medical devices to be monitored on the surgery note (case cart registration) and 2nd order entry. Also it was able to review the list of inputted medical material subject to tracking and add more if necessary.

**Case #3. Effect of health promotion using a patient portal**

When we developed the physician’s EHR application, a workshop for designing of the project was performed by 18 participants of clinicians and user experience researchers. Through the scientific user research, SNUBH tried to develop a user-friendly system. SNUBH collected patient’s lifestyle data such as sleep, diet, stress, weight, and blood pressure. The data from patient’s activity tracker was also interfaced to our EMR system through patient portal application.

In order to investigate the effects of the app and wearables on the patient’s weight reduction, SNUBH performed a three arm clinical trial. The first group used both app and wearable, and the second group used app only, and the last group was a control group with a conventional care. After giving patients personalized feedbacks based on the collected data for a month, SNUBH observed patient’s use of the app and wearables without any intervention for three months.

**Resulting Value / ROI**

**Case #1. The effect of Closed-loop medication administration & HIMSS 2019 award**

A total of 2,874,539 medication dose records from 30,232 patients (882.6 patient-years) were reviewed. Based on the result of the Big Data analysis regarding the whole medication administration, SNUBH found out that the following factors could be the risk factors that can trigger MAE: administration time, order type, route of medication administration, a period of nursing practice at the hospital, duty shift schedule, the number of medication doses administered.
The incident rate of MAE alert was 1.22% for the total number of medication administration. During the 1st year of this study SNUBH was able to prevent 35,082 cases of MAE and its associated adverse drug event (ADE). The incident rate of patient safety related to medication decreased by an average of 16.35% by each quarter compared to 2013 after implementing the upgraded PDA system in June 2018.

**Case #2. Effective Data Management of Medical Implants Subject to Tracking and Control**

Before the implementation of a tracking and management system for medical implant subject to KFDA tracking and control, the input rate of medical implant material information was improved from 25.8% to 100%. Before the system implementation, the data extraction period for the medical implants for follow-up management took about one week, but that information was available within 30 seconds after the system implementation, therefore the efficiency of management was increased.

**Case #3. Effect of health promotion using a patient portal**

From three arm clinical trial, patient’s weight was significantly reduced for both app and wearable group and app only group compared with the control group. We found that the patient portal and wearable can help patient reduce their weight. The average data collection rate was about 62%. And the patient satisfaction of the app and digital intervention service was found to be high. Therefore, the result of the study shows that digital health service utilizing patient portal and wearable devices improve the lifestyle of patients by helping them to stay healthy.

**Lessons Learned**

**Case #1. The effect of Closed-loop medication administration & HIMSS 2019 award**

To identify future areas for improvement, SNUBH monitors CLMA errors and override cases. Appropriate feedback and training to establish sound PDA use will continue. Furthermore, SNUBH intends to implement various open-ended and staff-initiated quality improvement activities to support the new Point of Care System (POCS).

**Case #2. Effective Data Management of Medical Implants Subject to Tracking and Control**

Through the implementation of tracking and reporting system in hospitals for medical devices subject to tracking and control, it is possible to quickly track and report in case of adverse events such as side effects of medical devices. Therefore it was possible to improve the necessary items for the management and monitoring that can contribute to patient safety by managing the information of medical devices used in the hospital.

**Case #3. Effect of health promotion using a Personal Health Records**

Prior to developing a system, the most important thing was to fully understand the needs of end users. The service should be developed based on the functions derived through user’s needs to increase patient satisfaction, and it leads for patients to continue to use the service. The patient portal of SNUBH was developed through this process, which has been the driving force behind the success of the service. Previously mentioned in the lessons learned the importance of user research should be a significant point in the development of other similar services. The patient portal service at SNUBH is a solution that fully reflects the needs of medical staff and patients, and it is developed under the idea that personal health information belongs to patients not to hospitals. In addition, health information managed by individuals was mutually compatible with hospitals, enabling active communication between patients and medical staff. Based on this model, SNUBH is going to continue to upgrade the Personal Health Record system through interfacing with other services.
“Through this EMRAM Stage 7 revalidation, we were able to verify the reliability of the BESTCare 2.0 once again, and we look forward to new takeoffs in search of improvements and developments as a leading IT hospital.

–Rong-Min Baek, President and CEO of Seoul National University Bundang Hospital