



Journey to Digital Hospital & Global Business: SNUBH Case

Jul, 2016



Seoul National University Bundang Hospital

2010

- ❁ 515 Physicians & 780 Nurses
- ❁ 910 beds, 23 operating rooms
- ❁ 4,000 outpatient visits / day
- ❁ Over 70,000 radiology exam / month

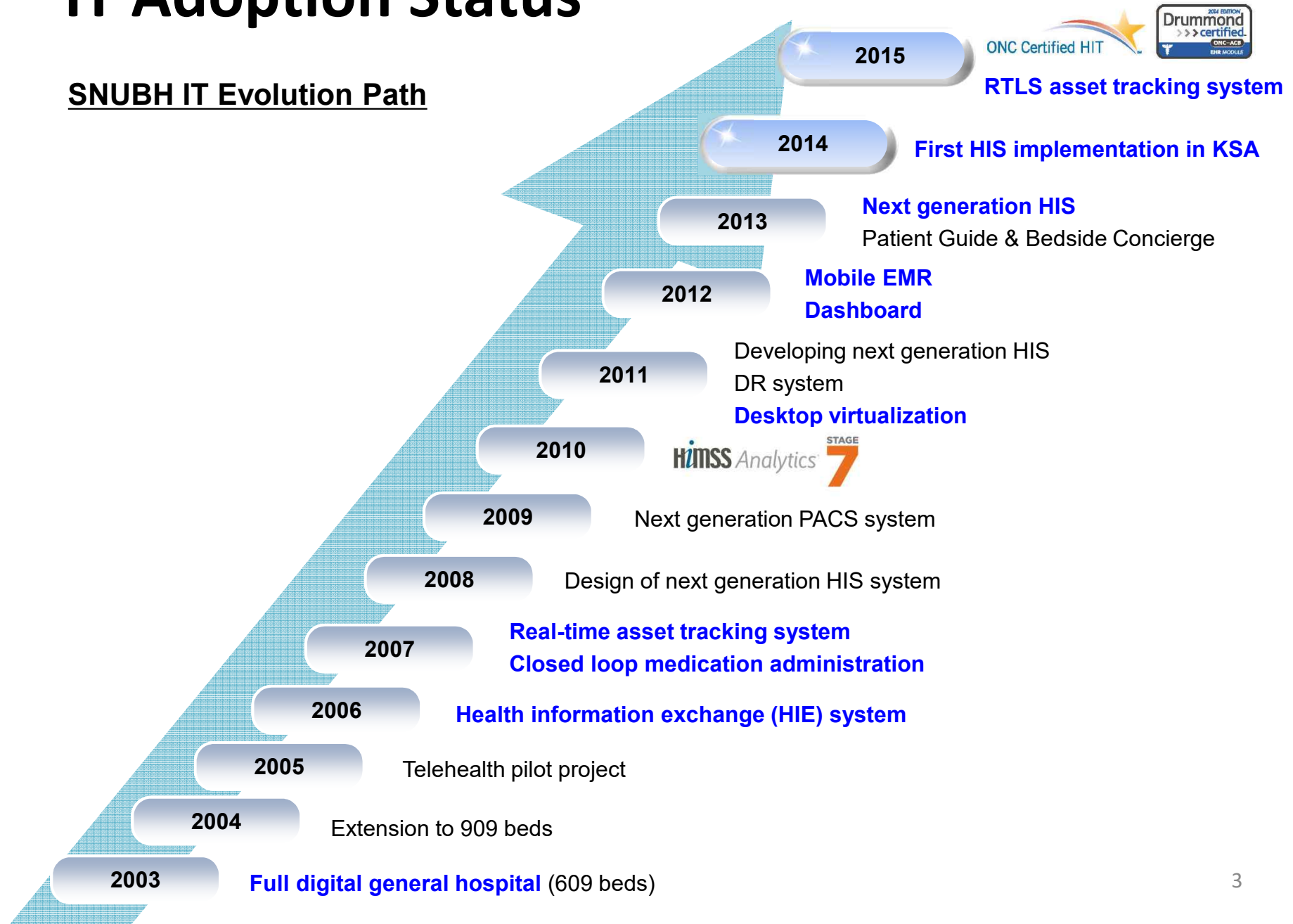
2016

- ❁ 740 physicians / 1,300 nurses
- ❁ 1,400 beds/ 38 operating rooms
- ❁ 6,500 outpatient visits / day
- ❁ Over 80,000 radiologic exam / month



IT Adoption Status

SNUBH IT Evolution Path



Awards and Recognition

Stage 7 Award

Stage 7 Hospitals

Stage 7 Case Studies

Stage 6 Hospitals

Stage 6 Primary Care
Facilities

Marketing Toolkit

Stage 7 Hospitals

Reaching Stage 7 is a very real and meaningful accomplishment, with challenges and rewards. HIMSS Analytics is proud of the following providers who have achieved Stage 7.

Possible because of their hard work and collaboration, these healthcare organisations now support the true sharing and use of patient data that ultimately improves process performance, quality of care, and patient safety.

Your participation is important and has never been more vital. Read more about others' journey in the case study section or contact a provider for more information.

Asian Hospitals - [click to view list](#)

Korea (1 Hospital)



분당서울대학교병원
SEOUL NATIONAL UNIVERSITY BUNDANG HOSPITAL



Seoul National University Bundang Hospital (910 beds)
Gyeonggi-do, 463-707, South Korea
Website: <http://en.snubh.org:8001/global/en/main/Index.aspx>

China (2 Hospitals)



北京大学人民医院
PEKING UNIVERSITY PEOPLE'S HOSPITAL

Peking University People's Hospital (1954 beds)
No. 11 Xizhimen South Street, Xicheng District, Beijing
Website: www.pkuph.cn



中国医科大学附属盛京医院
SHENGJING HOSPITAL OF CHINA MEDICAL UNIVERSITY

Shengjing Hospital of China Medical University (4750 beds)
No. 36 Sanhao Street, Heping District Shenyang, Liaoning
Website: www.sj-hospital.org

US Hospitals - [click to view website](#)

[Stage 7 journey through
their case studies.](#)

If you are a healthcare provider and would like more information on how to obtain your hospital's EMRAM score, contact Tina Hashim at: +65 6664 1185 or email her nurgistina.hashim@himssana.cs.org.

1st

**First Stage 7
Hospital
Outside North
America
(2010, 2015)**

Certified Health IT Product List

The Office of the National Coordinator for Health Information Technology

Home | Overview | Contact | Product Listings

Product Name

Search

Clear Search >

YOUR PRODUCTS (0)

Use Search Filters Below

CERTIFICATION EDITION

2014 ☒

PRACTICE TYPE

Ambulatory ☐

Inpatient ☐

CLASSIFICATION

PRODUCT

VERSION

PRACTICE TYPE

CLASSIFICATION

CERTIFICATION EDITION

VENDOR

CHPL PRODUCT NUMBER

☐ BESTCare

2.0G

Inpatient

Modular EHR

2014

ezCaretech Co., Ltd

12302015-3341-8

☐ BESTCare

2.0G

Ambulatory

Modular EHR

2014

ezCaretech Co., Ltd

12302015-3340-8

2 products found

<< < 1 > >>

10 per page



Certificate of EHR Compliance

This is to certify that:
BESTCare 2.0G

From:
ezCaretech Co., Ltd
www.ezcaretech.com
4FL, Kwanghee Bldg, 307, Toegye-ro, Jung-gu
Seoul, South Korea 04560

Completed EHR Certification of the Following:
EHR Module (Ambulatory)



Modules Tested: 170.314 (a)(1-15); (b)(1,2,4,5,7); (c)(1-3); (d)(1-8); (e)(2); (f)(1-3); (g)(2-4)
Clinical Quality Measures tested: 124v3; 125v3; 126v3; 130v3; 138v3; 146v3; 153v3; 154v3;
156v3; 165v3; 166v4
Additional software used: hMail Server

This EHR Module is 2014 Edition compliant and has been certified by an ONC-ACB in accordance with the applicable certification criteria adopted by the Secretary of the U.S. Department of Health and Human Services. This certification does not represent an endorsement by the U.S. Department of Health and Human Services. Drummond Group is accredited by ANSICB for the ONC HIT Certification Program to certify: Complete EHR, EHR Module (all), and Certification of other types of HIT for which the Secretary has adopted certification criteria under Subpart C of 45 CFR.

Holds Certificate No. 12302015-3340-8
Date Certified: 12-30-2015
Effective Date: 2014 Edition

For and on behalf of Drummond Group:

Jodi Gonzalez
Jodi Gonzalez, Certification Body Manager



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To be read in conjunction with the scope above or any attached appendices.

EHR-CB-961 Rev 05/04/2015
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Certificate of EHR Compliance

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From:
ezCaretech Co., Ltd
www.ezcaretech.com
4FL, Kwanghee Bldg, 307, Toegye-ro, Jung-gu
Seoul, South Korea 04560

Completed EHR Certification of the Following:
EHR Module (Inpatient)



Modules Tested: 170.314 (a)(1-17); (b)(1,2,4-7); (c)(1-3); (d)(1-8); (f)(1-4); (g)(2-4)
Clinical Quality Measures tested: 9v3; 30v4; 32v4; 53v3; 55v3; 60v3; 71v4; 72v3; 91v4; 100v3;
102v3; 104v3; 105v3; 107v3; 110v3; 111v3; 185v3
Additional software used: hMail Server

This EHR Module is 2014 Edition compliant and has been certified by an ONC-ACB in accordance with the applicable certification criteria adopted by the Secretary of the U.S. Department of Health and Human Services. This certification does not represent an endorsement by the U.S. Department of Health and Human Services. Drummond Group is accredited by ANSICB for the ONC HIT Certification Program to certify: Complete EHR, EHR Module (all), and Certification of other types of HIT for which the Secretary has adopted certification criteria under Subpart C of 45 CFR.

Holds Certificate No. 12302015-3341-8
Date Certified: 12-30-2015
Effective Date: 2014 Edition

For and on behalf of Drummond Group:

Jodi Gonzalez
Jodi Gonzalez, Certification Body Manager



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1st
**First Certified
Solution
Outside North
America**



Awards



Gartner, 2014 CIO Agenda

Gartner Executive Programs	
	Taming the Digital Dragon: The 2014 CIO Agenda
<ul style="list-style-type: none">4 Executive summary10 Welcome to the third era of enterprise IT20 Create powerful digital leadership26 Renovate the core36 Build bimodal capability42 Conclusion: Craft your digital legacy44 Appendix: Case studies, additional data, demographics65 Further reading	<div>2014 No. 1</div> <div>Gartner</div>

APPENDIX: CASE STUDIES, ADDITIONAL DATA, DEMOGRAPHICS

Seoul National University Bundang Hospital goes fully digital to replatform its health systems and services

Opened in 2003 with 609 beds, Seoul National University Bundang Hospital (SNUBH) has grown to a 1,400-bed facility with 38 operating theaters. The hospital hosts 5,000 outpatient visits per day, employs 700 doctors and 1,000 nurses, and has been digital from the start.

Dr. Hee Hwang, CIO and chief medical officer, has a Ph.D. in pediatric neurology. He leads the IT steering committee and supervised the latest rollout of digital health information systems at SNUBH. "I am not an engineer or an IT guy, but I have a great interest in digital technology," he says.

His digital leadership challenge was to muster both corporate and IT resources into a single vision: Design SNUBH to be fully digital. "We were chartless, filmless and order-slipless from the start," says Hwang. Digital assets include clinical decision support systems, clinical pathways and clinical indicators. As Hwang explains, "We now use 147 clinical pathways in 13 specialties, and more than 300 clinical indicators in areas such as recovery time, transfusion management and antibiotics management. Digital covers every aspect of our practice."

The first system was built using a previous version of Microsoft's .NET Framework and browser-based interfaces. "It was getting outdated," says Hwang. "Specifically, it could not support the Nexus of Forces Gartner refers to: social, mobile, cloud and information."

The next system, implemented in 2013, took SNUBH further into the digital world. "I can say that we used IT to build our first system, but we applied digital technologies to create the second one," explains Hwang (see figure opposite for digital milestones in the hospital's evolution).

Harvard Business Review

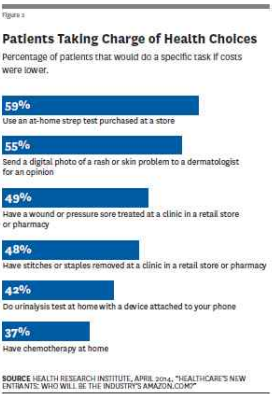
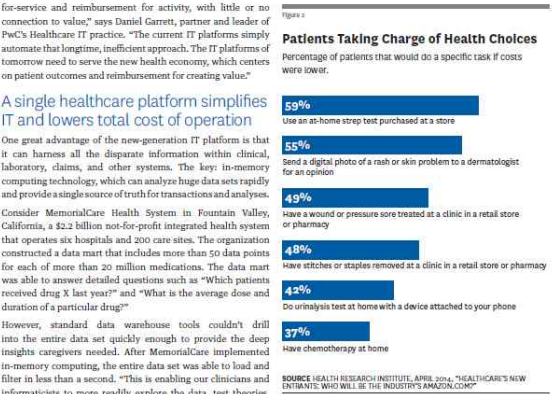
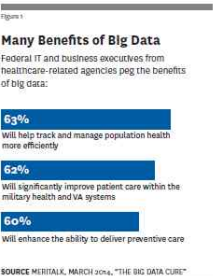


THE SPEED AND SCALE of the challenges and demands facing the healthcare industry are unprecedented. Yet in this period of rapid change, solutions are emerging that not only surmount those issues but also open new avenues to higher-value care. Cost pressures are making evidence-based medicine the industry catch phrase. At the same time, advances in genetics, biomedicine, and computing technology are ushering in an era of more effective personalized medicine and treatments tailored to patients' individual characteristics.

Exploiting these opportunities requires the savvy use of data, which has been a long-term challenge for healthcare providers, who work with some of the most complex and disconnected data sets of any industry. "Most of the data systems are for billing, and they aren't used to improve the quality of care," explains Jason Jones, executive director for clinical intelligence and decision support at Kaiser Permanente, a healthcare provider and not-for-profit health plan that serves approximately 9.1 million members in eight states and the District of Columbia.

Yet healthcare organizations on the forefront of efficiency are already reaping the benefits of big data (a catchall term for the masses of structured and unstructured data flowing through organizations as well as the tools for analyzing the information). They have adopted IT platforms that simplify processes and IT systems while expanding and improving the scope and spread of care at a lower total cost of operation. The evolving IT platforms link disparate pools of data within and outside healthcare organizations and present the information with visualization tools that put actionable insights into the hands of caregivers and patients, enabling providers to invent new healthcare practices as needed. The benefits of this approach, according to a recent MeritTalk survey of 150 federal IT and business executives from healthcare-related agencies, include IT simplification; more evidence-based, value-conscious medicine; better preventive care; and improved, more personalized treatment. [Figure 1](#)

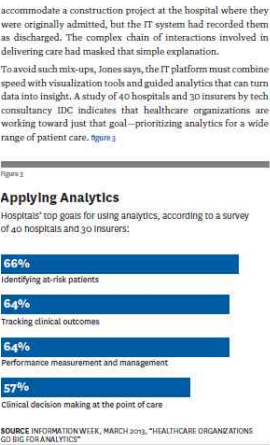
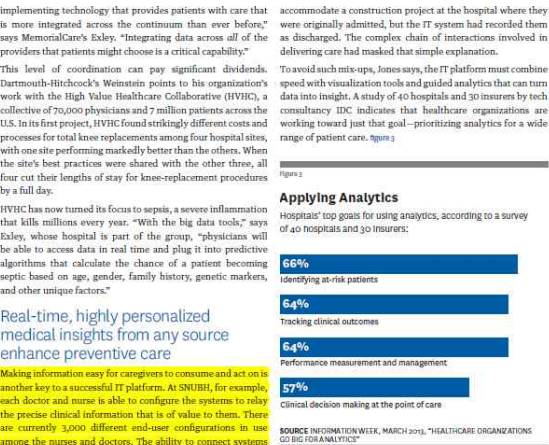
What is driving the push for big data? It's simple: the demand to create more value in healthcare. "The healthcare system of today is based on fee-



Investing new healthcare practices as needed for a much lower cost of care

The ability to rapidly analyze structured and unstructured data sets is improving patient care at Seoul National University Bundang Hospital (SNUBH), a South Korean facility with some 1,800 beds and 3,000 medical workers. There, doctors are using in-memory computing to improve preoperative care. Availing themselves of real-time feedback enabled by the technology, they have been able to reduce the use of antibiotics before surgery. Not only does the reduction cut costs and help prevent the growth of drug-resistant bacteria, it is a marker of "huge clinical significance to the patient," says Dr. Hee Hwang, CIO at SNUBH.

Other health systems are using new computing technology to pull together data scattered across not only different departments but also multiple organizations. "Some organizations, like MemorialCare, are strengthening existing partnerships and



Conclusion and recommendations

Healthcare's future is still under construction, but it's already clear that designing the healthcare IT platform of tomorrow entails reimagining not only how data is used but how healthcare is delivered. "We need to remove the barriers of time and space between the patient, the doctor, and the healthcare administrator," PwC's Garrett says. "It's about not just crunching a lot of data, but inserting that data at key moments when healthcare is delivered and consumed." And the linchpin of the entire approach will be a single innovation platform that delivers real-time and personalized medical insights while reducing costs across the continuum of care.

SAP SAPPHIRE NOW IT Innovation Award

Trailblazer



Spirit Aerosystems



Unilever



Textile Rubber & Chemical Company

Social Hero



NCT



Seoul National University Bundang Hospital



Medtronic

Big Data



Center Point Energy



T-Mobile



Alliander

ISO 27001/27799 Certified

(‘14.09.15)

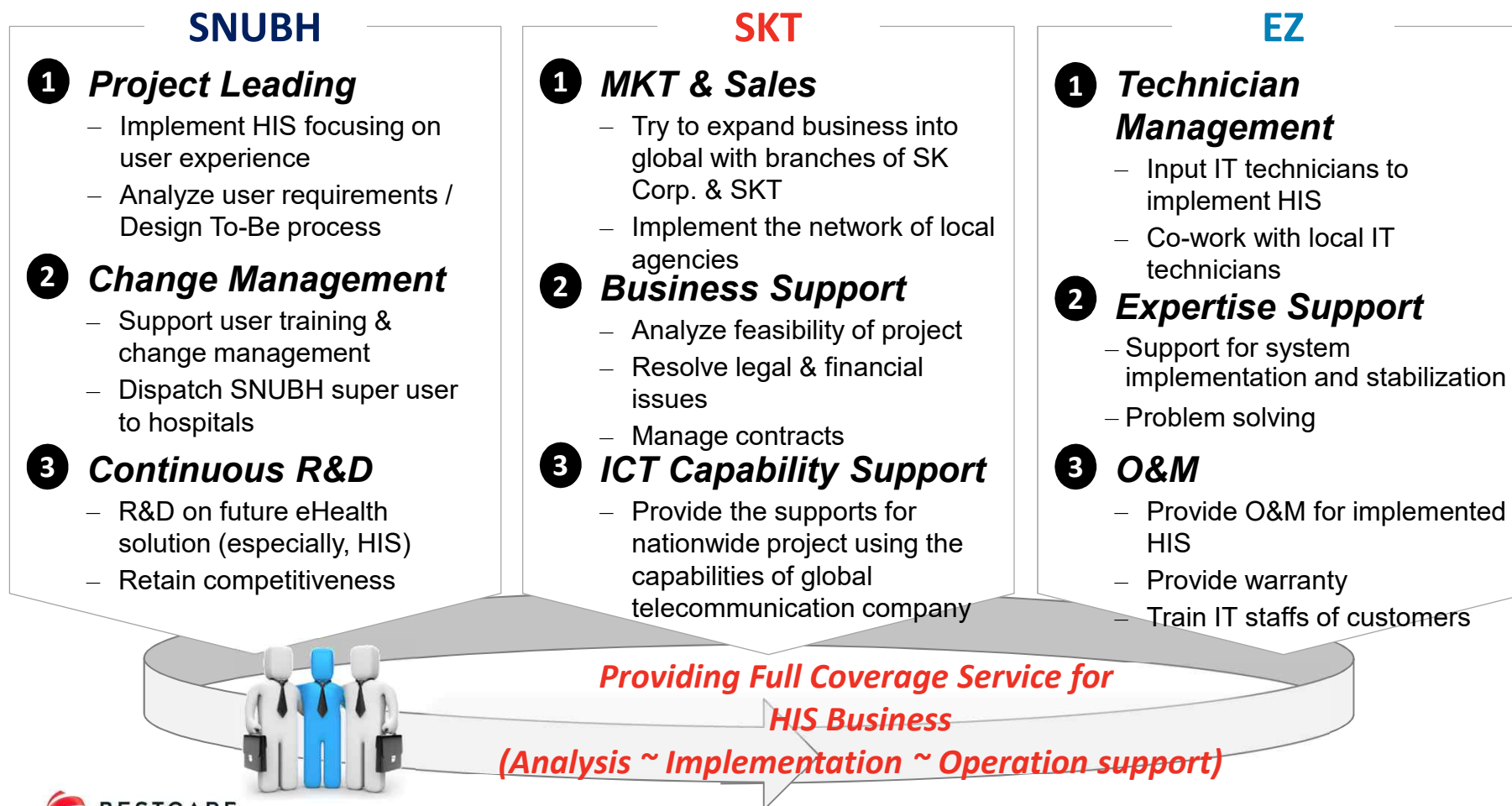
Standards – ISO/IEC 27001 : 2013

Scope of Certification – Health Security management system and maintenance activities including hospital information system for Seoul National University Bundang Hospital.



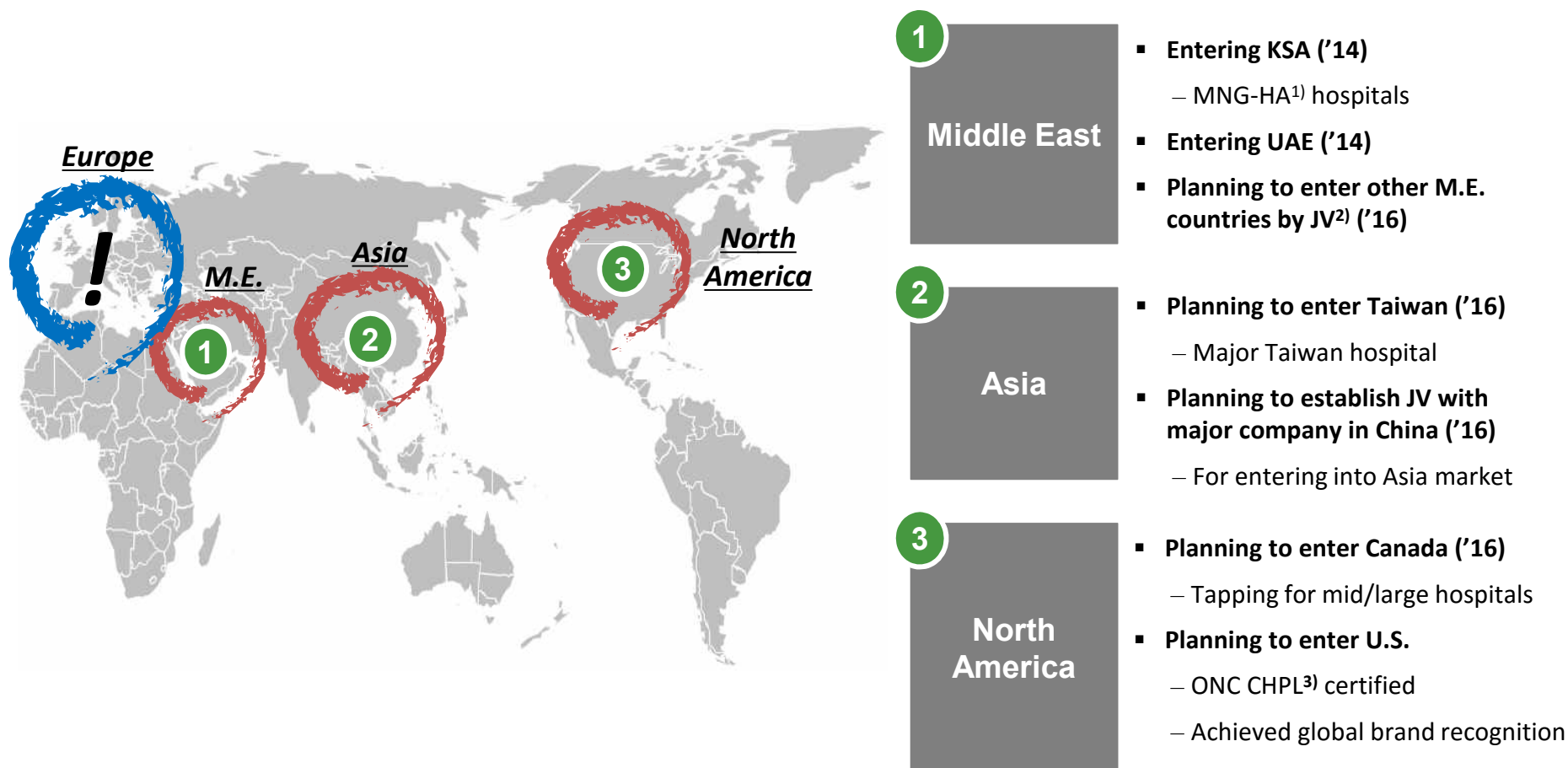
Role for Successful Global Business

- From the development to follow-up management of HIS project, each party performs their unique roles for the successful HIS global business.



Global Expansion

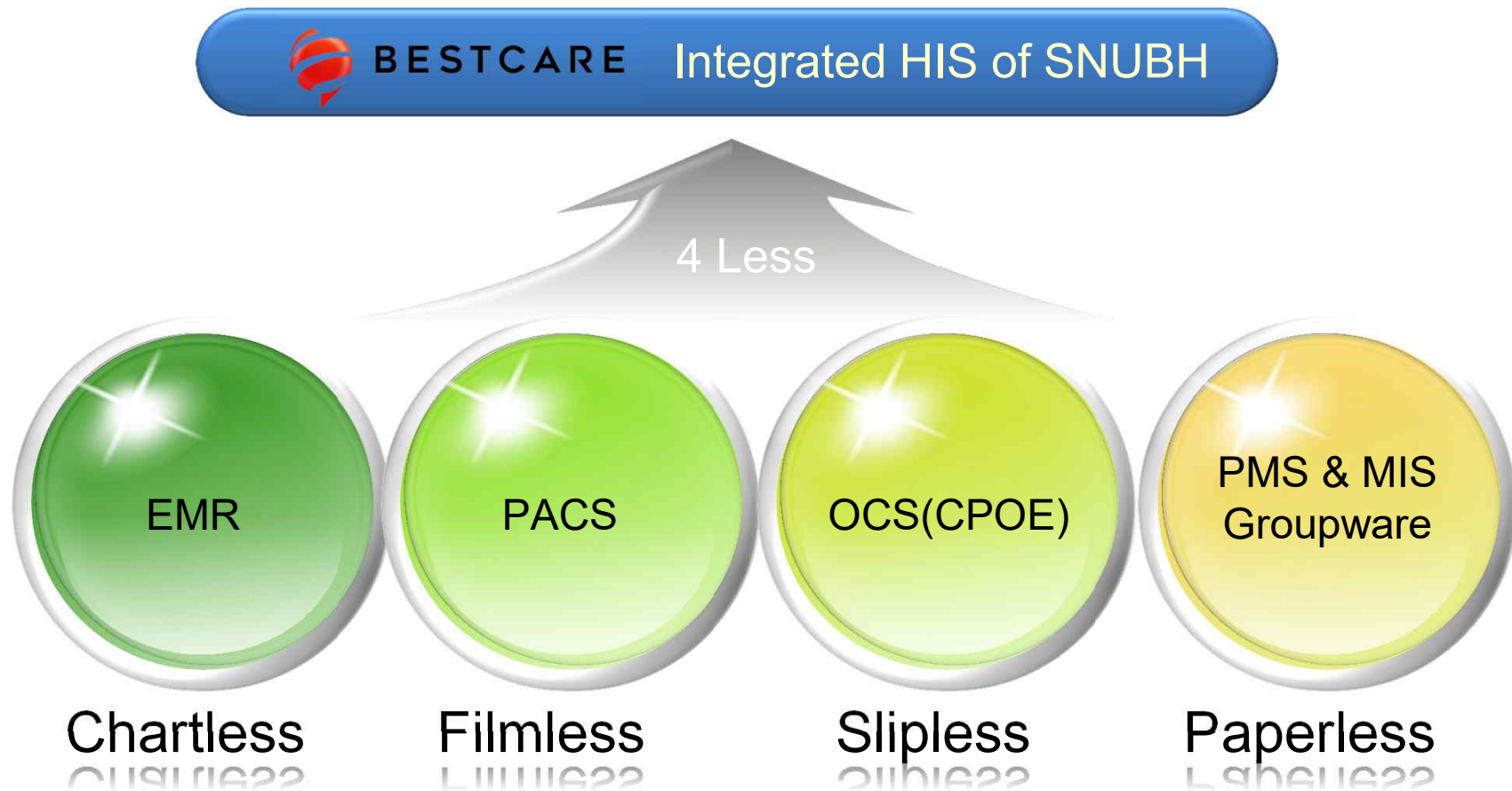
With the excellent capabilities and world class solution, BESTCare 2.0, Consortium expanded its business to M.E. and Asia, preparing to jump into Global HIS company.



BESTCare Overview

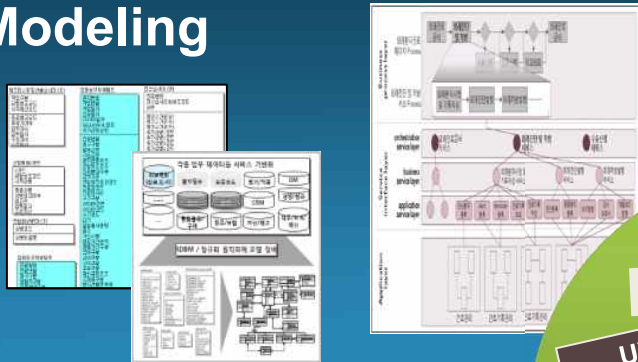
The World's **First** and **Best Digital** General Hospital

BESTCare : **B**undang hospital **E**lectronic **S**ystem for **T**otal care



Key Considerations for Moving Forward

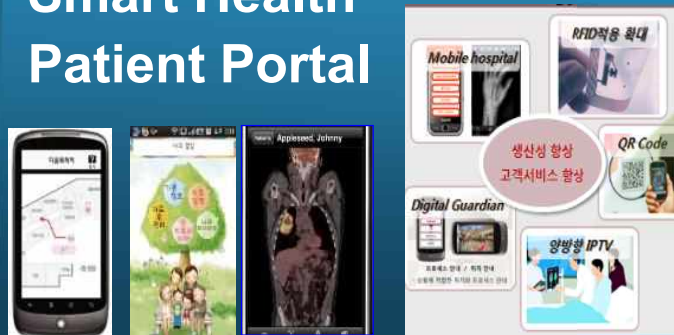
SOA-based Modeling



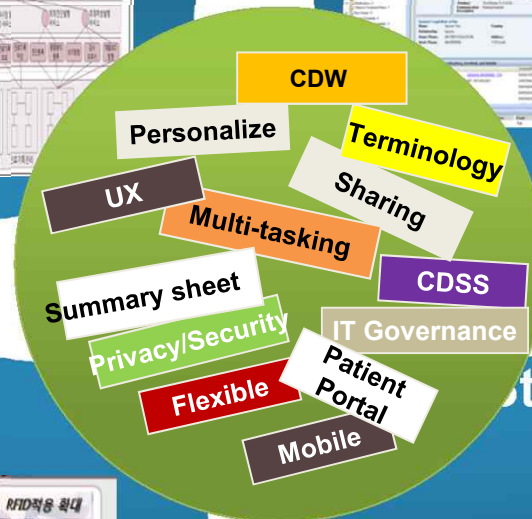
Next Generation User Experience



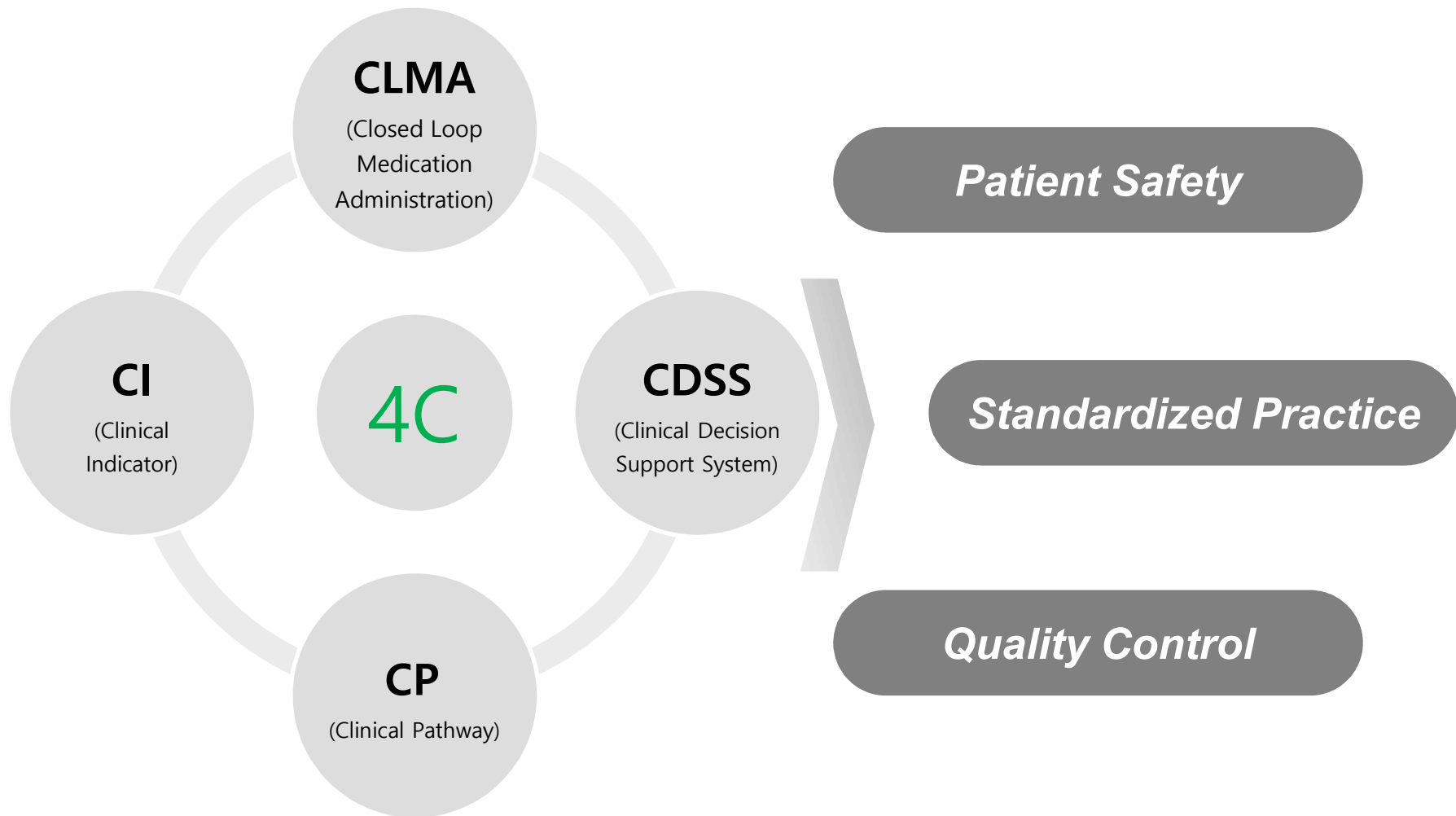
Patient-Centered Smart Health Patient Portal



Standard Terminology Free-text Retrieval



Evidence-Based Patient Care System



Use of Standard Terminology

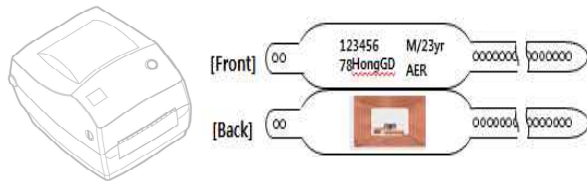
Medical terms mapped to standardized terminologies.

Terminology	Number	Medical terms of reference	
Chief Complaint	6,646	SNOMED – CT	UMLS
Diagnosis	22,683	SNOMED - CT	ICD-10
Operative Procedure	9,660	SNOMED - CT	ICD-10
Nursing practice	3,781	ICNP 2.0	

Medication Administration

(Right patient, Right medication, Right dose, Right route, Right time)

1 Print RFID wristband



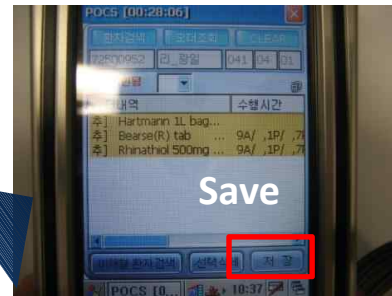
2 RFID wristbands given to all inpatients



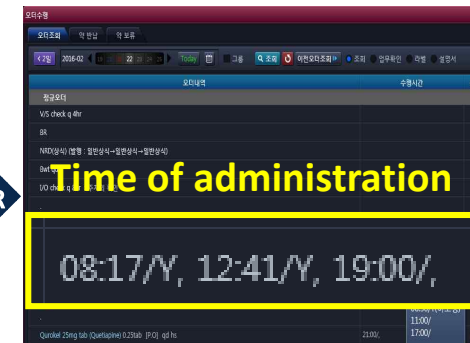
3 Scan RFID tag to staff ID card and patient's RFID tag to wristband



4 Crosscheck patient ID and medication barcode



Interfaced to EMR



Mismatch



Human milk

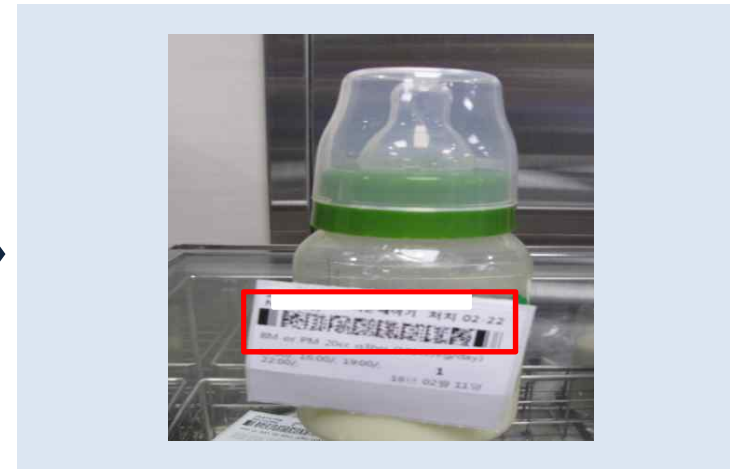
Human milk management process (from storage to feeding)

[Attach neonate's barcode]



Prepare feeding

[Attach barcode on bottle]



Milk feeding



EMR interface



[Check patient's ID and Barcode with PDA]

Blood bank - Delivery

Pop-up (nursing units)

Blood Preparation
complete

Print out label for pick-up (nursing unit)



- Blood T/F Order
- Patient's name, number
- Nurses name, number



Scan all three barcodes :

- #1 Barcode on cross-matching
- #2 Barcode on blood product
- #3 Barcode for pick-up

- Blood product is dispensed when all three information

FFP

혈액관리법에 따른 검사완료
에도 불구하고 수혈로 인한
응고장애가 발생하지 않음

Matching report

No. 0515410169

유효년월일: 2016-12-07
용량: 400ml

혈액은행 확인사항

☒ 혈액형검사
☐ 교차시험 1단계
☐ 교차시험 2단계
☐ 교차시험 3단계

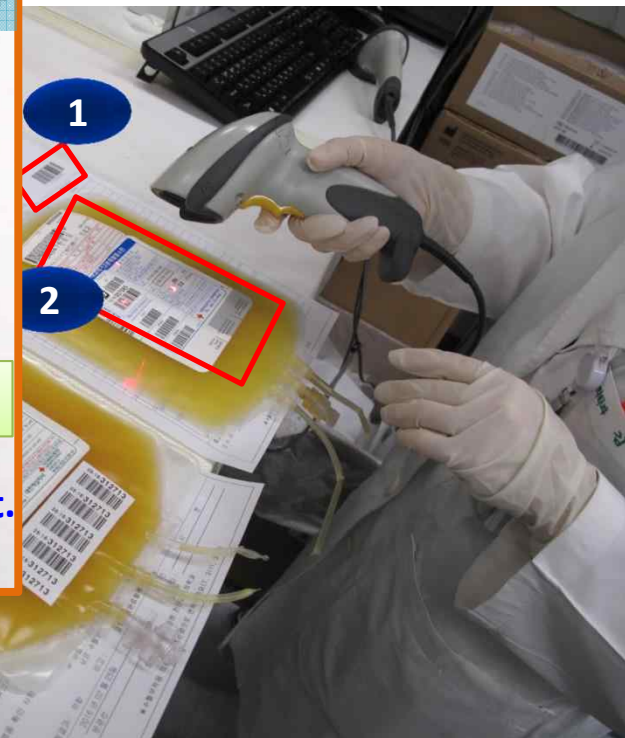
교차시험결과: 적합
비고:
교차시험 완료혈액

출고자: 권혜린 인수자: 고지혜 운송자: 연제경

Lab technician Nurse Delivery staff

TEL 031) 787-3111, 3112

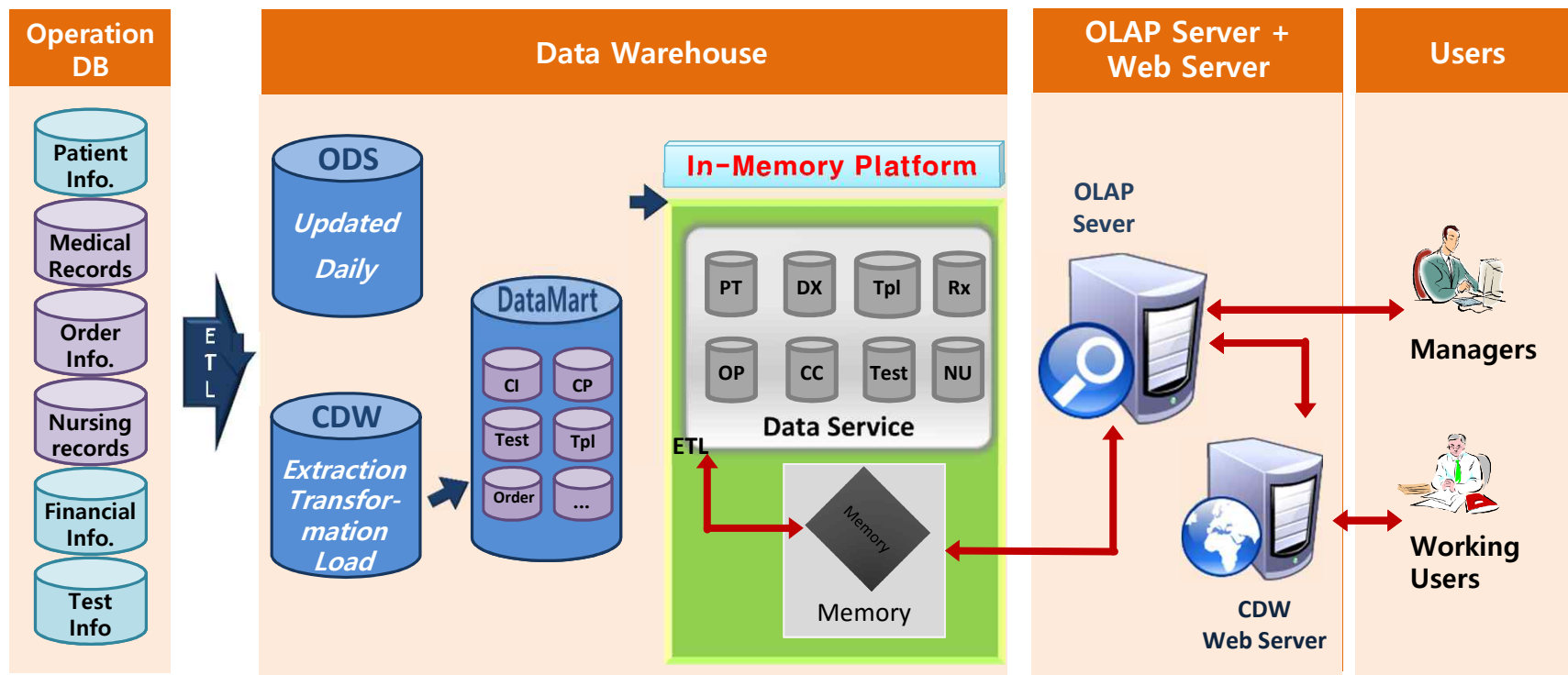
→ Attach and dispense product.



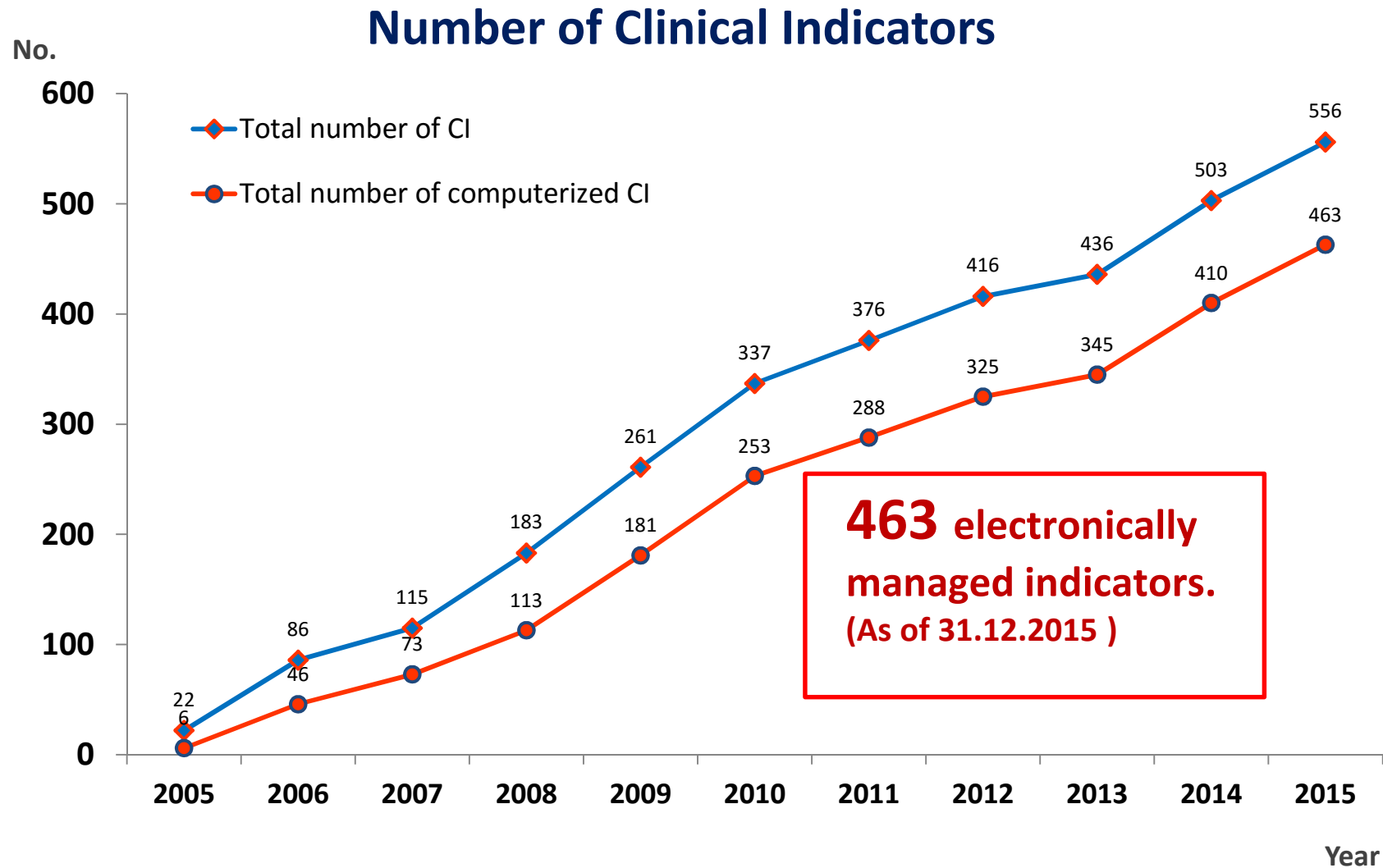
DW & CI

CDW Architecture

In-Memory Big data Solution

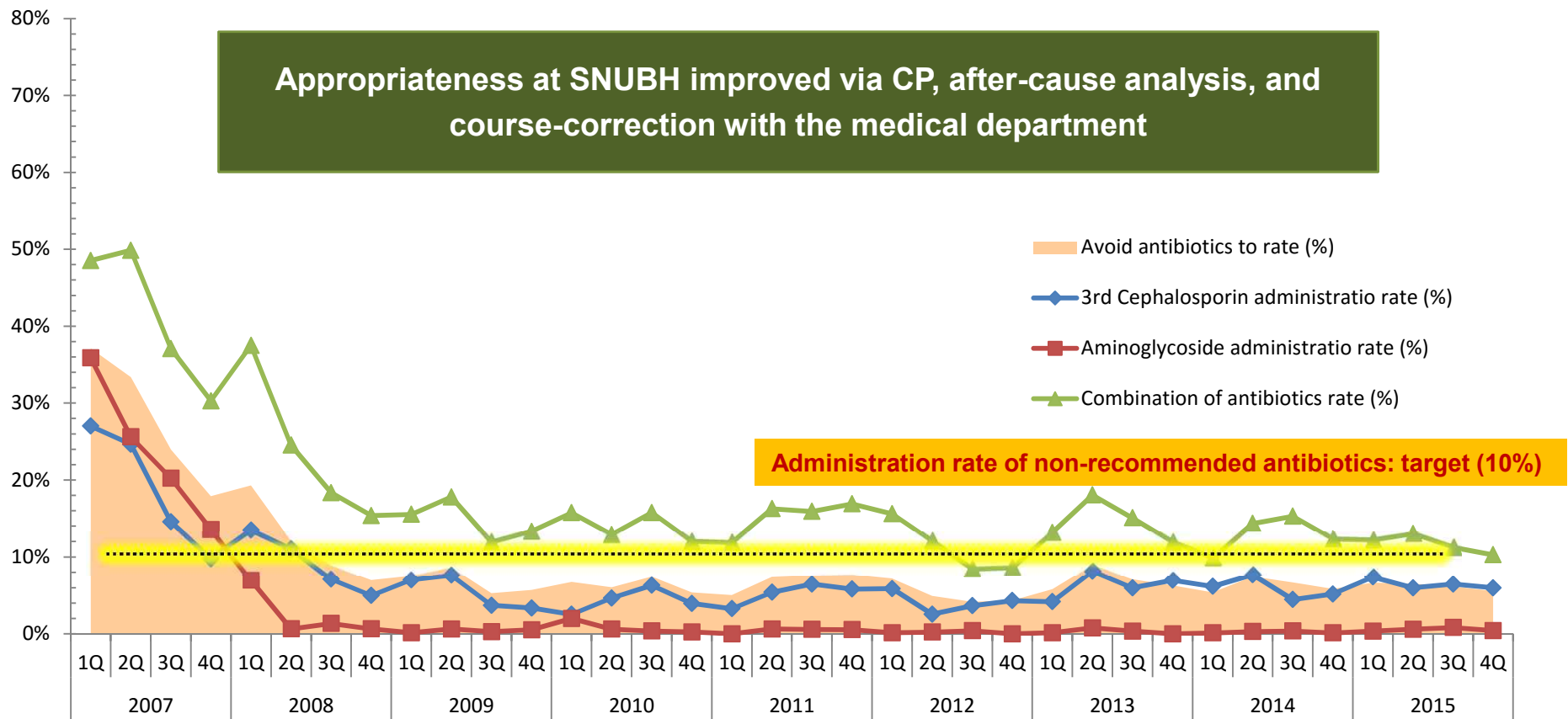


CI Development/Monitoring

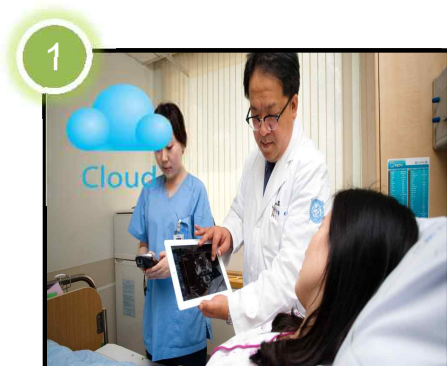


Optimal Prescription of Preventive Antibiotics by CI Application

Credited to its CI application, SNUBH provides consistent quality of healthcare, such as improving preventative antibiotics administration rates beyond target level



Smart Hospital & Patient Engagement Solutions



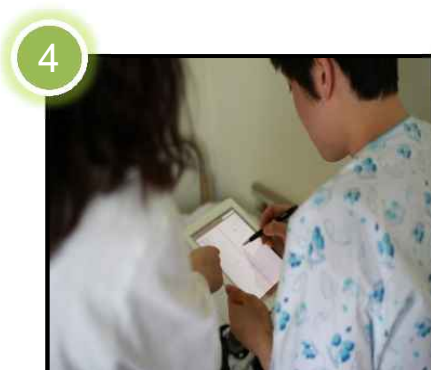
**Desktop
Virtualization**



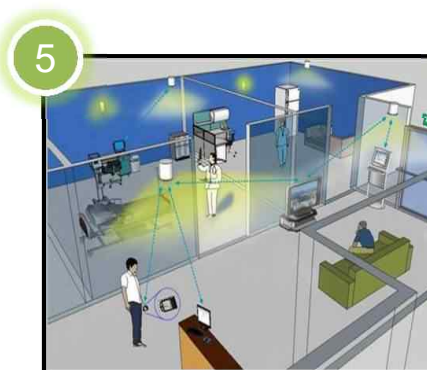
Mobile EMR



Dashboard



Mobile e-Consent



Smart Patient Guide



**Smart Bedside
Station**



Patient Portal

Mobile EMR

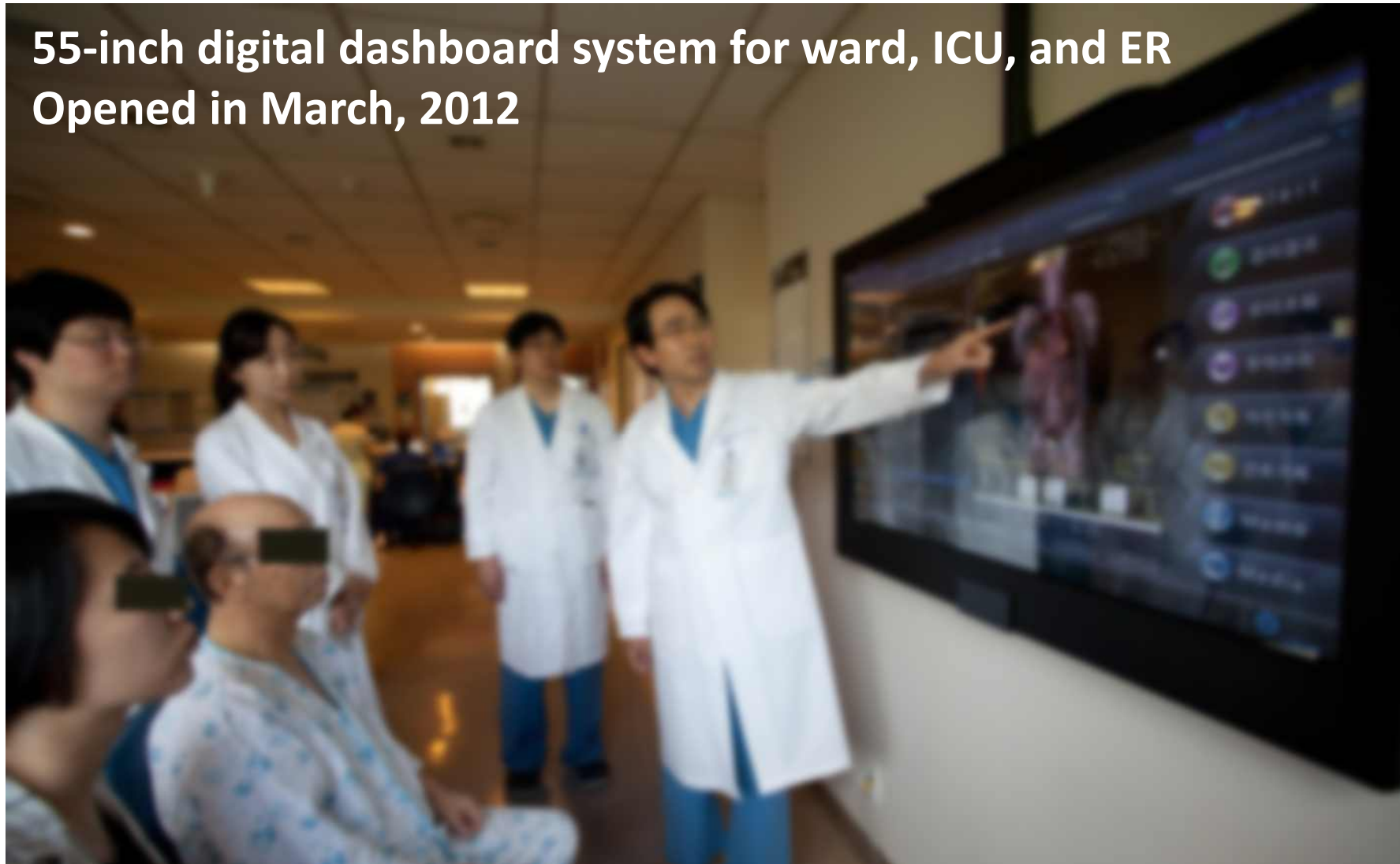
- Secure access to entire EMR record
- Mobile PACS Integration
- User-friendly interface
- Any smart devices

Dashboard

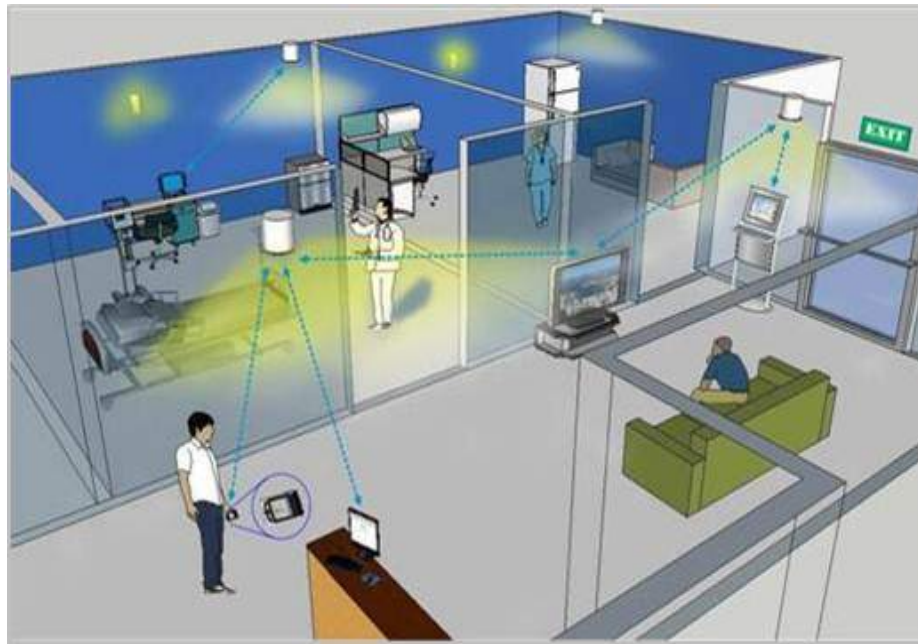
Q10 010 -	089	Obstructive Sleep Apnea					
①	2	6/20	Imagined, frequent awakenings, awaken, no air, awaken, please this sleep	MS			
②	2	6/20	MS				
③	3	6/20	MS				
④	4	6/20	MS				
⑤	5	6/20	MS				
⑥	6	6/20	MS				
⑦	7	6/20	MS				
⑧	8	6/20	MS				
⑨	9	6/20	MS				
⑩	10	6/20	MS				
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㊻	46	6/20	MS				
㊼	47	6/20	MS				
㊽	48	6/20	MS				
㊾	49	6/20	MS				
㊿	50	6/20	MS				

Dashboard (BESTBoard®)

55-inch digital dashboard system for ward, ICU, and ER
Opened in March, 2012



Smart Patient Guide



- Real-time location-based service
- Indoor location tracking using Bluetooth APs



Smart Clinic Information



Smart Indoor Navigation



Smart Outdoor Navigation



Smart Survey

※ This work was supported by the IT R&D program of SNUBH and SKT.

Smart Bedside Station



※ This work was supported by the IT R&D program of SNUBH and SKT.

Smart Bedside Station

Patient-centered user-friendly UI/UX



reddot design award
best of the best 2013



communication
design award

2014

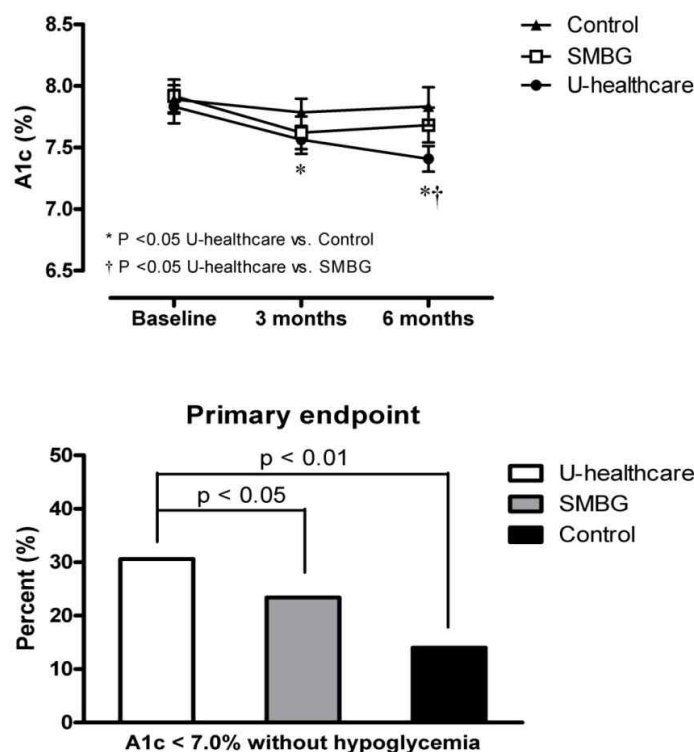
※ This work was supported by the IT R&D program of SNUBH and SKT.

Patient Portal



Diabetes Care

Study Result on Diabetes Care Device



Changes of A1c level over 6 months of study in the u-healthcare, SMBG and control groups and A1c < 7.0% without hypoglycemia

Published Journal

Improved Glycemic Control Without Hypoglycemia in Elderly Diabetic Patients Using the Ubiquitous Healthcare Service, a New Medical Information System

SOO LIM, MD, PHD^{1,2,3}
SEON MEE KANG, MD^{1,2,3}
HAYLEY SHIN, BS⁴
HAK JONG LEE, MD^{1,5}
JI WON YOON, MD^{1,2,3}
SUNG HOON YU, MD⁶

SO-YOUN KIM, RN¹
SOO YOUNG YOO, PHD¹
HYE SEUNG JUNG, MD³
KYONG SOO PARK, MD³
JUN OH RYU, MD⁷
HAK C. JANG, MD, PHD^{1,2,3}

OBJECTIVE—To improve quality and efficiency of care for elderly patients with type 2 diabetes, we introduced elderly-friendly strategies to the clinical decision support system (CDSS)-based ubiquitous healthcare (u-healthcare) service, which is an individualized health management system using advanced medical information technology.

RESEARCH DESIGN AND METHODS—We conducted a 6-month randomized, controlled clinical trial involving 144 patients aged >60 years. Participants were randomly assigned to receive routine care (control, n = 48), to the self-monitored blood glucose (SMBG, n = 47) group, or to the u-healthcare group (n = 49). The primary end point was the proportion of patients achieving A1c < 7% without hypoglycemia at 6 months. U-healthcare system refers to an individualized medical service in which medical instructions are given through the patient's mobile phone. Patients receive a glucometer with a public switched telephone network-connected cradle that automatically transfers test results to a hospital-based server. Once the data are transferred to the server, an automated system, the CDSS rule engine, generates and sends patient-specific messages by mobile phone.

RESULTS—After 6 months of follow-up, the mean A1c level was significantly decreased from $7.8 \pm 1.3\%$ to $7.4 \pm 1.0\%$ ($P < 0.001$) in the u-healthcare group and from $7.9 \pm 1.0\%$ to $7.7 \pm 1.0\%$ ($P = 0.020$) in the SMBG group, compared with $7.9 \pm 0.8\%$ to $7.8 \pm 1.0\%$ ($P = 0.274$) in the control group. The proportion of patients with A1c < 7% without hypoglycemia was 30.6% in the u-healthcare group, 23.4% in the SMBG group (23.4%), and 14.0% in the control group ($P < 0.05$).

CONCLUSIONS—The CDSS-based u-healthcare service achieved better glycemic control with less hypoglycemia than SMBG and routine care and may provide effective and safe diabetes management in the elderly diabetic patients.

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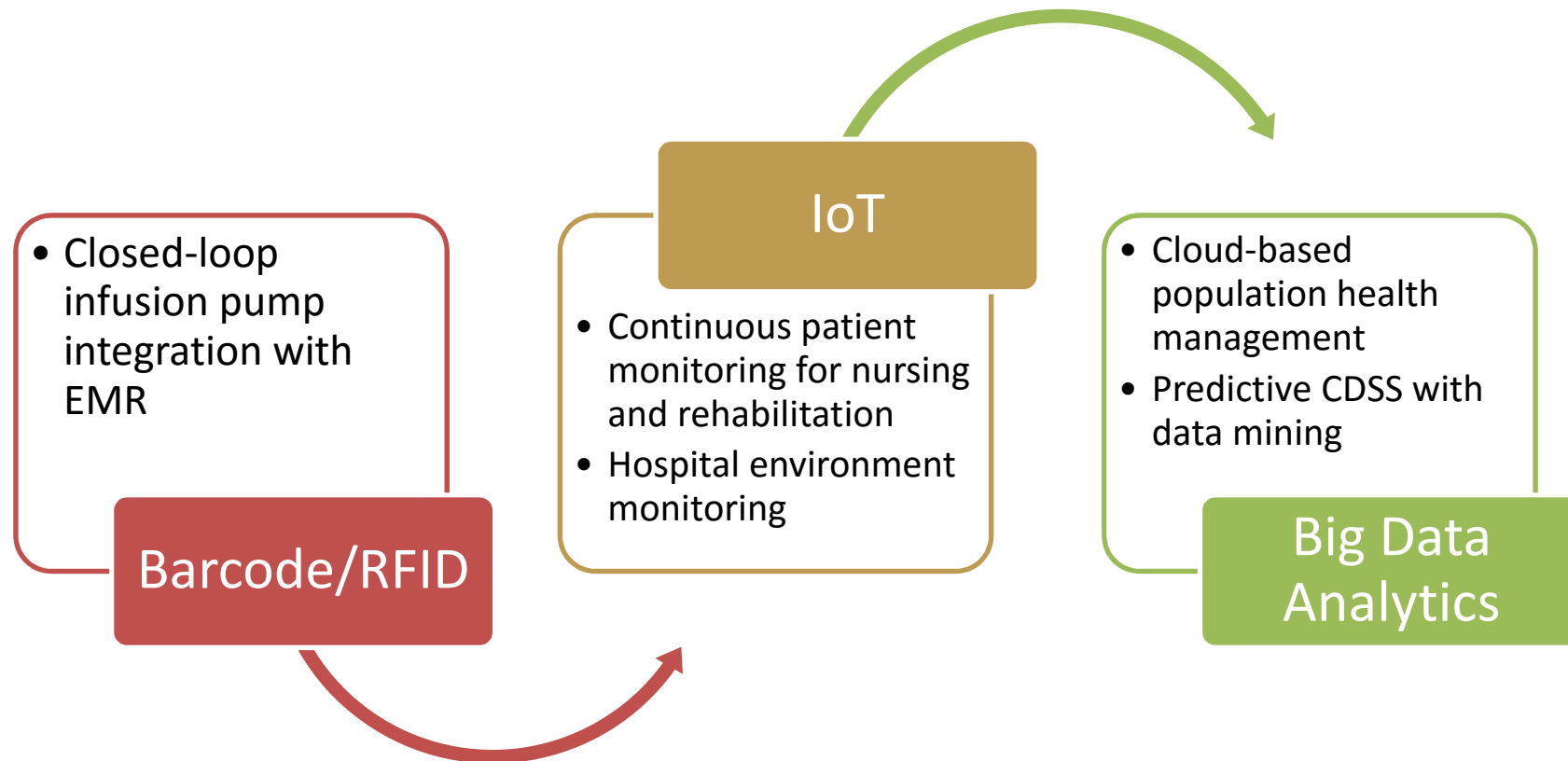
According to recent data from large clinical trials, approaches to adequate glycemic control focused on less hypoglycemia and less weight gain need to be used to reduce complication or mortality rates of diabetes (1,2). For this, close and consistent monitoring of glucose levels and individual specific interventions are required; however, this type of individualized approach has been difficult to obtain before advances in technology.

Advances in information technologies have enabled medicine to overcome time and location barriers by developing a system that provides real-time individualized medical treatments that are easily accessible using Internet and wireless technology (3–6). This system, referred to as ubiquitous healthcare (u-healthcare) (also known elsewhere as telemedicine, telehealth, or connected health), has been the center of attention for its revolutionary approach. The u-healthcare system can potentially provide disease prevention, early diagnosis, and early treatment, as well as continuous follow-up that are available whenever and wherever they are needed and requested. Such personalized health care services are important to diabetic patients whose disease management is depends primarily on time and frequency. Consequently, the

**Diabetes Care;
IF=7.3**

Future Plan

- Further integration of EHR system with smart ICT technologies



Thank you!