Smart Hospital
Integrating Innovation Technology
融匯創科 共建智慧醫院

Revolutionizing Healthcare :

Smart Hospital Implementation In Hospital Authority of Hong Kong

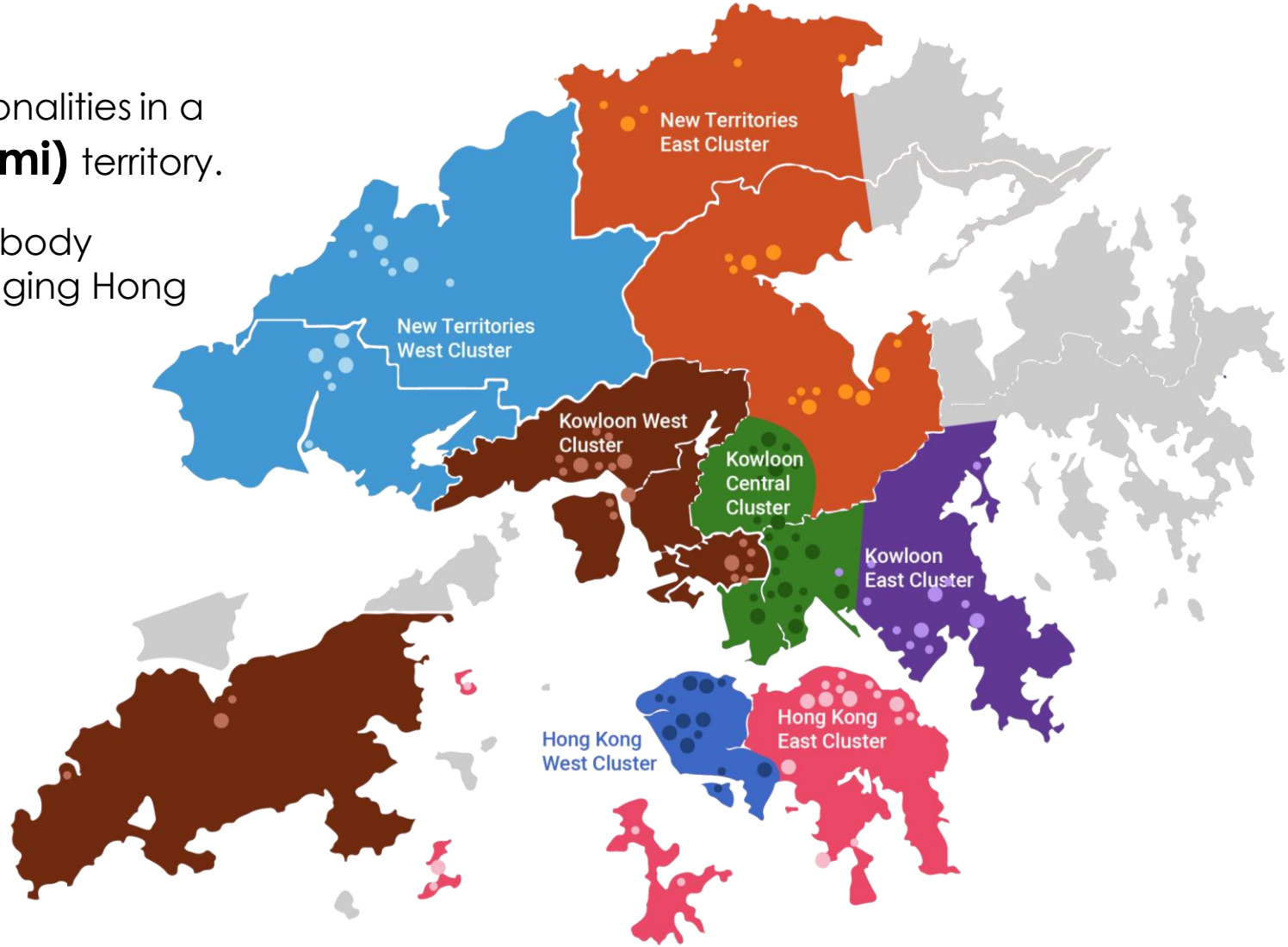
The International Forum on Quality and Safety in Healthcare

30 Oct – 1 Nov 2023

Hong Kong Healthcare

- **7.5 million residents** of various nationalities in a **1,104-square-kilometre (426 sq mi)** territory.
- The Hospital Authority (HA) is a statutory body established in 1990 responsible for managing Hong Kong's public hospital services.

- **7 Clusters**
  - Hong Kong East Cluster
  - Hong Kong West Cluster
  - Kowloon Central Cluster
  - Kowloon East Cluster
  - Kowloon West Cluster
  - New Territories East Cluster
  - New Territories West Cluster



Hospital Authority

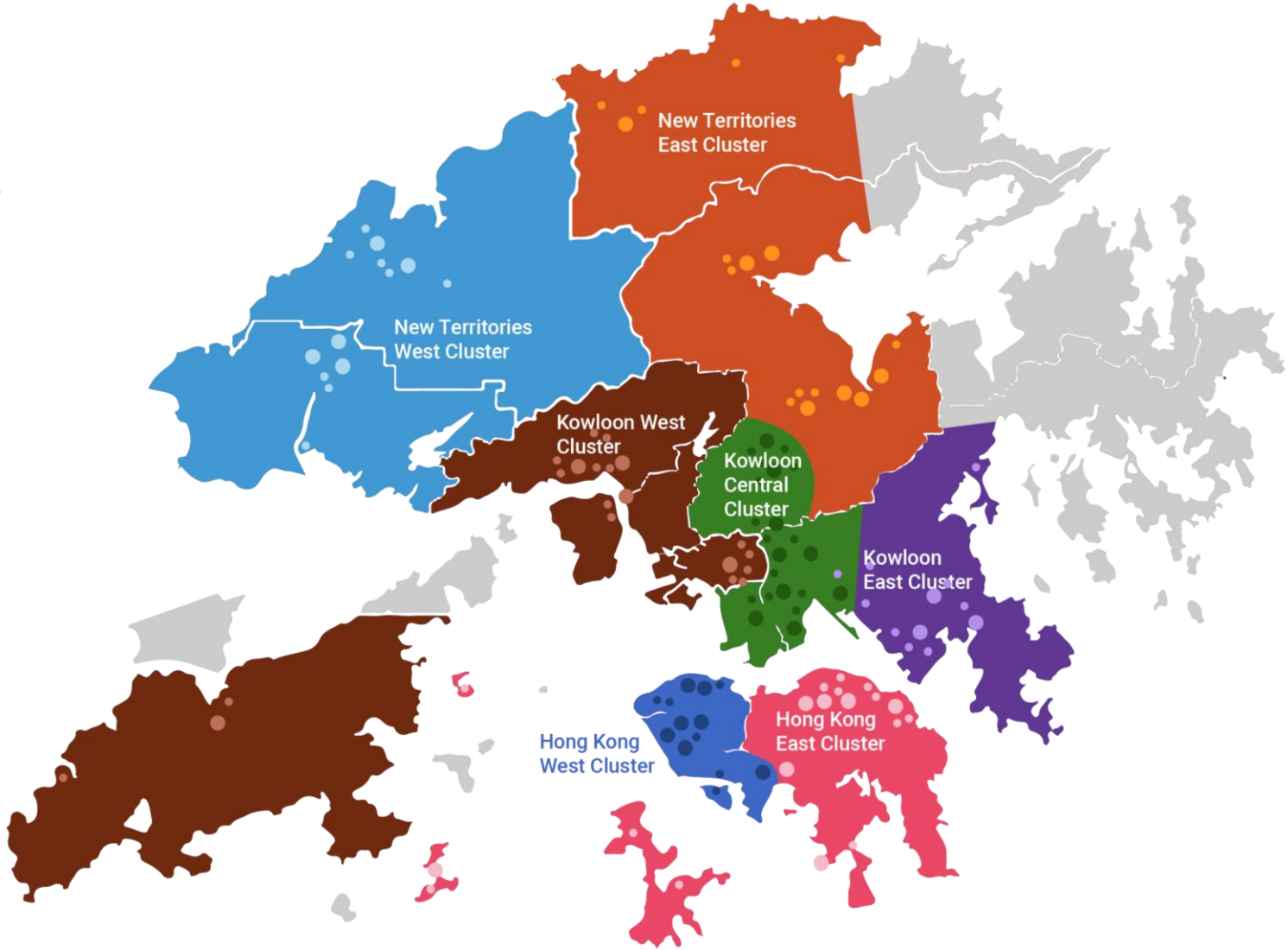
- 43 Public Hospitals
- 49 Specialty & 73 General Outpatient Clinics

- 30,000+ Beds

- 90,000+ Staff
  - 6700 + Doctors
  - 37,000 + Nurses & AH Prof

- 13M clinic attendances
- 1.84M A&E Attendances
- 1.76M Admissions

- HK$ 91B Annual Operating Budget



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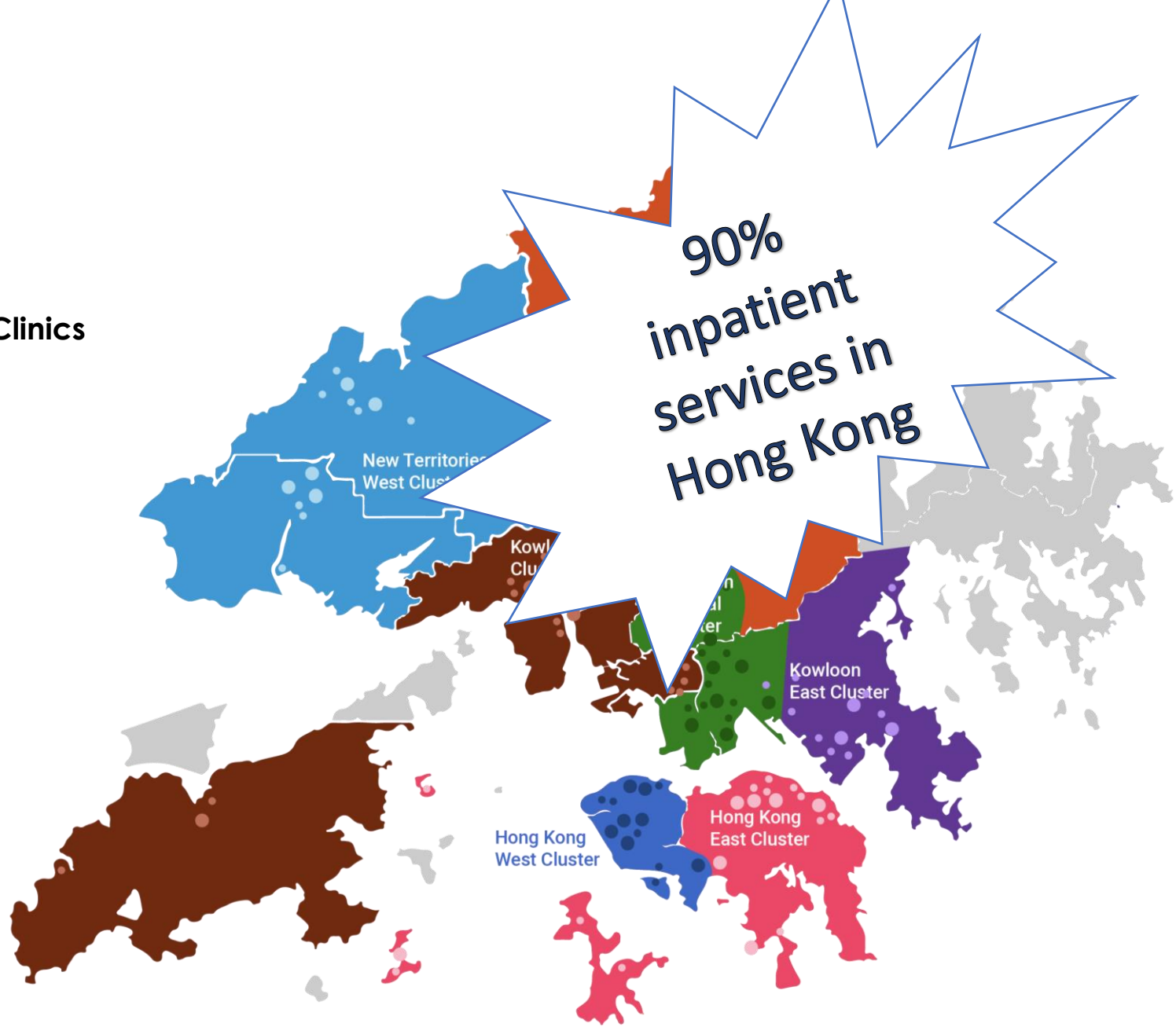
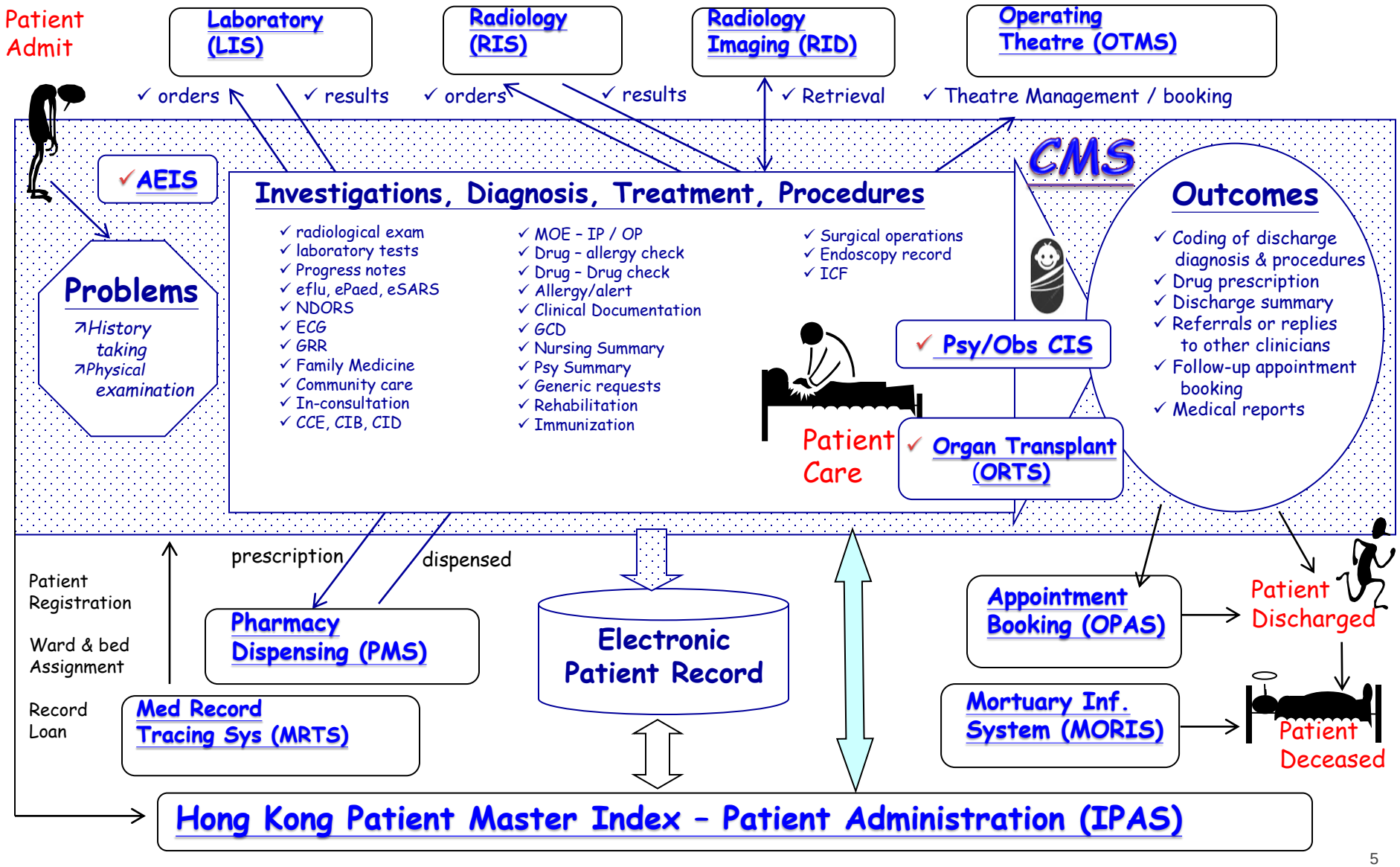


One CMS – Patient Care Delivery Journey



HA Clinical Management System (CMS)

100%

evolution to a world-class clinical IT system

30+ Years

made in HK & designed by clinicians

1000 Modules

covering all aspects of hospital healthcare

60,000+

clinical users in 43 public hospitals

280TB

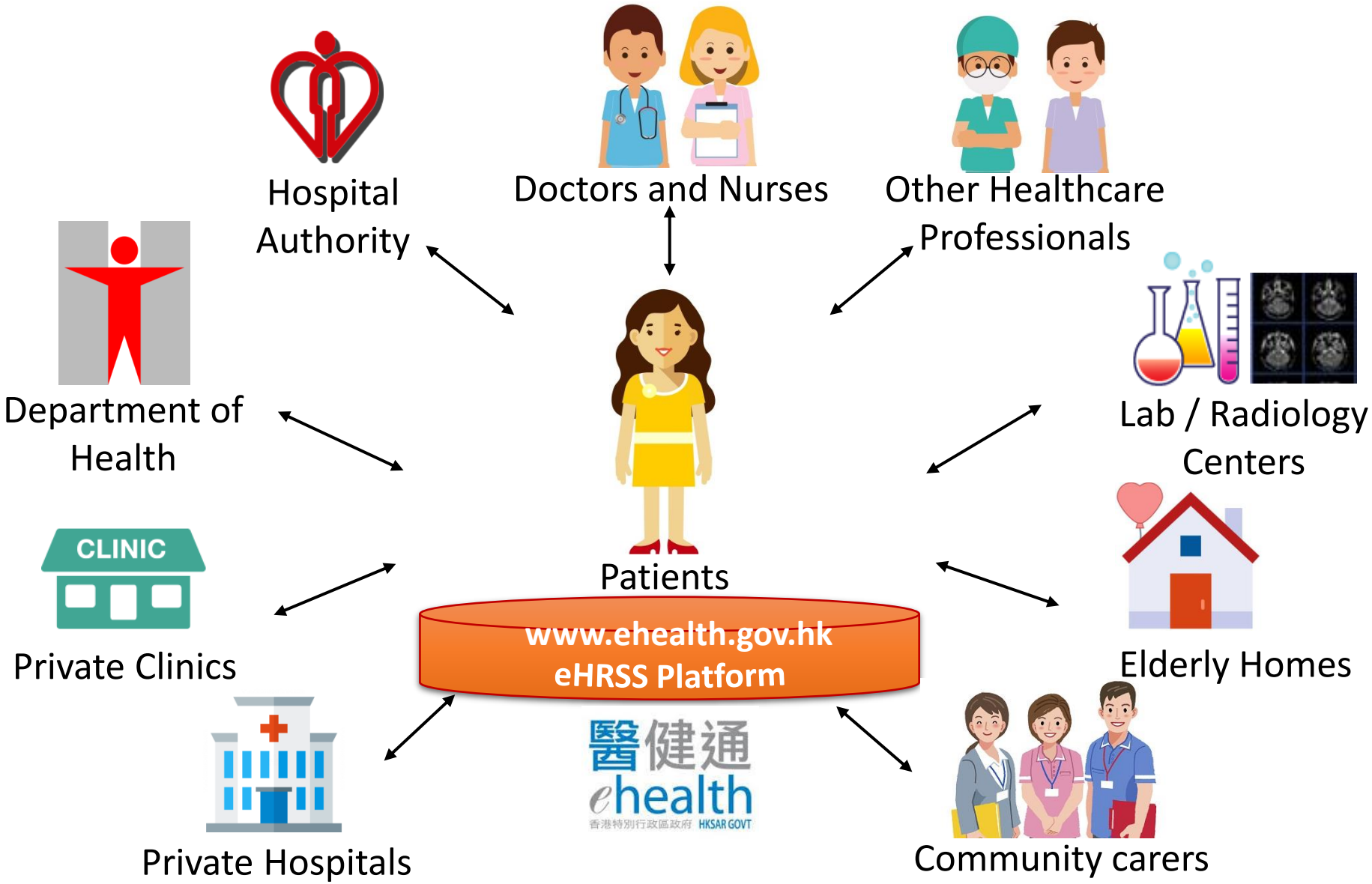
of HK citizens' clinical data

18M+

daily data transactions

HIMSS EMRAM

Territory-wide
Electronic Health Record Sharing System (eHRSS)



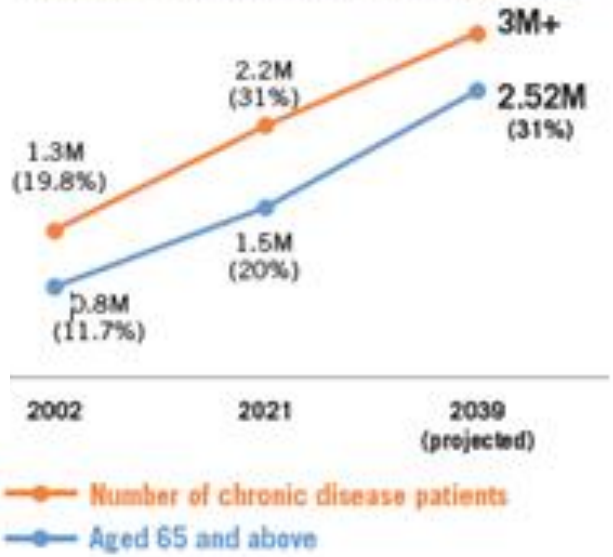
The Healthcare Challenges in Hong Kong

Ageing Population and Increase in Chronic Disease Prevalence

Projection of population aged 65 and over (Projection of 2039)

Population with chronic diseases (Projection of 2039)

Population aged 65 and over and number of chronic disease patients



Diabetes and Hypertension

About **half** are undiagnosed

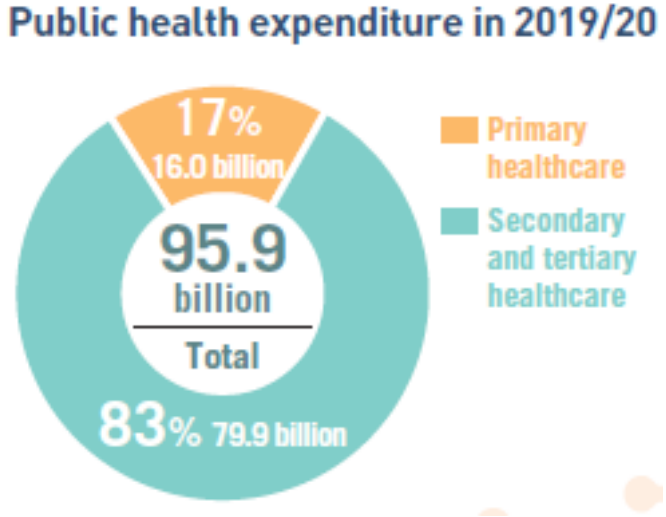
One in three has developed complications

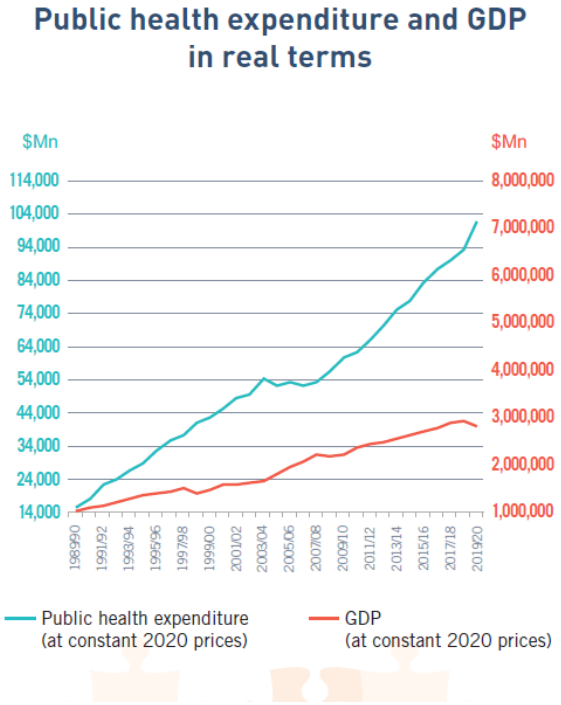
Service cost for complications is **two times higher**

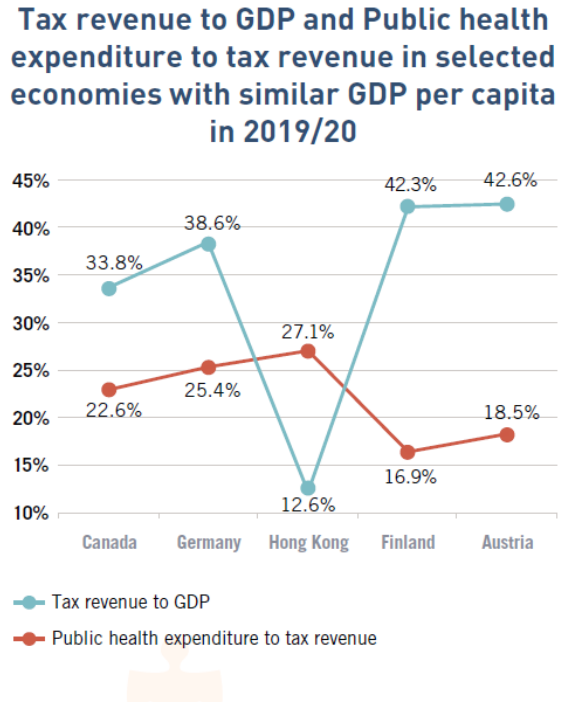
Source : [Homepage (primaryhealthcare.gov.hk)]

The Healthcare Challenges in Hong Kong

Health system sustainability





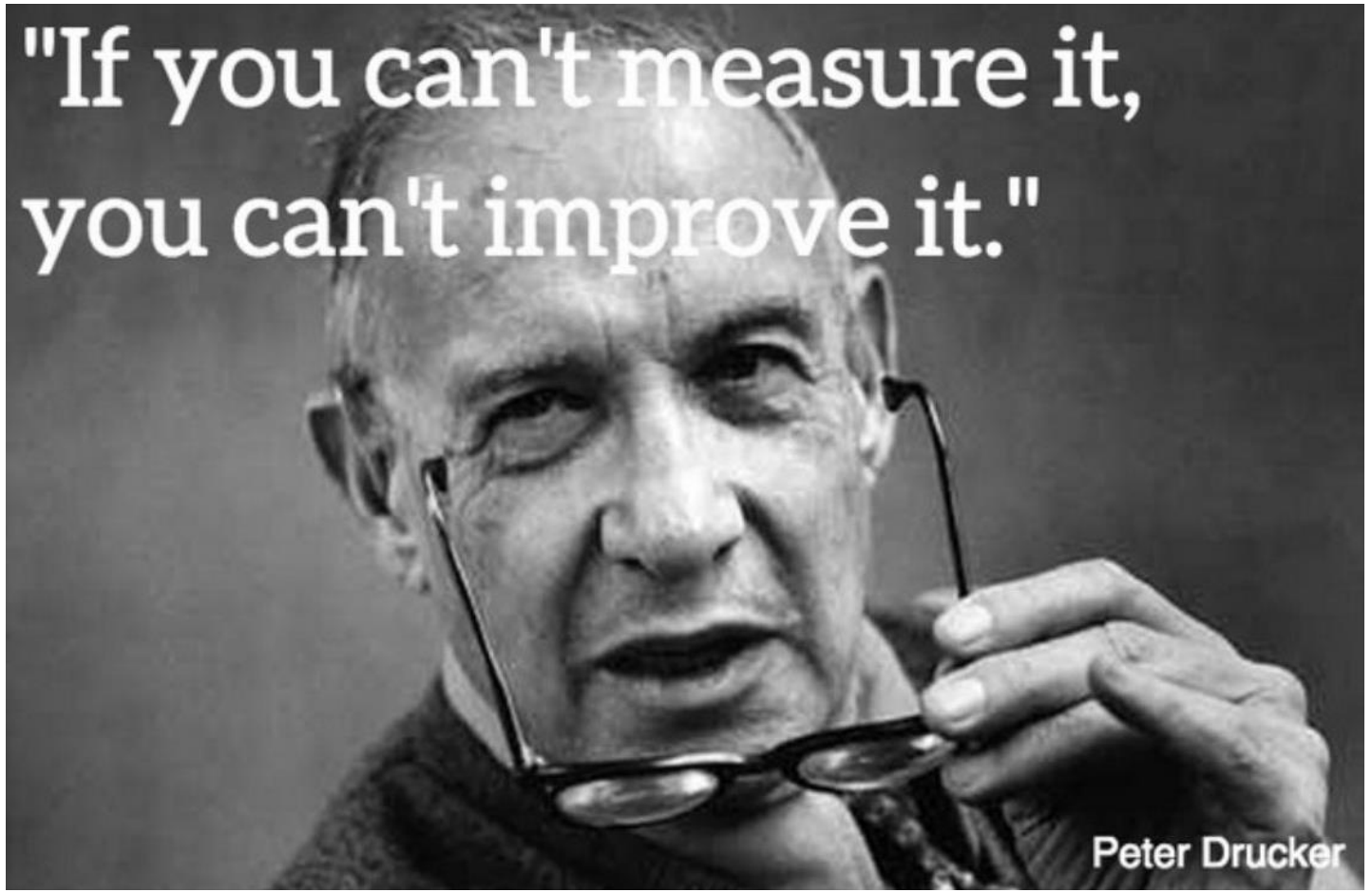


Source : [Homepage (primaryhealthcare.gov.hk)]

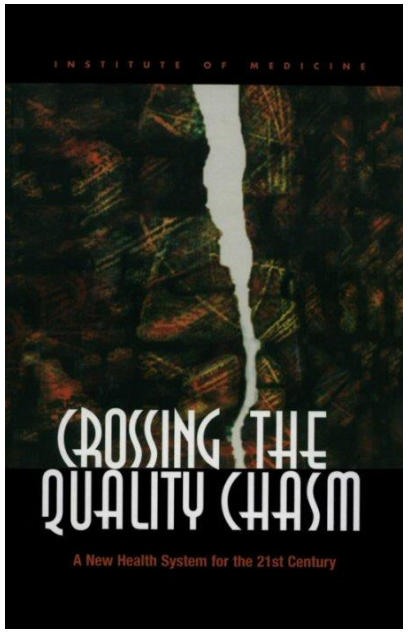
“Enabler”

From Individual Patient Care to
Corporate-wide Healthcare Service Delivery

Enabling systemic improvement of
HA Clinical Service Delivery
with real evidence of
rich pool of clinical data



Source : https://blog.scoop.it/2015/01/22/measuring-curation-coopit-analytics/



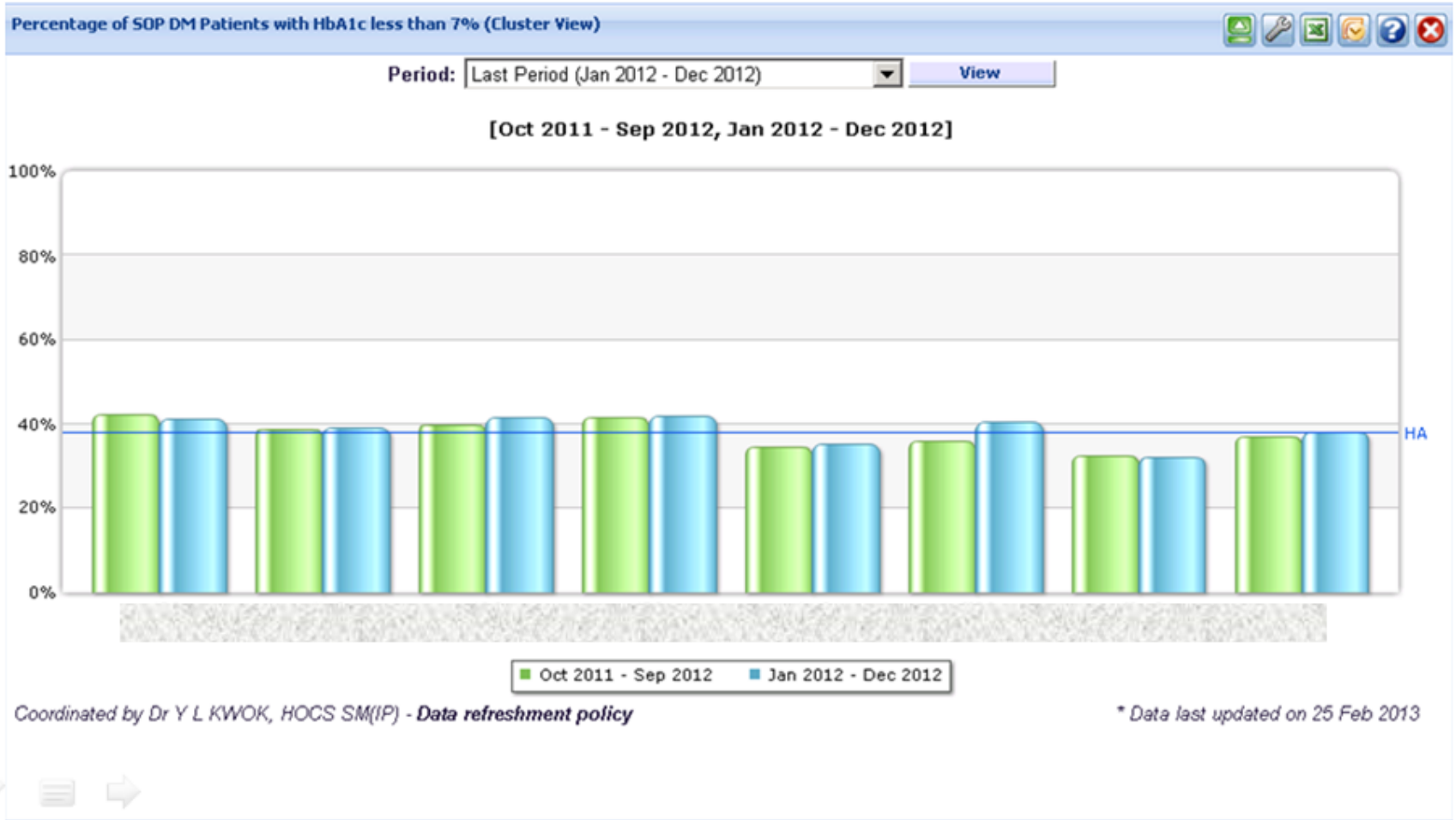
IOM Quality Domains

Safety Ensure that medical care intended to benefit patients is not causing harm	**Timeliness** Patients requiring medical attention should have access to timely health care	**Effectiveness** Treatments are based on scientific knowledge and produce beneficial results
Efficiency Care that avoids wasting finances, time, equipment, and energy	**Equity** Consistent care across all genders, ethnicities, and socioeconomic statuses	**Patient-Centeredness** Care is respectful and responsive to individual needs and preferences

Source : https://www.cdc.gov/ophss/csels/dls/pdf/arpa-2011-0555-ra.pdf

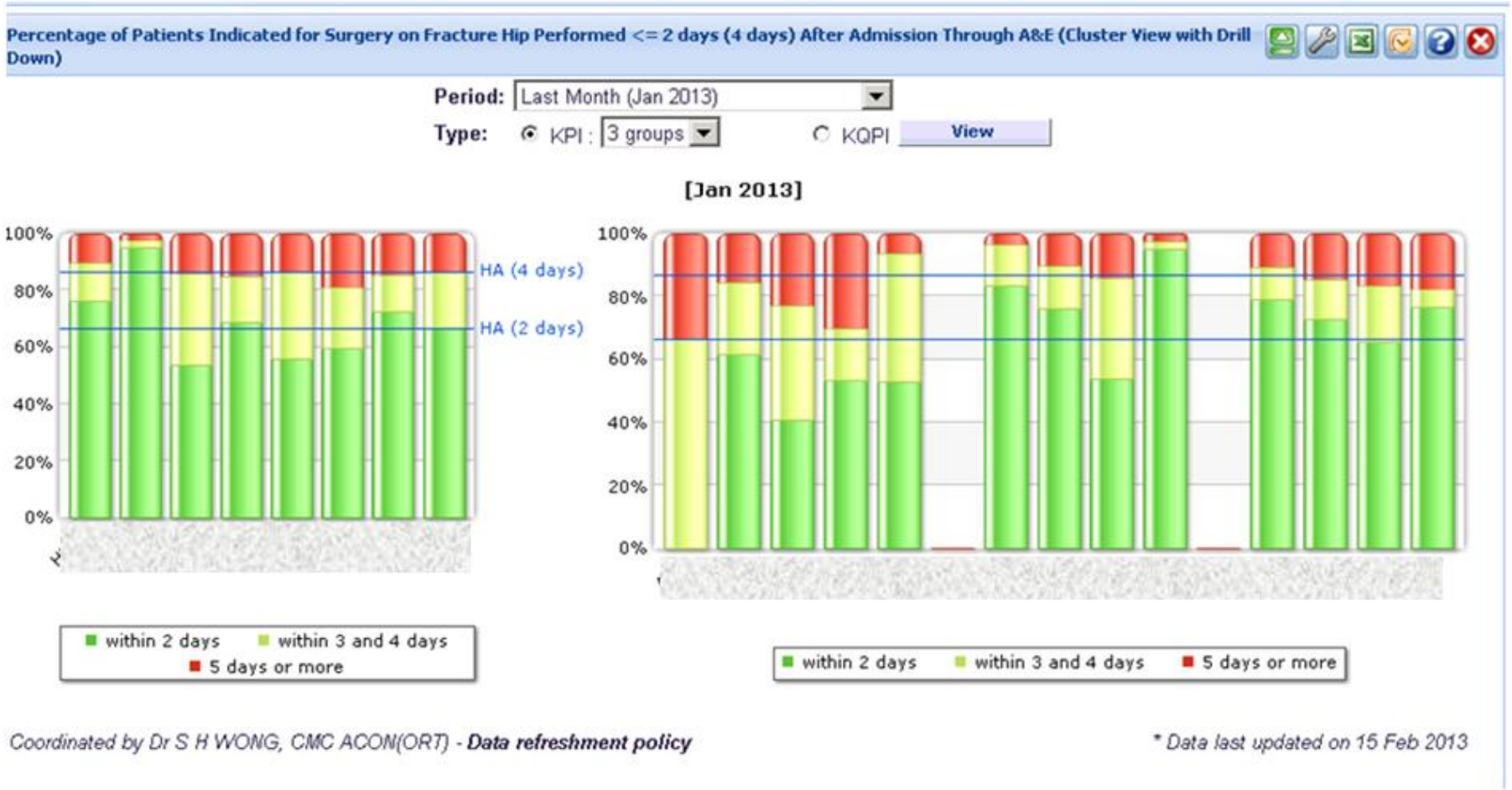
Quality Service Performance Monitoring

KPI - Diabetes Mellitus Patient Management



Quality Service Performance Monitoring

KPI – Fracture Hip Patient Management

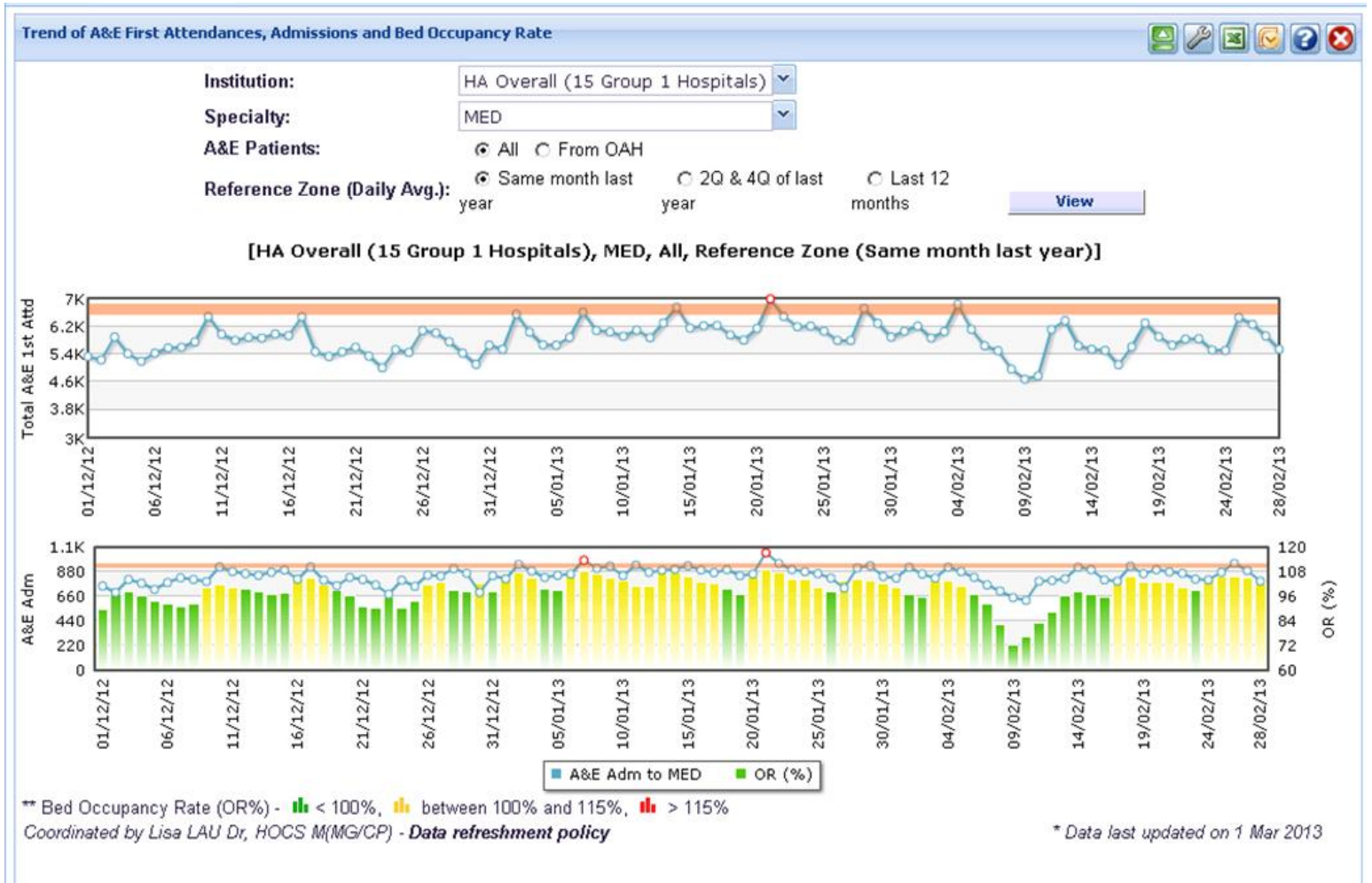


Service Accessibility

KPI – Cataract Waiting Time Management

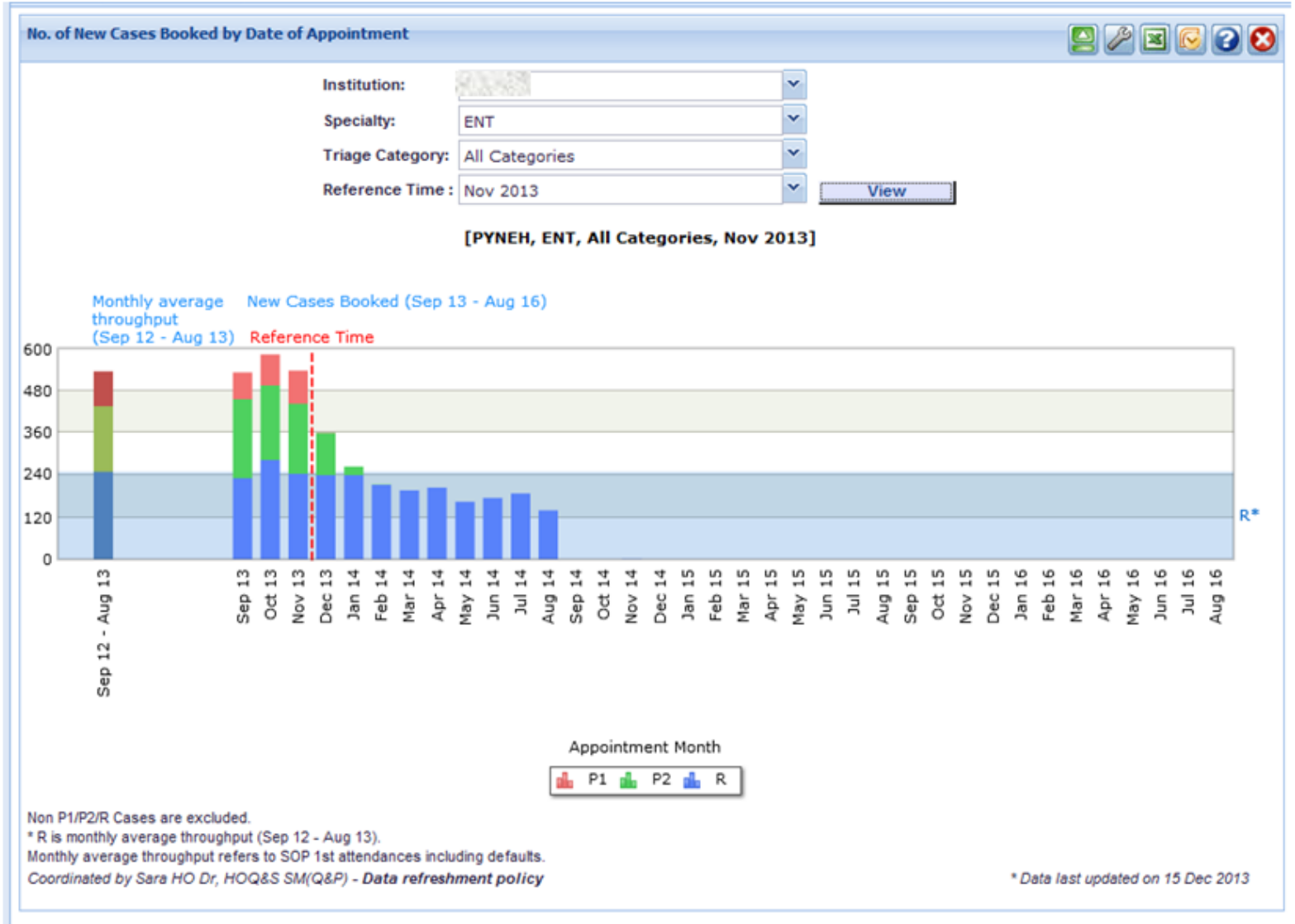
Service Accessibility

Flu Surge Management



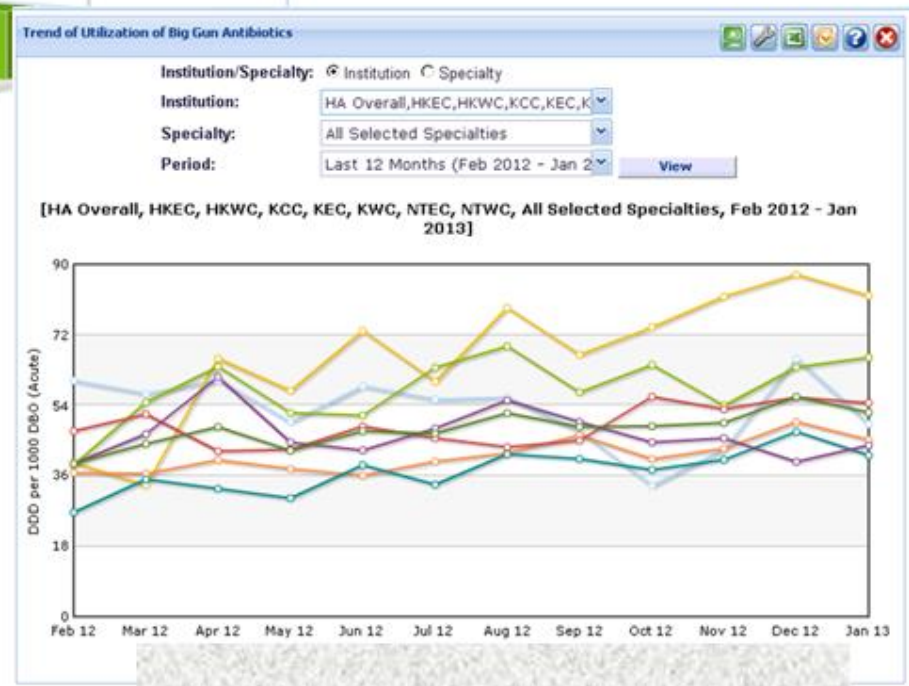
Service Accessibility

Specialty Outpatient Clinic Waiting List Management (2)



Resource Utilization Monitoring

Big Gun Antibiotics Utilization



Data driven care :
Improvement of Patient Safety & Risk Reduction

- Auto-Alert of Hepatitis B patients under Chemotherapy without adequate recommended coverage of antiviral treatment
- Auto – Alert for potential cases with Overstayed Ureteric Stent
- Identification of potential missing cases for critical investigation results using data analytics with structured and free text data
- ……

Example 1. Auto-Alert of Hepatitis B patients under Chemotherapy without adequate recommended coverage of antiviral treatment

- To earlier identify the potential **outstanding cases** of Hepatitis B patients under Chemotherapy **without** adequate recommended full coverage of antiviral treatment
- To auto-alert clinicians for **follow-up**

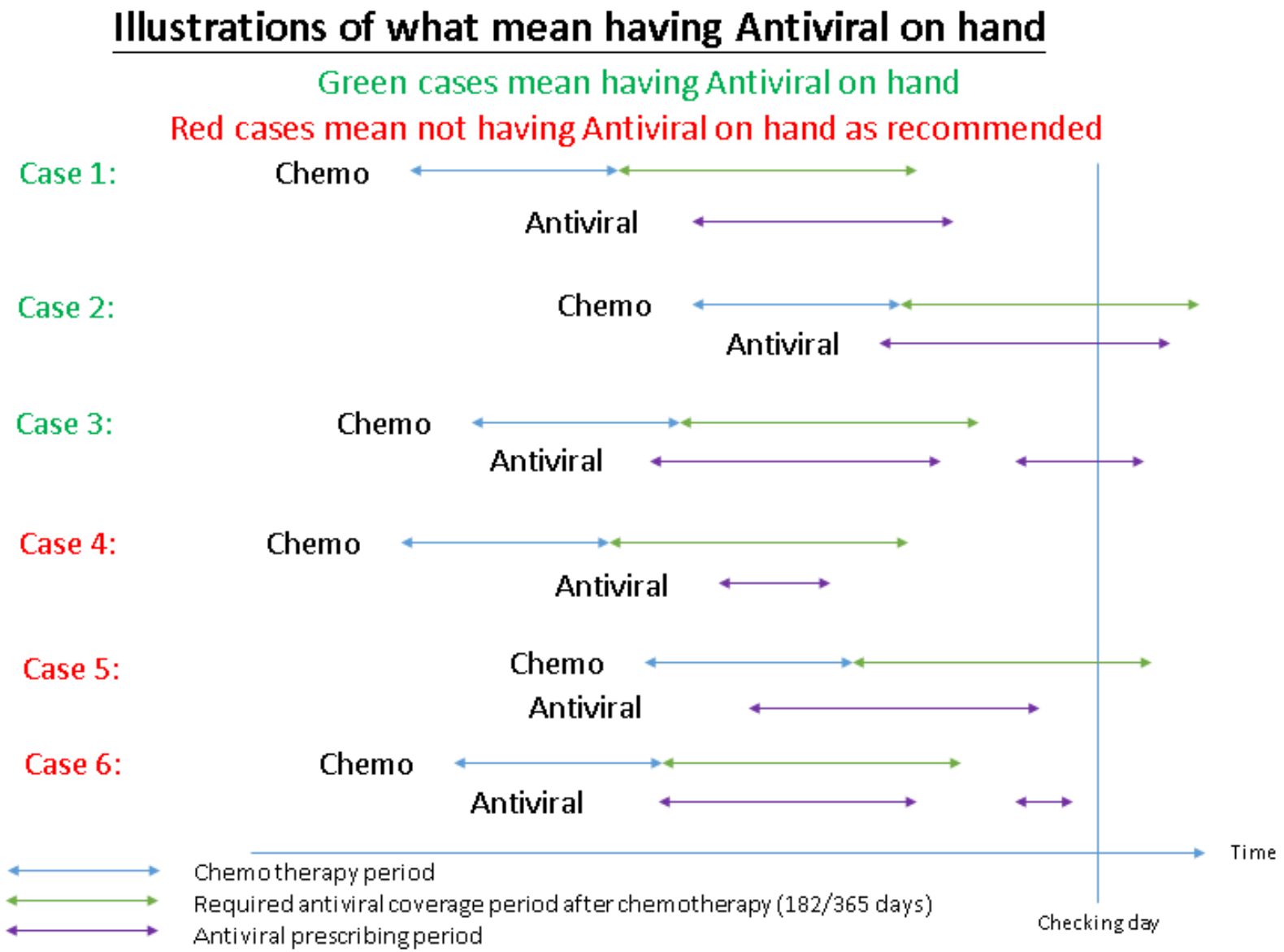
Criteria definition

1. Patient on Chemotherapy
   - Systems involved: Dispensing records

2. Hepatitis B patient
   - Systems involved: LIS, Corp Alert, Diagnosis

3. Patient without recommended antiviral cover
   - Systems involved: Dispensing records

Criteria definition – Antiviral on hand



Auto-Alert by Email notification

Subject: Chemotherapy patients with Hepatitis B potentially without full coverage of antiviral treatment as at dd-mmm-yyyy in XXX

Dear All,

Please note that as at dd-mmm-yyyy, there are potential xx patient(s) on Chemotherapy with Hepatitis B without full coverage of antiviral treatment in XXX.

- xx cases were newly found
- xx cases were reported previously but message not yet handled in CDARS

Please find the details by login to CDARS for your necessary follow up at:

http://cdars.home/production/JAVA/info/login.jsp?directLinkAction=directLinkAction_str761

Should you have any enquiry, please feel free to contact Ms Winnie WONG (HI) at 39192332 or Ms Ivy CHENG (IT) at 23008155 or Mr FUNG Wai Kit (IT) at 23008154.

Thanks for your attention.

Best regards,
CDARS Team

Auto Retrieval of Patient listing of Potential Outstanding Cases

CDARS | REPORT HISTORY | REQUEST SUBMISSION | USER DEFINITION | CDARS LITE | PATIENT LIST PORTAL | SYSTEM MAINTENANCE

Specify Reporting Criteria

Reporting Date 16/06/2018

June 2018

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Study Hospital

- All Hospitals and Institutions
  - [x] PMH
  - [ ] PWH
  - [ ] PYN
  - [ ] QEH
  - [ ] QMH
  - [ ] TMH
  - [ ] UCH

Other Criteria

- [x] Show Outstanding Case Only
- [x] Show Not Yet Handled Case Only

HIDE | VIEW REPORT

Chemotherapy patients with Hepatitis B potentially without full coverage of antiviral treatment

INFORMATION KIT | PRINT | BACK TO MENU

Reporting Date: 16/06/2018
Study Hospital(s): PMH
Show Outstanding Case Only: Yes
Show Not Yet Handled Case Only: Yes

Patient Id	Patient Name	Sex	Age	Patient in Previous Report (Y/N)	Hosp	Case No.	Best Matched Case No.	Date of Last Chemo Dispensed	Expected End Date of Antiviral Covered	Date of Last Antiviral Dispensed	End Date of Dispensed Antiviral	Antiviral on Hand (Y/N)	Case Closed	Remind Me 1 Week Later	True/False Positive	Remind History
[redacted]	[redacted]	M	74	Y	[redacted]	[redacted]	[redacted]	06-Jun-2018	08-Dec-2018	08-Jun-2018	11-Jun-2018	N	CLOSE	REMIND	Not Selected	REMIND HISTORY
		M	74	Y				06-Jun-2018	08-Dec-2018	08-Jun-2018	11-Jun-2018	N	CLOSE	REMIND	Not Selected	REMIND HISTORY
		M	74	Y				06-Jun-2018	08-Dec-2018	08-Jun-2018	11-Jun-2018	N	CLOSE	REMIND	Not Selected	REMIND HISTORY
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		M	74	Y				06-Jun-2018	08-Dec-2018	08-Jun-2018	11-Jun-2018	N	CLOSE	REMIND	Not Selected	REMIND HISTORY

Example 2.

Auto – Alert for potential cases with Overstayed Ureteric Stent

Criteria definition – With Stent insertion

Systems involved: Procedure records

Term Id	icd9_proc	ext	Description	Group	System checking for Expiry Period
25784	59.8	2	Insertion of double-J catheter, left	1	120 Days
25785	59.8	3	Insertion of double-J catheter, right		
47139	97.62	2	Removal of double-J stent, left		
47140	97.62	3	Removal of double-J stent, right		
47168	59.8	14	Insertion of metallic stent in ureter, left	2	365 Days
47169	59.8	15	Insertion of metallic stent in ureter, right		
47173	97.62	5	Removal of metallic stent from ureter, left		
47174	97.62	6	Removal of metallic stent from ureter, right		
47167	59.8	13	Insertion of double-J catheter in graft ureter	3	120 Days
47172	97.62	4	Removal of double-J catheter in graft ureter		
47898	59.8	18	Insertion of one year Type Plastics Double-J stent into left ureter	4	365 Days
47899	59.8	19	Insertion of one year Type Plastics Double-J stent into right ureter		
47901	97.62	7	Removal of one year Type Plastics Double-J stent into left ureter		
47900	97.62	8	Removal of one year Type Plastics Double-J stent into right ureter		

Criteria Definition

Patients with Stent insertion but without removal procedure for the same side over 120 days for group 1 & 3 Px, 365 days for group 2 & 4 Px.

Assumption:

1) Exclude private case

2) Exclude case performed by radiologists

3) At most one Stent at one side for the same group of stent insertion. Subsequent Insertion will be assumed that the old stent is removed and only 1 stent remains at the same side after insertion.

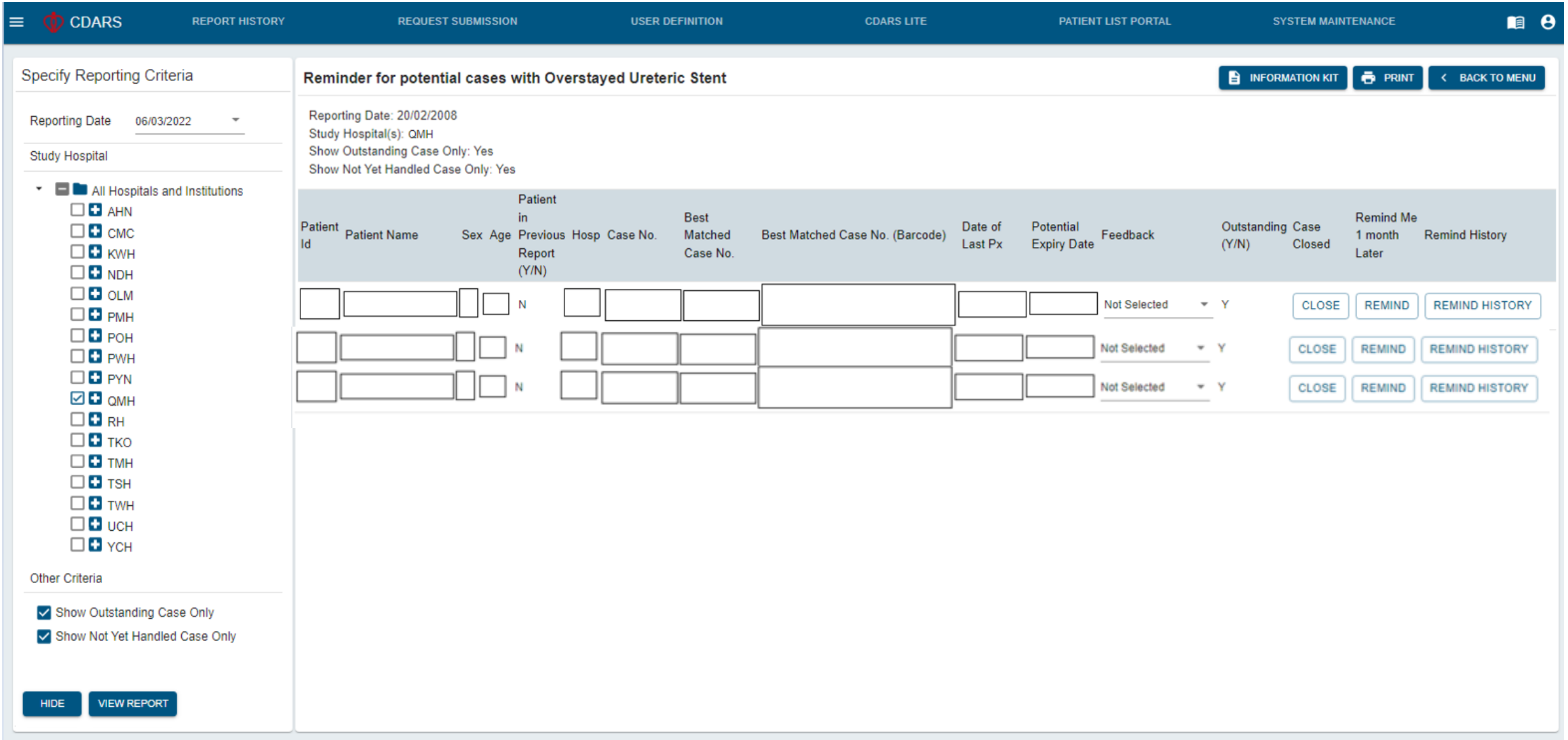
Counting rule:

For each group, each insertion Px will count 1 stent for the particular side

For each group, each removal Px will reset the count to 0 for the particular side

Example 2

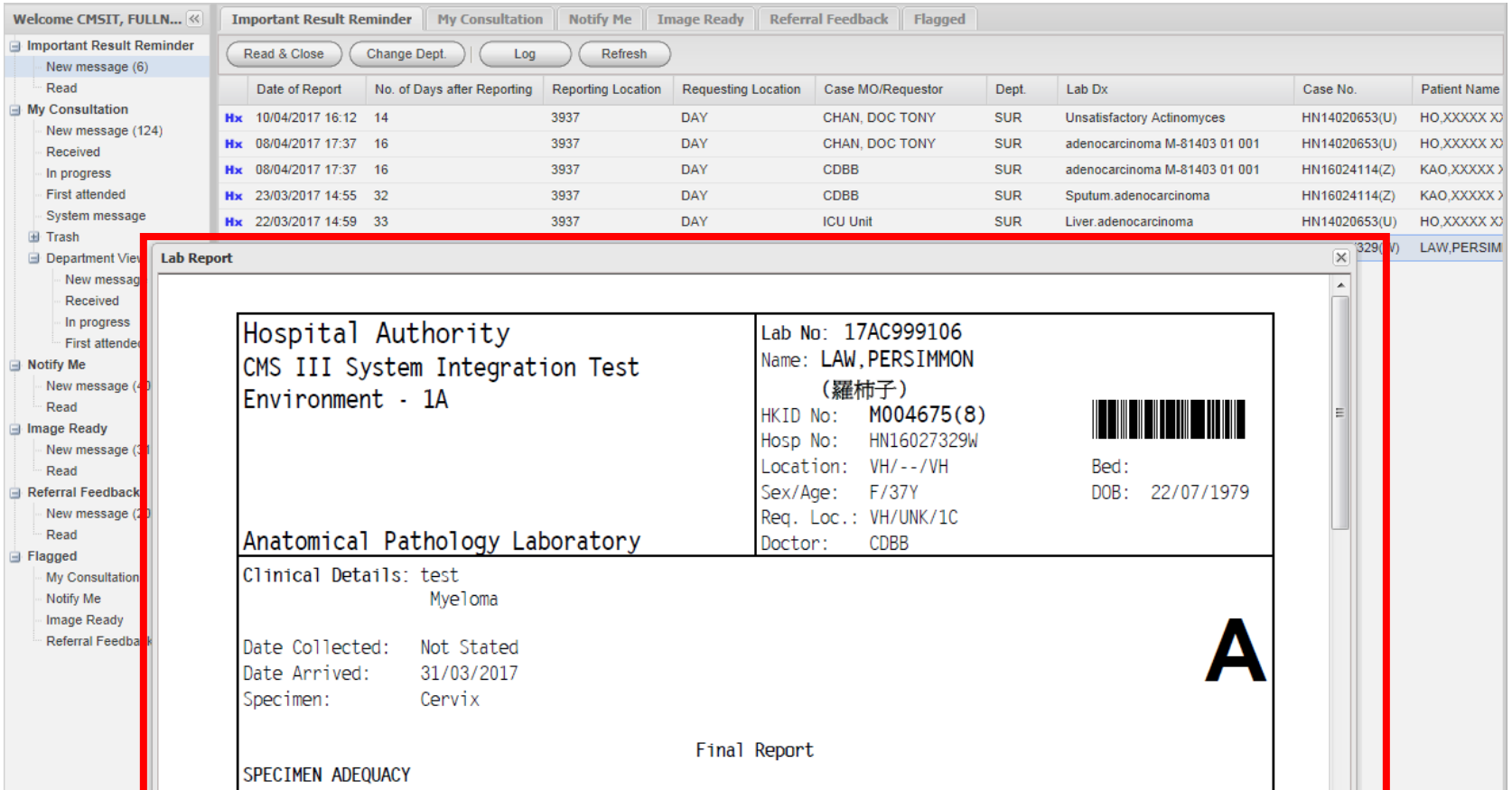
Patient listing of potential cases with Overstayed Ureteric Stent



Example 3.

Identification of potential missing cases for critical investigation results using data analytics with structured and free text data

Auto- Retrieval of Patient List with new Cancer Lab results for Clinical Team Review



Year 2022-27 - Strategic goals

Developing Smart Hospital for Sustainable Healthcare

STRATEGIC GOALS

Along with increasing service supply, the strategic goals reflect our aspiration to enhance sustainability by changing our service models towards the provision of "Smart Care", which will be implemented with the support and commitment of a "Smart Workforce", and with "Smart Hospitals" as a key enabler. The strategic goals are as follows:

- Provide Smart Care – Adopting new service models and technology to improve health outcomes and reduce the need of our patients for hospital care.
- Develop Smart Hospitals – Using Information Technology (IT), digital technology and Artificial Intelligence (AI) infrastructure to enable Smart Care and enhance operational efficiency.
- Nurture Smart Workforce – Nurturing a robust and flexible talent pool with the skills and knowledge for providing Smart Care.
- Enhance Service Supply – Expanding and modernising healthcare facilities as well as ensuring financial sustainability to meet escalating service needs.

Smart Hospital – 5 Pillars

Smart Care

Smart Hospital Support

Smart Hospital Management

Smart Facility & Infrastructure

Smart Staff

Smart Hospital Product - Targets

Clinical Excellence

Efficiency Gain

Smart Hospital Culture – *Collaborative Innovation*

Smart Hospital Products

Digital Transformation

Patient Experience

Environmental Sustainable

Smart Hospital Benefits to Key Stakeholders

Patients & Public

- Convenient to access services
- Better experience, e.g. queue-less
- Less crowd and better infection control

Clinical Frontline

- Clinical excellence
- Prevent clinical incidents
- More efficient
- Higher morale

Hospital Management

- Operation efficiency and effectiveness
- Flexible allocation of resources
- More business support intelligence

Corporate Management

- More efficient use of public resources
- Less clinical incidents
- Better organizational reputation

醫院管理局
HOSPITAL AUTHORITY

HA's Overall Digital Maturity

"Information is in Digital Form"

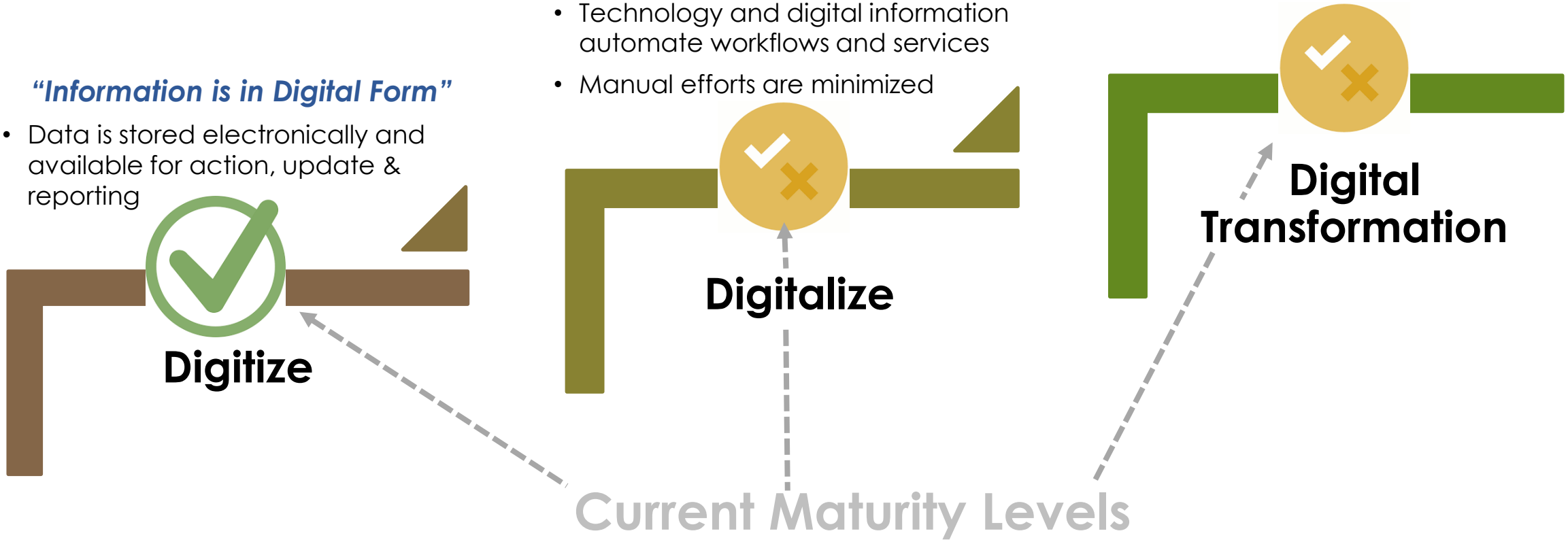
- Data is stored electronically and available for action, update & reporting

"Processes are automated & patient/ user centric"

- Technology and digital information automate workflows and services
- Manual efforts are minimized

"Service models are innovated using new technology"

- Major focus on opportunities to "rethink how we work", implement new service models
- Organization has the capabilities to execute new strategies and changes quickly



Smart Hospital Initiative - eAED for 18 AEDs

東方日報
2019-09-16
A14

醫健 Health

急症室電子化 減出錯 增效率

三醫院已採用 未來數年擴至全港

醫院急症室工作猶如戰場打仗，每一刻都要爭分奪秒，若配套跟不上時代步伐，便會加重醫護人員負擔。有前線醫生構思了急症室電子系統（eAED），統一病人病歷資料，加快急症室的分流，以電子化服務減少了醫護出錯或「走漏眼」機會，提出該系統的新界西醫院聯網急症科顧問醫生的雷俊達榮膺今年醫管局優秀青年獎得主。現時電子化的急症室服務已在天水圍、北大嶼山、律敦治醫院推行，未來幾年更計劃拓展至全港十八間公院急症室，有助提升全港急症室的工作效率。

■醫護人員在急症室工作的每一刻都要爭分奪秒。

雷介紹，目前三間公立醫院運用的急症室電子系統，已經容納幾十萬的病人數據在內，若將來推廣至全港所有急症室，相信會有超過二百多萬的病人數據量。他在二〇一一至一二年間開始構思急症室電子系統，在該系統下，醫護可將病人資料直接輸入電腦，減少手寫，亦毋須人手傳遞，提升資料傳送速度及準確度，醫生登入電腦更可即時查看病人過往的病歷紀錄。

手寫牌板「睇唔明寫乜」

現在該系統能夠察覺病人的維生指數，例如血壓、脈博、呼吸率等，若果出現異常便會在電腦中提醒醫護人員，從而對病人作出貼心照顧。從前的急症室工作效率較低，是因為醫護人員在使用手寫牌板，雷俊達解釋：「有時會睇唔明其他同事寫乜」，而且病人資料需要經人手傳遞，令工作流程十分緩慢，他以自己曾服務屯門醫院為例，每日大約有五百名病人使用急症室服務，根本容不下「慢」的情況，偏偏病人資料傳遞過程還有機會遺失。

談到系統的未來發展，雷認為數據能提升急症室效率，改善病人分流，亦可為人工智能科技發展提供貢獻。雖然該系統的數據現時尚未被數據實驗室採用，但他已經向醫管局「舉手」主動提供協助，相信這些數據能夠應用更廣。雷又希望未來能夠增加系統的透明度，讓病人清楚了解使用急症室服務的時間表，毋須常常詢問護士。

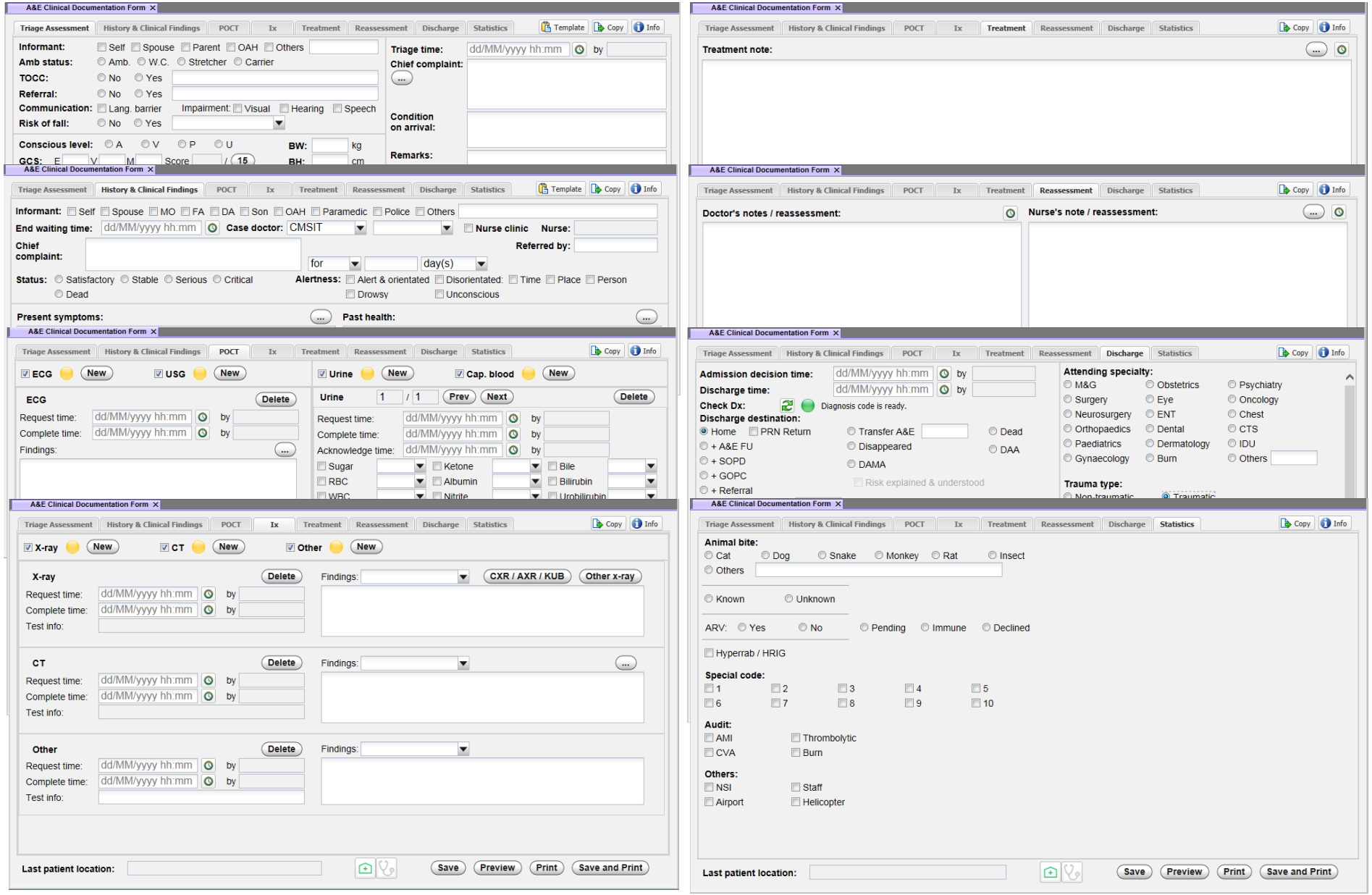
病人私隱獲嚴格保障

至於電子化系統會否導致個人資料容易外洩？雷認為毋須太擔心，因為醫管局對保護病人私隱有一套嚴格的政策，不會貿貿然取用病人資料，而且背後亦有專業的資訊科技團隊，監察該系統的正常運作，確保運作穩定性。

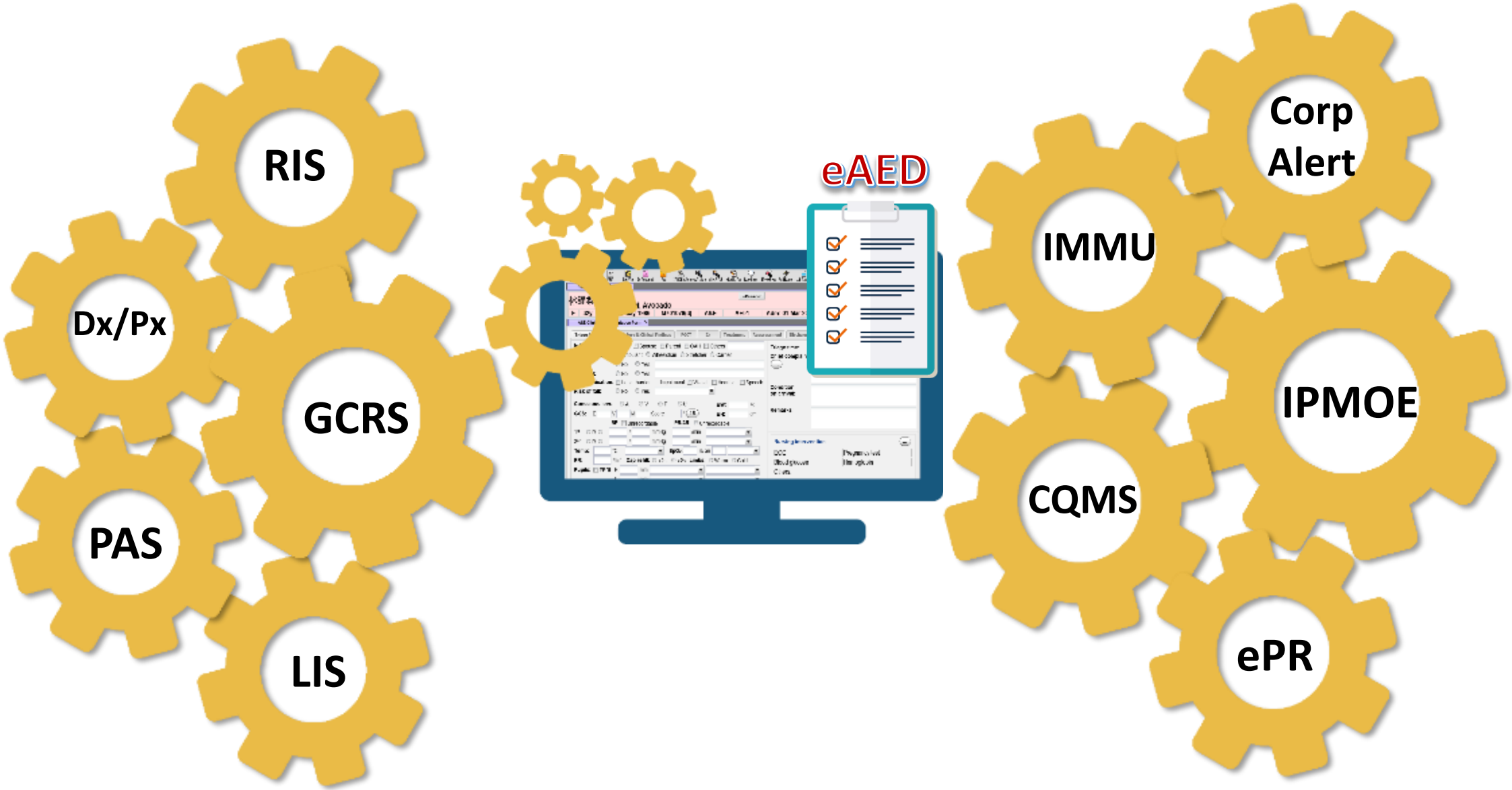
■雷俊達說急症室電子系統能提升工作效率。（林祐權攝）

IT&HI

eAED – AED Clinical Documentation

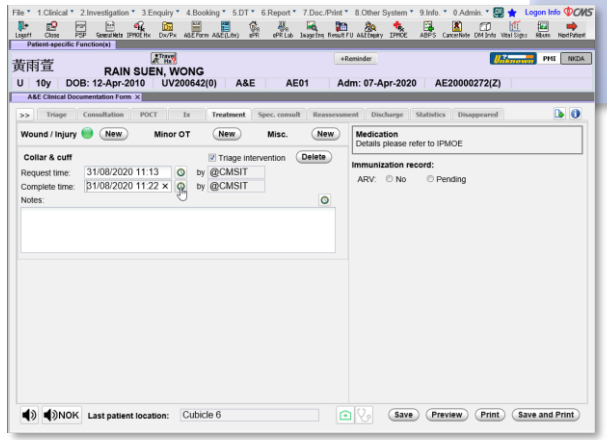


CMS Integration

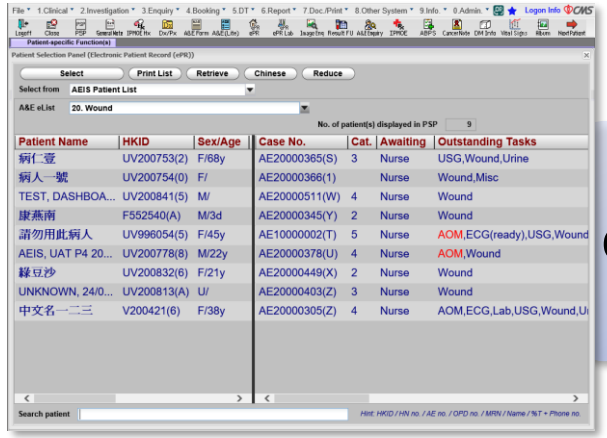


eAED - Closed Loop

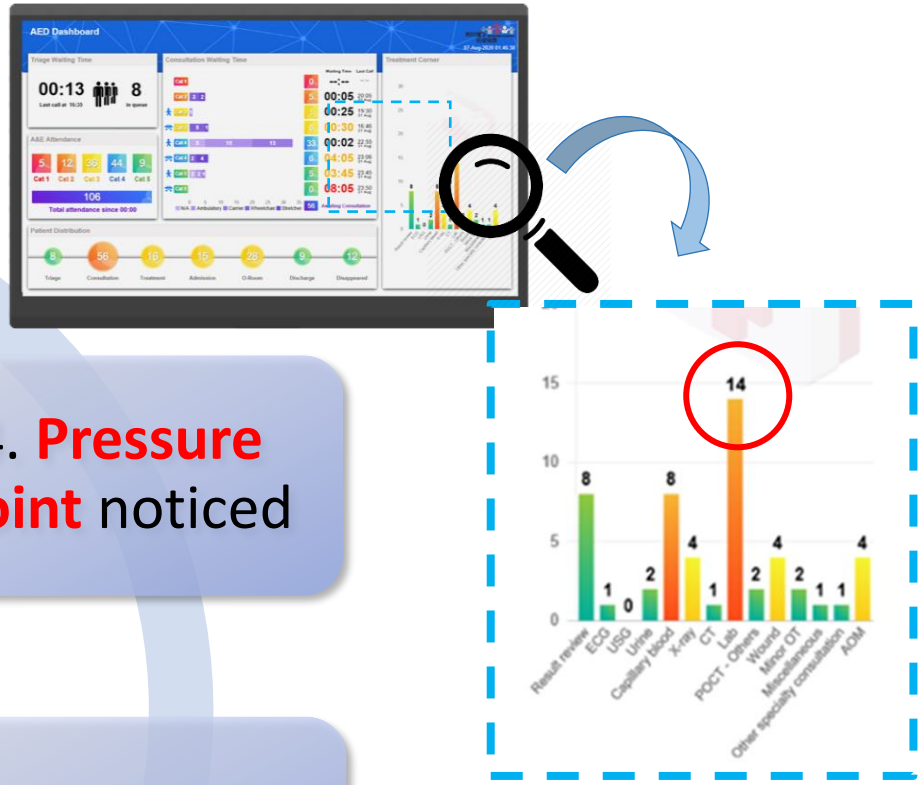
1.documentation at eAED



2. closed loop communication - eList

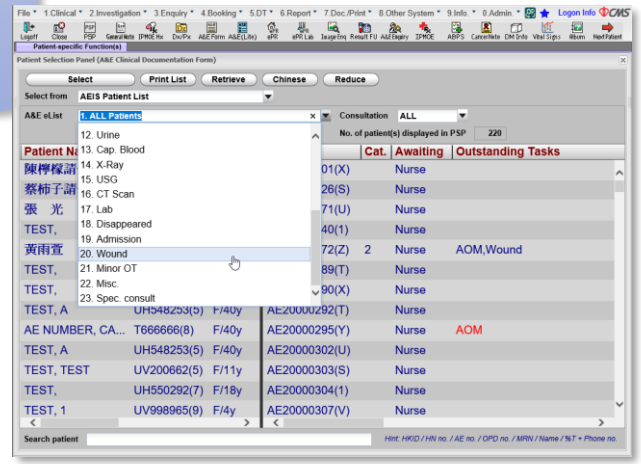


3. AED Dashboard



4. **Pressure point** noticed

5. **check eList**



6. **Resource / Manpower deployment**

6. task completed

Visualization of AED situation for AED Operation Management

VH AED Dashboard

Triage Waiting Time

00:12
Last call at 10:20

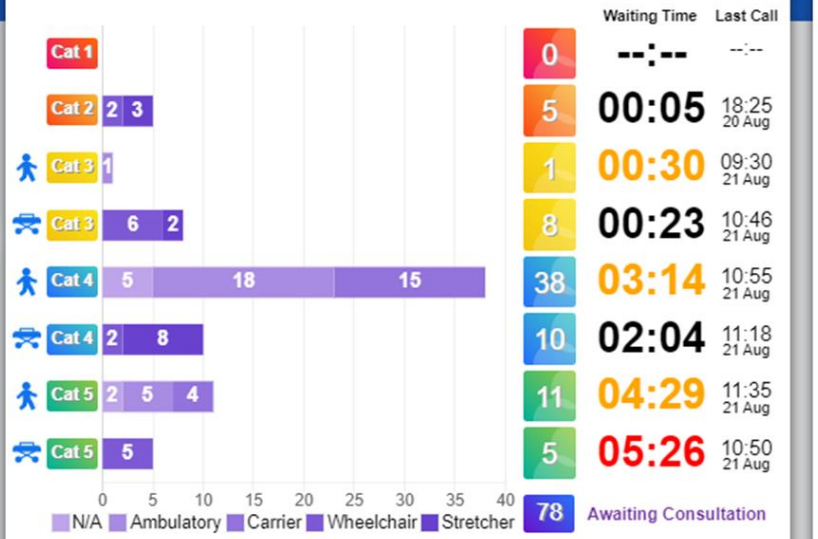
8
in queue

A&E Attendance

Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
2	9	38	52	24

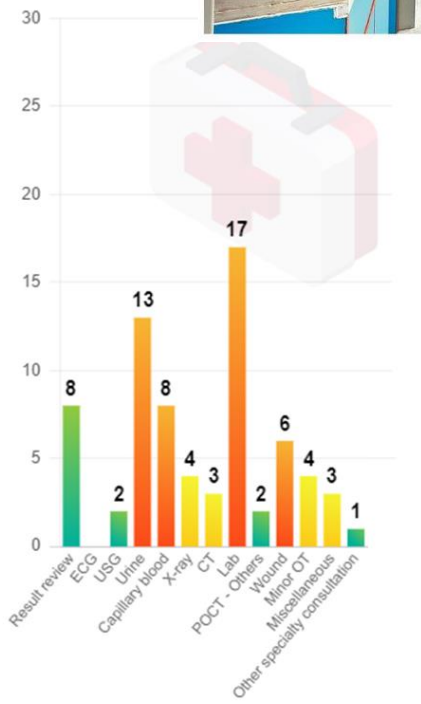
125
Total attendance since 00:00

Consultation Waiting Time



	Waiting Time	Last Call
0	--:--	--:--
5	00:05	18:25 20 Aug
1	00:30	09:30 21 Aug
8	00:23	10:46 21 Aug
38	03:14	10:55 21 Aug
10	02:04	11:18 21 Aug
11	04:29	11:35 21 Aug
5	05:26	10:50 21 Aug
78	Awaiting Consultation	

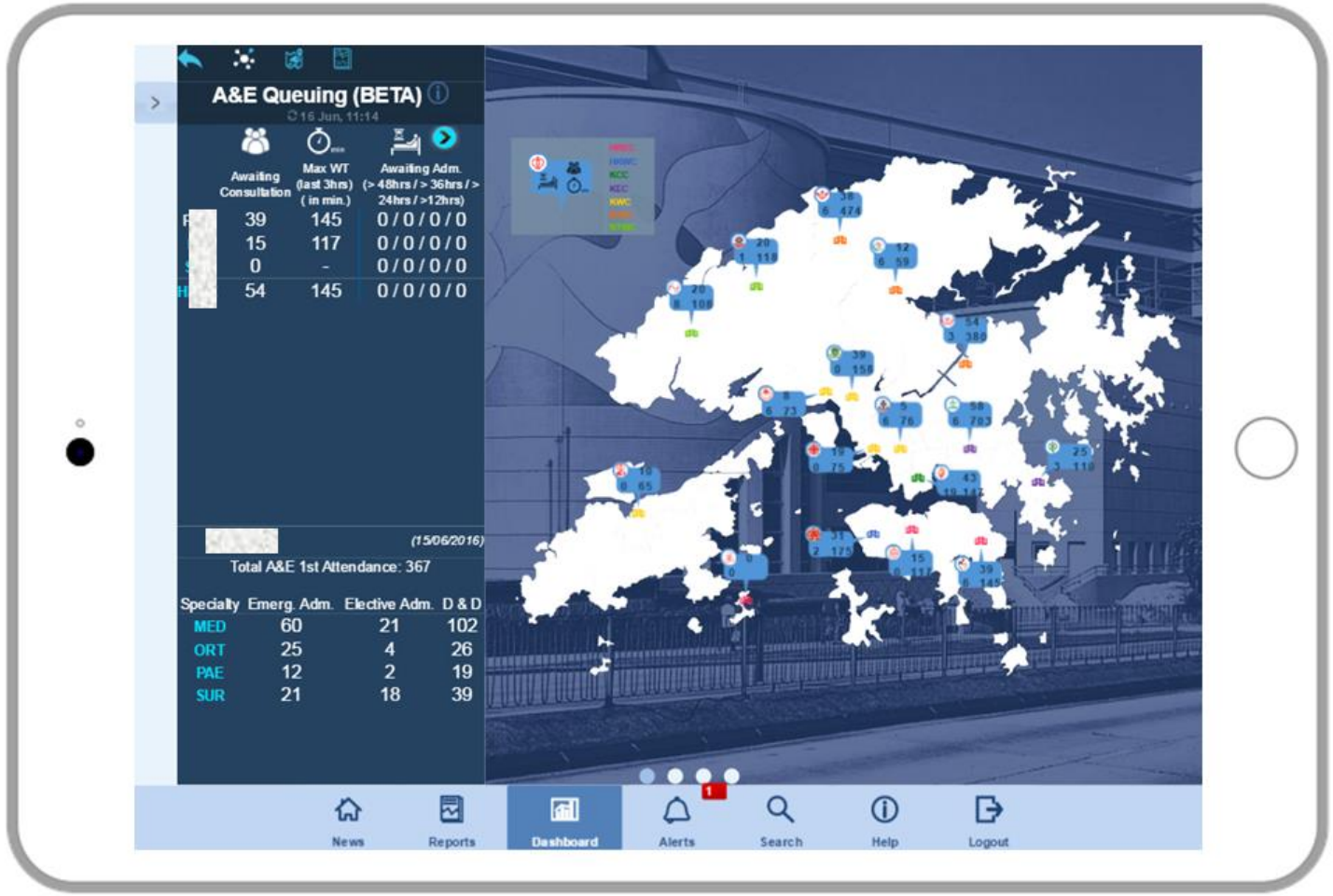
Treatment Corner



Patient Distribution

Triage	Consultation	Treatment	O-Room	Admission	Discharge	Disappeared
8	34	12	37	24	11	16

Situation Visualization of 18 AEDs for Hospital & Corporate Management



Auto Alert of 18 AEDs Situation for Hospital and Corporate Management

For monitoring of Access Block at AEDs

- Whenever there are A&E patients having waited for admission for over 12 hours, auto alert will be sent at 08:00 and 17:00 everyday

- Recipient of Alert:
  - When > 12 hours:
    - To: CCEs, HCEs of related hospitals
    - Cc: Bed coordinators and winter surge coordinators of related hospitals, HOCS team, HOQ&S team, HO Corp Comm
  - When > 24 hours:
    - To: DM members
    - Cc: HCEs, Bed coordinators and winter surge coordinators of related hospitals, HOCS team, HOQ&S team, HO Corp Comm

Waiting Time of 18 AEDs for Public

Mobile App – HA Go

HA Website – List or Map View

Onsite – PC monitor or TV

Smart Hospital Initiative
e-Vital

Smart Input

- Support multiple ways of data input including Bluetooth and QR code
- Auto integrate to different scoring systems

Smart Charts

- Auto charting with vital signs readings
- Flexibility on chart view, i.e., day / week / month view

High Usability

- Different application on e-Vital functions for Doctors, Nurses, Allied Health and Supporting staff

Seamless Workflow Integration

- Scheduling feature for retrieval of e-Vital work list
- Overview on ward summary of vital signs readings

View Anywhere Anytime

- Instant e-Vital data by Smart Panel, shared iPad,1D1P, CMS
- Access data across hospitals and IP episodes

Implementation at Clusters in 2023

Clusters	Hospitals
KCC	QEH, HKCH, OLMH, WTSH, HKBH, HKEH, KWH, KH
KWC	PMH, NLTH, CMC, YCH
KEC	UCH, TKOH, HHH
NTWC	TSWH, POH, TMH
NTEC	PWH, NDH, AHNH, SH, SCH, BBH
HKWC	QMH, GH, TWH, DKCH, FYKH, MMRC
HKEC	TWEH, PYNEH, CCH, RTSKH, SJH

As at 31 Aug 2023,
Product has implemented at
32 Hospitals over **500** wards

Clinical Benefits of e-Vital
(evaluation in 3 Kowloon West Cluster Hospitals)

	KWC Time and Motion Study: Average Time Required for Routine Vital Signs Taking (min / patient)					Projected Saving for All Official Hospital Beds per Year: (B) = (A) * 365
Hospital	Total Official Bed	Pre (Traditional)	Post (e-Vital)	Saving	Projected Saving for All Official Hospital Beds: (A)	
CMC	1 084	2.74	2.3	↓ 0.44	↓ 7.9 hours	2,883.5
PMH	1 542	3.25	2.54	↓ 0.71	↓ 18.2 hours	6,643
YCH	751	3.07	2.67	↓ 0.4	↓ 5 hours	1,825
				Total Projected Saving:	*31.1 hours*	*11 351.5 hours*

Efficiency Gain

- Saving 20 minutes workload per ward daily
- Saving 11,350 hours in 3 hospitals yearly

Environmental Friendly

- Less 578,000 sheets of paper
- Saving 69 trees

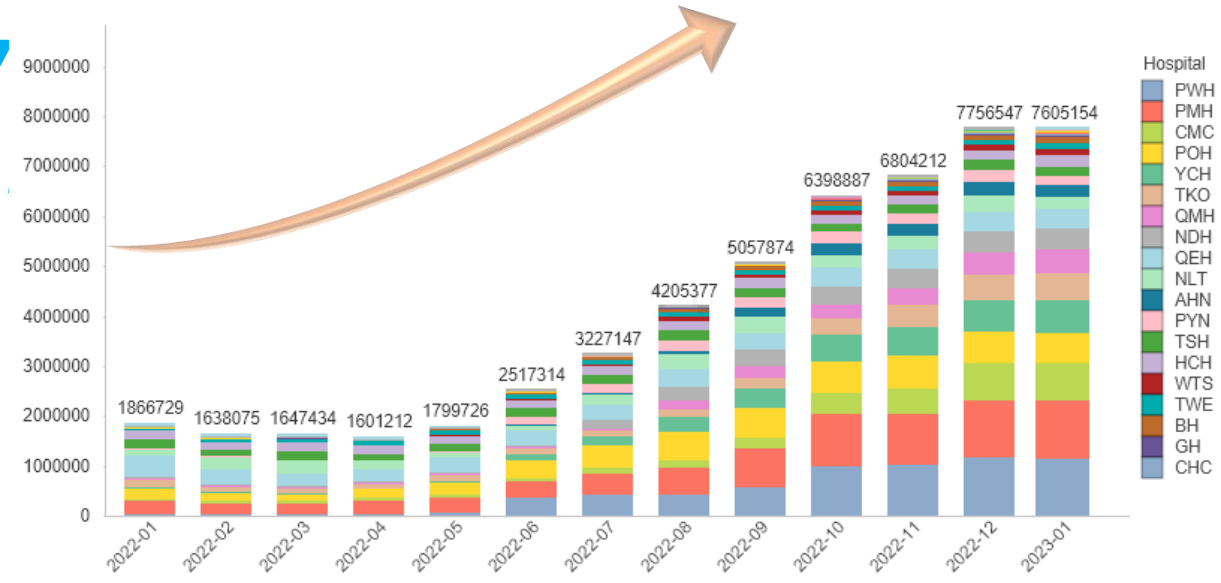
As at 31 Aug 2023,
Product has implemented at

32 Hospitals over **500** wards

NTWC	NTEC	KCC	KWC	KEC	HKWC	HKEC
POH	PWH	HCH	PMH	TKO	QMH	TWE
TSH	NDH	QEH	CMC	UCH	GH	PYN
TMH	AHN	WTS	YCH	HHH	DKC	CHC
		BH	NLT		TWH	RH
		HKE				

http://smartpanel-evital.home/

Over of **61M** eVital data captured
(as at end of Jan 2023)



Smart Hospital initiatives
Hospital Command Centre

Hospital Command Centre
醫院指揮中心

Situational Awareness

Process Flow Data Visualization:

a) Availability of Ward Bed (Supply)

b) Patient admission by specialty (Demand)

c) Demand / Supply Prediction

Operational Intelligence

Support Decision Making:

a) Identify Bottleneck

b) Resource Availability

c) Proactive Management on AI Prediction

Capacity Command Centre

(Ward Bed)

Resource Command Centre

(Porters, Robot, NEATS)

Clinical Command Centre

(Clinical Care Prioritization)

Hospital Operation Management via Hospital Command Centre

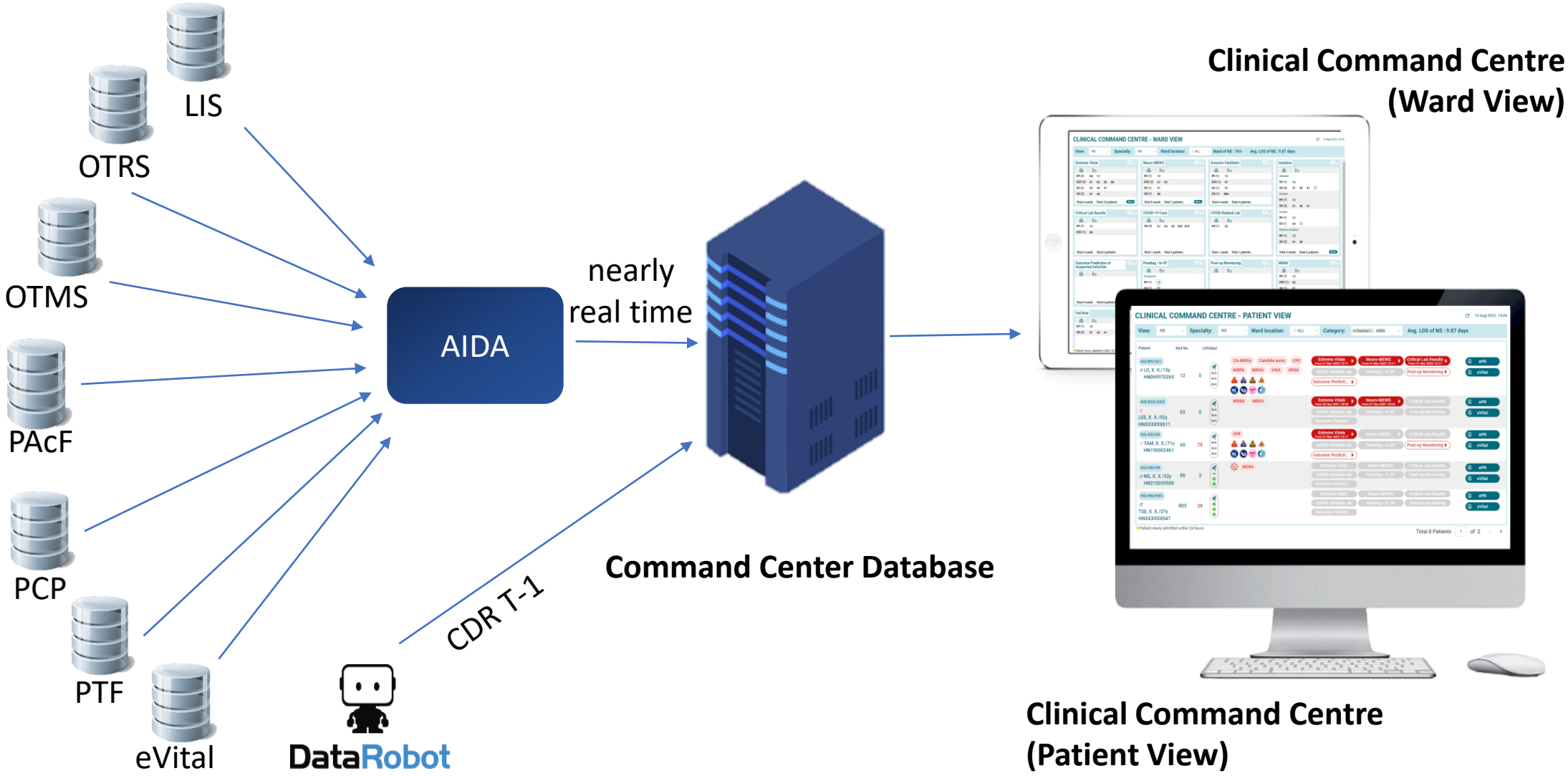
Clinical Command Centre

- **Data driven approach** with **smart visualization** with **big data / AI analytics**
  - **Early identification of patients with potential deterioration risk for prompt clinical intervention**
  - **Anticipation of high demand of clinical service needs for better resource allocation**

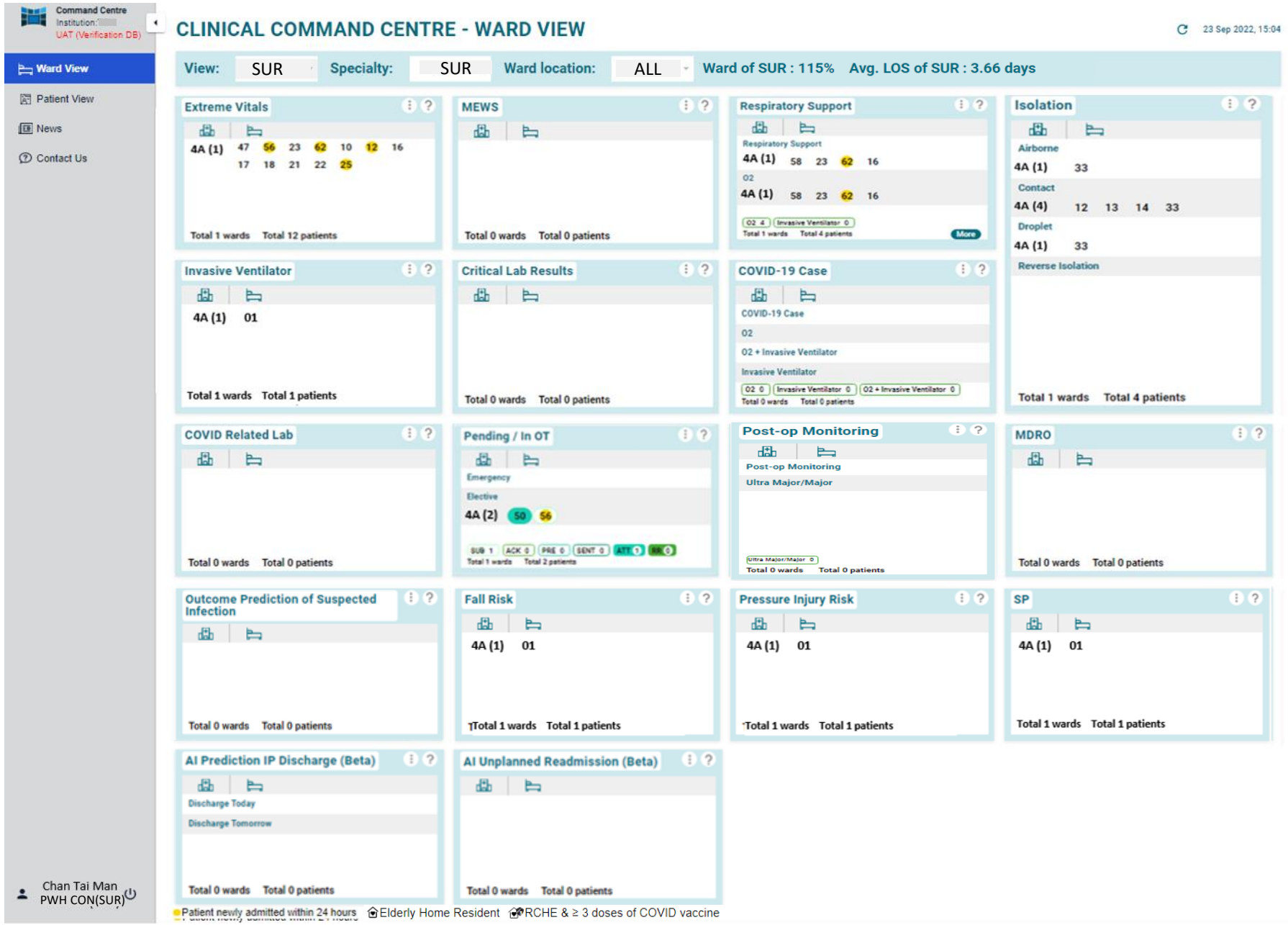
- Designated clinical and operational management users from clinical department including COS, Team Heads, Cons, NC, DOM, WM & CND

- **Criteria / rules of the business cases** with reference to corporate-wide standard practice, clinical practice and agreed with relevant Cluster / Hospital governance

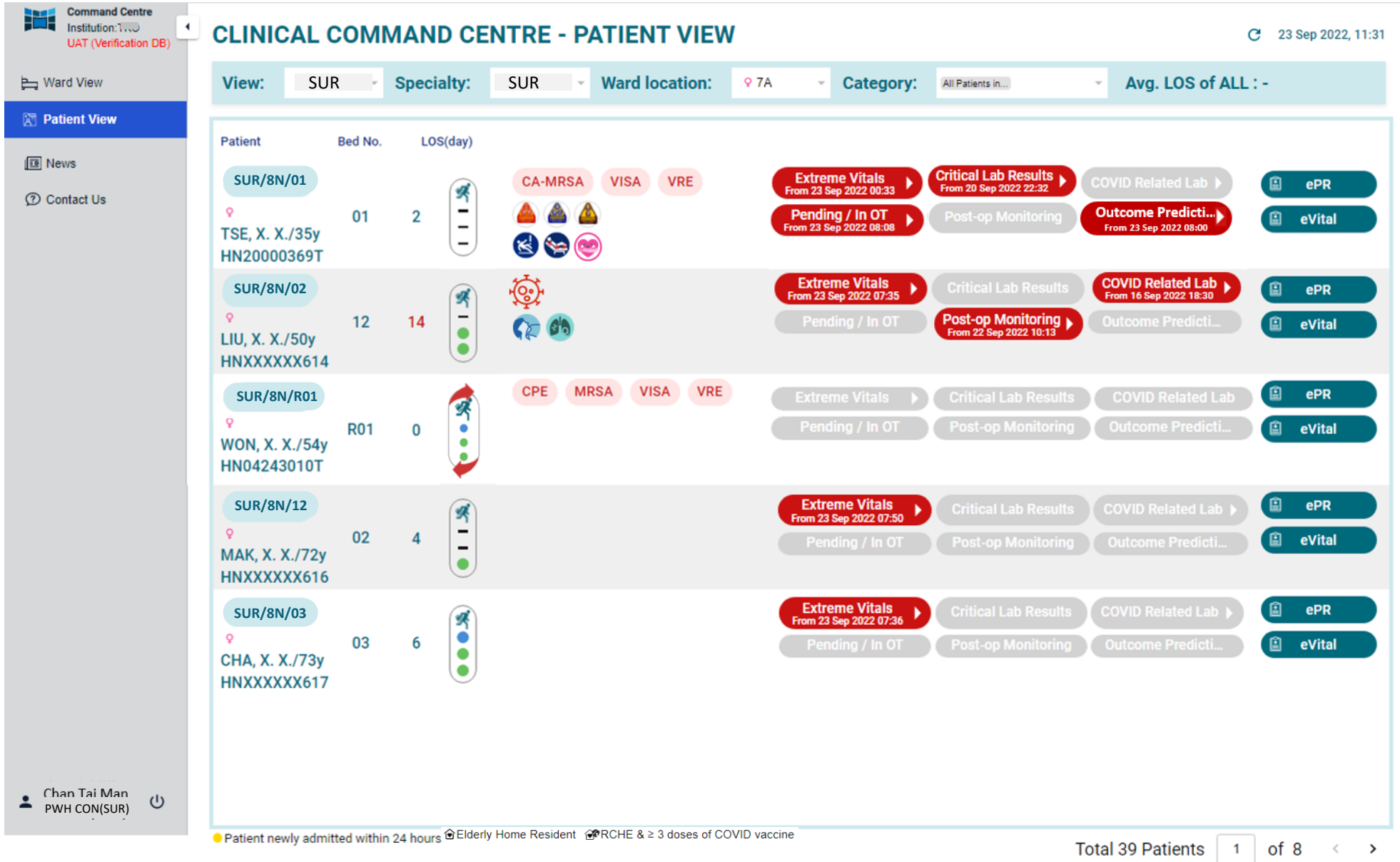
Clinical Data Analytics and Smart Visualization



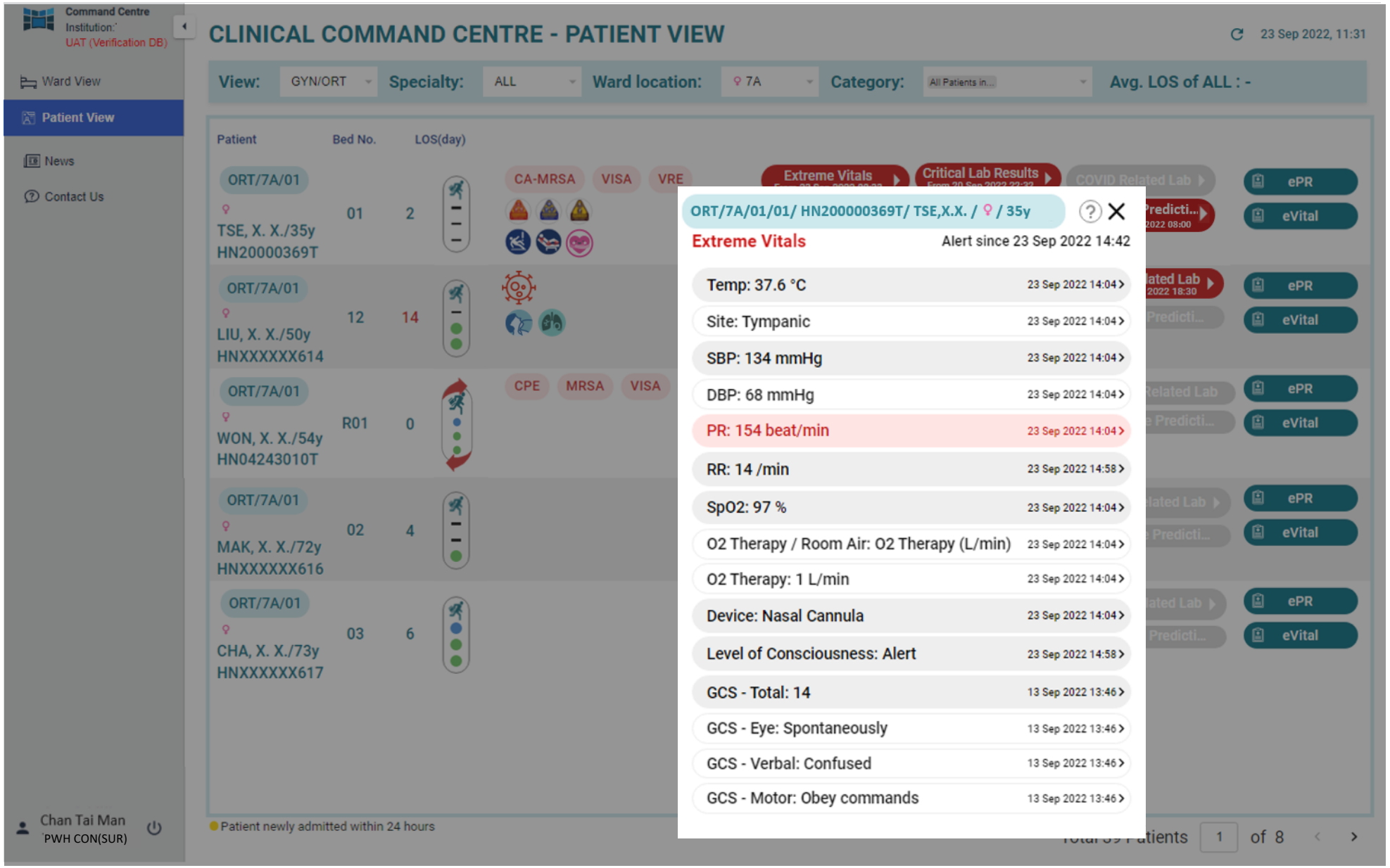
“Specialty / Ward View” of Clinical Command Centre



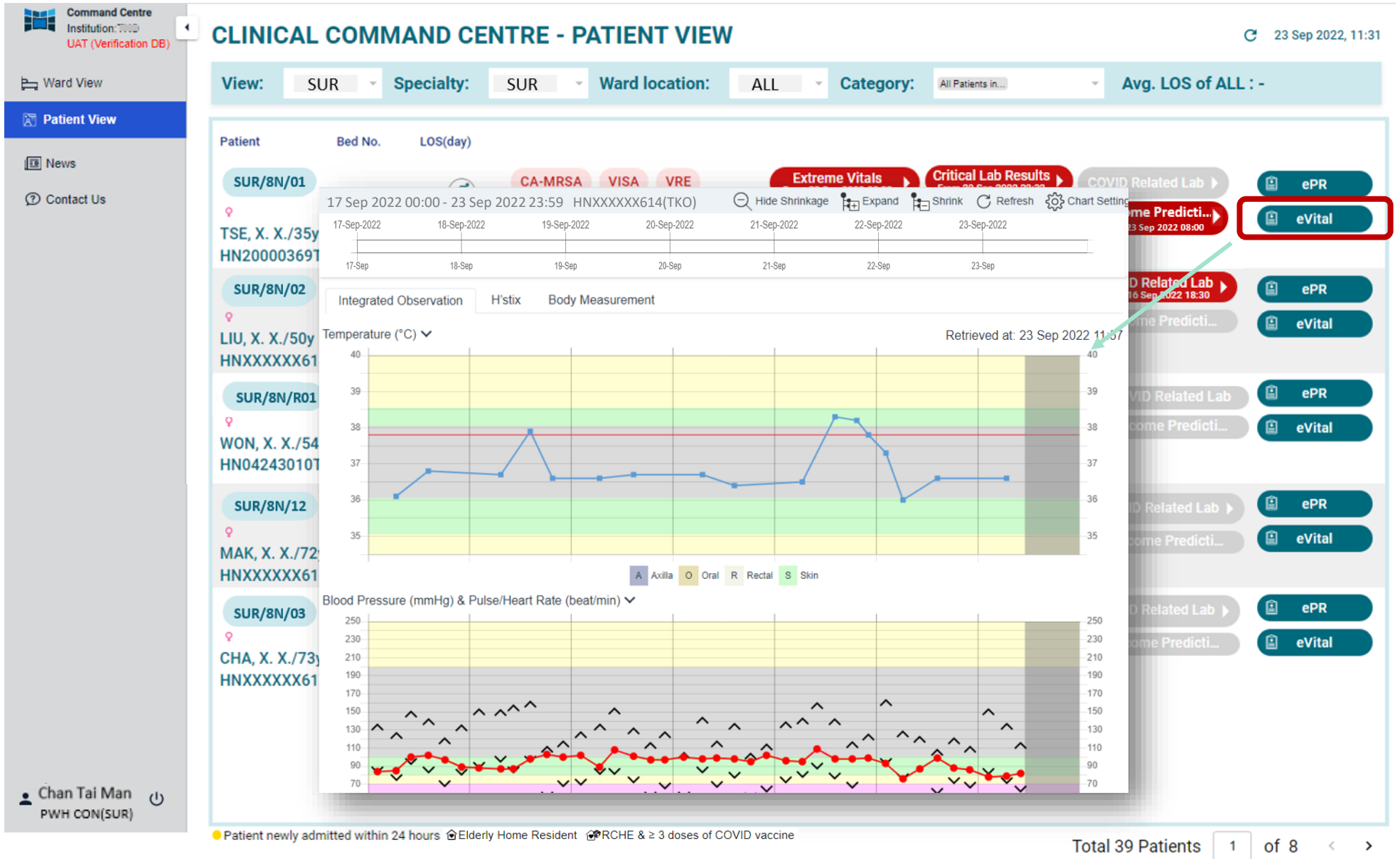
“Patient View” of Clinical Command Centre



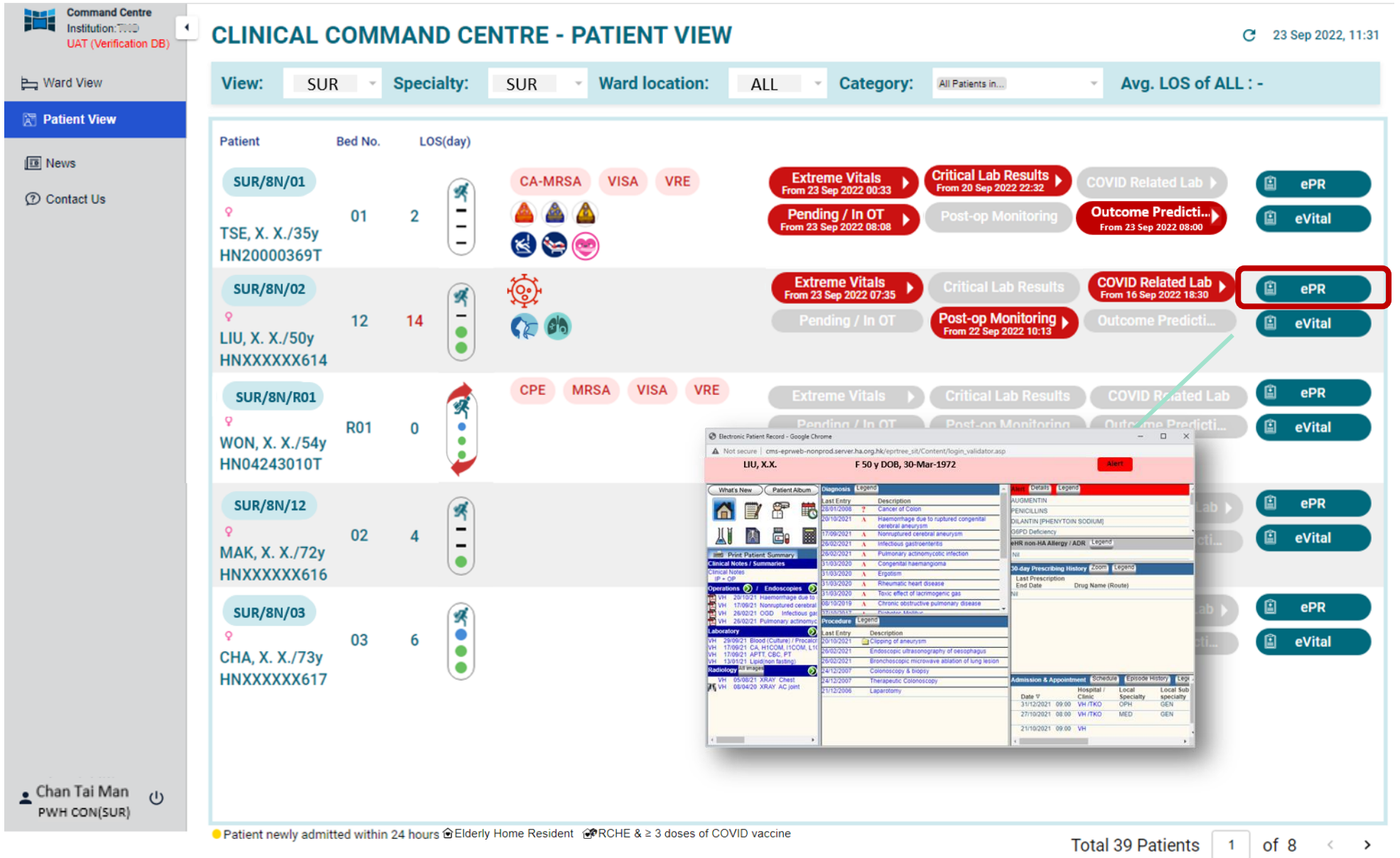
Drill Down of “Patient View” of Clinical Command Centre



eVital chart in “Patient View” of Clinical Command Centre



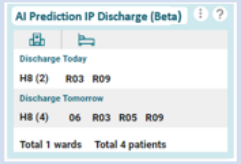
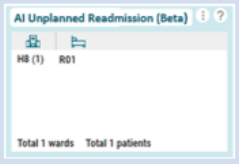
ePR Link in “Patient View” of Clinical Command Centre



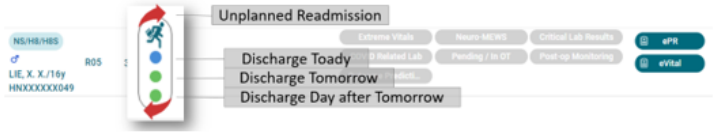
Info Page – e.g. AI Prediction IP Discharge & AI Unplanned Readmission

AI Prediction IP Discharge & AI Unplanned Readmission Info Page (as at September 2022)

- Patient's likelihood of inpatient discharge on Today, Tomorrow and Day after Tomorrow and potential unplanned readmission as predicted by AI model is retrieved to Clinical Command Centre.
- The data update date time of the prediction score is as of the previous date (Today -1) at 08:59 am.
- The AI prediction is available for patients with duration of stay < = 90 days and AE to IP non-day cases only.

Meeting any of the below criteria will light up AI Prediction IP Discharge in Ward / Specialty View:	Meeting any of the below criteria will light up AI Unplanned Readmission in Ward / Specialty View:
	
• Any "Likely" score in "Discharge Today" OR in "Discharge Tomorrow" AI prediction (The score of "Discharge Today", "Discharge Tomorrow" and "Discharge Day after Tomorrow" are shown in Patient View.)	• Any "Likely" score in "Unplanned Readmission" AI prediction

- Clicking the AI Prediction IP Discharge & AI Unplanned Readmission icon will open info page.



- Legend for the AI Prediction IP Discharge & AI Unplanned Readmission icon in Patient View:

Icon in Patient View	Discharge (Today/ Tomorrow/ Day after Tomorrow)	Remarks
	Likely	40 – 60% chance discharge
	Less Likely	30-40% chance discharge
-	Not Likely	90 % chance not discharge
N/A	N/A	Data not available for prediction

Icon in Patient View	Unplanned Readmission	Remarks - Prediction is made for LOS<=90 and AE to IP non day cases only
	Potential Unplanned Readmission	

The details of the training and validation dataset for the AI Prediction IP Discharge & AI Unplanned Readmission can be found as below:

	AI Prediction IP Discharge	AI Unplanned Readmission
Hospital	AHN, CMC, PWH, PYN, QEH, QMH, TMH, TSH, UCH, YCH, PMH, KWH, TKO, NDH, POH, RH	AHN, BBH, BH, CHC, CHS, CMC, CPH, DKC, FYK, GH, HHH, HKE, KCH, KH, KWH, ML, NDH, NLT, OLM, PMH, POH, PWH, PYN, QEH, QMH, RH, SH, SJH, TKO, TMH, TPH, TWE, TWH, UCH, WCH, WTS, YCH
Specialty	MED, NS, ORT, SUR	ANA, CTS, DEN, EM, ENT, GYN, HSP, ICU, INF, MED, MH, NEO, NS, NUR, OBS, ONC, OPH, ORT, OTH, PAE, PSY, REH, SKIN(DH), SUR
Training Dataset	Randomly selected 70% cases from 2019 and 2021	Non-day cases (including linked episodes) which were discharged in 2017
Validation Dataset	Randomly selected 30% cases from 2019 and 2021, excluding cases in the training set	All cases (including linked episodes) which were discharged in 2019 and 2021

End of document

Hospital Command Centre

Hospital Command Centre 醫院指揮中心

Centralized data to support decision & planning

Source Data

- Patient Admission
- Ward and Specialty
- Bed Information
- Porter & NEATS
- Pharmacy

Centralize & Visualized

Decision

- Assign Ward
- Assign Bed
- Assign CR
- Assign Porter
- Assign NEATS

Patient Discharge Flow

Prioritize Resource

Remove Bottleneck

伊院指揮中心成立3年　有效縮減急症室平均輪候入院時間9成

新聞觀看次數：3.1k

05月17日(三) 07:00　推介 1　分享　Tweet　分享

伊利沙伯醫院指揮中心團隊獲頒2023年度傑出團隊獎，中為麥凱鈞，右為李華珍，左為雷沛然。(洪芷晴攝)

伊利沙伯醫院於2020年成立醫院指揮中心作跨部門協作，管理臨床作業、床位調配和資源調配，跟進病人由抵達急症室、入院、轉院或出院的一系列流程。九龍中醫院聯網護理總經理李華珍昨日(16日)交代成效時表示，急症室平均輪候入院時間減少，以今年4月為例，入院人次有7,249人，輪候逾8小時及逾12小時人數分別佔0.7%及0.1%，較2019年1月時7,560人入院，當中有6.8%及4.3%需輪候逾

News clipping from hk.on.cc

from orientaldaily.on.cc

東方日報 | 22.2k 人追蹤 ☆ 追蹤

伊院推「紅綠燈」系統 出院轉院易追蹤

東方日報
2022年7月22日

麥凱鈞（左）及魏秀珍（中）介紹醫院指揮中心。（黃偉邦攝）

【本報訊】病人在醫院留醫流程往往牽涉多個部門，跨部門溝通協作非常重要，伊利沙伯醫院近年重點發展智慧醫院項目，其中於2020年成立醫院指揮中心作跨部門協作。當中設有「紅綠燈」模式顯示病人出院狀態，省卻以電話聯絡確認，成功令患者出院時間平均減少三分一。九龍中醫院聯網資訊科技統籌兼伊利沙伯醫院神經外科顧問醫生麥凱鈞說：「過往醫院無跨部門平台整合患者資訊，新系統有助將全院

Hospital Command Centre
醫院指揮中心

from mingpao.com

DAILY NEWS

【智慧醫院】伊院指揮中心協調各部門人手和資源 增病牀流轉 出院時間縮短三成

人工智能　伊利沙伯醫院　智慧醫院　醫護　醫院　醫院指揮中心

2022-07-25

【明報專訊】第五波新冠疫情嚴重，公營醫療系統曾面對資源調配不足問題，伊利沙伯醫院利用先前已成立的醫院指揮中心，協調各部門人手和資源，增加病牀流轉並及早識別高危病人，將病人平均出院時間縮短三成和優先處理情況欠理想病人。

目錄

1 3色顯示新冠病人分佈 可按需要轉送設施
2 系統自動分析血壓心跳 優先處理高危病人
3 擴大指揮中心聯網 預測病人入院出院需要

伊利沙伯醫院成立的醫院指揮中心，可以實時掌握輪牀和非緊急救護運送車隊使用情況，以及及時調配資源幫助行動不便的病人出院或轉院。（伊利沙伯醫院提供）

Queen Elizabeth Hospital Business Benefits

QEH 8 medical wards

Discharge Process

↑ **29%** faster

*3.5 hrs to 2.5 hrs

Convalescent / Rehabilitation Hospital Transfer

Before 13:00

↑ **47%**

*805 cases to 1186 cases

- Patients – less waiting time
- AED – less access block
- Ward – less admin workload
- Nurse – less clinical handover

AED Waiting time

↓ **20%**

*9.2 hrs to 7.4 hrs

No. of access block >12 hrs

(@08:00)

↓ **33%**

*54.0 to 36.4

伊利沙伯醫院
QUEEN ELIZABETH HOSPITAL

Comparison of May - Sep 2019 and 2021 (include COVID-19 PCR test result)

Hospital Command Centre
Co-Development + Co -Delivery (as at Sep 2023)

Hospital Command Centre 醫院指揮中心

Capacity and Resource

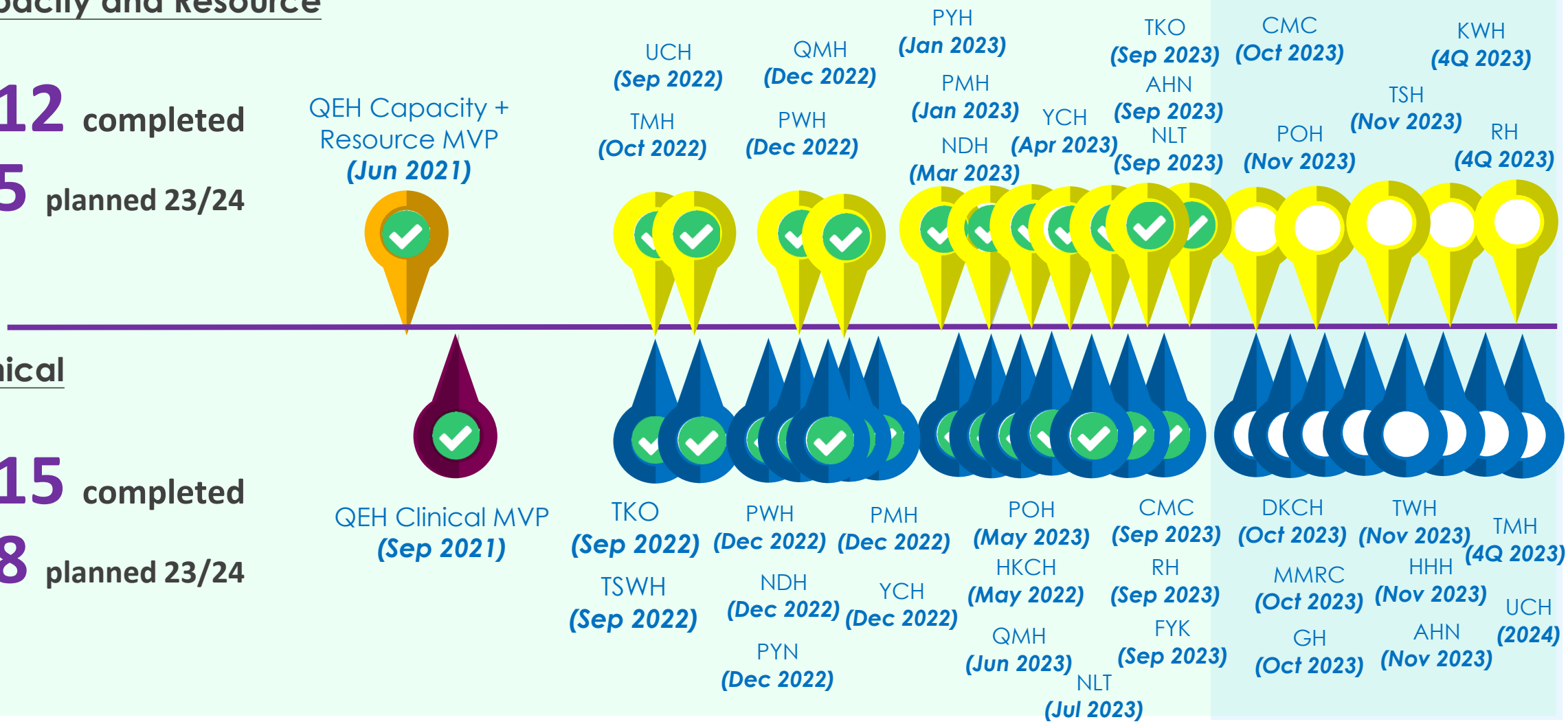
12 completed

5 planned 23/24

Clinical

15 completed

8 planned 23/24

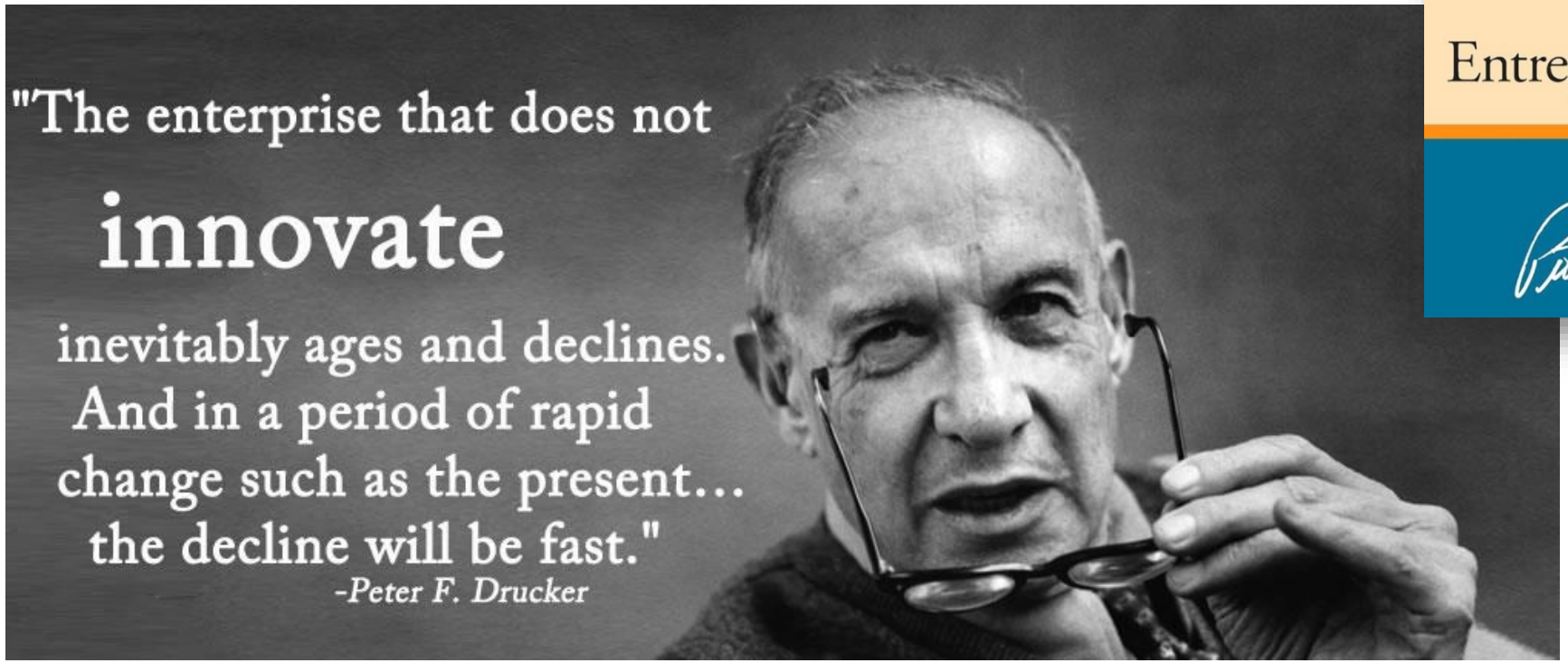


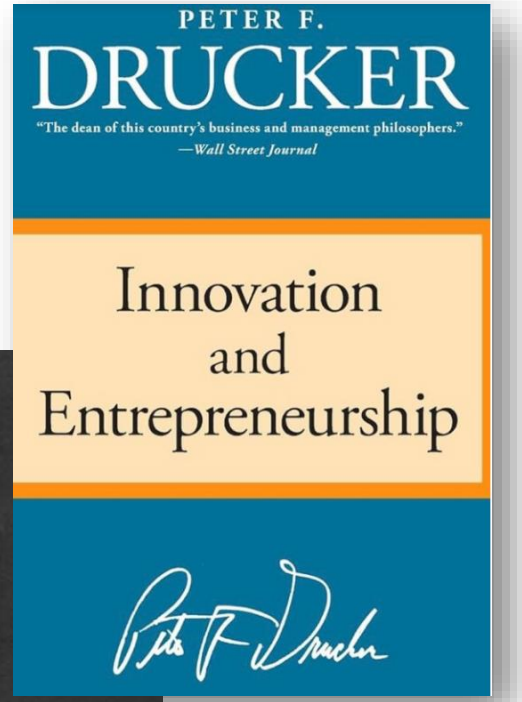
HA Go - Smart Hospital Digital Front Door

Patient Engagement Platform – HA Go

2M+
Members

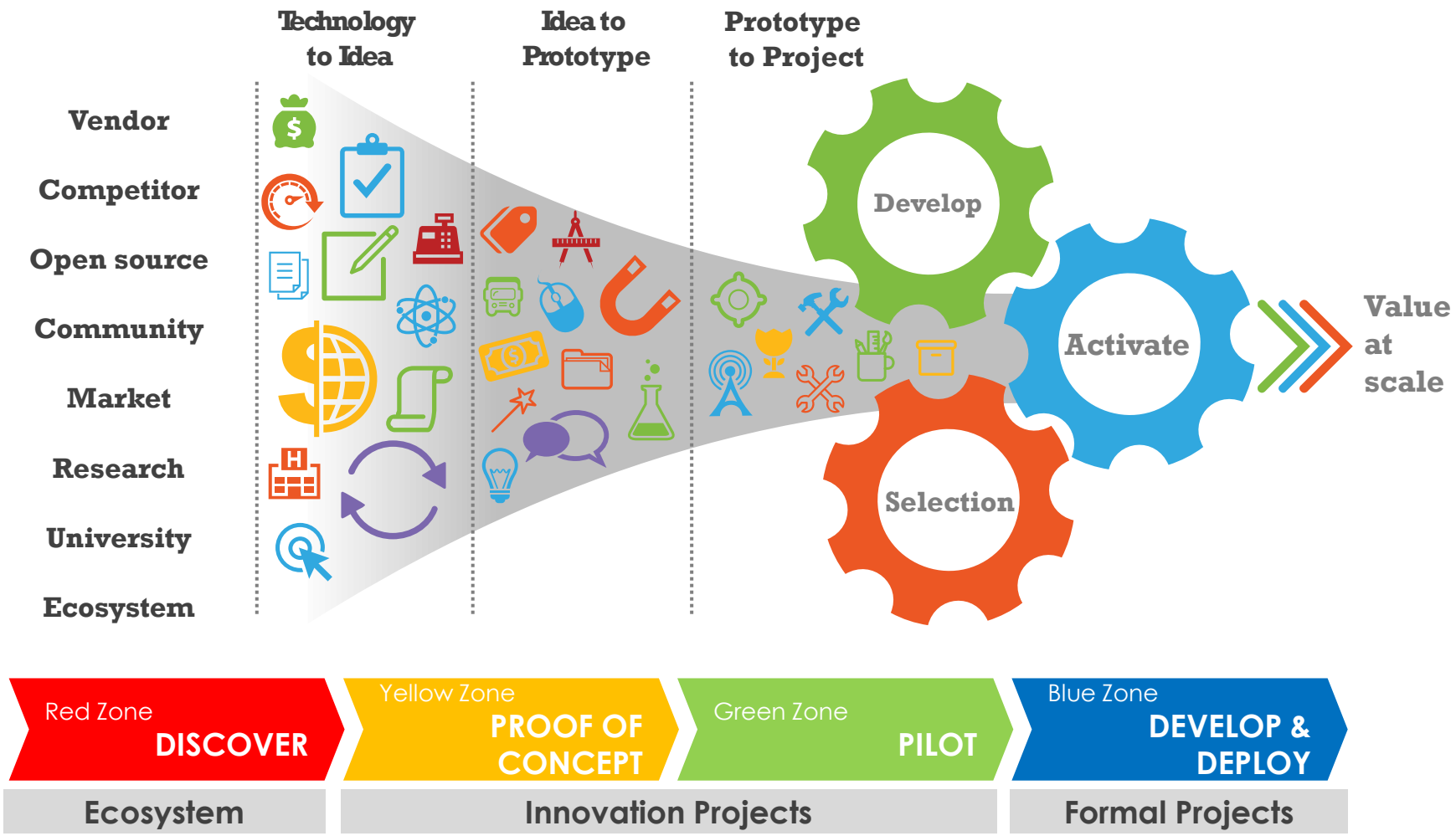
- **1,200,000+** S/GOPC appointments booked per year
- **220,000+** payments made per year
- **1,000,000+** rehab exercises done per year
- **150,000+** attendances taken per year
- **100,000+** views on their health records* in 3 months





Source : https://jelenkoblog.files.wordpress.com/2014/06/drucker.jpg

HA Innovation Funnel Framework



HA Digital Transformation Management Framework

Digital HA Transformation Framework

Directors' Meeting

Strategy Steering Groups

IT Innovation Steering Group

Level 1 Service Transformation

- *New Service Models*
- *Outcome Focused*

Level 2 Program Transformation

- *Existing 4 x Program SG*
- *Smart Hospital; AI : HA GO; Digital Workplace*

Level 3 Solution Innovation

- *Existing Innovation Office*
- *4 x Digital Accelerators*

Enabled by Technology & Innovation

Transformation Champions

- Nominated by CE/ CCE
- Patient Experience centred
- Off line to On line Model
- 7x24 Digital Service

Service Champions

- 4*PSG Members
- Co-development clinicians
- Hospital Smart Hospital Team

Innovation Champions

- 80 x Co-innovations
- Innovation webinar - 20,000 staff
- Innovation Lab Visits – 2,000 staff
- Geek team Clinicians – 300 staff

Clinical AI - Chest X-Ray AI & Application

Challenges

- Ever increasing Demands
- Shortage of front line resources

Severe shortage of doctors in Hong Kong prompts new plan to plug holes in city's health system

Health chiefs unveil new pathway into public healthcare sector for non-locally trained medics in bid to address challenges of a rapidly ageing population.

by RHODA KWAN
09:00, 19 MAY 2021

- Long waiting times
- Perceptual and Interpretive Errors

Hong Kong / Health & Environment

Doctors missed crucial signs in patients' X-rays in fatal lung cancer blunder, Hong Kong hospital bosses admit

- Two patients were diagnosed with the disease, and one who visited Princess Margaret Hospital, died in January
- City's doctors stretched to breaking point because of flu season

Peace Chiu + FOLLOW
Published: 9:57pm, 1 Feb, 2019

Why you can trust SCMP

AI as Solutions

【創新技術】醫管局引入AI技術 篩查肺片比舊程序快近3倍 助醫生早悉重症

醫療頭條 編輯：Him @ Medical Inspire Dec 6, 2021

73 GOPCs

Triage Higher Risk Patient

70,000 cases

since Jan 2021

18 AEDs

Perform 2nd Screening

1.4M cases since Jan 2021

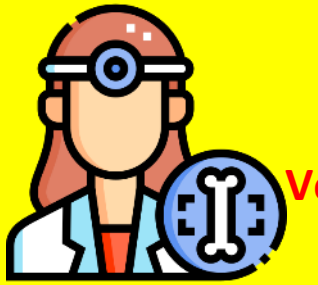
Identified 4 potential-missing cases

CXR AI - Application of Innovation Frameworks

People

Health Informatics + Data Scientist / Engineer

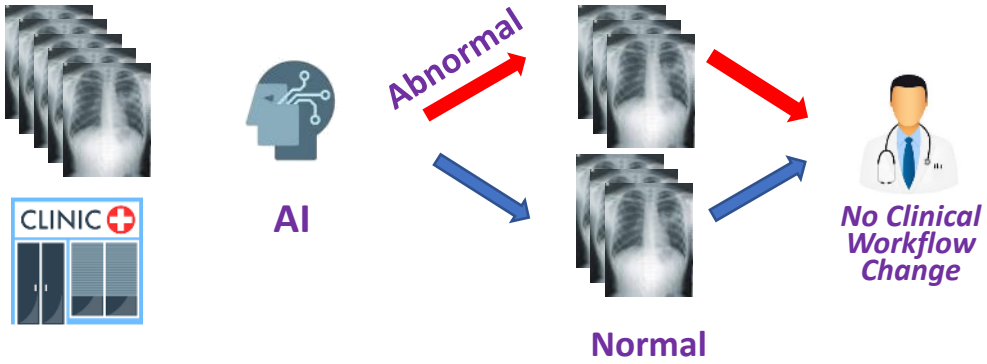
(+ Frontline Champions)



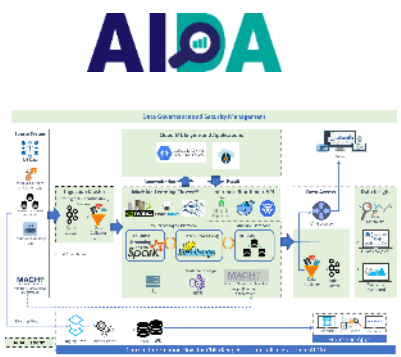
45

Volunteer Doctors (Radiologists)

Process

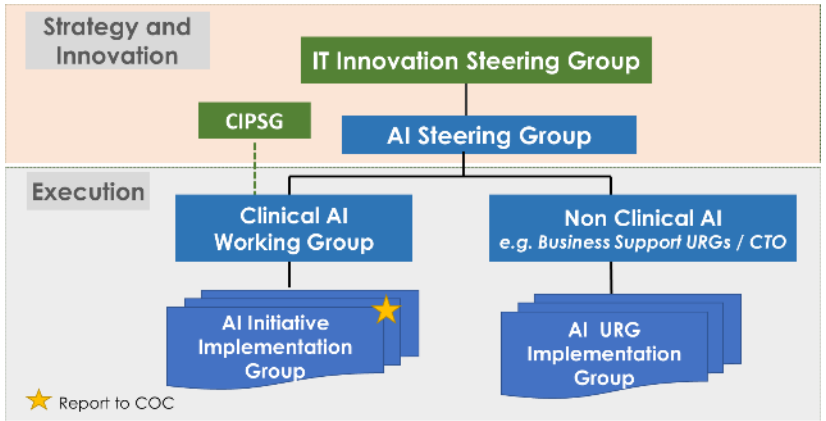


Technology & Data



30+ Years of HK-wide Clinical Data

Governance



Clinical AI products (> 10 products in HA)

Relieve Frontline Workload

Improve Clinical Quality

Continuous Improvement & Sustainable

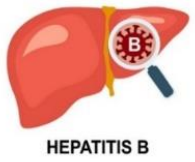
AI CXR GOPC

AI CXR A&E

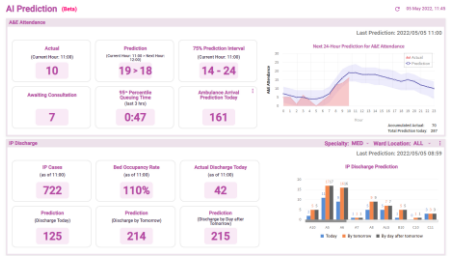
Hip Fracture

AI Hep B

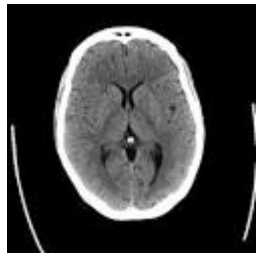
HBV DNA
Anti HBc



Command Centre



CT Brain



DM Risk

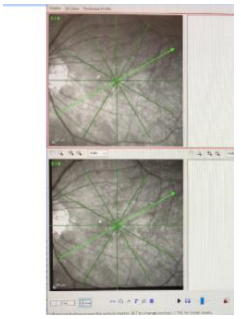
AI

Feeding Tube

AI Hep C

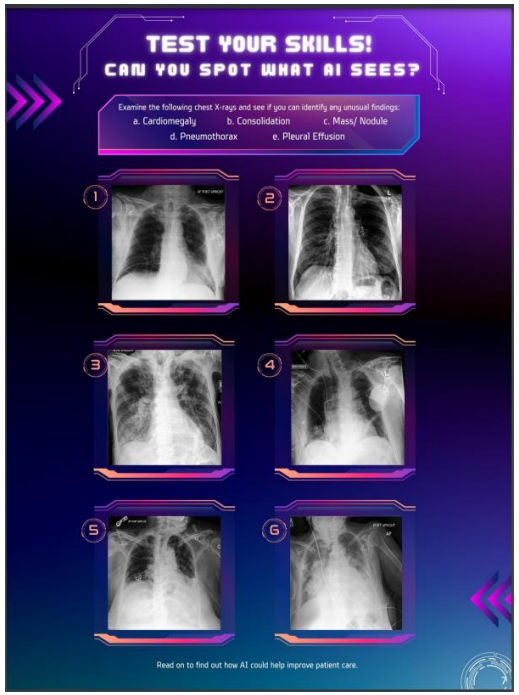
HCV RNA
Anti HCV

Fundus & OCT



Patient Deterioration Prediction

Bone Age Assessment



Risk Alert

ISSUE 71 OCT 2023
A Risk Management Newsletter for Hospital Authority Healthcare Professionals

IN THIS ISSUE

Opening Message

HARNESSING THE POWER OF AI

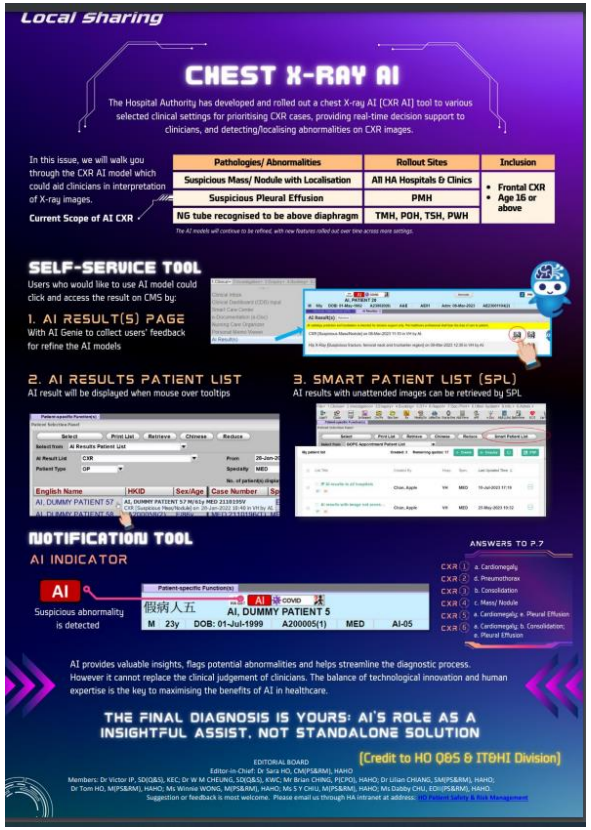
The integration of digital technology with medical care has been underway in HA for three decades. This started with CMS and has accelerated with HA Go and the Smart Hospital. The goals of digitisation have always been to raise the quality and safety of care delivered to patients and to streamline the workflow of staff but now the development of artificial intelligence (AI), first with Big Data driven machine learning, and then with Generative AI (such as ChatGPT), promises to be a game changer.

HA is actively exploring this technology. We have deployed AI to review chest X-rays, hip X-rays and brain CTs routinely and more radiological and image based AI is in development. AI is helping predicting patient discharge and we are exploring AI to predict patient deterioration. We have seen the power of this technology to improve quality and safety, but we are also very mindful of the risks.

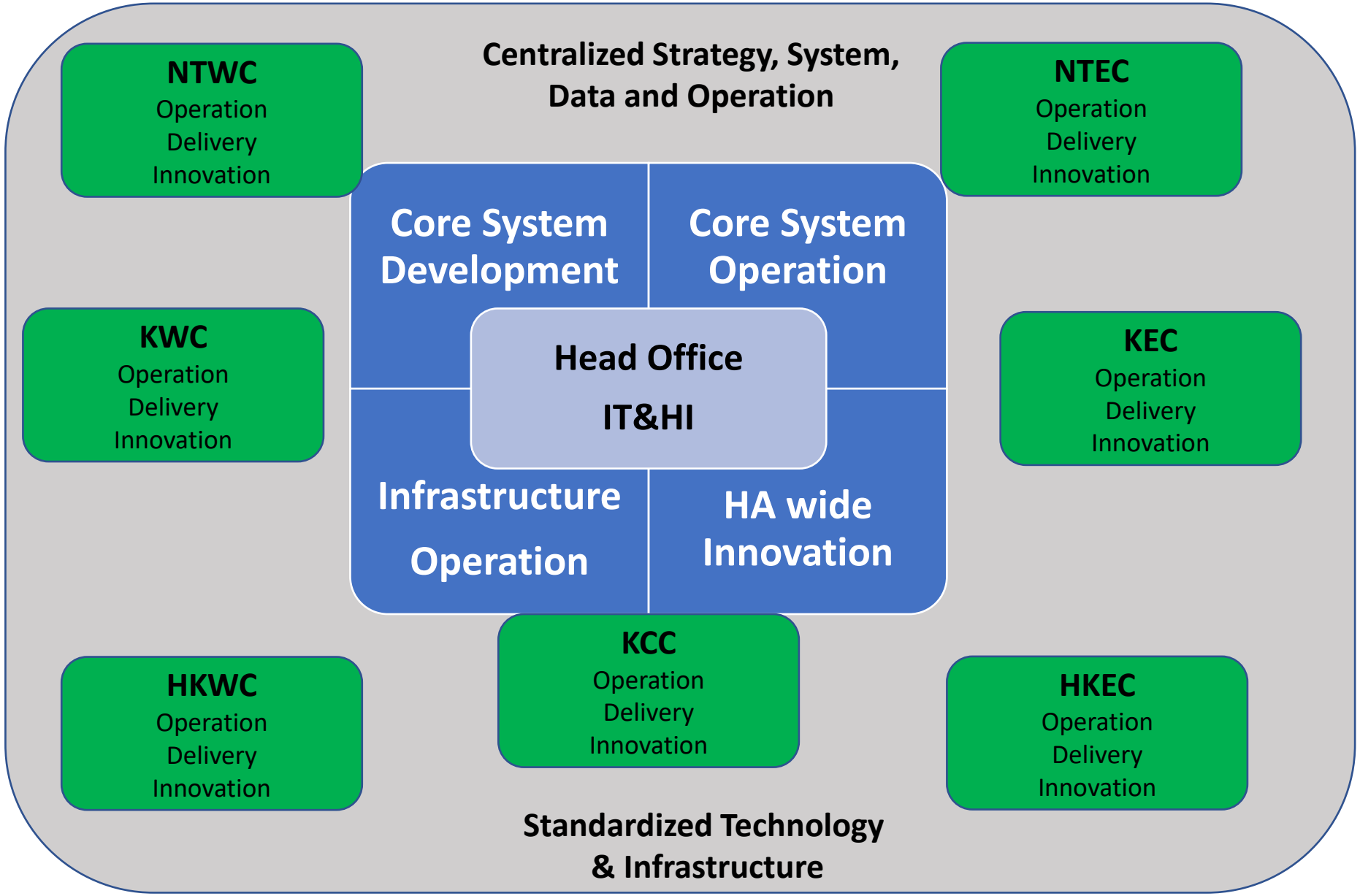
AI models must be carefully validated against HA data in HA's AI Lab to ensure they perform well locally, and we must deploy them suitably within our clinical workflow. We must understand the impact of deploying each AI, particularly the impact on clinical decision making. AI development must be a collaborative process led by clinicians, to ensure that the AI advice is accepted.

The combination of AI and smart medical care has endless possibilities, but as the saying goes, "with great power comes great responsibility". Moving forward, we must ensure that AI is deployed in HA safely, effectively and responsibly.

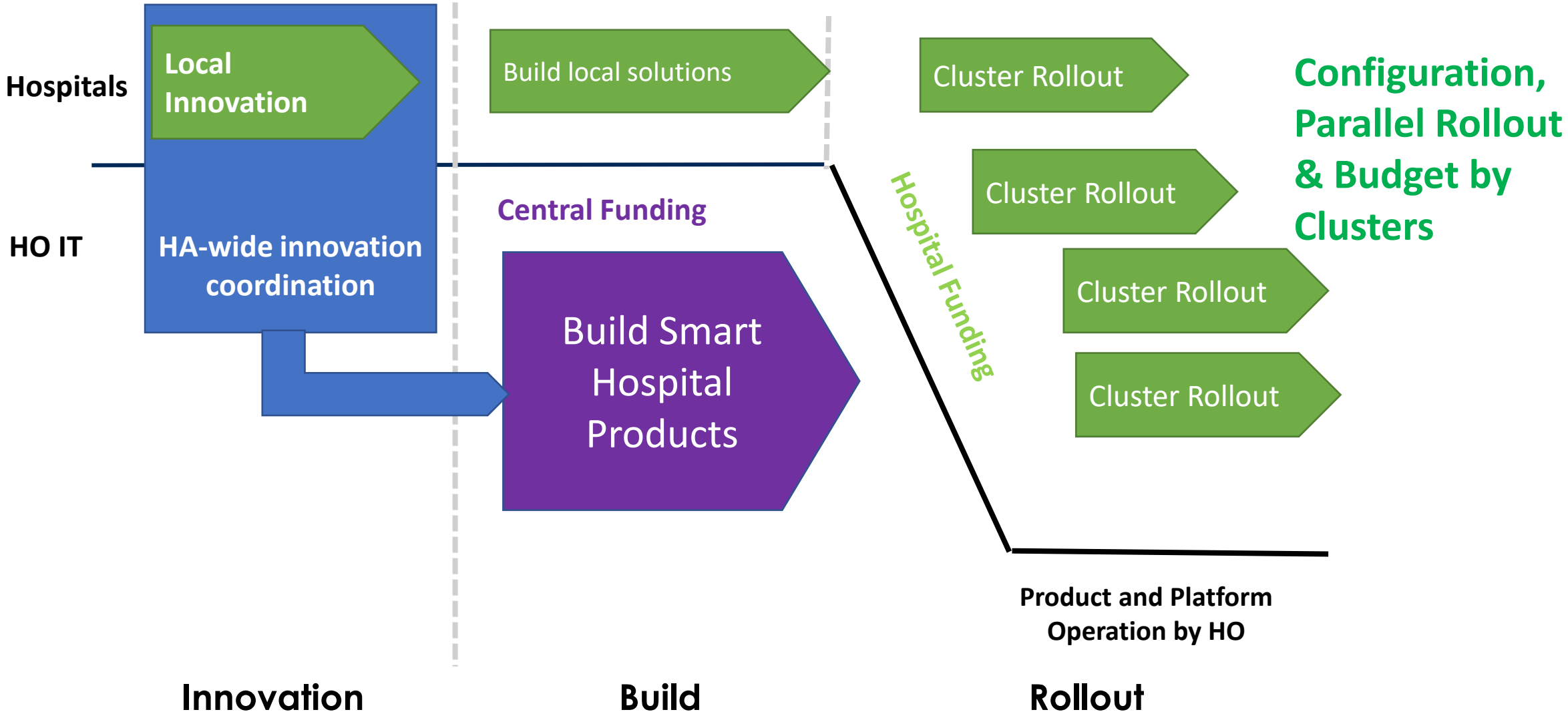
Dr NT CHEUNG
Head of Information Technology and Health Informatics, HAHO



Collaboration of HOIT and Cluster IT



Fast Co-delivery of Smart Hospital Product Accelerated Digital HA Transformation



Three Pilot Hospitals of different sizes – parallel pilots for various Smart Hospital products

Posts About Videos More

Queen Elizabeth Hospital
1d ·

Hospital Command Centres
#DataAnalytics #AI

Real-time location tracking System
#IoT #BLE #UWB #RFID

DeliverBot in isolation wards
#Robotics

7.5 millions

Like Comment Share

Posts About Videos More

Tseung Kwan O Hospital
1d ·

5G Operating Theatre
#5G, #VR

Surgical Instrument Tracking System
#AI

Smart Dispensing
#Automation

7.5 millions

Like Comment Share

Posts About Videos More

Tin Shui Wai Hospital
1d ·

AI Chest X-ray (CXR), Feeding tub
#AI

Smart OT – Family Link
#5G #Mobile

Paperless ECG
#IoT, #Cloud

7.5 millions

Like Comment Share

Value of Collaboration

Innovations for enhanced patient care

- Access to anonymized HA clinical data
- Data analytics & algorithms
- Research publications

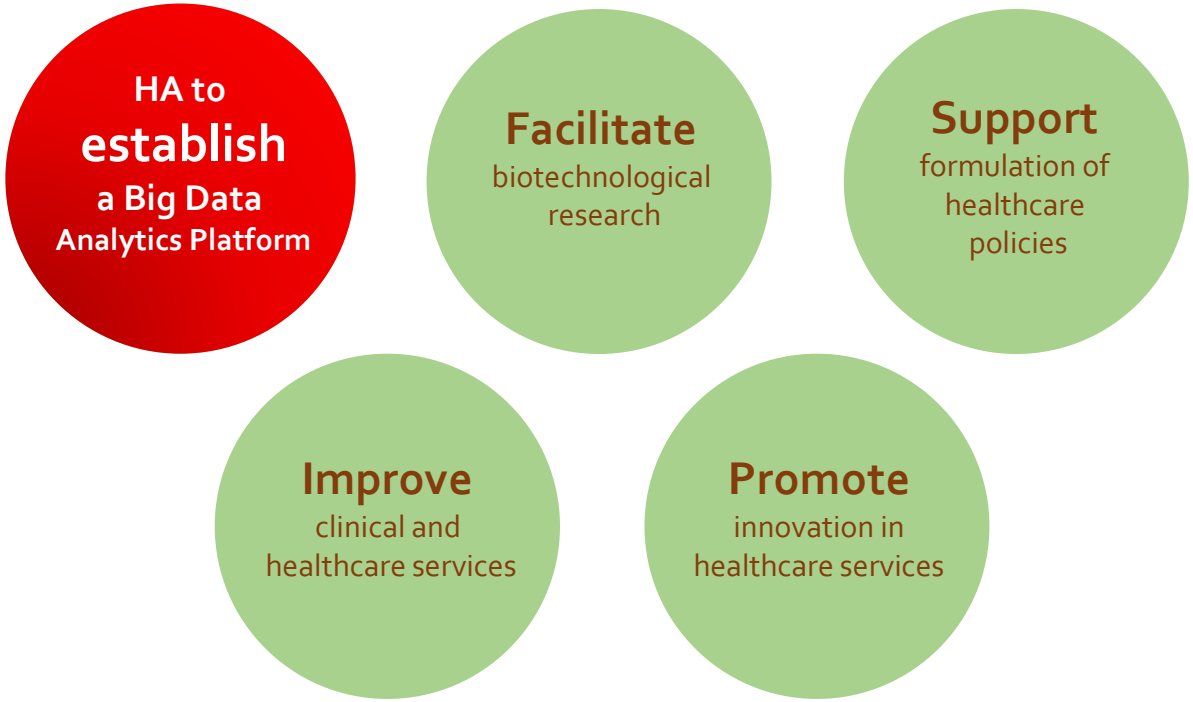
Academic Institutions

Hospital Authority

- Data source, platform and lab facility
- Advisory for interpreting the HA data
- *Convert innovation to service delivery*

Big Data Collaboration
a Hong Kong's Strategic Initiative

HKSAR CE's2017 Policy Address



Alignment to HK Government's Policy

Vision

Embrace innovation and technology to build a world-famed Smart Hong Kong characterised by a strong economy and high quality of living

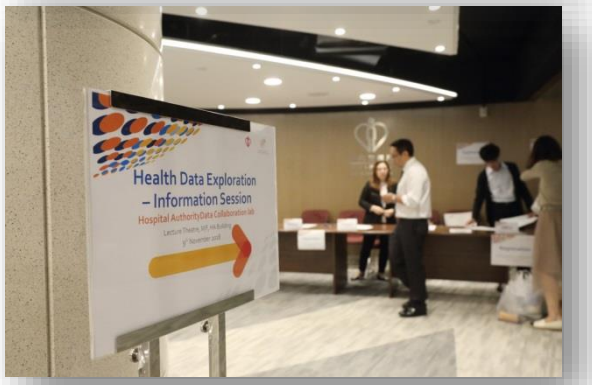
Mission

To provide better care for the elderly and youth and foster a stronger sense of community. To make the business, people and Government more digitally enabled and technology savvy

*The Hospital Authority (HA) is actively making preparations for a **Big Data Analytics Platform**, which will allow academic researchers to access HA's clinical data. The HA will also provide training for them to facilitate collaborative research projects*

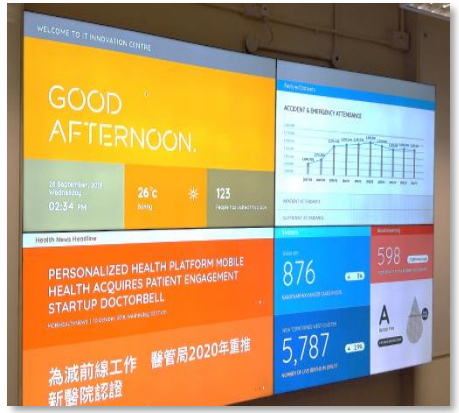
from the Policy Address 2018

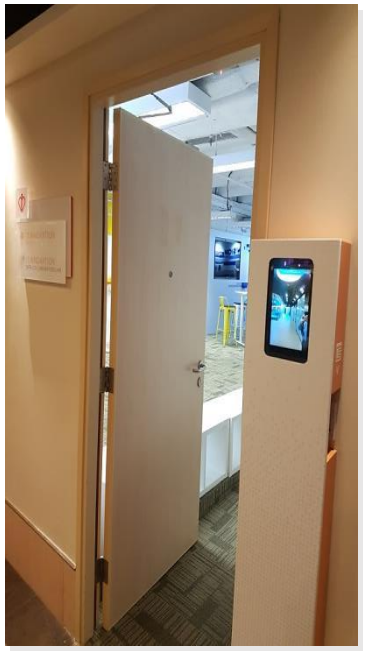
Engagement with the Academic Community

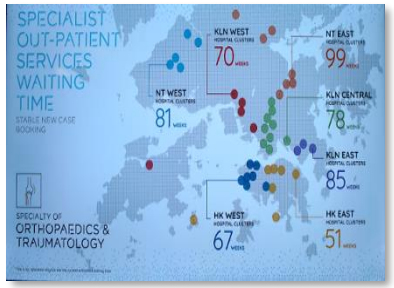


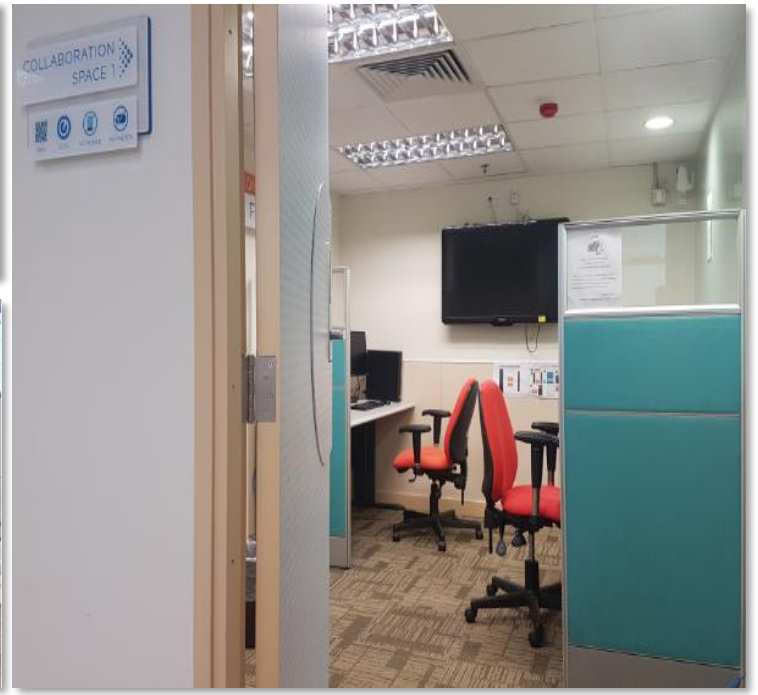
HA Data Collaboration Lab

IT.INNOVATION
DATA.COLLABORATION.LAB









What HADCL Offers to Collaborators

HK-wide Clinical Data of 30+ Years

Structured, Unstructured and Image Data

Open Source AI & ML Technical Platform

Health Informatics & ML Expertise

HADCL Data Catalogue

HA DCL Services Offering

IT.INNOVATION
DATA.COLLABORATION.LAB

Data Exploration Workshop

- Orientation to HA Data and Clinical Workflow
- 0.5-day Information Session & 1-day Hands-on Session

Data Collaboration Projects

- Health data collaboration projects with local universities
- Support Machine Learning/AI development with the aim to integrate to HA IT Systems

Statistical Research Service

- Enable researchers to draft hypothesis and proposals, and make further analysis by using sample data of around 200,000 patients

醫管局

予8大科研共贏 50億條醫療數據

5報告揚威 冀AI分析病歷預防重症

■數據實驗室位於九龍灣國際展貿中心7樓，佔地約2,000呎。（莊得盈攝）

共享資訊

醫院管理局於2018年成立數據實驗室，提供龐大數據庫平台予8間大學的科研人員，支持本港生物科技研究和醫療數據分析，至今已有5份利用數據實驗室分析的醫療報告揚威國際，令本港學術研究地位大大提升。另外，明年醫院將嘗試以人工智能（AI）來分析腦部掃描及髖關節X光影像，從而找出高風險和需接受重大治療的病人，把嚴重個案交由醫生優先處理。

■醫管局成立數據實驗室，提供數據予8大的科研人員，支持香港醫療數據分析，左為李壁堅、右為彭育華。

對比外國只有幾百至幾千條病人數據供研究，本港醫管局總行政經理（醫療信息）彭育華表示，本港數據是統一儲存在臨床醫療管理資訊系統內，涉及醫管局轄下醫院及診所於25年來收集所得的逾50億條病人數據，包括病歷紀錄、藥物資料及化驗報告。醫管局高級系統經理李壁堅表示，每年會增加二至3億條數據，期望來年數據庫可更新至2019年的數據。

新增自助平台遙距連接

數據實驗室最新的發展為設立自助數據平台及遙距連接服務器。前者已於上年啟用，讓研究人員能使用近20萬名病人於2007年及2017年的1.5億條數據。該平台目前已收到75份申請，涉及超過450名參加者。李表示，因平台的數據較實驗室少，申請使用時能免部顯外手續及提交計劃書，研究人員能輕易掌握和使用自助數據平台，進行不同創新的科研假設。

遙距連接服務器則暫時只設立於港大、中大及科大，由本年1月開始實行，中大和科大分別於7月及本月初開通。其他院校亦在申請中。李稱，即使服務器地理上不在數據實驗室範圍，服務器內設有嚴密網上保安系統，以免資料流出或被黑客入侵。

「去識別化」保障病人私隱

為了保障病人的私隱，所有資料都被「去識別化」，例如不會顯示病人的姓名、出生日期等，讓使用者難以利用外來資訊來配對病人的身份及病歷。另外，研究人員查詢及瀏覽數據庫時，不准拍攝或錄影電腦內顯示的內容。

數據實驗室位於九龍灣國際展貿中心7樓，今年年初開始投入服務，場內有工作人員作技術支援。實驗室佔地約2,000呎，比之前在同一大廈內6樓時，面積大了接近7倍，能同時容納50人進行研究。開放時間為星期一至六早上9時至下午8時。

HEALTH

Researchers given access to records of 100,000 patients

Trio of universities to open dedicated rooms with secure connections to Health Authority database

Nadia Lam
nadia.lam@scmp.com

Local university researchers will soon be able to access a vast trove of government health care data from the comfort of their campuses following a move by authorities aimed at accelerating medical innovation in Hong Kong.

Five billion pieces of clinical data, culled from the records of all the city's public hospitals over the past 25 years, have been made available since 2019 for researchers from eight government-funded universities at the Hospital Authority Data Collaboration Laboratory in Kowloon Bay.

> The platform can provide [researchers] ... with more freedom now, because our data is more comprehensive
>
> Dr JOANNA PANG, HEALTH INFORMATICS AT THE HOSPITAL AUTHORITY

"It took a lot of time collecting and integrating data in the past; obtaining hundreds to thousands of pieces of data was already very difficult," said Dr Joanna Pang Yuk-wa, chief manager for health informatics at the Hospital Authority. "The platform can provide them with more freedom now, because our data is more comprehensive and in-depth."

The data provided on the platform, however, is restricted to 159 million records from about 100,000 patients randomly selected from 2007 and 2017. Accessing the complete 25 years of records requires researchers to submit proposals to join a data collaboration project and access the platform at the Kowloon Bay lab.

Still, the smaller data set available remotely "is already enough for research that does not need a huge sample size, and [applicants] do not need to go through the proposal approval process," said Dennis Lee, a senior system manager at the authority.

"These two years were chosen because in some of our previous algorithms, we wanted some representative sample data to observe the evolution of diseases."

The laboratory has supported 28 data collaboration projects involving more than 200 researchers. Since the self-service platform was installed, the lab has received

---

University researchers get remote access to vast trove of Hong Kong health care data

- Access to the roughly 5 billion pieces of data, compiled over 25 years, had previously been available only at a government data laboratory
- Now dedicated rooms with secure connections to the data set will be established at three local universities

Nadia Lam + FOLLOW

Published: 10:00am, 25 Oct, 2021

Why you can trust SCMP

nna Pang and Dennis Lee at the Hospital Authority's data lab. Photo: K. Y. Cheng

HADCL collaborative projects in 2019-2023

Institution	Number of project
CityU	2
CUHK	26
HKBU	2
HKU	13
HKUST	12
PolyU	6
Grand Total	61

Statistical Research Service

Statistical Research Service

- Enable researchers to draft hypothesis and proposals, and make further analysis by using sample data of around 200,000 patients

207

Applications

(since Oct 2020)

166 Draft research **hypothesis / proposal**

41 Conduct **research**

(Ethics approval required)

137

Researchers already accessed/ accessing the Platform;

(via Remote access)

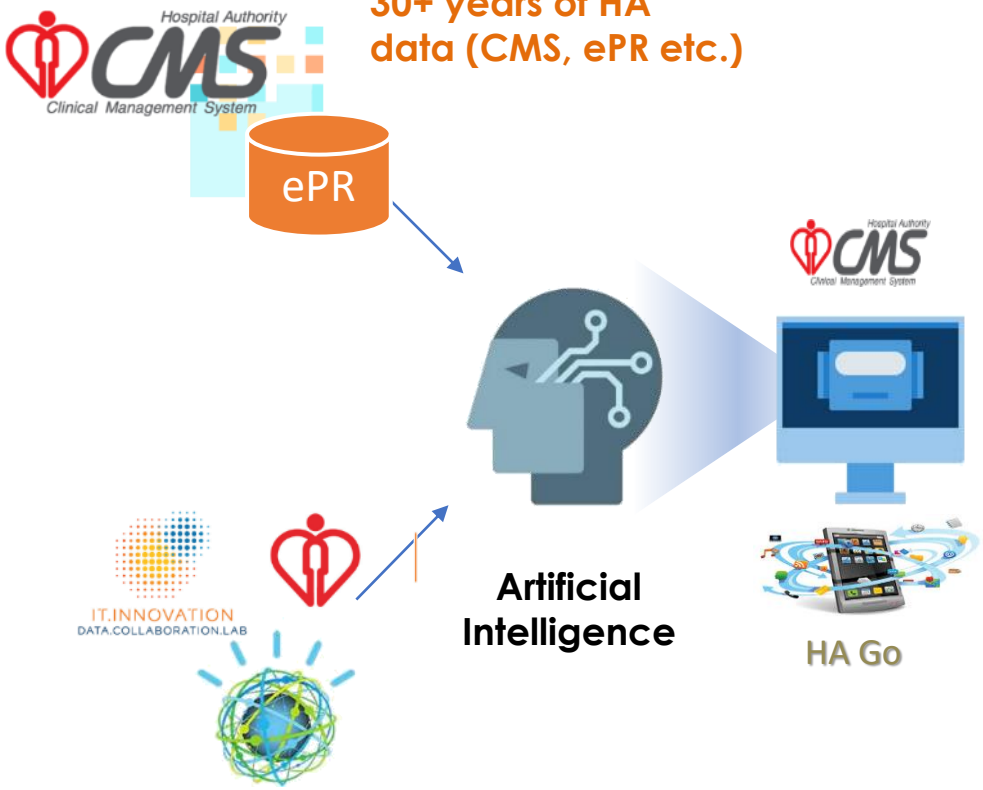
As of 04 Aug 2023

^ A proportionate stratified random sample of 100k patients was separately drawn from 2007 and 2017. Longitudinal time range limited from data availability per DCL data catalog to end of Dec 2017.

HADCL Research to improve HA Services

Transform data into innovative ideas for **decision support** and improve **clinical effectiveness**

30+ years of HA data (CMS, ePR etc.)

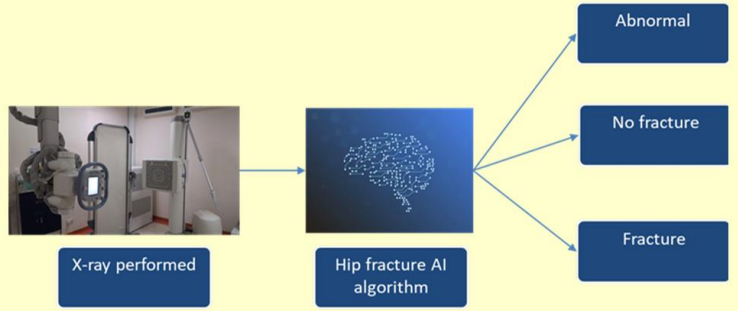


Algorithms from HA internal / **HADCL Collaborators** / External Suppliers

Automatic hip fractures detection using deep learning

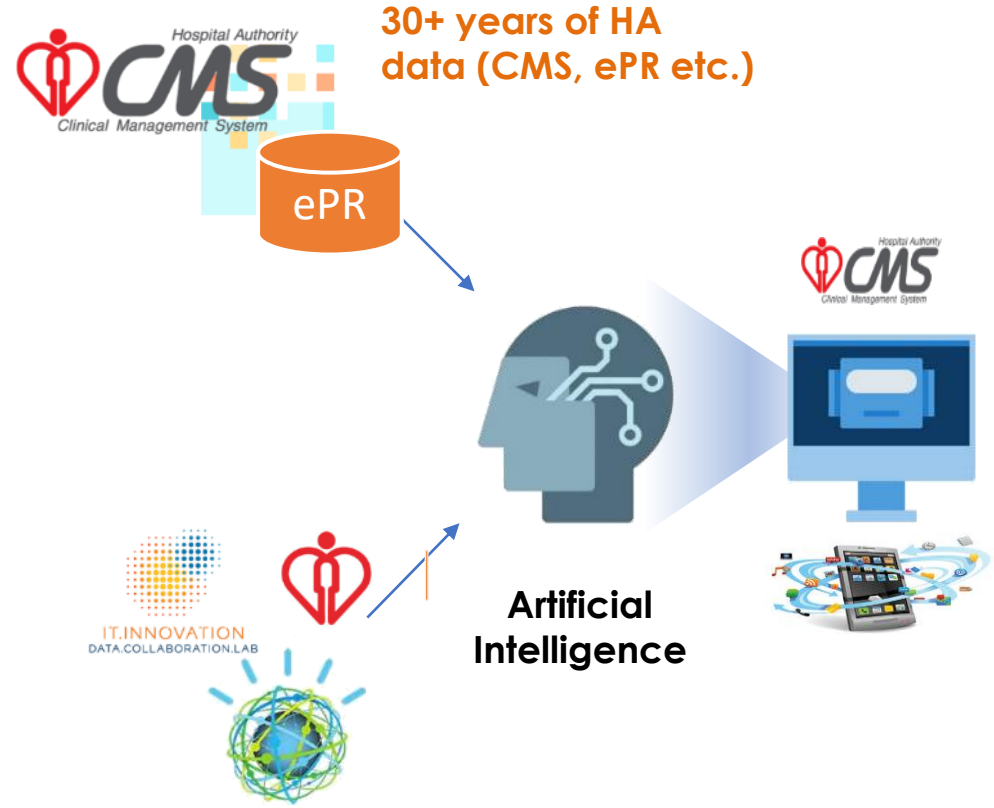
Principal Investigator:
Prof. Michael Kuo, Dept of Diagnostic Radiology, HKU

Primary objective:
Application of deep learning using convolutional neural networks to detect neck of femur fractures from standard hip radiographs




晴報 News 4
26.9.2022 Mon | skypost.hk
公院兩聯網急症室今冬應用
AI「睇X光片」識別髖骨折者 準備度96%
加快分流 料惠及數千病人

HADCL to support research and improve patient outcome



Press Releases

CUHK study reveals daily prescription of 5mg of glucocorticoid doubles risk of cardiovascular events for patients with rheumatoid arthritis

4 Oct 2023

A CU Medicine study shows patients with rheumatoid arthritis (RA) who receive 5mg or above of glucocorticoid daily are at almost twice the risk of major adverse cardiovascular events (MACE).

(From left) Mr Tsang, patient with RA; Professor Tam Lai-shan, Head of Division of Rheumatology; and Dr So Ho, Assistant Professor in the Department of Medicine and Therapeutics at CU Medicine

Share clinical data for academic research to transform data into useful knowledges for **patient outcome** improvement

Future Vision for HADCL

IT.INNOVATION
DATA.COLLABORATION.LAB

Scale Up

- Build up data & processing capacity
- Strengthen research support & education capability

Expand Service Profile

- Study feasibility of controlled data access via API / tool
- Explore commercial sector collaboration

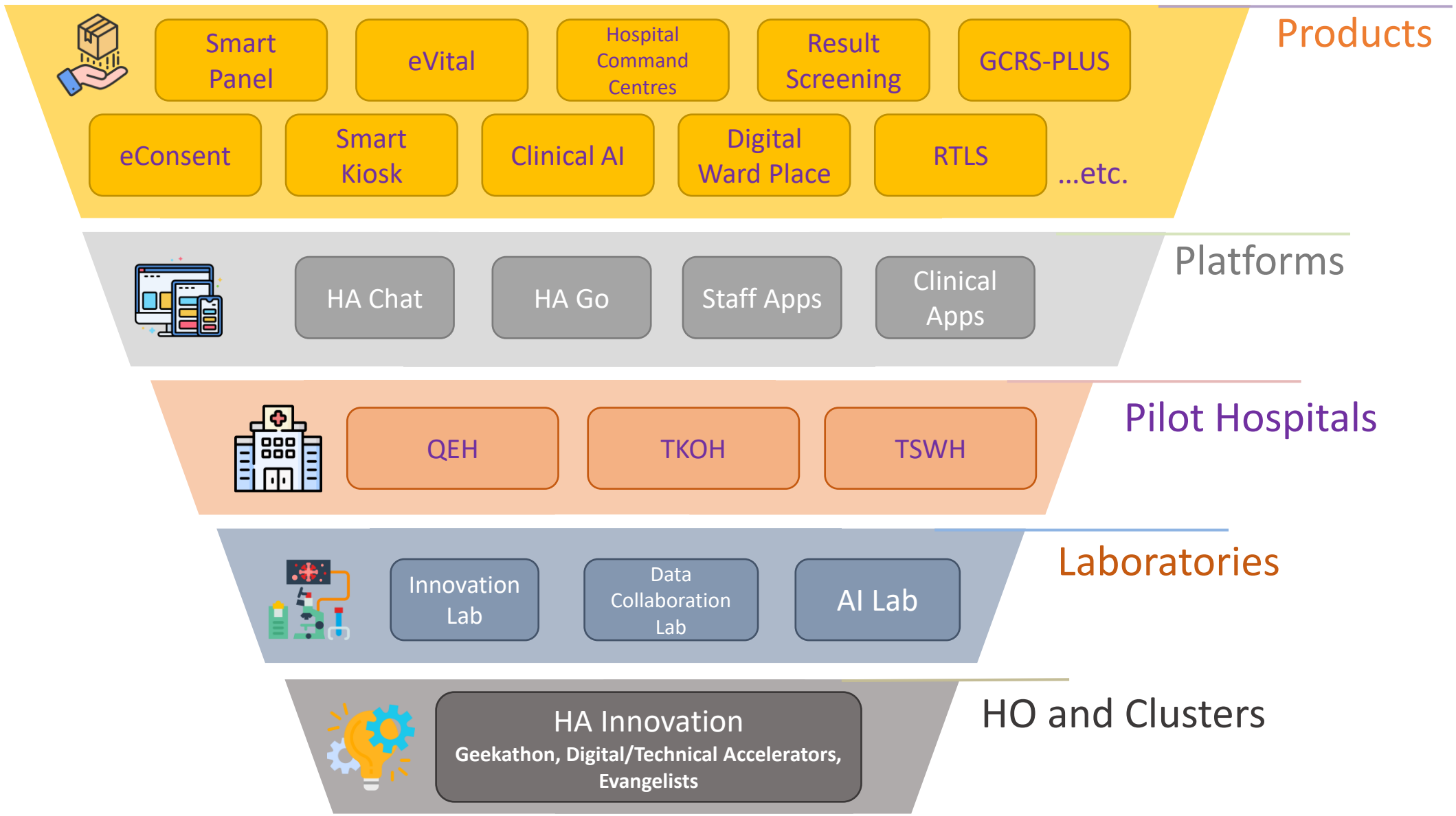
Stimulate Healthcare Innovation

- Integrate into HK innovation strategy
- Contribute to HK Smart City via HK Healthcare Cloud

Cultural Changes for Innovation and Digital Transformation

Traditional Publicly-funded Institution		Collaborative Innovation Institution
Clinical Oriented		Patient Journey, Patient Experience Oriented
Central Project Management		Co-Innovate, Co-Develop, Co-Deliver
Healthcare is a matter of life and death		Innovation and Proof of Concept ➔ Pilots, evaluations and continuous improvements

Smart Hospital Products are Co-Developed by HA Innovation Lab and Pilot Hospitals




Smart Hospital
Integrating Innovation Technology
融匯創科 共建智慧醫院

International Forum on QUALITY & SAFETY in HEALTHCARE HONG KONG

26-28 August 2024
Hong Kong

Institute for Healthcare Improvement | BMJ

Accelerating healthcare improvement: Hong Kong 2024

Returning to Hong Kong on 26-28 August 2024, the International Forum on Quality and Safety in Healthcare will gather the quality improvement community to tackle the improvement challenges in the region.


International Forum on
Quality & Safety in Healthcare
26-28 August 2024
Looking forward to seeing you
in Hong Kong
Please visit https://internationalforum.bmj.com/hong-kong/