香港中文大學醫院
CUHK
Medical Centre

# Planning of a Smart Hospital

Dr Hong FUNG

Executive Director & CEO

Oct 2019

# CUHK Medical Centre (CUMC)

- A private teaching hospital
- Wholly owned by The Chinese University of Hong Kong (CUHK)
- To serve a social mission –
  - bridge the gaps between private & public healthcare services in Hong Kong
  - offer **quality** healthcare at **affordable**, **transparent** package prices

*Pioneering Solutions in Healthcare*
*開拓醫護新領域*

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# Vision, Mission, Values

**Vision**

By 2025, our patients will view us as:

- **Respected** for quality patient-centered services
- **Reputable** for new models in coordinated care
- **Recognised** for transparent and affordable pricing
- **Renowned** for clinical excellence

以人為本、創新服務、收費透明、臨床卓越

**Mission**

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**Values**

**Patient First** **Holistic** **Teamcare**

**Compassionate** **Open** **Trustworthy**

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# Integrated Strategy

To offer quality healthcare at affordable, transparent package price to our **patients**

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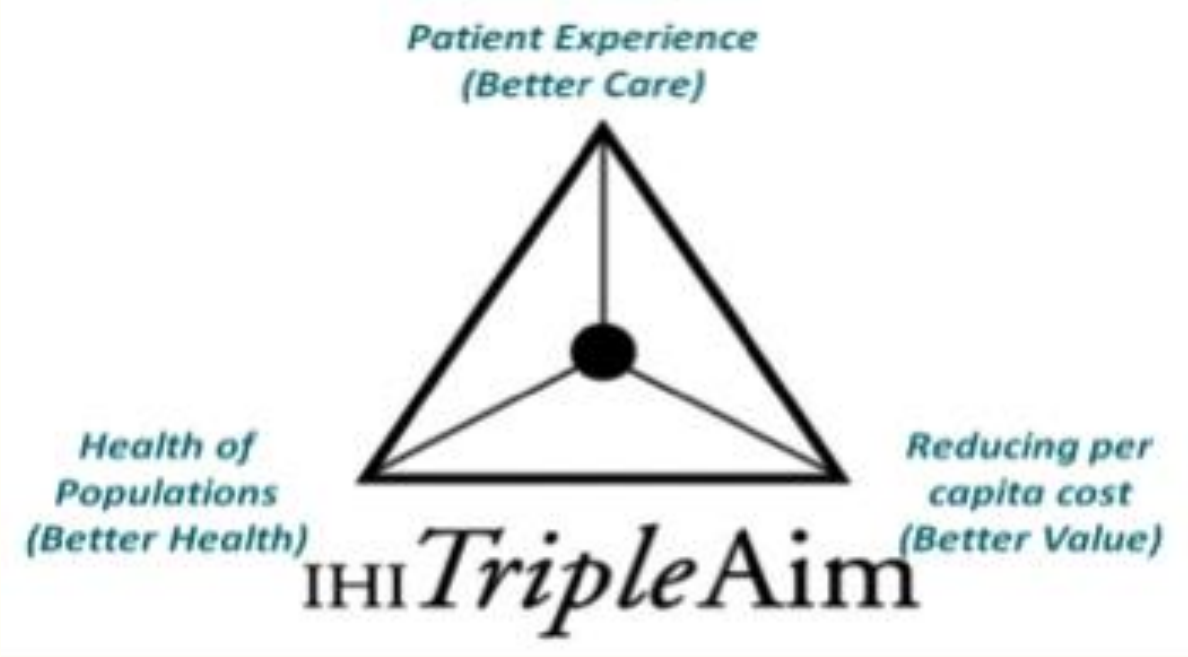
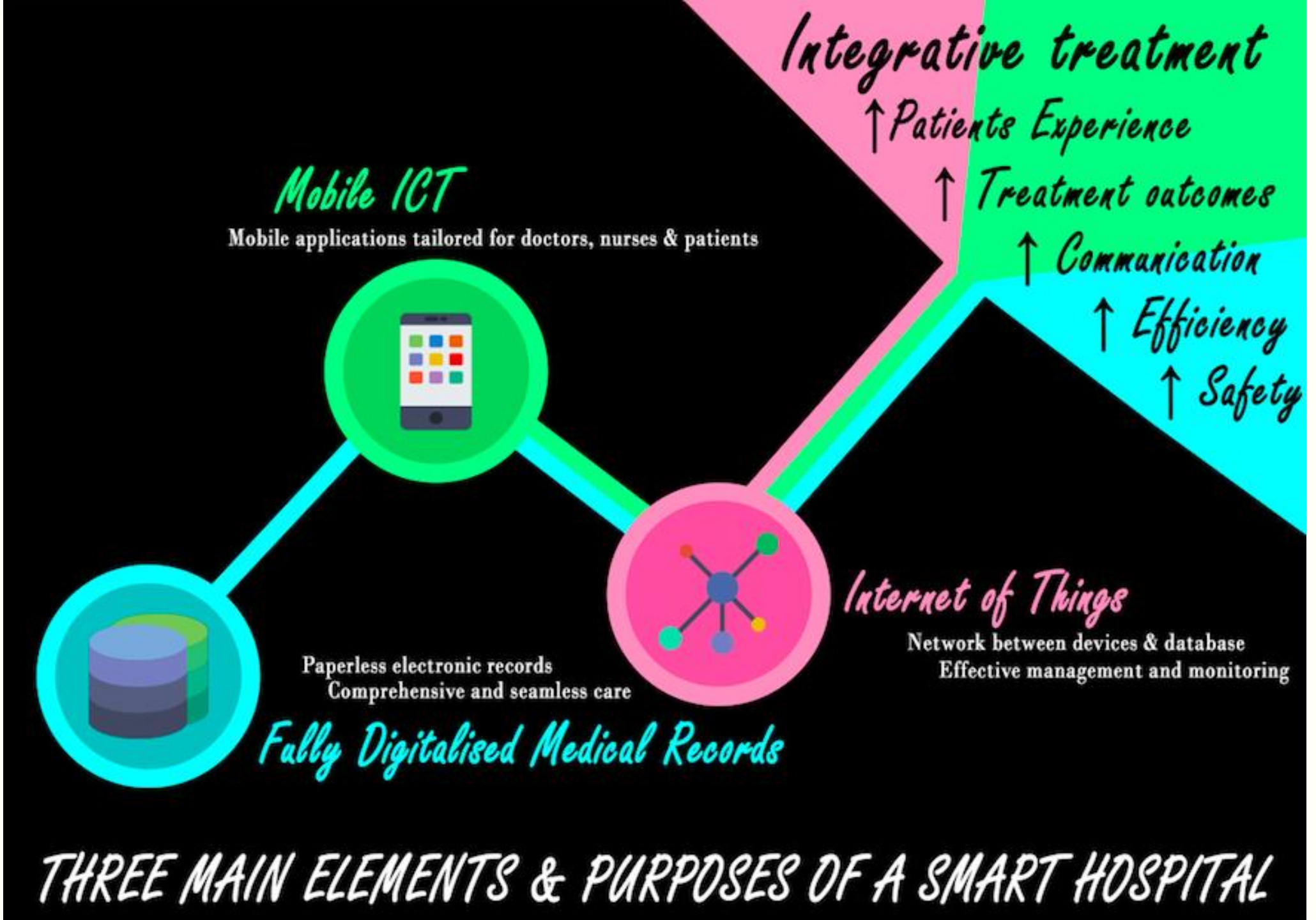
# Institute for Healthcare Improvement (IHI) – Triple Aim

- Improve health of the defined population
- Enhance patient care experience (including quality, access and reliability)
- Reduce, or at least control, the per capita cost of care

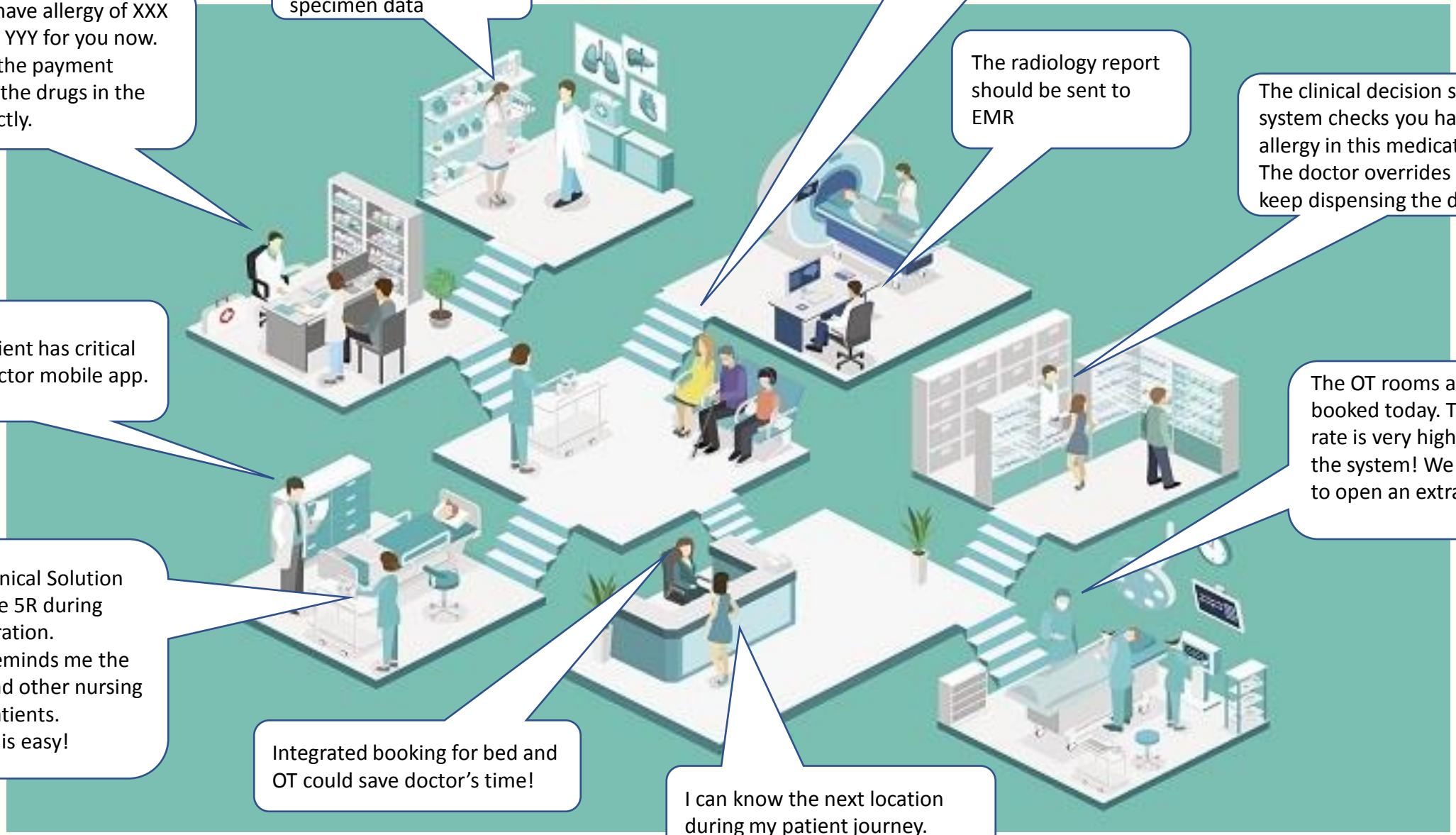



Integrative treatment
↑Patients Experience
↑ Treatment outcomes
↑ Communication
↑ Efficiency
↑ Safety
Mobile ICT
Mobile applications tailored for doctors, nurses & patients
Internet of Things
Network between devices & database
Effective management and monitoring
Paperless electronic records
Comprehensive and seamless care
Fully Digitalised Medical Records
THREE MAIN ELEMENTS & PURPOSES OF A SMART HOSPITAL

# FULLY DIGITISED MEDICAL RECORDS

# Integrated Hospital Information System (HIS)

# Seamless Interconnections



I checked you have allergy of XXX and I prescribe YYY for you now. You can settle the payment online and get the drugs in the pharmacy directly.

The RFID solution enables the tracking of specimen data

The hospital provides location tracking and also remind me when I am the next one

The radiology report should be sent to EMR

The clinical decision support system checks you have drug-allergy in this medication order. The doctor overrides and I can keep dispensing the drugs.

I found the patient has critical value in the doctor mobile app.

The OT rooms are fully booked today. The utilization rate is very high because of the system! We may consider to open an extra theatre ☺

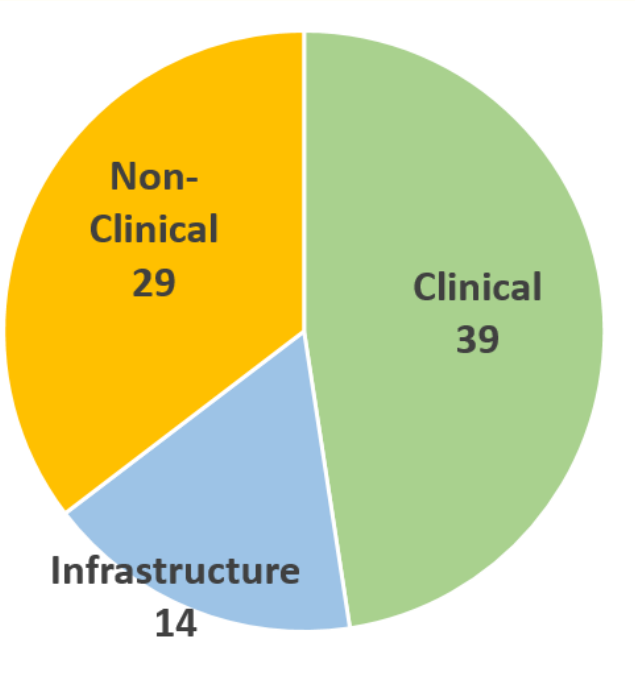
The Mobile Clinical Solution helps to ensure 5R during drug administration.
Besides, NIS reminds me the assessment and other nursing tasks to the patients.
And handover is easy!

Integrated booking for bed and OT could save doctor's time!

I can know the next location during my patient journey.

# Components of Integrated HIS

- Deployment of Systems in phases



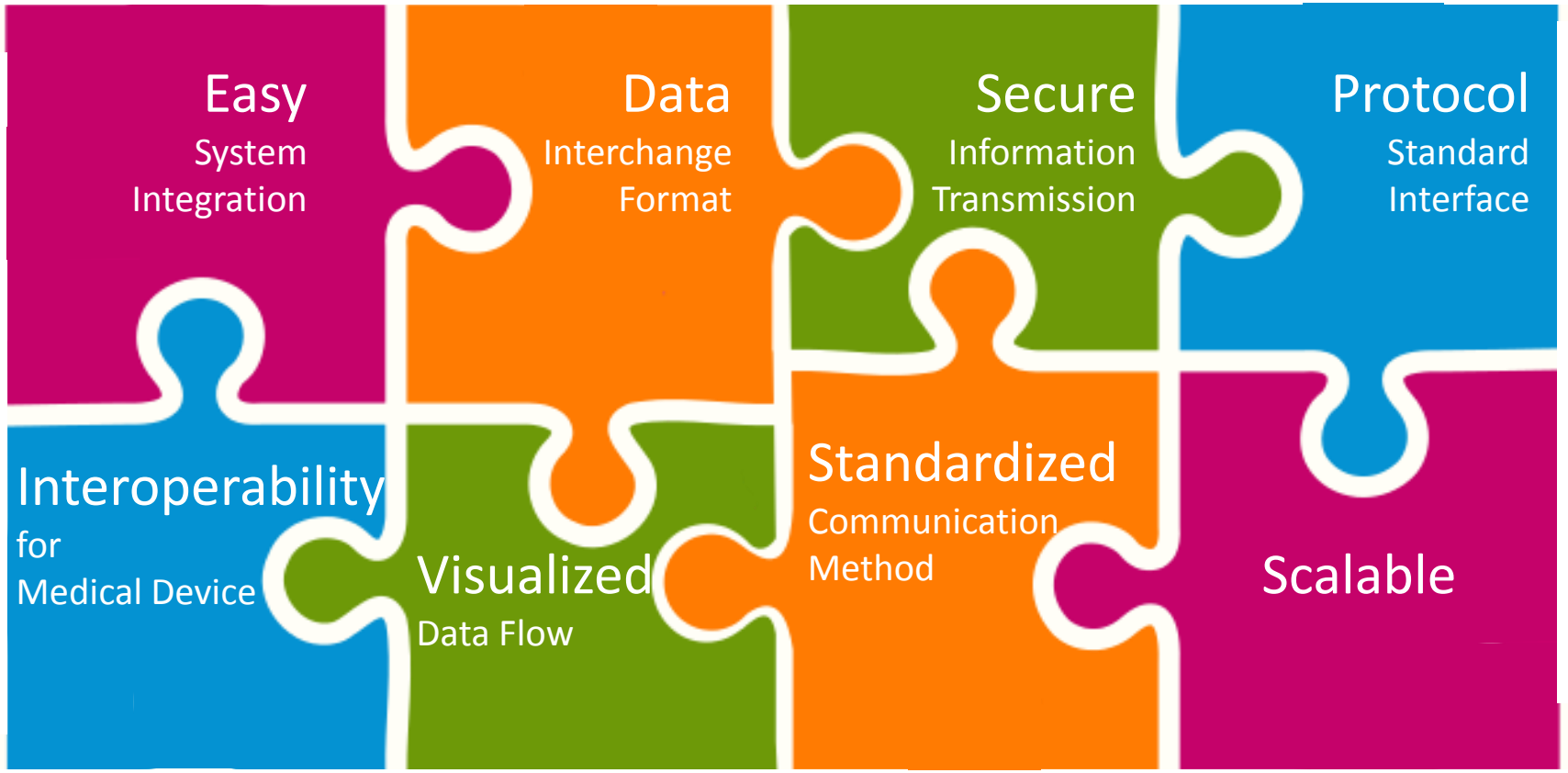

82 IT Systems on the master list

| | Count of IT Systems |
|---|---|
| Live | 6 |
| Within 2019 | 2 |
| By Jun 2020 | 15 |
| By Oct 2020 | 32 |
| By Jan 2021 | 14 |
| After Jan 2021 | 13 |

| | Count of IT Systems |
|---|---|
| IT | 32 |
| Admin | 17 |
| Pharmacy | 12 |
| Pathology | 7 |
| Nursing | 6 |
| Others | 2 |
| Academy | 1 |
| Biomedical Engineering | 1 |
| Chinese Medicine | 1 |
| Eye Centre | 1 |
| Radiology | 1 |
| Radiotherapy | 1 |

# Open Integration Platform

## Information BACKBONE for Integrated HIS



# Closed-Loop Management

# Closed-loop Automation

- Clinical pathways
- Patient journeys
- Medication Management
- Blood Transfusion Management
- Laboratory Order Management
- Surgical Instrument & Specimen Processing
- Linen and Uniform Management
- Supply Chain Management
- Meal Ordering
- Portering System



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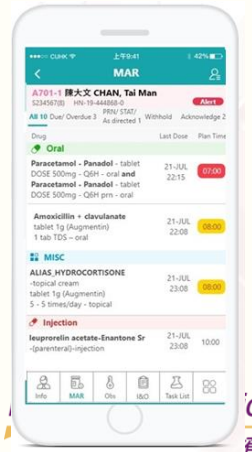
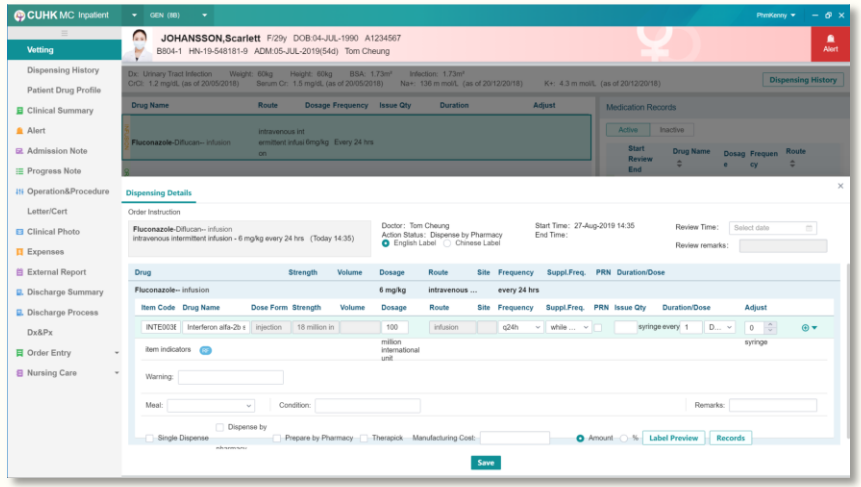
# Closed-Loop Medication Management

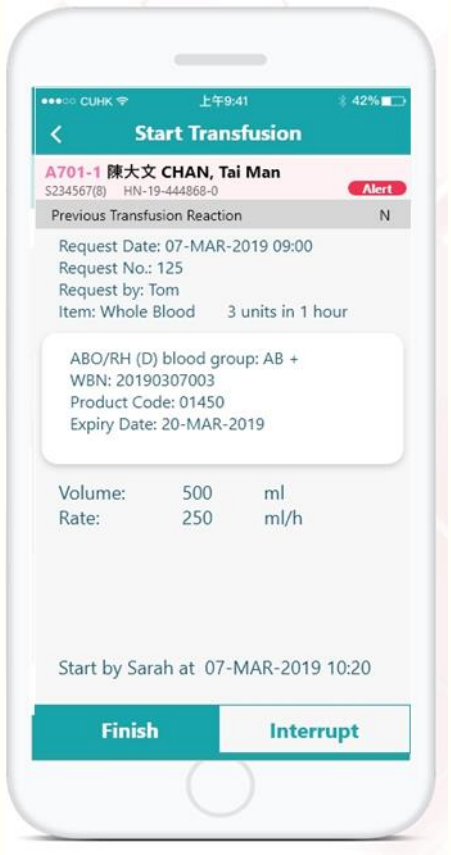
Clinical Decision Support System

Pharmacy App (Drug Picking & Inventory Mgt)



# Closed Loop Blood Transfusion




Return blood product

*(for unfinished transfusion or with severe reaction)*

Blood Transfusion Request

Specimen Collection for T&S

T&S Screening

Confirm blood transfusion request

Assign blood product to patient

Collection of blood product

Prepare blood product (countersign required)

Start blood transfusion

End/ Interrupt blood transfusion

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# Clinical Decision Support

# Medication Order Entry (MOE) with Clinical Decision Support System (CDSS)

- Assists providers in timely and efficient decision making
- Prevents clinical errors such as
  - drug-drug interactions,
  - drug-allergies,
  - adverse drug reaction,
  - pregnancy checking,
  - G6PD deficiency,
  - duplicate therapy, etc.
- Saves cost, improves quality of care and enhances patient safety

## Examples

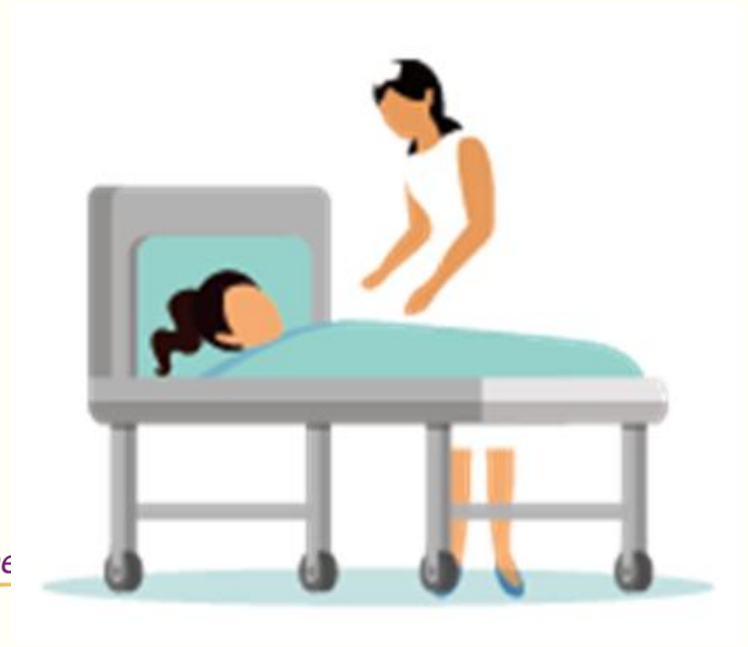
**Patient allergic to AMOXICILLIN**

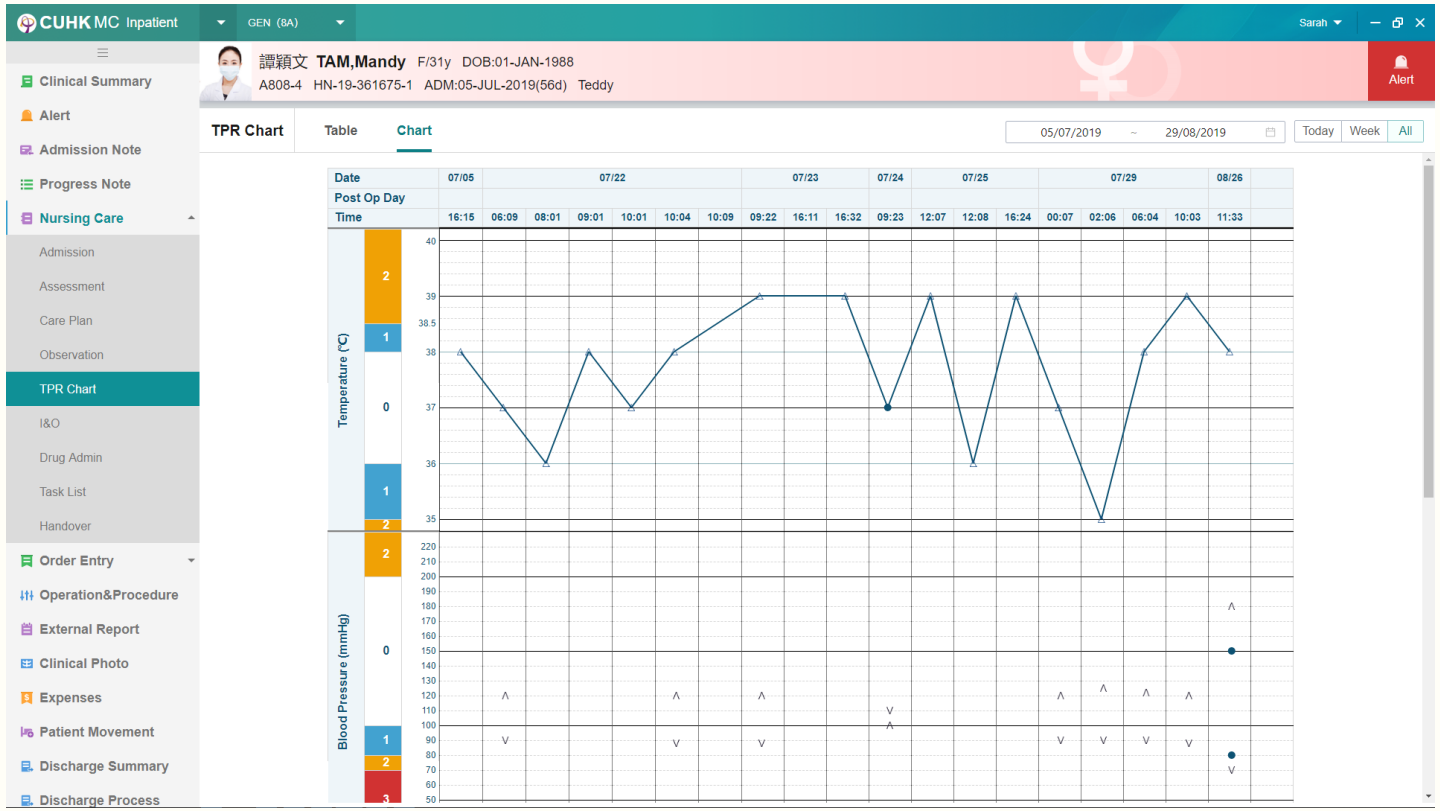
**Warning:** The use of CEFTRIAXONE SODIUM INJECTION VIAL 1 GRAM may result in an allergic reaction based on a reported history of allergy to **AMOXICILLIN**

# Paperless Use Case

# Highlight of Paperless Use Case - Medical Record

Capture the vital sign data for EMR





# MOBILE EXPERIENCES

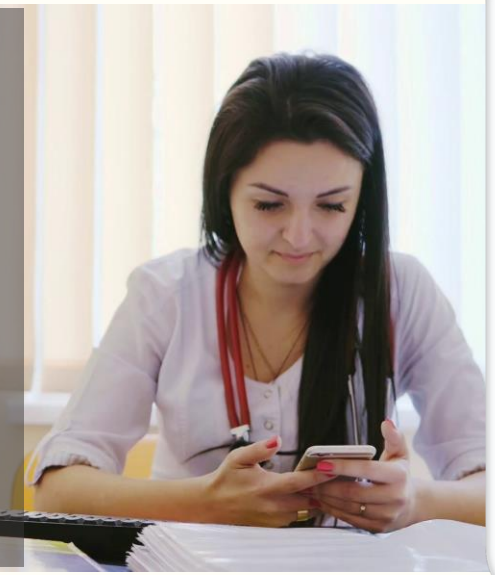
# CUMC Mobile Apps

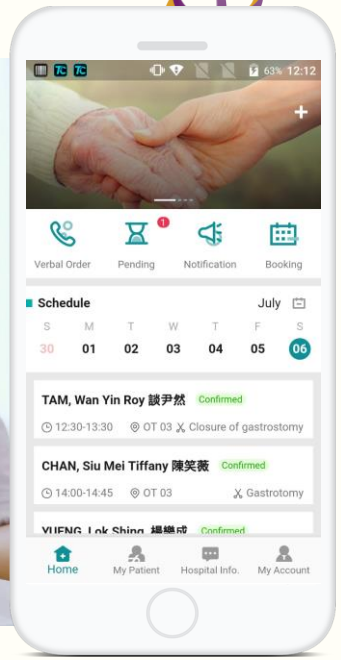
## Nursing – Medication Administration

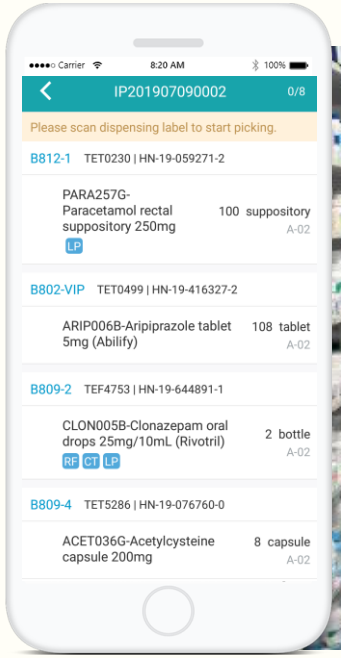
- 5R *(right patient, right drug, right dose, right route, right time)*
- Track and reduce medication errors

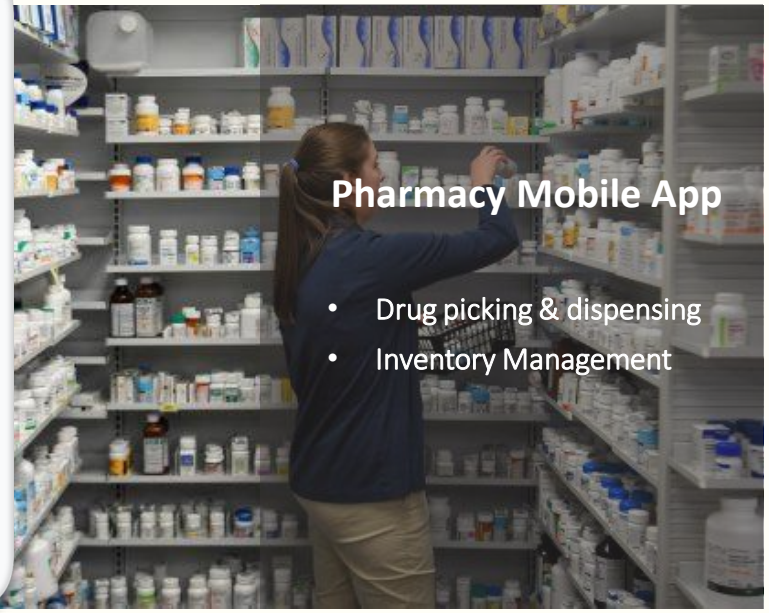
## Doctor Mobile App

- My schedule
- My patients
- Medication management



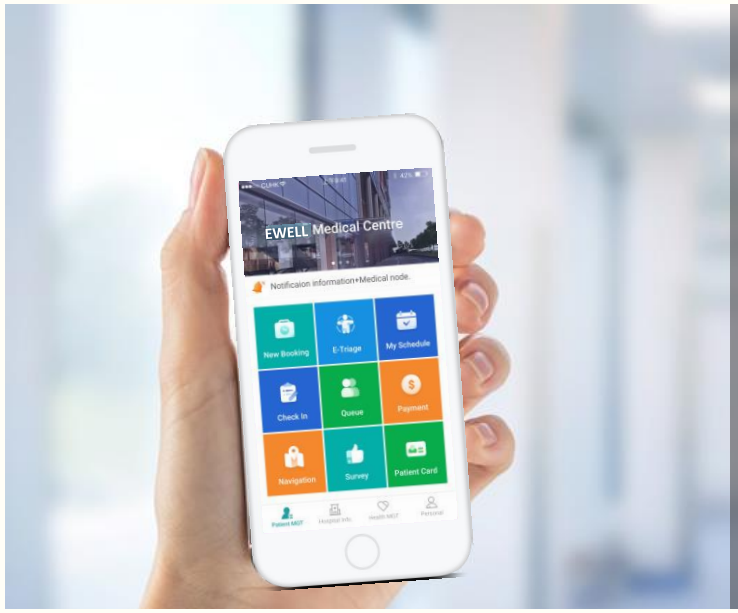


## Pharmacy Mobile App

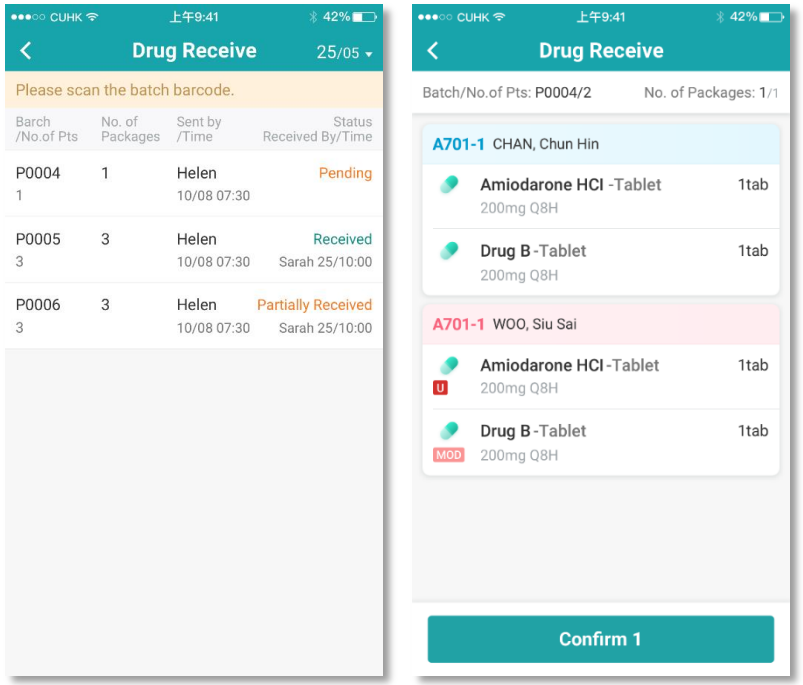
- Drug picking & dispensing
- Inventory Management

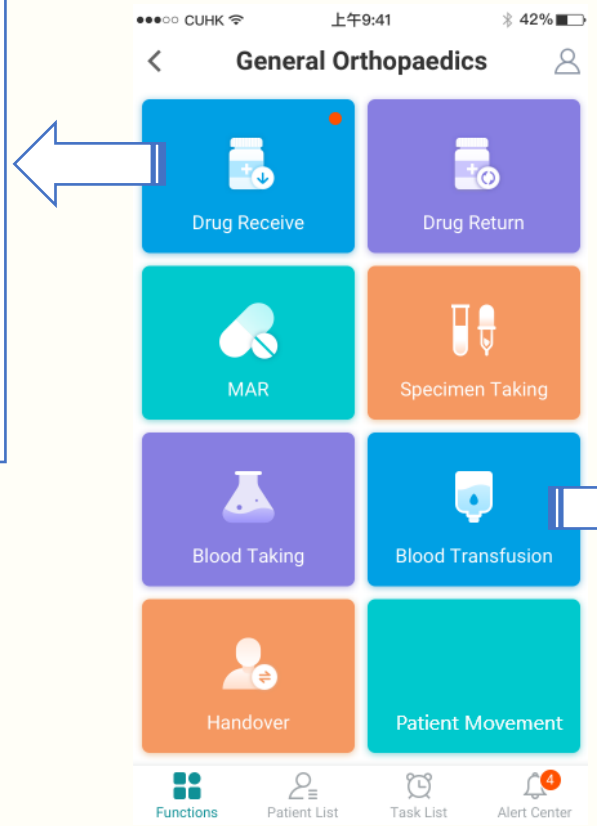


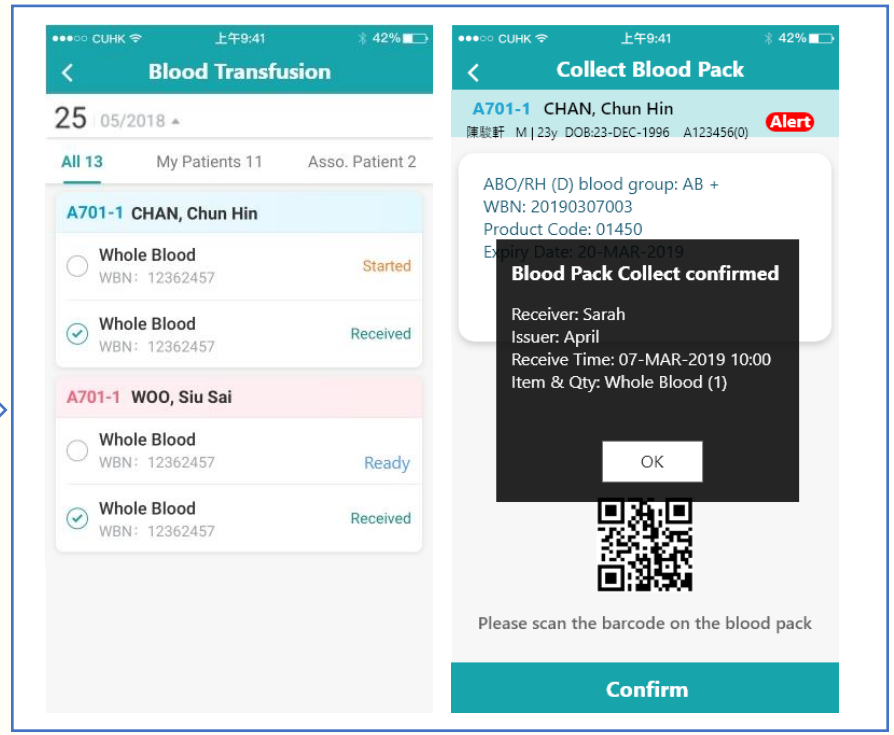

## Patient Mobile App

- My schedule
- Appointment
- Medication
- Way finding
- Payment

# Nursing App

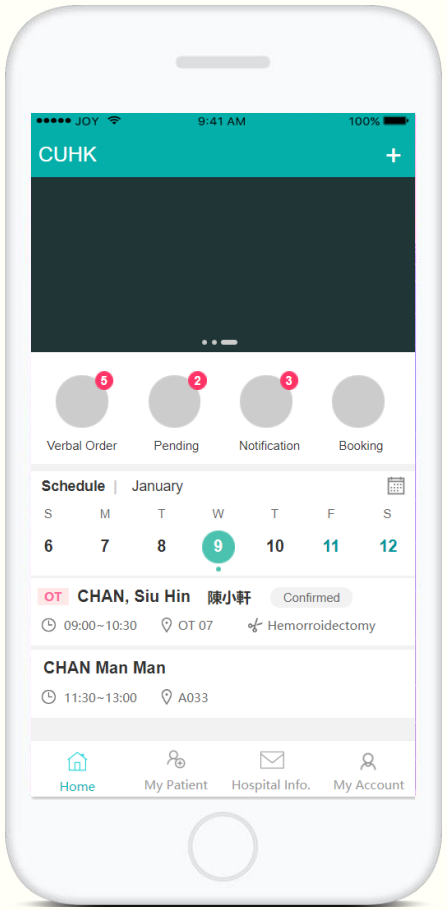

CUHK 上午9:41 42%
Drug Receive 25/05
Please scan the batch barcode.
Barch /No.of Pts
No. of Packages
Sent by /Time
Status Received By/Time
P0004 1 Helen 10/08 07:30 Pending
P0005 3 Helen 10/08 07:30 Received Sarah 25/10:00
P0006 3 Helen 10/08 07:30 Partially Received Sarah 25/10:00
Drug Receive
Batch/No.of Pts: P0004/2
No. of Packages: 1/1
A701-1 CHAN, Chun Hin
Amiodarone HCl -Tablet 1tab 200mg Q8H
Drug B -Tablet 1tab 200mg Q8H
A701-1 WOO, Siu Sai
Amiodarone HCl -Tablet 1tab 200mg Q8H
Drug B -Tablet 1tab 200mg Q8H
Confirm 1


CUHK 上午9:41 42%
General Orthopaedics
Drug Receive
Drug Return
MAR
Specimen Taking
Blood Taking
Blood Transfusion
Handover
Patient Movement
Functions
Patient List
Task List
Alert Center

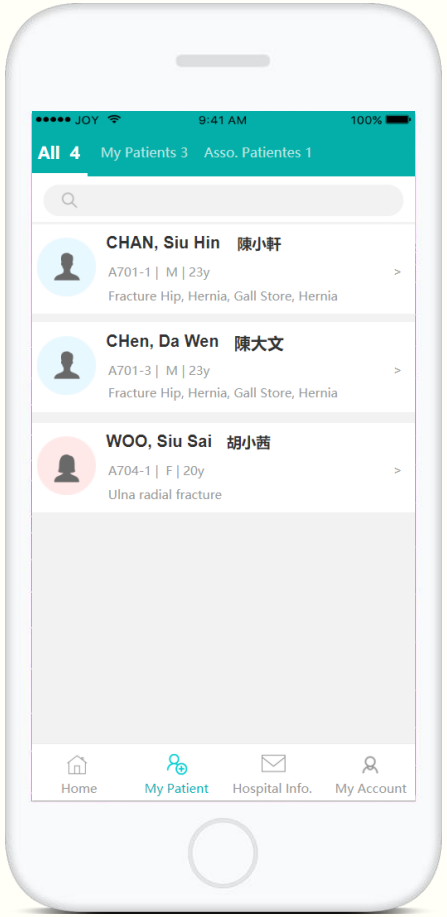

CUHK 上午9:41 42%
Blood Transfusion
25 05/2018
All 13
My Patients 11
Asso. Patient 2
A701-1 CHAN, Chun Hin
Whole Blood WBN: 12362457 Started
Whole Blood WBN: 12362457 Received
A701-1 WOO, Siu Sai
Whole Blood WBN: 12362457 Ready
Whole Blood WBN: 12362457 Received
Collect Blood Pack
A701-1 CHAN, Chun Hin
Alert
ABO/RH (D) blood group: AB +
WBN: 20190307003
Product Code: 01450
Blood Pack Collect confirmed
Receiver: Sarah
Issuer: April
Receive Time: 07-MAR-2019 10:00
Item & Qty: Whole Blood (1)
OK
Please scan the barcode on the blood pack
Confirm

# Doctor App

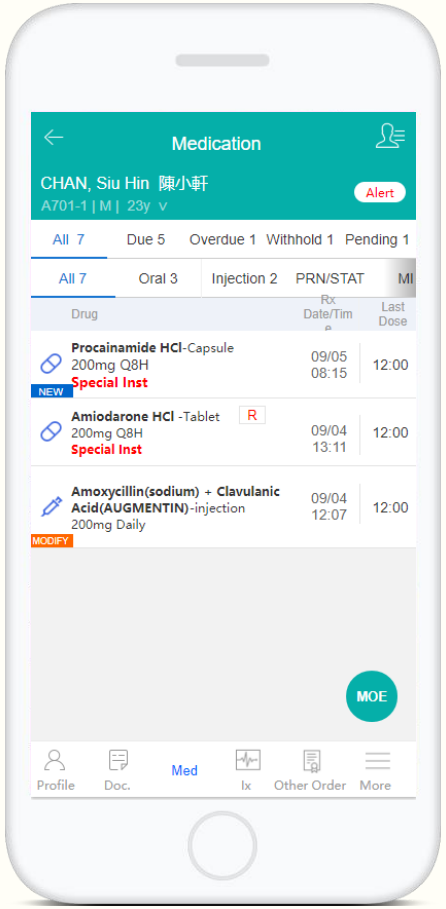
**Home Page**



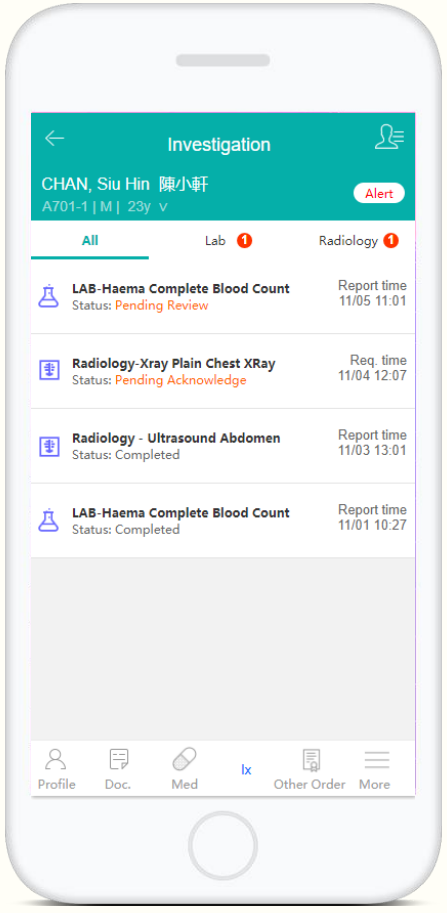

**My Patient**



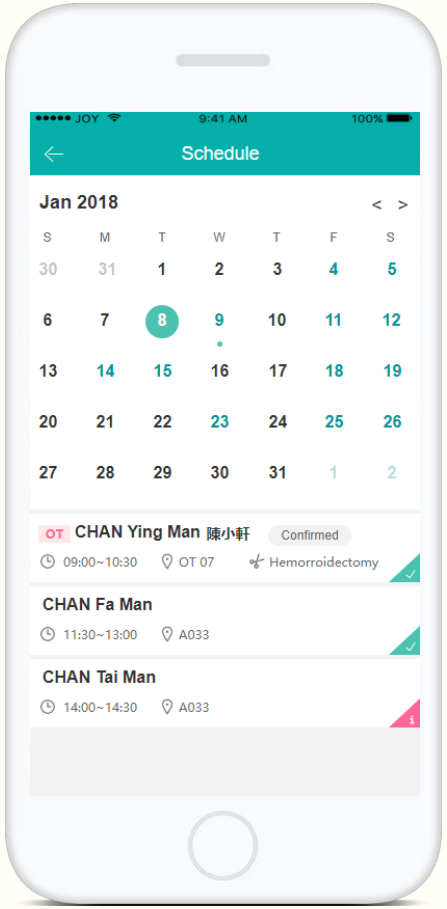

**Medication List**




**Investigation**




**Physician Schedule**

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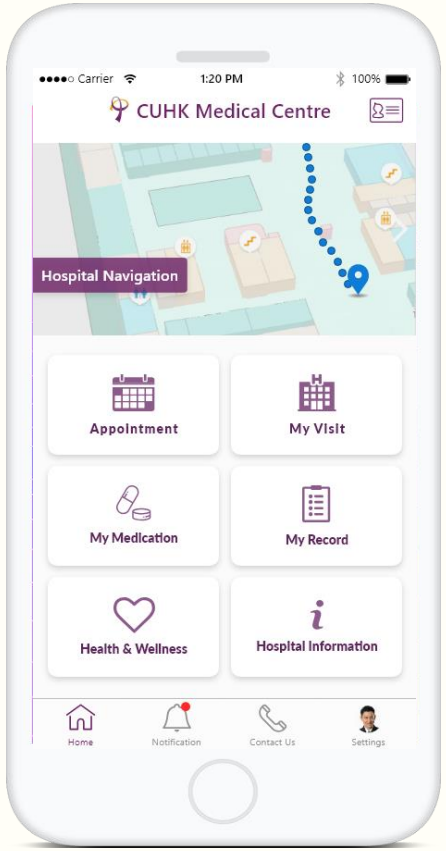
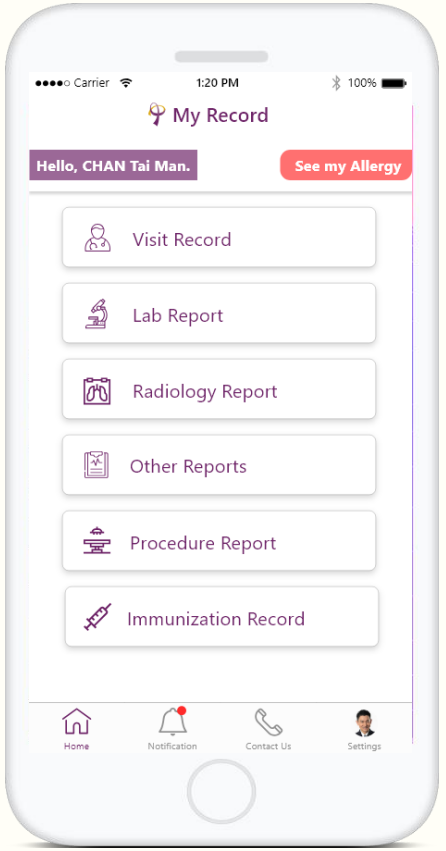
# Patient App

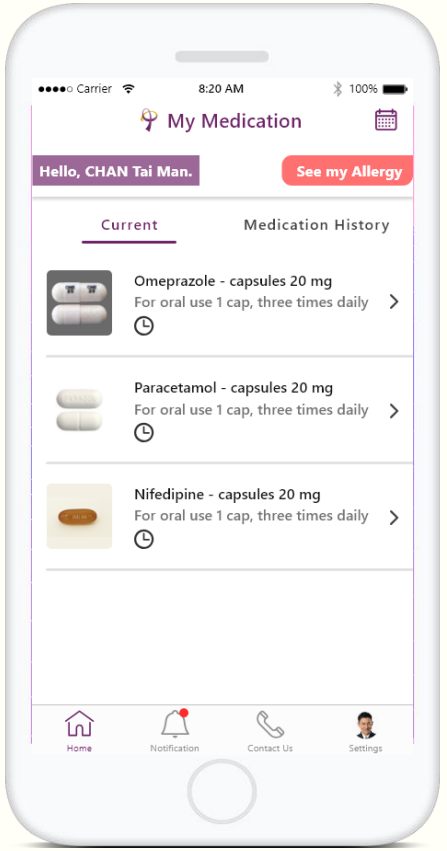
**Home Page**



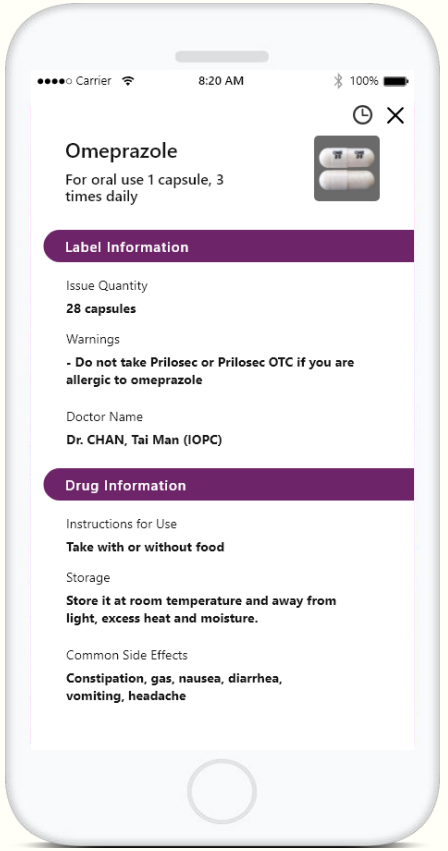

**My Record**



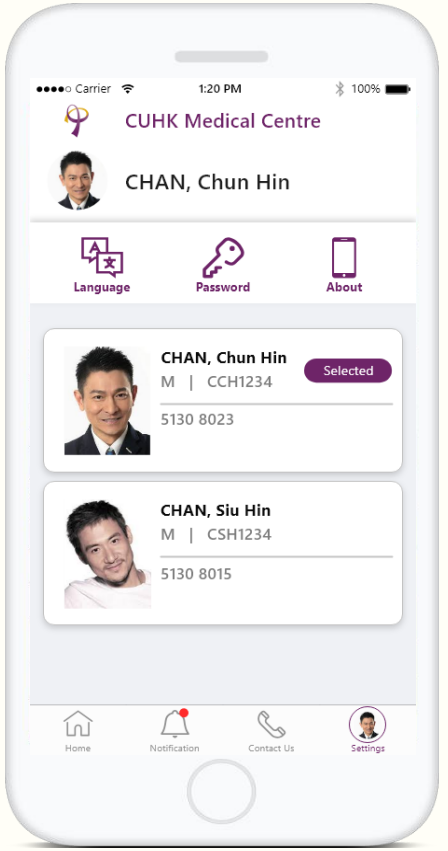

**My Medication**




**Med Detail**




**Setting**

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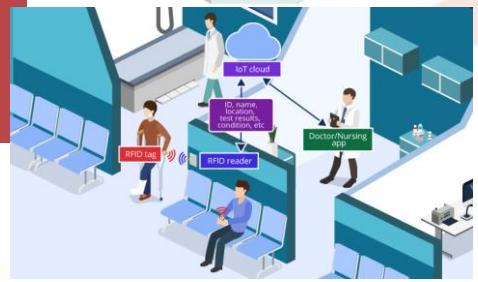
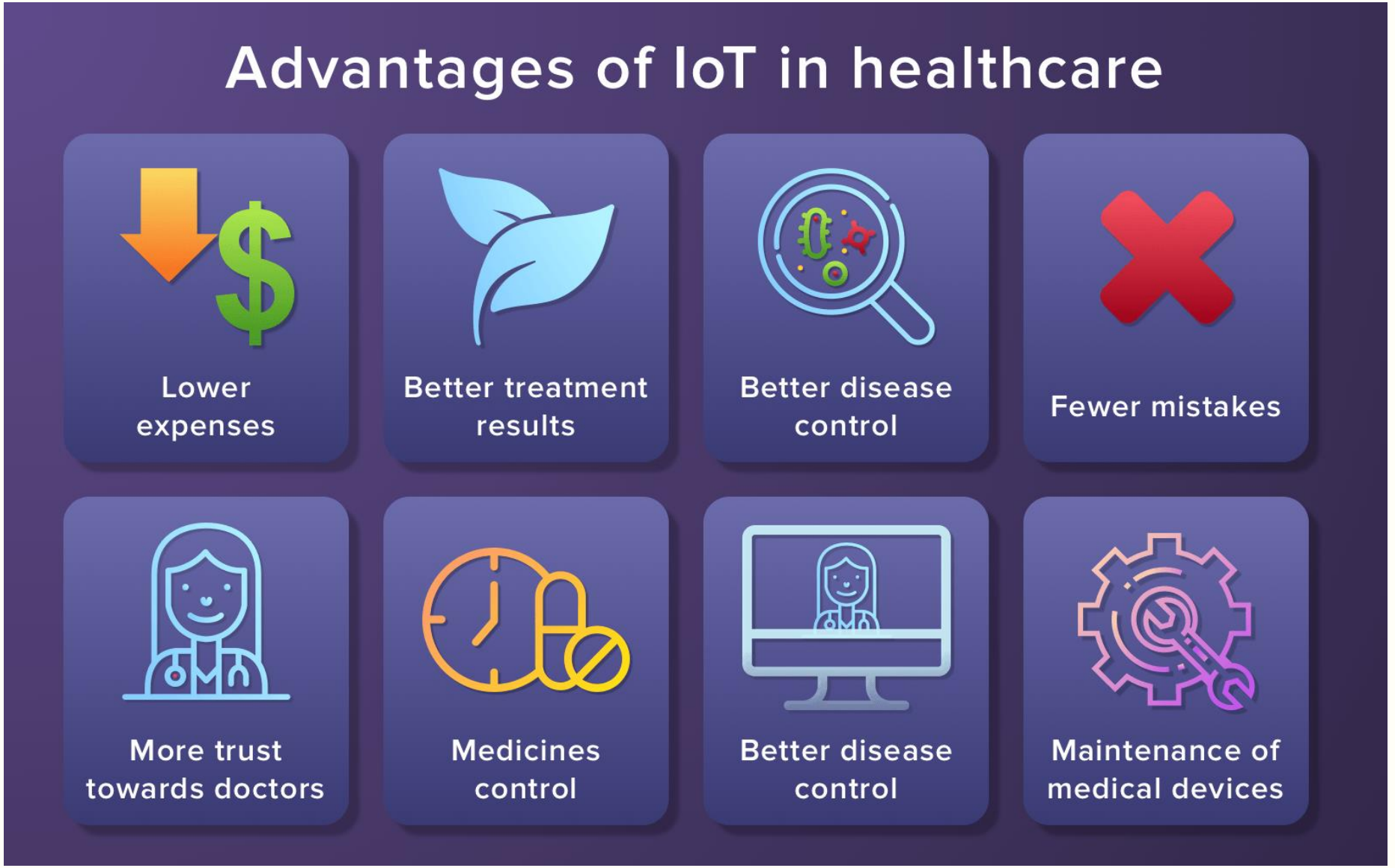
# INTERNET OF THINGS

# IoT Solutions for Smart Hospital

- Patient Tracking & Wayfinding
- Asset Tracking & Management
- Linen Management
- Smart Bed Patient Information Display
- Locating Call System
- In-hospital Intelligent Navigation
- Facilities Status Monitoring
- Baby Tracking System

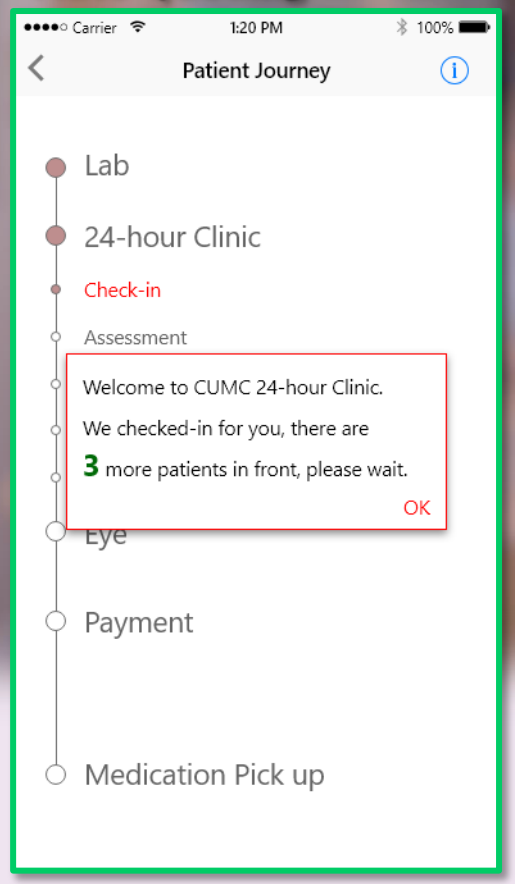


# Advantages of IoT in healthcare

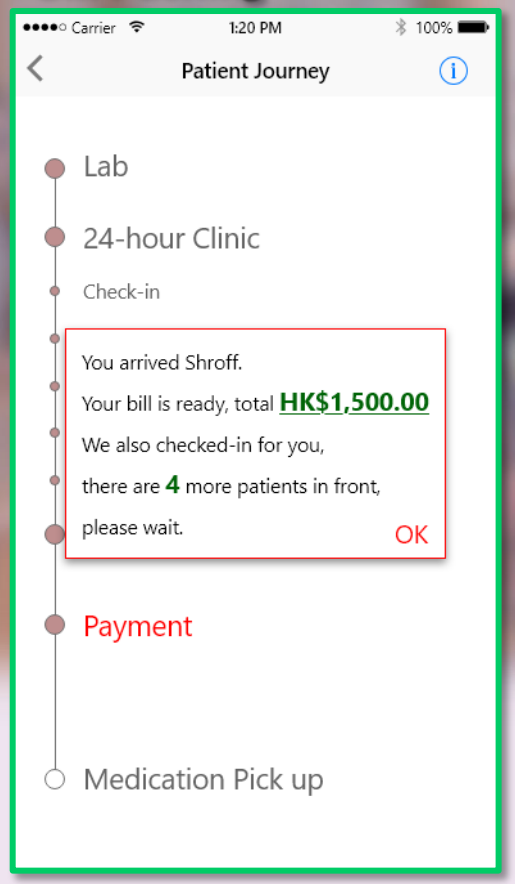


# Out-Patients

## Auto-queuing




## Bill Pushing



# Real-time Location Tracking for In-Patients

Real-time Patient Locating (via UWB)

Geo-fencing Alert for Paediatric, Elderly Patients, Mortuary (via UWB)

Anti-thieving for New Born Infants (via UWB/Active RFID)

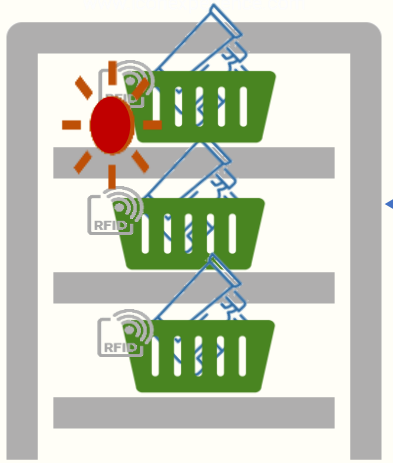
# IoT in Medication Management

## RFID / Bluetooth Applications

Prescription & dispensing information

Picking Stations

- Order information
- Drug information
  - Location
  - Batch, expiry
- Picking status



Checking

- Real-time prescription status
- Visibility & traceability

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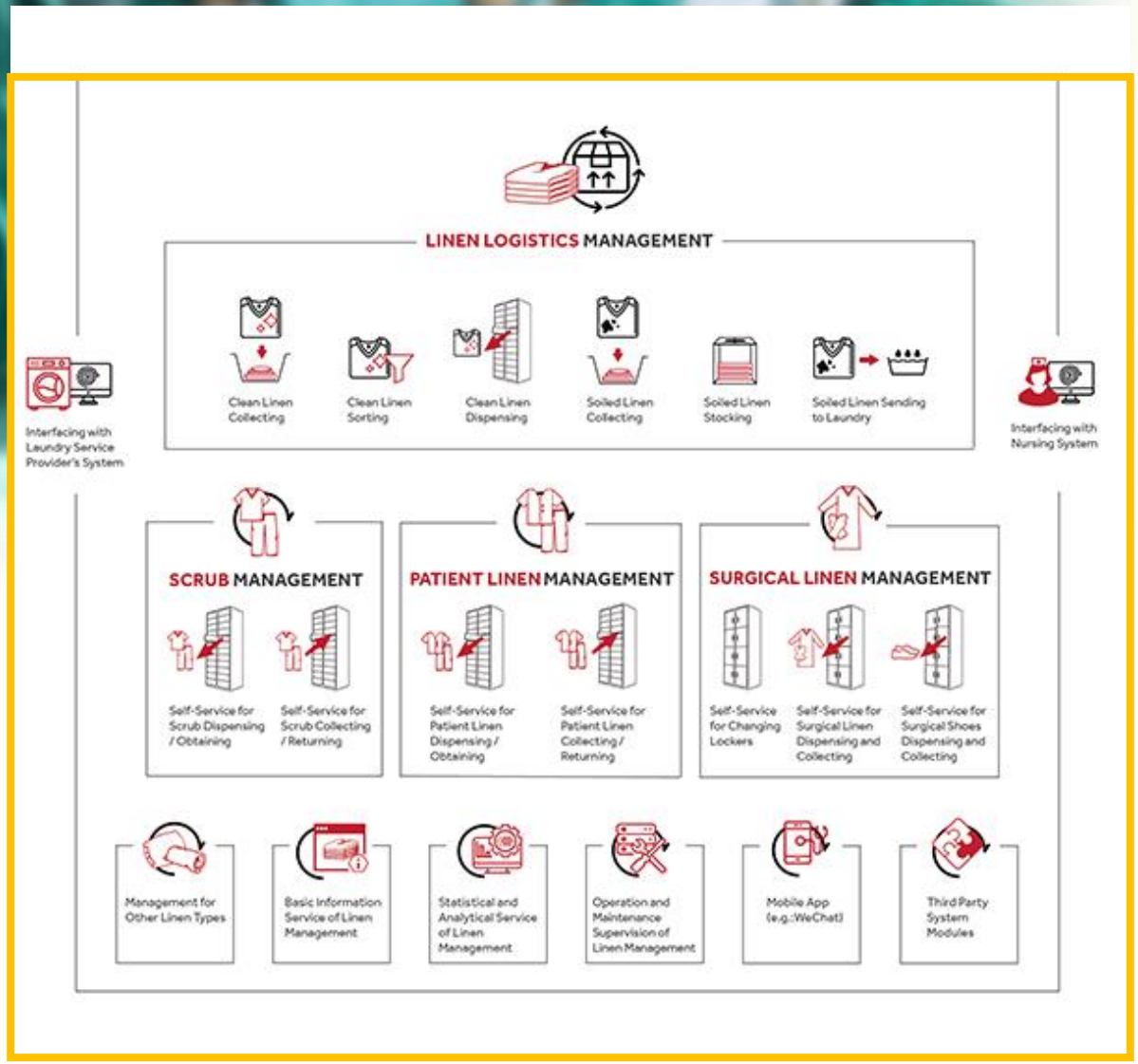
# High-value Consumable Cabinet

# Real-Time Location Tracking for Porters

**Objective: Enhance Overall Visibility**

**Results: Faster Response & Better Service Quality**

# Uniform Dispatching & Collecting

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# Real-time Location Tracking of Mobile Equipment

# THANK YOU!