



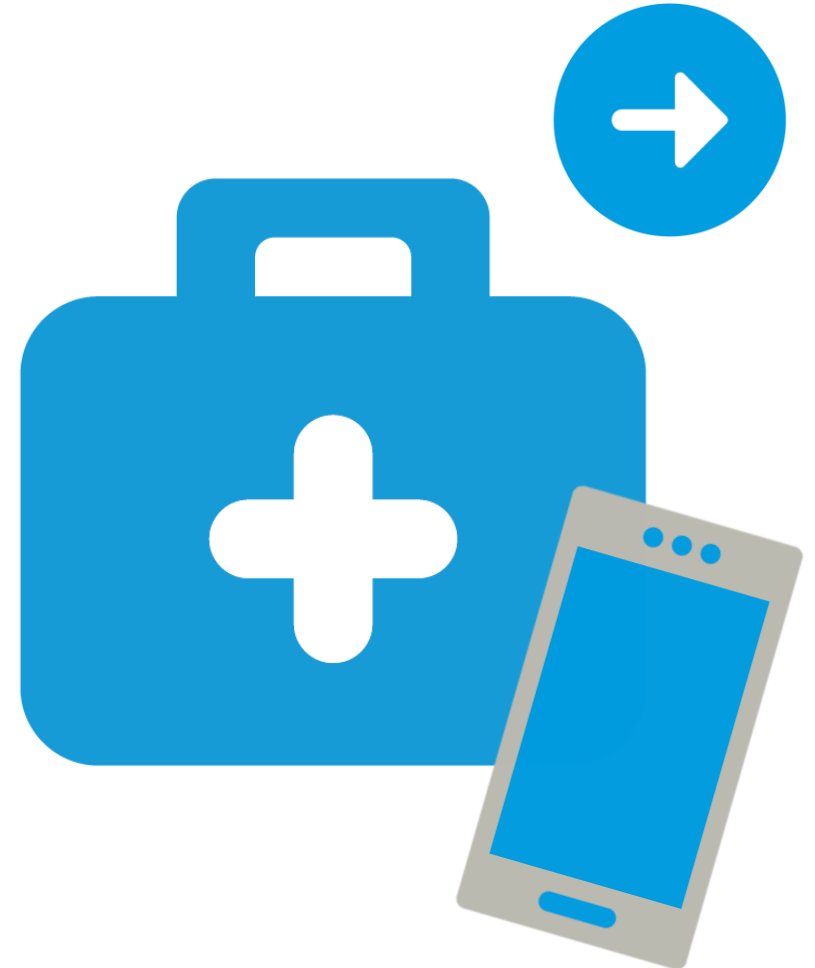
ICT & AUTOMATION IN SMART HOSPITALS

A SMART BUILDING APPROACH TO SUPPORT THE PATIENT JOURNEY DURING HOSPITALIZATION

Anita Woll, Ramboll Norway

KNOWN ISSUES WITH PATIENT CARE DURING ADMISSION

- Patient engagement
- Streamlining communication
- Hospital navigation for patients and staff
- Workflow optimization
- Patient notification
- Hospital assets tracking
- Leveraging data analytics



THE FUTURE IS SMART HOSPITALS

- A new direction at the intersection of medicine, information, health, and business, which is related to the usage of information technology support within healthcare services
- The Smart Hospital concept is aimed at creating a single IT environment composed of automated «bricks» of specialized and supplementary processes
- In the course of this new technological revolution, a huge amount of data, cloud computing services, machine learning methods, and artificial intelligence solutions are being combined



OBJECTIVE OF ADDING LAYERS OF SMARTNESS TO HOSPITAL BUILDING

- Smart buildings are the digital extension of architectural and engineering progress
- “New must” in healthcare - the world is going digital and so does the patient experience
- Through connecting smart technology, a much-needed two-way dialogue during in-patient care is established
- Improves the patient experience and productivity of the workforce that embraces it



HOW TO INCREASE THE PATIENT EXPERIENCE

- Spending time in a hospital can be overwhelming with stress and anxiety
- From complex to minor procedures, diagnostic tests, waiting on results and talking to various care providers, provide same information to several care givers, receive education with others
- The staffing is the core of all the activities in the patient journey during admission
- However, technology can make a patient's experience smoother and safer, supporting the work flow, increase communication, wayfinding, schedule the day from the patient's view point etc



TECHNOLOGY SUPPORTING THE PATIENT EXPERIENCE

- Yesterday's hospitals focused on giving access to patient health record in a patient-friendly manner during **pre-admission** and for **out-patient follow-up**
- Tomorrow's hospitals have increase IoT devices and information technology supporting patients during **inpatient** as well



TRENDS

- Patients and hospitals use more high-tech devices both in hospital rooms and on outpatient basis.
- Patients use wearables, remote monitoring devices and smartphones to monitor their vitals and medication
- Hospitals use smart TVs and tablets to educate staff and patients
- Electronic health records (EHRs) are to aggregate all patient information and provide healthcare professional with all data necessary to provide quality care
- Increased multimedia information related to each patient (The need for storage capacity will increase)

TRENDS

- Increased use of self-service solutions and welfare technology during the patient journey
- Increasing use of mobile devices such as terminals and others will use wireless communication, e.g., increased patient safety.
- Tools supported workflow processes
- Increased requirements for more efficient service deliveries

MORE EFFICIENT SERVICE DELIVERIES

Staff is equipped with one tool for all ICT-based interaction

- Alarm and alerts
 - Two-ways communication
- Wayfinding support
 - Rooms
 - Persons
- Hospital assets tracking
- Access to patient information



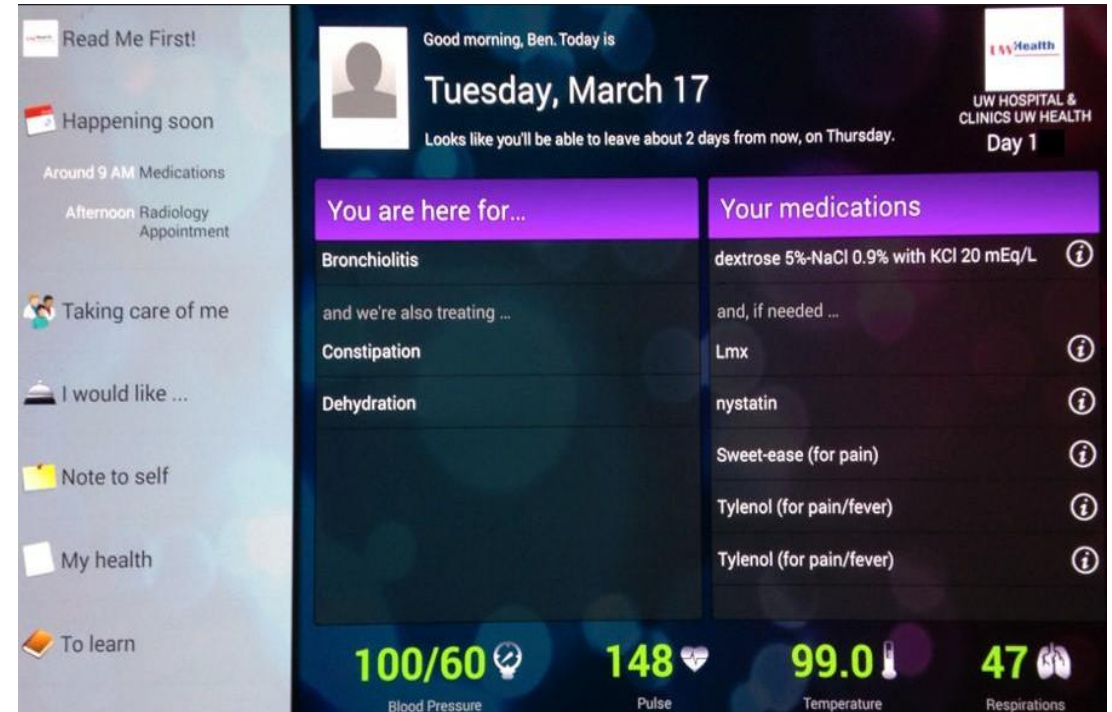
**Less walking in the corridor =>
The more time for quality work**

***"The more healthcare professionals
walks, the less time they spend with
the patients"***

MY CHART BEDSIDE

A digital display in a patient's room;

- Health records and test results from the laboratory
- Daily treatment schedules
- Communicate with care providers and
- Receive disease management education
- Order food
- Entertainment
- Companion app for approved family members remotely login
- Outpatients can also use the app to schedule appointments, request prescription refills and communicate with care providers from their smartphones



TWO-WAY COMMUNICATION BETWEEN PATIENT AND NURSE FOR PRIORITIZING OF ALARMS, AND FOR THE SAKE OF WELL-BEING

“May I have a glass of water,
please?”



NURSE CALL SYSTEM AND MEDICAL EQUIPMENT

- IP-based systems
- 24/7/365 uptime (require back-up solutions for network and power)
- Pull cord and wearables
- In-door positioning system
- Alarms go to the staff's terminal (and possibly to a corridor display)
- Two-ways communication – prioritization of alarms/alerts
- Prepare for integration to other medical equipment
- Sustainable - facilitated for future integrations of new technology
- Require flexible user interfaces to configure for hospital wards needs
- Retrieval of reports / statistics as basis to adjust amount of staffing



ICT-SUPPORTED COOPERATION

- ICT as a collaboration tool for improved communication between doctor and patient
- Support better decision making
- Today's patients are "demanding" they search health information, self diagnosis, and engage in treatment process



REAL-TIME PATIENT FLOW - DIGITAL WHITEBOARDS

Finding solutions that support health care managing

- Resources processes
- Interactions processes along the patient journey
- Two-way communication
 - Between health professionals
 - Between health professionals and patient
- Image and record sharing
- Support increased patient safety



BETTER ORGANIZATION OF QUEUING SYSTEMS AND INCREASED VISIBILITY TO IMPROVE THE PATIENT EXPERIENCE



Read Me First!

Happening soon

Afternoon Radiology Appointment

Taking care of me

I would like ...

Good morning, Ben. Today is **Tuesday, March 17**

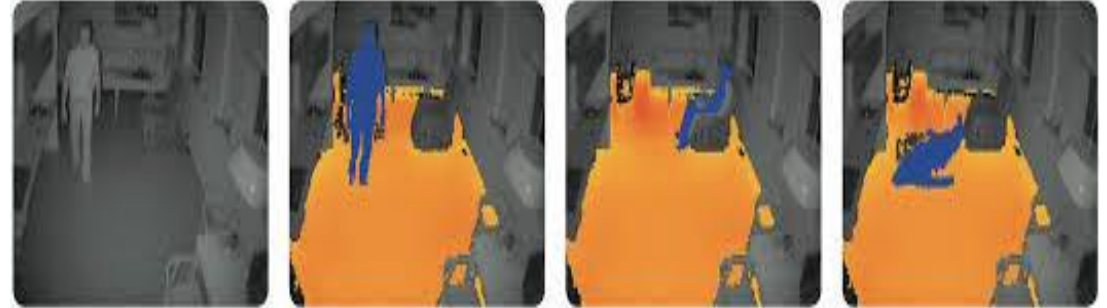
Looks like you'll be able to leave about 2 days from now, on Thursday.

UW HOSPITAL & CLINICS UW HEALTH Day 1

You are here for...	Your medications
Bronchiolitis	dextrose 5%-NaCl 0.9% with KCl 20 mEq/L
and we're also treating ...	and, if needed ...
Constipation	Lmx
Dehydration	nystatin
	Sweet-ease (for pain)

NIGHT SUPERVISION PERFORMED BY REMOTE DIGITAL SUPERVISION

- The staffing for night duties are costly
- Typically night rounds are set at 24, 03 and 06 o'clock
- Unwanted accidents/illness can occur beyond these rounds
 - Nurses on night duty can also wake-up patients during their rounds
- Camera with multiple functions and additional monitoring can provide the safety for patient during the night beyond the night rounds- and alert in cases of accidents/illness
- Transformation of a more need-driven night supervision can contribute to increased security for patient and a more efficient night duty organization



CHECK IN AND CHECK-OUT: SELF-SERVICE SOLUTIONS ARE ENTERING THE HOSPITALS



AUTOMATION OF OTHER OPERATING SERVICES IN HOSPITALS

- Automation of inventory – refill themselves
- Automation of trash management
- Beds that find their way down for disinfection and return to rooms in time for new patients arrival
- Automated food trolleys
- Returns for laundry and robots collect laundry
- Cleaning robots that relieve cleaning personnel
- Tracking and locating assistive technology in building using RFID
- Streamlining of room wash
- Pipe Post Systems

=> All of these operational tasks steal time with patients

BARRIERS FOR TRANSFORMING INTO SMART HOSPITAL

- Prioritization of scarce health care resources
- Standardization and policy making
- Developing into “smart» takes time, add one service at a time
- Interoperability and cybersecurity
- Unstructured data and legacy systems have to be integrated
- Require sufficient training of staffing in using smart systems and devices effectively to support their workflow

IMPORTANT TO BE CRITICAL IN THE SCOPE OF SMART CHOICES

- INFORMATION DILEMMA "MUST HAVE" VS. "NICE TO HAVE" FOR ACTION

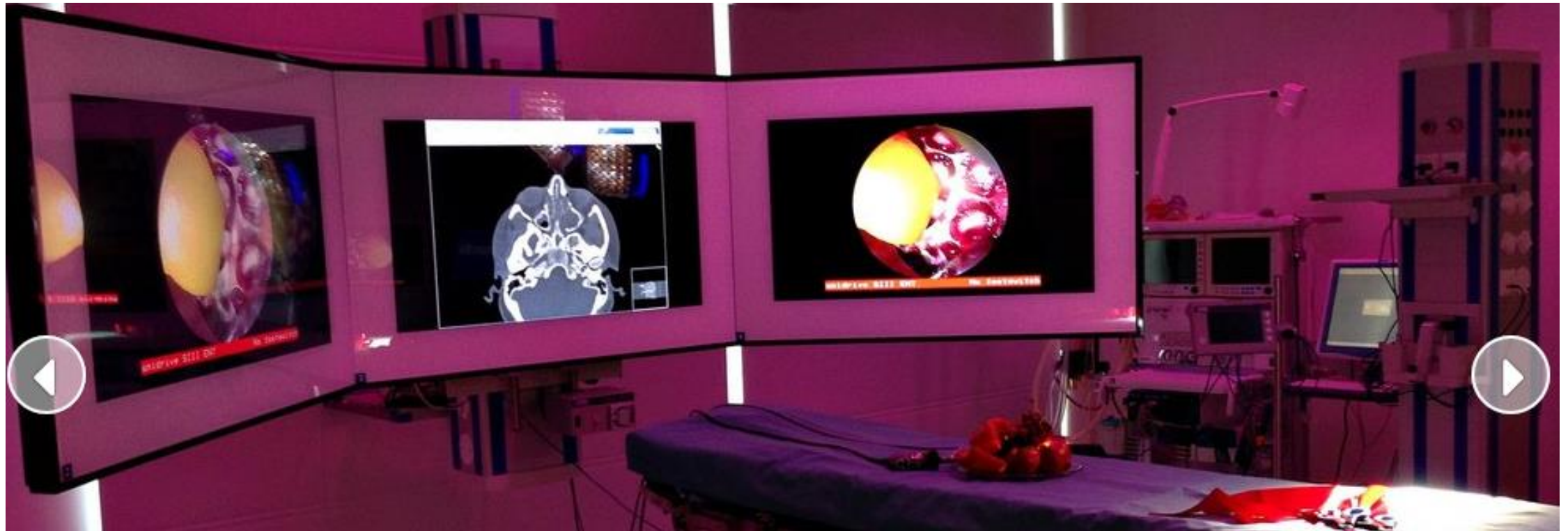


Illustration of "cockpit solution" at the operating room

THANK YOU

E: ANITA.WOLL@RAMBOLL.NO

M: +47 915 43 736

