Big Health Data in Hong Kong

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Total Expenditure on Health as Percentage of GDP

5.4% = 2.4% + 3.0%

Sources: (1) Census and Statistics Department, 2011 GDP
(2) OECD Health Data October 2012
Hong Kong Healthcare System – Dual System

Public
Highly subsidized by govt

- 2.4% GDP
- 88% inpatients
- 31% outpatients
- Public Health

Private
Self-financed by patients

- 3.0% GDP
- 12% inpatients
- 69% outpatients
Clinical Management System (CMS)

- Patient Presents
  - Laboratory (LIS)
  - Radiology (RIS)
  - Operating Theatre

- Problems
  - History taking
  - Physical examination

- Investigations, Diagnosis, Treatment, Procedures
  - Radiological examinations
  - Laboratory tests
  - Progress notes
  - ECG
  - Endoscopy
  - EEG, EMG
  - Outpatient drug orders
  - Generic Requests
  - Therapeutic Interventions (e.g., ERCP)
  - Rehabilitation (Physiotherapy)
  - Nursing treatment
  - Clinical Protocols / EBM
  - Surgical operations

- Outcomes
  - Coding of discharge diagnosis & procedures
  - Drug prescription
  - Discharge summary
  - Referrals or replies to other clinicians
  - Follow-up appointment booking
  - Medical reports

- Pharmacy Dispensing
- Electronic Patient Record
- Web-based Computerised Patient Records Information Retrieval
- Appointment Booking (OPAS)

- Hong Kong Patient Master Index - Patient Administration (IPAS)

- Patient Discharged
Data quality begets data use
Documentation becomes knowledge

Management data should be a byproduct of clinical documentation
The Electronic Patient Record (ePR)

- A web-based lifelong longitudinal record of all healthcare transactions for all Hong Kong citizens
- Many data formats including multimedia and digital radiology
- Patient privacy protected with access controls and full audit logs
- Available at all 162 facilities in the HA
## Electronic Patient Record

Patient Name: MO, SIU YUEN

<table>
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<tr>
<th>Test Name</th>
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<td>Phosphate</td>
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</table>

Click the test name for single test view.
An essential clinical tool

- 9M patients
- 250M episodes of care
- 1B laboratory results
- 150M radiology studies
- 400M drug items
- 3.5M updates / day
- 700K hits / day
- Sub-second response time
- 7x24 >99.98% uptime since live run
Clinical Data Analysis & Reporting System (CDARS)

Whipple's Operation 30-day Mortality Rates

Hospitals

A  B  C  D  E  F  G  H  I  J  K  L  M
HARRPE

Risk stratification for elderly Patients

Targeted intervention by call centre nurses
Hospital Admission Risk Reduction Programme for the Elderly (HARRPE)

Model development and validation

Training Dataset
1.37 million index episodes of target subjects in 2006

4 Validation Datasets
4 quarterly cohorts in 2006 each with a complete profile of over 0.3 million index episodes

14 Predictor Variables
HARRPE score

Model building

Model

Model validation
Model Output

The HARRPE score

- is the predicted probability of emergency admission to medical ward of any HA hospital within 28 days after an index episode, in which the elderly patient was discharged alive

- the higher the score, which ranges from 0 to 1, the higher is the likelihood
HARRPE

65 yrs+ Discharge

Look back period

0

Look forward period

28

14 Predictors: Socio-demographics, Prior utilization, Comorbidity, Type of index episode

Risk Prediction Model

HARRPE score >0.17
Outcomes

Episodes of Emergency Admission

Control Group: 67
TNCS Group: 43

$\downarrow 35.8\%$

$p=0.05$
Community Health Call Centre (CHCC)

- **2007**: High risk elderly (HARRPE - Hospital Admission Risk Reduction Program for the Elderly)
- **2011**: Mental Health Direct
- **2012**: Chronic Disease Management
- **2013**: Defaulter tracing
Community Health Call Centre (CHCC)

Identifying at-risk patients from the total population
Delivering the patient lists to appropriate care providers in a timely fashion
Enabling new models of care delivery
The Hong Kong Wide Electronic Health Record
Without eHR

Private Hospitals

Laboratory

X-ray

Other healthcare professionals

Doctors and Nurses

Private Clinics

HA

DH
eHR - An essential health infrastructure

Patient-oriented healthcare records

Family doctor concept; integrated primary and hospital care

Public-private interface and partnership

Electronic Health Records Sharing Infrastructure
The End