

Infectious Disease Control Training Centre 傳染病控制培訓中心





Infection Control Branch 感染控制處



Seminar on Application of Artificial Intelligence (AI) on Infectious Diseases and Infection Control on 13 November 2024



Smart solution for Infectious Disease Management

Dr Anna TONG Chief Manager (eHealth), HO IT&HI Hospital Authority



Clinical Systems – Patient Care Delivery Journey





Hospital Authority ePR

🧑 Clinical Management System [CMS] 🛛 La	st successful logon: 15-Mar-2011 14:24 (V	H_HAHO)			_ 8 ×
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Electronic Patient Record (ePR)					
				Detai	Alert
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				Unknown	
M 37y DOB: 12-Dec-1973	M101488(4) MED 5	A-06 Adm:	07-May-2010	HN10000012(Z)	
	Diagnosis Legend		Alert Detai	ls Legend	
	Last Entry Description			Logona	
	10/02/2007 Chest infection		No Known	Drug Allergy	
	10/02/2007 Chronic Obstructive Pulm	onary Disease	Gi upset due to m	eπormin	
	10/02/2007 A Peptic Ulcer		CRAVOL IDIMENI		
	13/01/2007 📄 Diabetes Mellitus				
	13/01/2007 A Type II DM with backgro	und retinopathy			
DB Connection: online, one whaten	13/01/2007 A Type II DM with overt ne	phropathy		s Zoom Legend	~
Clinical Notes and Summary	(macroalbuminuria)		Last	S Loom Logona	
Clinical Notes	24/02/2006 A Benign prostatic hypertrop	hy	Prescription	Drug Name (Route)	
IP	17/01/2003 Congestive heart failure	tub execute eie	End Date		
IP + OP	17/01/2003 A Late effects of respiratory		23/02/2012	CHLORMETHIAZOLE (O	RAL)
Operation / Endoscopy	14/06/2001 Courty arthritis		R 23/02/2012		
Nil.	Gody animus		× 23/02/2012		
Laboratory	Procedure Legend		► 15/12/2011	GEMFIBROZIL (ORAL)	
VH 09/01/08 LFT, RFT	Last Entry Description		► 15/12/2011	GLIBENCLAMIDE (ORAL	.)
Radiology All images	29/01/2007 📄 Oesophagogastroduoden	ioscopy with biopsy	► 15/12/2011 (X 2) METFORMIN (ORAL)	
VH 12/11/09 OTHER	27/01/2007 Therapeutic OGD		R 15/12/2011		
VH 28/08/08 CT Brain plain, Orbit plai	17/01/2003 Ultrasonogram of abdome	en	06/12/2011	HALOPERIDUL (URAL)	
VH 16/01/08 MRI IAM plain, IAM+con. VH 09/01/08 CT Abdomen plain. Pelv	23/04/2002 Lung function test		606/12/2011	HYPROMELLOSE (OPH	THALMIC) 🗹
VH 09/01/08 XRAY Chest			Future Appo	intment HKPMI View	Schedule Legend
			Date	Hospital / Clinic	Service
			01/06/2011 0	7:30 KWH	Radiology DMSA
			<		>
Ready		VH SURG	CHAN	MING SUM (VH3) 15-0	3-2011

Hong Kong wide eHealth

Clinical	Administratio	n Emerger	icy Access	standards I	nformation		UPPPI	NURSE011 UPP	PNURSE011 D	K (Logo
黄大文 WONG, TAI M/ HKIC No.: Q000999(3)	AN DOB : 14	-Feb-1976	Age : 3	9 years	Sex : M	Details 🕨		Allergy & ADR	Select Patient	Close Record
e健通 All Local I	Non-Local	oratory Re	cord							
health	Help	ite View Do	cument View La	boratory: All		Period: All	v		Defaul	View 🗸
Y 🗊 🕷 🕅 🖏 🛄	Date	• •	Profile Desc	ription				¢	Institution	¢
Clinical Note & Summary	02-4	pr-2013	🔁 CA, GGT, LFT	RFT.					QEH	
Clinical Note & Summan	, O2-A	pr-2013	🔁 CBP/DC						QEH	
Encounter / Appointment	02-A	pr-2013	🔁 CEA						QEH	
Problem & Procedure									000	
Problem / Diagnosis	Lab	oratory Cu	mulative Result	(s)						
Procedure	La	t 1 voar	V						Page 1 of	
Medication	La	it i yeai	<u> </u>					00		.00
Prescribing History	Inst	tution		QEH	QEH	QEH	QEH	QEH	QEH	
Dispensing History	Date			02-Apr-2013	08-Mar-2013	14-Feb-2013	21-Jan-2013	31-Dec-2012	10-Dec-2012	
Laboratory Record				10:01	10:00	10:10	09:50	10:07	09:44	
Chemical Pathology	PDF	Report		2	12	2	2	2	74	
Microbiology & Virology	Sod	um, Serum o	r Plasma	142	140	139	137	139	138	
I oxicology	Pota	ssium, Serur	n or Plasma	3.5	3.5	3.6	3.6	4	3.7	
Canaral Dadialagu	Urea	, Serum or P	lasma	2.0 L 🖡	2.6 L 🖡	2.5 L 🖡	2.4 L 🖡	2.3 L 🖡	3.7	
	Crea	itinine, Serun	n or Plasma	43 L 🖡	52 L 🖡	56 L 🖡	65	68	73	
Computed Tomography	Prot	ein, Serum or	Plasma	64 L 🖡	69	74	71	73	77	
compared remography	Albu	min, Serum o	or Plasma	29 L 🖡	33 L I	35	30 L I	30 L I	33 L I	
	Glob	ulin, Serum,	Calculated	35	36	39 H †	41 H T	43 H T	44 H †	
	Bilin	ıbin, Serum o	or Plasma	3L¥	5L‡	6	6	6	6	
PEA	Alka Plas	line phospha ma	tase, Serum or	95	105 H 🕇	111 H †	111 H †	100 H 🕇	116 H 🕇	
	Alan Plas	ine aminotrai ma	nsferase, Serum o	r 7L↓	6 L I	8 L I	12 L 🖡	11 L II	13	



vailable online at www.sciencedirect.com ScienceDirect

Jeanal of Biomedical Informatics

fical Informatics 40 (2007) 365-36

Guest Editorial Public health informatics

Imagine a public health system where all rtable disease and laboratory information ailable within 24 hours of collection, anal sis of the data for anomalies is ongoing and tic, and alerts are distributed in an blic health and clinical om a wide variety of sources he health status of every of uld be collected, analyzed, and dissem

September 11th attacks. It was this vision that ted the convening of the American Medical Inforiation's Spring 2001 Congress that brought to the informatics and public health communities t nda for the growth and develor eting held in Atlanta, Georgia, May 15-17,

ed since that meeting and the Sepber 11th attacks. During that time, anthrax even uses and unforeseen natural disa singly urgent need to better utilize methods from ablic health informatics to strengthen the structure we all depend on to aid in the sm and other public

Obesity is now the fastest-growing cause of death disease in our nation-second only to smoking in its mber of deaths assoc iated with exces . Obesity also has ealth consequences. For example, chil affer much more frequently from type 2 diabehigh blood pressure, and poor overall health

164/5 - see front matter /0 2007 Elsev 1016/j.jbi.2007.07.005

tillions of Americans from successfully managin ealth. As health information has become more acc to millions of Americans via the Internet, it has becom ncreasingly apparent that the 90 million Americans who tely understand basic health informatio being left behind. Low health lite ients' inadequate engagement in, and benefit are advances and is linked with such adverse orer self-management of chronic diseases, ehaviors, higher rates of hospitaliz While informatics alone will not

> Public health informatics is de ation of information and computer scia ogy to public health practice, research, and learning [3,4 oprovention of public health informat omic surveillance and outbreak det prising given that expansion of p us a field coincided with the Sept he terrorist acts that followed. Prior to Sep 2001, PubMed lists only six articles con words "mublic health informatics." This ne PubMec address this particular pu prising to some of our readers that the post-Sep estment in public health is the single largest since th Second World War. The cates has mandated that these res bioterrorism and preparedn

As a result, recent papers p ormatics journals reflect surveillance and outbreal detection as the core of public health inform aper in this issue by Buckeride automated syndromic surveillance. In general, the resi suggest that syndromic surveillance systems are capa detecting some types of disease outbreaks rapidly

collection, analysis of the data for anomalies is ongoing and automatic, and alerts are distributed in an automated fashion to relevant members of both public health and clinical community. Furthermore, a steady of electronic information from a wide variety of sources regarding the health status of every community would be collected, analyzed and disseminated continuously."

"Imagine a public health system where all

reportable disease and laboratory

information is available within 24 hours of

Source : Kukafka at el. Journal of Biomedical Informatics 40 (2007) 365 – 369)



"Enabler"

From Individual Patient Care to Population-wide Healthcare Service Delivery

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

Data

- the Fuel for Artificial Intelligence

"Get the right data right"



Unique Patient Identifier

- Using Hong Kong Identity Number (HKID #)
- HKPMI, Admissions/Discharges and Appointments Booking implemented across all HA hospitals and clinics
- HA HKPMI contains 8 million people's records

Uniquely identify all patients and facilitate linking together episodes of care



HA Data Mobilization Strategy

One-stop Platform for all data & solutions for analytics (Artificial Intelligence & Data Analytics Platform, AIDA)

- ✓ Generic framework on integrating & linking all data sources
- ✓ Structured & unstructured data and image processing
- ✓ Near real-time data analytics for timely decision support
- ✓ Self-service analytics for various user groups
- ✓ Easy access to machine learning and artificial Intelligence

Through advanced **analytics tools/data services** to **transform** clinical and operational **data** into **knowledge** and **insights**

AIDA – Artificial Intelligence & Data Analytics Platform



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AIDA – Artificial Intelligence & Data Analytics Platform

Data Governance and Security Management

1. Data Acquisition Collect data from source systems including real time structured & unstructured data and images

6. Machine Learning cluster & Al Lab

- Provide an AI & ML platform including auto ML ,GPU & cloud resource
- Connects internal and external stakeholders to embrace innovations & adoption of AI technologies in HA

5. Data Collaboration Laboratory

Provides a big data analytics platform enabling academic researchers to access HA's clinical data

Clinical Apps

4. Data-driven Service Enable integration with data services to HA clinical operation systems

3. Advanced Analytics tools/data services Enable data access and self-service analytics solutions for range of user groups

2. Data Standardization and Transformation

Manage data lifecycle and combine multiple data sources and types (structured &unstructured data, images) to streamline data access

Data Standardization and Transformation

- To manage data lifecycle and combine multiple data sources and types (structured & unstructured data, images) to streamline data access
 - Data **definition** & **standardization** (from Hospital to Corporate standards)
 - Support various international clinical terminologies and standards (e.g. LOINC, SNOMED CT, ICD9-CM, ICD10, ICPC-2, BNF) for facilitating data analytic criteria searching and grouping
 - Creation of **value added** information such as risk scores





Use of Standards in Hospital Authority



Reference Terminology binding to local hospitals data

> To enable secondary use of clinical data

- Interoperable between clinical systems
- Driven-driven decision support
- Corporate data analysis & research



Information Architecture Management System (IAMS)

- Data Entity Management
- Corporate Data Definition & Dictionary
- Terminology management (e.g. LOINC, SNOMED CT, ICD9-CM, ICD10, ICPC-2, BNF)

cept Search Criteria	9														
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Information										🔍 Sear	ch 💢	Clear			
laster Criteria	_	الالا	MS	Entity - Concept -	Form - Repo	ort - Subset -								Guest 🕱 🏠	
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	Ç	Search Re	sult Ref 1	Term Search Result			Term ID	2317	IN USE	Natu	re Di	agnosis (Dx) Stage	In Use	Version 2	
	0	🔍 Search					Full Description	Cancer of fe	male breast -	central					
	L	Stage	HA Stat.	Nature	Term ID	Concept Description	Short Description	Mal neo fem	ale breast- c	entral					
Terminology Selection	C		Activo	Diagnosis (Dv)	2256	Ckin malanama of trunk not	eHR Description	Cancer of fe	male breast -	central					
Stiction		III USE	Active	Diagnosis (DX)	2230	involving scrotum	Alias	Malignant n	eoplasm of c	entral part of	female	breast (disorder)		Source:SNOMED	σ
		To Use	Inactive	Diagnosis (Dx)	2258	Skin melanoma - trunk, anus.		Malignant n	eoplasm of o	entral portion	n of fema	ale breast		Source:HACVT	
Keyword	C		Indeave	Diagnosis (DX)	2250	breast, buttock	Validation Rule	Principal	Yes	Sex Femal	e	Age N/A		Laterality N/A	
	٩	🔲 In Use	Inactive	Diagnosis (Dx)	2296	Cancer of skin - trunk, anus, brea	Remarks								
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	[[📃 In Use	Inactive	Diagnosis (Dx)	41597	Breast cancer, female	ICD9Dx ICD10-2001	<u>C50.1</u>							
Stage		In Use	Inactive	Diagnosis (Dx)	43268	Malignant neoplasm of breast	ICD10-2010+MBD	<u>C50.1</u>							
HA Status		To Lise	Inactive	Diagnosis (Dy)	2315	Cancer of ninnle and areola of	ICPC2								
	C	111030	Indenve	Diagnosis (DX)	2010	female breast	SNOMED CT	188151006				71CD 7			
C System Used		In Use	Active	Diagnosis (Dx)	2316	Malignant neoplasm of nipple and	- HA Properties					IASP Type			
Branch	-					areola of female breast	Status	Active		Inactive	e Reaso	n			
Other Criteria —	1	📃 In Use	Active	Diagnosis (Dx)	2317	Cancer of female breast - central	CM5 Ref. No.			CDF		Show		System Used	
	[In Use	Inactive	Diagnosis (Dx)	2318	Cancer of female breast - central	eHR Properties								
		_				Contra	Status	Active		Inactive	e Reaso	n			

Health Facts of Hong Kong

2024 Edition

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Population and Vital Statistics for 2023	
Land Area (Sq. km)	1 114.6
Mid-year Population ('000)	7 536.1
Population Density (Persons per sq. km)	6 910
Mid-year Population by Age Group ('000)	
Below 15 years	781.7
15 - 64 years	5 112.5
65 years and above	1 641.9
Annual Population Growth Rate (%)	2.6
Crude Birth Rate* [‡] (Registered births [‡] per 1 000 mid-year population)	4.4
Crude Death Rate* [‡] (Registered deaths [‡] per 1 000 mid-year population)	7.5
Late Foetal Mortality Rate* [‡] (per 1 000 total births [‡])	2.8
Perinatal Mortality Rate* [‡] (per 1 000 total births [‡])	3.6
Neonatal Mortality Rate* [‡] (per 1 000 registered live births [‡])	0.9
Infant Mortality Rate* [‡] (per 1 000 registered live births [‡])	1.6
Maternal Mortality Ratio* [‡] (per 100 000 registered live births [‡])	3.0
Life Expectancy at Birth* (Years)	
Male	82.5
Female	87.9
Percentage Distribution of Live births by Birth Weight	
Under 2.5 kg	7.7
2.5 kg to less than 4.0 kg	90.7

4.0 kg and above

Registered Healthcare I	Professionals	(End 2023)
-------------------------	---------------	------------

Type of Professional	Total	He Prof to Po	althcare essionals opulation*	
Doctors	16 180	1:	464	
Chinese medicine practitioners				
Registered Chinese medicine practitioners	8 423	1:	891	
Chinese medicine practitioners with limited registration	32		_	
Listed Chinese medicine practitioners	2 137	1:	3 511	
Dentists	2 876	1:	2 609	
Dental hygienists	612	1:	12 260	
Nurses	68 752	1:	109	
Midwives	4 618	1:	1 625	
Pharmacists	3 317	1:	2 262	
Medical laboratory technologists	4 658	1:	1 611	
Occupational therapists	3 205	1:	2 341	
Physiotherapists	4 589	1:	1 635	
Optometrists	2 306	1:	3 254	
Radiographers	2 907	1:	2 581	
Chiropractors	338	1:	22 199	
Health Facilities (End 2023)				
Number of Public Hospitals and Institutions under Hospital Authority				
Number of Private Hospitals				
Number of Hospitals under Correctional Institutions				
Number of Hospital Beds in Hospitals in Hospi	ital Authority		30 636	
Number of Hospital Beds in Private Hospitals				

Number of Hospital Beds in Correctional Institutions On 1 January 2021, the Hospitals, Nursing Homes and Maternity Homes Registration Ordinance (Cap. 165) was repealed when the Private Healthcare Facilities Ordinance (Cap. 633) was commenced. Nursing homes, which were regulated under Cap. 165, are no longer subject to regulation under Cap. 633. Hence, the statistics of nursing homes and their beds previously compiled according to Cap. 165 are not available from 2021 onwards.

852

Accident and Emergency and Outpatient Atten 2023*	ndances in
Department of Health	
General outpatient service attendances	427 997
Other outpatient service attendances	3 897 380
Hospital Authority~	
Accident and emergency attendances	2 067 729
General outpatient attendances	5 780 101
Specialist outpatient (clinical) attendances	8 291 838
Allied health (outpatient) attendances	3 220 342
Family medicine specialist clinic attendances	339 548

Inpatient Discharges and Deaths in All Hospitals Classified by Disease, 2022

Disease Classification	Number of Attendances	(%)
Diseases of the genitourinary system	301 226	(15.3)
Neoplasms	301 159	(15.3)
Diseases of the digestive system	191 945	(9.8)
Diseases of the respiratory system	180 445	(9.2)
Diseases of the circulatory system	143 223	(7.3)
Factors influencing health status and contact with health services	107 841	(5.5)
Injury, poisoning and certain other consequences of external causes	101 464	(5.2)
Diseases of the musculoskeletal system	79 638	(4.1)
Pregnancy, childbirth and the	65 384	(3.3)
Endocrine, nutritional and metabolic	50 922	(2.6)
Certain infectious and parasitic	43 039	(2.2)
Diseases of the eye and adnexa	42 532 35 646	(2.2)
tissue	55 040	(1.0)
Mental and behavioural disorders	34 218	(1.7)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	31 147	(1.6)
Diseases of the nervous system	28 419	(1.4)
Certain conditions originating in the perinatal period	16 479	(0.8)
Congenital malformations, deformations and chromosomal abnormalities	7 501	(0.4)
Diseases of the ear and mastoid process	7 408	(0.4)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	191 306	(9.7)
Unknown diagnosis (refers to uncoded principal diagnosis)	2 227	(0.1)
Total	1 963 169	(100.0)

Source : <u>Health Facts of Hong Kong 2024 Edition</u>

1.6

Notifications and	Deaths	of Notifiable	Infectious	Diseases in	n
2023 [@]					

	Notific	cation	Dea	ath‡
Disease	Number	Rate [#]	Number	Rate [#]
Acute poliomyelitis	0	0.00	0	0.00
Amoebic dysentery	14	0.19	0	0.00
Anthrax	0	0.00	0	0.00
Bacillary dysentery	11	0.15	0	0.00
Botulism	2	0.03	1	0.01
Chickenpox	1 396	18.52	1	0.01
Chikungunya fever	0	0.00	0	0.00
Cholera	0	0.00	0	0.00
Community-associated methicillin-resistant Staphylococcus aureus infection	469	6.22	3	0.04
Coronavirus disease 2019 (COVID-19)	255 307	3 387.79	2 594	34.42
Creutzfeldt-Jakob disease	15	0.20	10	0.13
Dengue fever	62	0.82	0	0.00
Diphtheria	0	0.00	0	0.00
Enterovirus 71 infection	0	0.00	0	0.00
Food poisoning (Outbreaks)	236	3.13	0	0.00
Haemophilus influenzae type b infection (invasive)	4	0.05	0	0.00
Hantavirus infection	1	0.01	0	0.00
Invasive pneumococcal disease	94	1.25	15	0.20
Japanese encephalitis	0	0.00	0	0.00
Legionnaires' disease	121	1.61	14	0.19
Leprosy	1	0.01	0	0.00
Leptospirosis	3	0.04	0	0.00
Listeriosis	9	0.12	3	0.04
Malaria	7	0.09	0	0.00
Measles	3	0.04	0	0.00
Melioidosis	17	0.23	5	0.07
Meningococcal infection (invasive)	5	0.07	0	0.00
Middle East Respiratory Syndrome	0	0.00	0	0.00
Monkeypox	53	0.70	0	0.00
Mumps	28	0.37	0	0.00
Novel influenza A infection	0	0.00	0	0.00
Paratyphoid fever	5	0.07	0	0.00
Plague	0	0.00	0	0.00
Psittacosis	14	0.19	0	0.00
Q fever	0	0.00	0	0.00
Rabies	0	0.00	0	0.00
Relapsing fever	0	0.00	0	0.00

Rubella and congenital rubella syndrome	1	0.01	0	0.00
Scarlet fever	167	2.22	0	0.00
Severe Acute Respiratory Syndrome	0	0.00	0	0.00
Shiga toxin-producing Escherichia coli infection	6	0.08	0	0.00
Smallpox	0	0.00	0	0.00
Streptococcus suis infection	6	0.08	1	0.01
Tetanus	2	0.03	0	0.00
Tuberculosis	3 260	43.26	173	2.30
Typhoid fever	16	0.21	0	0.00
Typhus and other rickettsial diseases	37	0.49	1	0.01
Viral haemorrhagic fever	0	0.00	0	0.00
√iral hepatitis	149	1.98	2	0.03
West Nile Virus Infection	0	0.00	0	0.00
Whooping cough	15	0.20	0	0.00
Yellow fever	0	0.00	0	0.00
Zika Virus Infection	2	0.03	0	0.00

Number of Registered Deaths[‡] by Leading Causes of Death in 2023* (Ranking is based on number of registered deaths[‡] in 2023)

Rank	Disease Group	Number of Registered Deaths [‡]
1	Malignant neoplasms	14 865
2	Pneumonia	11 333
3	Diseases of heart	7 258
4	Cerebrovascular diseases	3 048
5	Coronavirus disease 2019	2 594
6	External causes of morbidity and mortality	2 377
7	Nephritis, nephrotic syndrome and nephrosis	1 756
8	Dementia	1 537
9	Septicaemia	1 329
10	Chronic lower respiratory diseases	1 268
11	Diabetes mellitus	570
	All other causes	8 841
	All causes	56 776

Health Expenditure (Hong Kong's Domestic Health Accounts 2022/23)[^]

Total expenditure on health	
amount (HK\$ million)	284,073
as % of GDP	10.0
per capita total expenditure on health (HK\$)	38,670
Public expenditure on health	
amount (HK\$ million)	173,747

as % of total expenditure on health61.2as % of total public expenditure20.5per capita public expenditure on health (HK\$)23,652Private expenditure on health110,327as % of total expenditure on health38.8per capita private expenditure on health (HK\$)15,018Per capita GDP (HK\$)387,018

Official Estimates on Immunisation Coverage of Infants born in 2021 †

Type of Vaccine	E	Official Estimates
B.C.G. Vaccine (at birth)	A	bove 95%
Combined Diphtheria, Pertussis & Tetanus Vaccine (third dose)	A	bove 95%
Polio Vaccine (third dose)	A	bove 95%
Hepatitis B Vaccine (third dose)	A	bove 95%
Pneumococcal Vaccine (second dose) At		
Combined Measles-Mumps-Rubella Vaccine (first dose)		
Environmental Health for 2023		
Percentage of population with sustainable access to an improved		

water source			
Percentage of population facility	with access to	improved sanitation	99

Prevalence of Selected Lifestyle Practices and Health Status Among Persons Aged 15 or above, 2022^{α}

Lifestyle Practices and Health Status	Male	Female	Overall
Proportion of daily alcohol drinkers	3.8%	0.6%	2.1%
Proportion of adults aged 18 or above who had insufficient physical activity (according to WHO's definition)	22.8%	26.5%	24.8%
Proportion of population with inadequate daily intake of fruit and vegetables (less than 5 servings on average per day)	98.2%	97.8%	97.9%
Prevalence of self-reported doctor-diagnosed overweight and obesity (BMI ≥ 23.0)	6.4%	6.1%	6.3%

Prevalence of current smokers (aged 15 and over), 2023§

Current Smokers			Male	Female	Overall
Daily conventional cigarette smokers			16.4%	2.7%	9.1%
Daily conventional cigarette smokers Notes: * Provisional figure(s). ^ Source: @ Information as at 10 July 2024. # Per 100 000 population. a Source † The official estimates is based on the results of 2 coverage may be lower than the official estimate - In view of the emergence of the Coronavirus D Hospital Authority (HA) has adjusted its services account when comparing the throughput of servi of local COVID-19 egidemic situation and cesasi been gradually resuming provision of all of its pu- normalcy measures.			b: Health Bureau. S: Census and Statistics Department. a: Population Health Survey 2020-22. 2021 immunisation survey. The actual e due to COVID-19. Disease 2019 epidemic in Hong Kong since early 2020, as in response to the epidemic. This should be taken into rices provided by HA across the years. With the subsiding ation of anti-opidemic measures in early 2023. the HA has public healthcare services to tie in with the Government's		
1 Fi	Figures based on births and deaths registered under the Births and Deaths Registration Ordinance			ation Ordinance	

‡ Figures based on births and deaths registered under the Births and Deaths Registration Ordinance (Cap. 174, Laws of Hong Kong) during the specified period.

Source : Health Facts of Hong Kong 2024 Edition



AAA المعالية المحمد المحم محمد المحمد ا

Acute gastroenteritis

syndrome group

III. Weekly charts for the current and previous two years

Hot searches: Seasonal Influenza Vaccination, Vaccination Schemes, Mental Health, Mpox, COVID-19

About	Health Topics	Recommendations	Resources	Statistics	Media Room	Others
Statistics	;					

🛊 Home > Statistics > Statistics on Communicable Diseases > Sentinel Surveillance > Accident & Emergency Departments Communicable Diseases Syndromic Surveillance

Statistics on Communicable Diseases	Accident & Emergency Departments Communicable Diseases			
Statistics on Health Behaviours	Syndromic Surveillance			
Vital Statistics	This weekly update is produced by the Surveillance Division of the Communicable Disease Branch of the Centre for Health Protect of the Department of Health. It summarises the findings of the communicable diseases surveillance based at the Accident & Emergency Departments of public hospitals.			
Statistics on Antimicrobial Resistance Control				
Statistics on Laboratory Surveillance	Week 44 (27-Oct-2024 to 2-Nov-2024)			
Statistics on Youth Health-related Behaviour	The rates of the influenza-like illness; hand, foot and mouth disease; acute gastroenteritis; and acute conjunctivitis syndrome groups were at baseline levels.			

HA Support to Public Health



II. Weekly average rates in the past four weeks (per 1000 coded cases)

Influenza-like illness

syndrome group

121.1

123.0

122.5

127.9

and, foot and mouth

disease syndrome



tendance date

Notes

The Centre for Health Protection is a professional arm of the Department of Health for disease prevention and control

Department of Health



 The influenza-like illness syndrome group includes codes rela and pneumonia.
The hand, foot and mouth disease syndrome group includes i related presentations.
The acute gastroenteritis syndrome group includes codes rela poisoning.

The acute conjunctivitis syndrome group includes codes relat
Data in this report are provisional and subject to revision base

III Minship shouts for the surrout and mandans the

Source: <u>Centre for Health Protection - Accident &</u> <u>Emergency Departments Communicable Diseases</u> <u>Syndromic Surveillance</u>



Acute conjunctivitis

syndrome group









Methodology

 This surveillance system makes use of the principal diagnosis code (ICD-9-CM) data collected at the Accident & Emergency Departmen under the Hospital Authority. These codes are grouped by their attendance dates into time series data.

The rate for each syndrome group is calculated by dividing the number of consultations with the principal diagnosis codes equalling to or of the codes in the corresponding syndrome group, by the number of consultations with principal diagnosis codes provided.

COVID-19: Globe

Globally, as of 13 Oct 2024, there have been 776,618,091 cases of COVID-19 reported to WHO.



IT support during COVID-19 outbreak

- Data driven notification for clinical operation
- Case reporting to relevant external parties (e.g. Department of Health for epidemiology)
- Daily summary of COVID-19 hospitalization and death cases
- Resources & Capacity management and visualization in MIPo
- Support data analysis and research e.g.
 - high risk patients list eligible for 3rd vaccination
 - Targeted patients list of Evusheld Injection for Pre-exposure prophylaxis
 - potential case with adverse event of special interest (AESI) for pharmacovigilance project

Daily update of COVID-19 hospitalization and death cases in Hospital Authority

HA is one of the data contributors for keeping the public updated for outbreak situation



Sophia Chan (second from left) and Chuang Shuk-kwan (second from right) at a press conference on July 9, 2020. File Photo: GovH

To raise public awareness on how to combat COVID-19, DH has produced various health information resources for dissemination via on-line platforms and television / radio channels.

Daily media briefings are jointly organised by DH and the Hospital Authority (HA), with timely updates on the Government's dedicated COVID-19 website. An "Interactive Map Dashboard" has been developed through the collaborative efforts of the Development Bureau, Lands Department, CHP, OGCIO, HA and volunteers from the local IT sector to provide the public with the latest information on the COVID-19 situation.



COVID-19 case reporting to Department of Health



Resources & Capacity Management in MIPo

- Death Case Monitoring for public health concern



Resources & Capacity management in MIPo

- Bed Occupancy Monitoring for strategic operational planning





50% 6/9 3/0 (18)

51.6%

No. of Non-occupied Bed

Those above 85% are marked in T

Resources & Capacity management in MIPo

- COVID-19 Vaccination Status for monitoring immunization trend



Support data analysis and research for public's benefit

- Contribute data to support government 'CARE' Programme for decision support
- Linked up population-based records to identify potential adverse events after COVID-19 vaccination
- Among the first teams in the world to analyze **Bell's palsy** and **carditis** following vaccination
- Reports to DH for action relevant to public health policies and clinical recommendations

COVID-19 Vaccines Adverse Events Response and Evaluation (CARE) Programme

Together, We Fight the Virus

The CARE Programme is a comprehensive surveillance programme implemented under The University of Hong Kong Department of Pharmacology & Pharmacy Team that closely monitors known and potential adverse events of COVID-19 vaccines. It aims to ascertain details of adverse events and inform the public in a timely manner.

HA's Overall Digital Maturity



"Service models are innovated using new technology"

AEIS – Clinical & Statistics data



Smart Hospital Initiative - eAED for 18 AEDs

東方日報 2019-09-16 A14

医 院急症室工作猶如戰場打仗,每一刻 **产** 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。

院已採用 未來數 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 清失:

> **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,不會買貿然取用病人資料,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







eAED – AED Clinical Documentation

A&E Clinical Documentation Form X		ABE Clinical Documentation Form X
Triage Assessment History & Clinical Findings POCT Ix Treatment Reasse	ssment Discharge Statistics 🔀 Template 🌘 Copy 🚺 Info	Triage Assessment History & Clinical Findings POCT Ix Treatment Reassessment Discharge Statistics 🕞 Copy 👔 Info
Informant: Self Spouse Parent OAH Others	Triage time: dd/MM/oppy bb mm	Traatmant anta:
Amb status: O Amb. O W.C. O Stretcher O Carrier	Chief complaint:	
TOCC: O No O Yes		
Referral: O No O Yes		
Communication: Lang, barrier Impairment: Visual Hearing Speech		
Risk of fall: O No O Yes	Condition on arrival:	
Conscious level: OA OV OP OU BW: kg	Pamarke	
GCS: E V M Score / (15) RH· cm ASE Clinical Documentation Form X	Remarks.	ARE Clinical Documentation Form X
Triage Assessment History & Clinical Findings POCT Ix Treatment Reasses	ssment Discharge Statistics 🚯 Template 🚯 Copy 🚯 Info	Triage Assessment History & Clinical Findings POCT Ix Treatment Reassessment Discharge Statistics
Informant: Self Spouse MO FA DA Son OAH Paramedic	Police 🖾 Others	Doctor's notes / reassessment:
End waiting time: dd/MM/vvvv hh mm @ Case doctor: CMSIT	V Nurse clinic Nurse:	
Chief	Referred by:	
complaint:	dav(s)	
Status: © Satisfactory © Stable © Serious © Critical Alertness: © Alert &	& orientated Disorientated: Time Place Person	
O Dead Drows	sy 🔄 Unconscious	
Present symptoms: Past heat	ith:	
Hait similar posementation Form X		A&E Clinical Documentation Form X
Triage Assessment History & Clinical Findings POCT Ix Treatment Reasses	ssment Discharge Statistics	Triage Assessment History & Clinical Findings POCT Ix Treatment Reassessment Discharge Statistics
V ECG V VSG VSG VVine VVine V	New Cap. blood 🤫 New	Admission decision time: dd/MM/yyyy hi.mm O by Attending speciatry:
ECG (Delete) Urine	1 / 1 Prev Next Delete	Discharge time: dd///iM/yyyy nn.mm O by Osuroery Eve Oncology
Request time: dd/MM/vvvv hh.mm O bv Request time:	dd/MM/www.bh.mm	Check DX: Discharger Status
Complete time: dd/MM/vvvv hh mm Q bv Complete time:	dd/MM/www.bh.mm	Home PRN Return O Transfer A&E O Dead O Orthopaedics O Dental O CTS
Eindinge:	dd/MM/aaay bhimm O by	C + A&E FU Disappeared Paediatrics Dermatology DIDU
Picklowedge a		© + SOPD © DAMA © Gynaecology © Burn © Others
E Bugai		0+GOPC
E NDC		C + Referral C Hosk explained & understood Traumatic
A&E Clinical Documentation Form X		A&E Clinical Documentation Form ×
Triage Assessment History & Clinical Findings POCT Ix Treatment Reasse	essment Discharge Statistics 🕞 Copy 🚺 Info	Triage Assessment History & Clinical Findings POCT Ix Treatment Reassessment Discharge Statistics 🕒 Copy 👔 Info
🗵 X-ray 💛 New 🗵 CT 💛 New 🗵 Other 💛 New)	Animal bite: © Cat © Dog © Snake © Monkey © Rat © Insect
X-rav (Delete) Findings	CXR/AXR/KUB Other x-ray	© Others
Request time: dd/MM/yvyy hh.mm (Q) by		
Complete time: dd/MM/vvvv hh mm Q tv		C Known C Unknown
Test info		104 Oliver Oliver Olivery Olivery
		Arce, ortes one openang oriminane obecinea
		Hyperrab / HRIG
CT (Delete) Findings:		Special code:
Request time: dd/MM/yyyy hh.mm O by		
Complete time: dd//MM/yyyy hh.mm O by		6 7 8 9 10
Test info:		
		Audit:
Other Delete Findings:	*	ANI I HININAYUC
Request time: dd/MM/yyyy hh mm O by		
Complete time: dd/MM/vvvv hh mm (0 bv		Others:
Test info		NSI Staff
		Airport Helicopter
Last patient location:	Save Preview Print Save and Print	Last patient location: (Save) (Preview) (Print) (Save and Print)

Patient Observation & Monitoring



Smart Hospital Initiative e-Vital



Smart Input

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

Seamless Workflow Integration



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

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



View Anywhere Anytime

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

Each of us is defined by

many layers of data

Source : <u>https://youtu.be/s7vur7ckBE0?si=9fljjMiX9P-yauEX</u>


Future Medicine More Personalized Diagnostics



eHealth App









日期 (日/月)	血壓 (mmHg)	心跳 (bpm)
10/7	120 / 80	86
9/7	120 / 84	68
6/7	135 / 80	69
4/7	150 / 85	85

(1) 紀錄	新增紀錄	① 提醒

eHealth App











10/7

9/7

From Cuff To Cuffless: The Evolution Of Blood Pressure Monitoring

Let's take a look at the cuffless revolution and how blood pressure monitoring evolves thanks to photoplethysmography



Pranavsingh Dhunnoo 5 min | 29 June 2023



NSW completes statewide expansion of virtualKIDS Urgent Care Service to lower ER visits

Families in one state are now able to access a virtual healthcare service for sick kids, in an effort to help stop unnecessary trips to hospital emergency rooms.



The expanded virtualKIDS Urgent Care Service is expected to be used by more than 500 households every month. Picture: iStock



NSW completes statewide expansion of virtualKIDS Urgent Care Service to lower ER visits | news.com.au — Australia's leading news site NSW Government expands innovative virtual care service statewide - News / Sport - News/Sport - The Orange App



"Big data will transform medicine."

Source : http://www.autowrappers.co.uk/history



Source : <u>Facts About AI and Machine Learning in Healthcare Worth Knowing</u> (innovecs.com)



Key Challenges of Healthcare

- Manage growing service demand
 - Ageing population and healthcare needs
 - Burden of chronic disease
 - High demand services
- Ensure service quality and safety
 - Medical technology and facilities
 - Service models
 - Patients' expectation
- Maintain sustainability
 - Financial situation
 - Workforce situation

The Healthcare Challenges in Hong Kong

Health system sustainability



Public health expenditure and GDP in real terms



Tax revenue to GDP and Public health expenditure to tax revenue in selected economies with similar GDP per capita in 2019/20



--- Tax revenue to GDP

--- Public health expenditure to tax revenue

Source : Homepage (primaryhealthcare.gov.hk)



Innovation and Entrepreneurship

"The enterprise that does not

innovate

inevitably ages and declines. And in a period of rapid change such as the present... the decline will be fast." -Peter F. Drucker

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

Data Competence Center (DCC)



Formed in June 2015 from 8 to 80 members in 2017

R&D Open source data technology Data infrastructure HA use cases, develop prototypes Learn and share, develop data engineers

Innovation Framework



Our Vision



Use AI to advance Healthcare from Descriptive to Prescriptive Analytics

See adverse event coming – and prevent them, rather than reacting to them

Engage patients through deep understanding of their unique needs and preference

≻more.....

Examples of DCC POC / Projects on HA Clinical Service Improvement



Application of Innovation Frameworks



Smart solution for Infectious Diseases Management



Data driven notification and reporting

Decision support for clinical operation

Proactive surveillance and early alert

Situation & resources monitoring

Support data analysis and research

Concern of from MDROs emerging to antibiotics misuse/antibiotics resistance



Smart solution to Infectious Diseases Management with AIDA Platform



Smart IT solution to MDROs emerging to antibiotics misuse /antibiotics resistance in HA



Smart Infection Control Analytics Engine (SICA) to support Infection control team for MDROs



Corporate MDRO definition in AIDA



Generation of MDRO case list

1. Smart patient tagging	 3. MDRO case visualization & statistics Enable self-service by Infection control team to have insight/track of MDRO trend CDARS Lite MDRO trend visualization Pre-calculated MDRO cases facilitates MDRO ad hoc enquiry in CDARS 				
Data-driven auto-tag confirmed MDRO cases in relevant clinical systems for timely notification to clinical staff for precaution					
2. Smart Patient List	4. Support Smart MDRO contact tracing				
MDROs SPL GCD form	Contact case SPL				
Notification	 Enable MDRO contact tracing with other clinical data Contact case identification with MDRO x in-patient admission system data Cubicle info from digital ward place Enable contact case via Smart Patient List and Smart Patient tagging 				
Support infection control workflow with CMS features (clinical e-documentation) and enhance communication with infection control team, ward staff, and even relevant external parties via auto- notification.					
1) Single source of MDRO calculation in AIDA					



2)

3)

Single source of MDRO calculation in AIDA

Reduce manual infection control team workload (e.g. tagging, communication) Open the potential for e-documentation & replace historical silo MDRO systems

Potential benefits & outcome of SICA

Reduction in frontline workload (from manual to data-driven)

To internal (HA): ward staff and infection control team's workload To external: Department of Health, and even residential care settings

Early detection and prevention of spreading of MDROs

Enhance patient outcome with early intervention Facilitate resources and manpower management



Efficient to support MDROs surveillance monitoring

Allow detection of newly emerging MDRO pattern & monitor epidemiologic trends Measure the effectiveness of treatment



Smart ASP (Antibiotic Stewardship Programme)

HA response to HKSAR for antibiotics misuse /antibiotics resistance

- The **IT system enhancement to support ASP** is one of the AMR indicators relevant to HA, as stated in the Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2023-2027.
- HA WG ASP and HO IT&HI have been following up on the development of Smart ASP, subsequent to HA Directors' Meeting on 1 Feb 2023 and High Level Steering Committee on AMR on 10 July 2023.

Key Areas	Indicators relevant to HA	Target time	
Optimise use of antimicrobials in humans and animals	1. IT system enhancements to support ASP as recommended by EC since 2021	By 2024	Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2023 -2027
	 No year-on-year increase in proportion of E. coli non- susceptible to carbapenems from blood culture specimens collected > 48 hours after hospital admission (data available in Q1 2024) 	From 2023 onwards	
Reduce incidence of infection through effective sanitation, hygiene and preventive measures	3. Year-on-year decrease in proportion of MRSA and acinetobacter with reduced susceptibility to carbapenems in public hospitals participating in the universal decolonisation programme	By 2024	
(Strategic intervention: Address transmission of MDRO between hospitals and residential care homes)	3. Year-on-year decrease in proportion of MRSA and acinetobacter with reduced susceptibility to carbapenems in RCHE residents admitted to public hospitals participating in the universal decolonisation programme (data available in Q1 2025)	Dy LOL T	

Smart ASP

Smart ASP



- is developed to guide the prescription of antibiotics.
- leverages data analytics to conduct automatic review of antibiotic prescription, and provide automatic recommendations to clinicians via "Medication Genie" for **potentially inappropriate antibiotic prescriptions**.
- ASP teams would be benefited as data analytics would **reduce their manual review workload** and the feature provides **a more automated and user friendly platform for case auditing**.





Smart ASP- Data scope



Drug dispending data & di administration data



Smart ASP (big gun antibiotics) review workflow



*Applicable to rules for checking markers on life-threatening / serious infections.

No Medication Genie message would be prompted if the case is marked as "Appropriate" in ASP form after ASP team assessment in Day 4 – 7 checking, handled by AIDA data analytic

Start New ASP checking rule



Research and Applications

Information displays for automated surveillance algorithms of in-hospital patient deterioration: a scoping review

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Abstract

Objective: Surveillance algorithms that predict patient decompensation are increasingly integrated with clinical workflows to help identify patients at risk of in-hospital deterioration. This scoping review aimed to identify the design features of the information displays, the types of algorithm that drive the display, and the effect of these displays on process and patient outcomes.

Materials and methods: The scoping review followed Arksey and O'Malley's framework. Five databases were searched with dates between January 1, 2009 and January 26, 2022. Inclusion criteria were: participants—clinicians in inpatient settings; concepts—intervention as deterioration information displays that leveraged automated Al algorithms; comparison as usual care or alternative displays; outcomes as clinical, workflow process, and usability outcomes; and context as simulated or real-world in-hospital settings in any country. Screening, full-text review, and data extraction were reviewed independently by 2 researchers in each step. Display categories were identified inductively through consensus.

Results: Of 14 575 articles, 64 were included in the review, describing 61 unique displays. Forty-one displays were designed for specific deteriorations (eg, sepsis), 24 provided simple alerts (ie, text-based prompts without relevant patient data), 48 leveraged well-accepted score-based algorithms, and 47 included nurses as the target users. Only 1 out of the 10 randomized controlled trials reported a significant effect on the primary outcome.

Conclusions: Despite significant advancements in surveillance algorithms, most information displays continue to leverage well-understood, well-accepted score-based algorithms. Users' trust, algorithmic transparency, and workflow integration are significant hurdles to adopting new algorithms into effective decision support tools.

Key words: machine learning; clinical decision support; patient deterioration; information display.

Background and significance

Evidence demonstrates that the early identification and treatment of patients at risk of clinical deterioration (eg, sepsis, acute kidney injury) reduces the likelihood of adverse outcomes.^{1–3} However, recognizing patients at risk for deterioration and implementing appropriate interventions depend upon many factors surrounding the care teams' workflow and workload.¹ Definitions of patient deterioration include general deterioration (ie, any deterioration regardless of cause), and condition-specific deterioration, such as cardiac arrest, sepsis, and acute kidney injury (AKI). Unfortunately, reactions to early signs of deterioration are often delayed due to failure to recognize decline and communication barriers.^{4–7}

The increasing complexity of diagnostic and treatment modalities and the burden on healthcare systems will likely only worsen delays in response to deterioration. Thus, many look to algorithms that predict deterioration as a promising solution. Early warning scores (EWSs) that predict patient deterioration have been utilized for over 2 decades.^{8,9} More advanced machine learning (ML) algorithms recently gained attention for this purpose.^{10–15} Although these surveillance algorithms demonstrated increasingly better predictive performance, their implementation in clinical settings is still a challenge and the effect on patient outcomes has been mixed.

Although the importance of implementation factors on the efficacy of clinical decision support (CDS) tools has been well-recognized, ¹⁶⁻¹⁸ factors such as user interface design for information displays in the context of patient deterioration surveillance remain largely unexplored.¹⁹ Previous scoping reviews have examined several aspects of such surveillance tools. For example, Smith et al.²⁰ and Le Lagadec et al.²¹ examined tools that utilized EWSs. Gerry et al.²² reviewed studies on the development and evaluation methodology for EWSs rather than information displays or implementation in clinical settings. Blythe et al.²³ concentrated on users' reactions to alerts, and Mann et al.²⁴ recently reviewed algorithms that predict general deterioration in general wards. Many other reviews focused on

- Surveillance algorithms that predict patient decompensation are increasingly integrated with clinical workflows to help identify patients at risk of in-hospital deterioration.
 - Sepsis is one of the most severe but preventable adverse events in hospitals.
- Despite significant advancements in surveillance categorized into score-based, classical ML, and deep-learning.
 - Most information displays continue to leverage well-understood, well-accepted score-based algorithms.
- Users' trust, algorithmic transparency, and workflow integration are significant hurdles to adopting new algorithms into effective decision support tools.

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(A) EHR alert that displays basic information notifying users of the patients' AKI stage and serum creatinine.

(B) A multiple-patient dashboard provides on-demand access to a single patient's sepsis management display.

(C) Graphical trend lines representing risk score history embedded into a short text message were sent to clinicians' mobile devices, notwithstanding their limited screen size.

(D) A multi-patient dashboard in which icons convey rich contextual information. The single-patient display is launched from the dashboard that displays relevant observations by organ system.

Hospital Command Centre



Hospital Command Centre is built to evolve the operation of hospital to a "more real-time" mode by leveraging technologies which provide staff with more timely and accurate information for enhancing the hospital operational intelligence, efficiency and patient outcomes.

Benefits and Values

Hospital Command Centre





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【本規則】第人在醫院醫驗室程住產漸涉多個部門,賽部門 溝通信作非常重要,伊利沙伯醫院近年重點發展皆醫驗現 目,其中於2020年成立醫院指導仍近年重點發展皆醫院現 目,其中於2020年成立醫院指導小的一個的一合物質的門儲備。當中起 有「紅綠虎」模式顯示病人出院狀態,省部以電話聯絡指 認此教成諸學作利沙國醫院的是公科範疇實置要求動約段: 「過往醫院期前部門平伯整合卷者實訊,新永統有助將全院



DAILY NEWS

orientaldaily.on.cc

from

f in ≊ +

【明報專訊】第五波新冠疫情嚴重,公黛醫療系統當面對資源調配不足問題, 伊利沙伯醫與利用先前已成立的醫院指揮中心,信調各部門人手有資源,增加 病狀流轉並及早識別高危病人,將病人平均出院時間總短三成和優先處運備況 久理經病人。

目錄
1 3色顯示新冠病人分佈可按需要轉法設施
2 未統回動分析血壓心跳 優先處理高危病人
3 奠擴大指導中心聯網 預測病人人院出院需要





P利沙伯醫院成立的醫院指揮中心,可以實時掌握輪非和非緊急設護運送単隊使用情況,以 時調配資源幫助行動不便的過人出院或輪院。(伊利沙伯醫院提供)

News clipping from hk.on.cc

Clinical Data Analytics and Smart Visualization



Clinical Command Centre

Objectives

Smart visualization to unleash the potential of clinical data captured during patient care

- Provide data-driven decision support based on clinical conditions
- Monitor trends of patient parameters and pick up deviation of the baseline parameters of each patient
- Predict patient's length of stay (LOS) and estimate risk of deterioration
- Mitigate clinical risks or in-hospital mishaps e.g. pressure sores, falls and suicides
- Warning system, including alerts via mobile devices, with actionable suggestions
- Facilitate efficient inter-department consultations with patient location tracking technology

Results

- Improve Patient Care
 - ✓ Able to monitor patients on-the-go
 - ✓ Identify risk areas and patients at-risk
 - ✓ Prioritise care upon ward round
- Better Resource Utilization
 - ✓ Improve efficiency in overseeing ward situation
 - ✓ Save time from manually obtaining data from different clinical systems





"Patient View" of Clinical Command Centre


Drill Down of "Patient View" of Clinical Command Centre

Command Centre Institution: UAT (Venfication DB)		ENTRE - PATIENT VIEW	C 23 Sep 2022, 11:31
)는 Ward View	View: GYN/ORT - Specialty:	ALL · Ward location: 97A · Category: AllP	atients in Y Avg. LOS of ALL : -
 Patient View News Contact Us 	Patient Bed No. LOS(day) ORT/7A/01	CA-MRSA VISA VRE Extreme Vitals Critit CA-MRSA VISA VRE ORT/7A/01/01/ HN200000369T/ TSE,X CRT/7A/01/01/ HN200000369T/ TSE,X Extreme Vitals A	cal Lab Results) COVID Related Lab) ePR 30 See 30727 29127 ?? edicti) ePR .x. / ♀ / 35y ?? ★ ?redicti) eVital Iert since 23 Sep 2022 14:42 eVital
	ORT/7A/01 © 12 14 ILIU, X. X./50y HNXXXXX614	Temp: 37.6 °C Site: Tympanic SBP: 134 mmHg	23 Sep 2022 14:04> ated Lab 223 Sep 2022 14:04> Predicti @ eVital 23 Sep 2022 14:04>
	ORT/7A/01 v WON, X. X./54y HN04243010T	CPE MRSA VISA DBP: 68 mmHg PR: 154 beat/min RB: 14 /min	23 Sep 2022 14:04> 23 Sep 2022 14:04> 23 Sep 2022 14:04> 23 Sep 2022 14:58>
	ORT/7A/01 ORT/7A/01 MAK, X. X./72y HNXXXXX616	Sp02: 97 % O2 Therapy / Room Air: O2 Therapy	23 Sep 2022 14:04> (L/min) 23 Sep 2022 14:04> 22 Sep 2022 14:04> 23 Sep 2022 14:04>
	ORT/7A/01 © 03 6 CHA, X. X./73y HNXXXXX617	Device: Nasal Cannula Level of Consciousness: Alert	23 Sep 2022 14:58 > 23 Sep 202 14:58 > 23 Sep 20 Sep 20 14:58 > 23 Sep 20 Sep 20 14:58 > 23 Sep 20 Sep 20
		GCS - Total: 14 GCS - Eye: Spontaneously	13 Sep 2022 13:46>
Chan Tai Man PWH CON(SUR)	Patient newly admitted within 24 hours	GCS - Verbal: Confused GCS - Motor: Obey commands	13 Sep 2022 13:46> 13 Sep 2022 13:46> 10 Carl 0.9 F atients 1 of 8 < >

eVital chart in "Patient View" of Clinical Command Centre



ePR Link in "Patient View" of Clinical Command Centre



Support Infectious Disease Management in Clinical Command Centre



Isolation



Criteria / Rules of Isolation

Data Source	Data Items (shown on upo	on clicking)	Rules for showing indicator (Meet any of the below)	Data Refresh	
CDB	CDB Isolation Precaution =		CDB Isolation Precaution =	Nearly real	
	Airborne		Airborne	time from	
	Contact	CDB update date time	Contact	CDB	
	Droplet		Droplet		
	Reverse Isolation		Reverse Isolation		

Patient Activity Form - CDB ×			Corp OP Appt	Cluster Rad Appt	31	Elective OT (Emergency OT 31 34 X02	
tient Care			,,,			, ,		
Isolation Precaution:	Airborne	Ix	Lab Request(Last 30 days) 🖘	Attention	Iso	lation Precaution	Wound Dressing	
	Contact Droplet Reverse Isolation		, 02, 34, X08, X20	Fall Risk: 02, 24, X02, X08 Fragile Handling: 05, 10, 15, X08 M: 02, 05, 10, 15, 24, 33, X02, X08, X19	Airt XO Cor Dro XO Rev	borne: 02, 24, 33, 12, X08, X18, X19 ntact: 10, 15, 32, X08 plet: 02, 15, 33, X02, 18, X18, X19 verse isolation: X08	Daily: 10, X19 BD: 02, X02 Alternate day: 15	
	Remarks:	10, X08	MAR change 🔤 , 27, 28, 30, X02, 8, X18, X20	Fasting After breakfast: X19 After midnight: 02, X02 NPO: 10 Others: 15	Daii BD: TD: QID Q4H	ly: 10, 15 : 33 S: 32 b: 30 f: 28	Tube Feeding Bolus: 15, X02, X08, X	X19
		Patien 02 24	nt Remarks: Q6H 0416	linician at 4nm 2 Nov 2016	15	Lai Hoi Tong5	-16 update Q4H	
		30	04-16 QID New form 04-16		32 34	TDS 04-16 Hstix = Other 04-16		

Voo New Gene View

V00 Detient De

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MDRO

-

			омм	AND	CENTRE - F	PATIENT V	IEW		с	23 Sep 2022, 11:31
	Cap	View: SUR	- S	Specialt	y: SUR	Ward locati	on: ALL Category:	All Patients in	Avg. LOS of ALL :	
	Cli	Patient Be	ed No.	LOS(d	ay)					
		SUR/8N/01			CA-MRSA	VISA	Extreme Vitals From 23 Sep 2022 00:33	Critical Lab Results	COVID Related Lab	ePR
	@=	TSE, X. X./35y	01	2	3		Pending / In OT From 23 Sep 2022 08:08	Post-op Monitoring	From 23 Sep 2022 08:00	eVital
MDRO 🔅 ?	2°	SUR/8N/02 9	12	14			ORT/7A/01/R01/ HN200 MRSA	000369T/ WON,X.X. Alert sinc	/ 🕈 / 54y 🤶 🗙	ePR 2 eVital
		LIU, X. X./50y HNXXXXX614					[Confirmed] MRSA co	nfirmed in Wound		
Confirmed A2 (8) 02A ^{CC} 04 ^{CC} 16 ^{CC} 21 ^{CC} 21A ^{CC} 25 28A ^{CC} 30A ^{CC}		SUR/8N/R01	R01	0	Candida a	auris) (MRSA)	Swab on 17/08/2022. precautions.	For contact	22 Aug 2022 09:30	ePR eVital
Contact		HN04243010T		4	2					
A2 (3) 16 21 29 Confirmed 8 Contact 3 Total 1 wards Total 9 patients		SUR/8N/12	02	4	¥ _		Extreme Vitals From 23 Sep 2022 07:50 Pending / In OT	Critical Lab Results Post-op Monitoring		ePR eVital
Ward view		HNXXXXXX616			•					
		SUR/8N/03 CHA, X. X./73y HNXXXXX617	03	6	ו••		Extreme Vitals From 23 Sep 2022 07:34 Pending / In OT	Critical Lab Results Post-op Monitoring		ePR eVital
		Patie	ent v	view	,					
	•	Patient newly admit	ted withir	n 24 hour	s 01 Patient age un	nder 19	/ Home Resident @ RCHE & ≥ 3 dos	ses of COVID vaccine To	tal 39 Patients 1	of 8 < >

Criteria / Rules of MDRO

Data Source	Data Items (shown on upon clic	king)	Rules for showing indicator (Meet any of the below)	Data Refresh
AIDA (Corp Alert)	Corp alert structure alert = CA-MRSA Candida Auris CPE MDRA MRPA MRSA VISA VRE	+ additional info & Corp Alert update date time	Corp alert structure alert = CA-MRSA Candida Auris CPE MDRA MRPA MRSA VISA VRE	Every 15 mins
	AK2H		AK2W	

lert Input Screen	
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Alert categories	Multi Drug Resistant Organisms
Clinical Condition On Medication Assessment Infectious Multi Drug Resistant Organisms Procedure Radioisotope / Radioactive Implant Miscellaneous All	CA-MRSA Candida auris CPE MDRA MRPA MRSA VISA VRE VRSA

Outcome Prediction of Suspected Infection

		юмі	MAN	D CE	NTRE	- PAT		v				C 23 Se	p 2022, 11:31			
Сар	View: SUR	-	Speci	alty:	SUR	~ W	ard location:	ALL Cat	tegory: All Patien	sit v	Avg. LOS of A	LL : -				
r 🚍																
Cli	Patient	Bed No.	LO	S(day)												
É	SUR/8N/01			*	CA-N	IRSA V	ISA VRE	Extreme Vit From 23 Sep 2022	als Critical From 20 §	Lab Results COV	/ID Related Lab ▶		PR			
6= 	• TSE, X. X./35y HN20000369T	01	2				ORT/7A/01/	Pending / In 01/ HN2000003691	OT [/ TSE,X.X. / 9 /	35y ? X	23 Sep 2022 08:00	(ii) e\	Vital			
26	SUR/8N/02	12	14	*	() () ()	5	Outcome F Suspected	Prediction of I Infection	Alert since 2	23 Sep 2022 08:00	D Related Lab		ePR Vital			
	HNXXXXXX614			$\overline{\mathbf{O}}$			Temp: 38	.6 °C		25 Apr 2022 10:23 >						
	SUR/8N/R01				CPE	MRSA	Site: Tym	panic		25 Apr 2022 10:23 >	VID Related Lat		PR			
	WON X X /54v	R01	0	.			WBC : 13.	.0 H x10^9/L		17 Sep 2021 15:05 >	come Predicti	🗎 e	Vital			
	HN04243010T			2			C-Reactiv	e Protein : 21 mg/l	L	17 Sep 2021 14:51 >						
	SUR/8N/12			*			SBP: 99 n	nmHg		25 Apr 2022 10:23 >	D Relative Lab		PR			
	о МАК, Х. Х./72у	02	4	E			DBP: 69 n	nmHg		25 Apr 2022 10:23 >	come Predicti.	e (Vital			
	HNXXXXX616			9			GCS - Tota	al: NA		25 Apr 2022 10:23 >						
	SUR/8N/03	0.2		1			GCS - Eye	: None		25 Apr	Falestation) Lateratory	altern Al	PR		Roam Constitute Protoci 192	2 Y
	CHA, X. X./73y HNXXXXX617	03	0				GCS - Ver tracheost	bal: Endotracheal t omy	tube or	25 Apr		Q, Swindhiladoratori ba Roferna co Gale V P 1940/2021 B 1760/2021 C	A	n V. DORP	Laboratory Microbiology Electromistry	
							GCS - Mo	tor: Localises to pa	ain	25 Apr		1/10/201	PTI, GEC, PT		Hereitagy	
							RR: 24/m	nin		25 Apr	reporter .					
										Countraling 123300-118 DNI Contraling / HEAT (12310)			ePR	ort		
•	Patient newly adm	itted wit	hin 24 ho	ours 01	Patient ag	e under 19		e Resident 🛛 🞯 RCHE 8	& ≥ 3 doses of COV	ID vaccil Preside Degrade			Lab rep	bort		
										Tech Typed Typed Haner						

			-			
Data Source	Data Items		Rules for Light Up the Category	Data Refresh		
eVital	Temperature	eVital Assessment date time	Temperature <36.0 OR > 38.3°C OR	AND	Nearly real time from eVital	
LIS	WBC	Lab Reference date	WBC<4 or >12 (x10^9/L)	AND	Every 15 mins	
	CRP	time	CRP > 2 mg/dL (i.e. > 20 mg/L)	Either one of		
	Procalcitonin		Procalcitonin > 0.5 ng/ml (only Procalcitonin in ng/ml will be included for calculation due to no standardized reporting unit and no standardized conversion factor across HA)	the lab test		
eVital	Systolic / Diastolic blood pressure	eVital Assessment date time	Systolic blood pressure ≤100mmHg OR Unrecordable BP	AND Any 2/3	Nearly real time from eVital	
	GCS - Total EVM scores		GCS – Total ≤ 13 OR			
	Respiratory Rate		Respiratory Rate ≥22 (/min)			

Criteria / Rules of Outcome Prediction of Suspected Infection

As at 13 June 2022

Entity	ePR Description	QEH
7428	Procalcitonin	ng/ml
1298	WBC	x10^9/L
505	C-Reactive Protein	mg/L

Rules as discussed with QEH





Epic's sepsis algorithm is going off the rails in the real world. The use of these variables may explain why

Casey Ross



Mike Reddy for STAT

In marketing materials and internal documents, national electronic health record vendor Epic Systems has touted the ability of its sepsis algorithm to crunch dozens of variables to detect the life-threatening condition in advance, enabling doctors to expedite the delivery of potentially lifesaving antibiotics.

But STAT has learned it is using a curious piece of data to make its prediction: whether a doctor has already ordered antibiotics.

The use of that information, which has not been publicly disclosed by the company, is contributing to a discrepancy between the accuracy of the



Sepsis Prediction Model for Determining Sepsis vs SIRS, qSOFA, and SOFA

Adam R. Schertz, MD, MS; Kristin M. Lenoir, MPH; Alain G. Bertoni, MD, MPH; Beverly J. Levine, PhD; Morgana Mongraw-Chaffin, PhD; Karl W. Thomas, MD

Abstract

IMPORTANCE The Sepsis Prediction Model (SPM) is a proprietary decision support tool created by Epic Systems; it generates a predicting sepsis score (PSS). The model has not undergone validation against existing sepsis prediction tools, such as Systemic Inflammatory Response Syndrome (SIRS), Sequential Organ Failure Assessment (SOFA), or quick Sepsis-Related Organ Failure Assessement (qSOFA).

OBJECTIVE To assess the validity and timeliness of the SPM compared with SIRS, qSOFA, and SOFA.

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study included all adults admitted to 5 acute care hospitals in a single US health system between June 5, 2019, and December 31, 2020. Data analysis was conducted from March 2021 to February 2023.

MAIN OUTCOMES AND MEASURES A sepsis event was defined as receipt of 4 or more days of antimicrobials, blood cultures collected within ±48 hours of initial antimicrobial, and at least 1 organ dysfunction as defined by the organ dysfunction criteria optimized for the electronic health record (eSOFA). Time zero was defined as 15 minutes prior to qualifying antimicrobial or blood culture order.

RESULTS Of 60 507 total admissions, 1663 (2.7%) met sepsis criteria, with 1324 electronic health record-confirmed sepsis (699 [52.8%) male patients; 298 [22.5%] Black patients; 46 [3.5%] Hispanic/Latinx patients; 945 [71.4%] White patients), 339 COVID-19 sepsis (183 [54.0%] male patients; 98 [28.9%] Black patients; 36 [10.6%] Hispanic/Latinx patients; and 189 [55.8%] White patients), and 58 844 (97.3%; 26 632 [45.2%] male patients; 12 698 [21.6%] Black patients; 367 [5.7%] Hispanic/Latinx patients; 40 491 White patients) did not meet sepsis criteria. The median (IQR) age was 63 (51 to 73) years for electronic health record-confirmed sepsis, 69 (60 to 77) years for COVID-19 sepsis, and 60 (42 to 72) years for nonsepsis admissions. Within the vendor recommended threshold PSS range of 5 to 8, PSS of 8 or greater had the highest balanced accuracy for classifying a sepsis admission at 0.79 (95% CI, 0.78 to 0.80). Change in SOFA score of 2 or more had the highest sensitivity, at 0.97 (95% CI, 0.97 to 0.98). At a PSS of 8 or greater, median (IQR) time to score positivity from time zero was 68.00 (6.75 to 605.75) minutes. For SIRS, qSOFA, and SOFA, median (IQR) time to score positivity was 7.00 (~105.00 to 08.00) minutes, 74.00 (~22.25 to 599.25) minutes, and 28.00 (~108.50 to 134.00) minutes, respectively.

CONCLUSIONS AND RELEVANCE In this cohort study of hospital admissions, balanced accuracy of the SPM outperformed other models at higher threshold PSS; however, application of the SPM in a clinical setting was limited by poor timeliness as a sepsis screening tool as compared to SIRS and SOFA.

JAMA Network Open. 2023;6(8):e2329729. doi:10.1001/jamanetworkopen.2023.29729

Key Points

Question Does the Sepsis Prediction Model (SPM) outperform other sepsis prediction scores with respect to validity and timeliness?

Findings This cohort study of 60 507 adult admissions found that although balanced accuracy of the SPM at a predicting sepsis score (PSS) threshold of 8 or greater was better than that of the quick Sepsis-Related Organ Failure Assessment (qSOFA), Sequential Organ Failure Assessment (SOFA), and Systemic Inflammatory Response Syndrome (SIRS), there was longer time to score positivity from time zero for the SPM vs SIRS and SOFA.

Meaning While the balanced accuracy of the SPM was better than qSOFA, SOFA, and SIRS at higher-threshold PSS, it had poor timeliness for sepsis prediction.

Invited Commentary

Supplemental content

Author affiliations and article information are listed at the end of this article.

JAMA Network Open. 2023;6(8):e2329729. doi:10.1001/jamanetworkopen.2023.29729

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Value of Collaboration

Innovations for enhanced patient care

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



- Data source, platform and lab facility
- Advisory for interpreting the HA data
- Support from HA clinicians for converting innovation to service delivery

Big Data Collaboration as a Hong Kong's Strategic Initiative



Alignment to HK Government's Policy



Vision

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



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



Moving Digital Transformation forward in Healthcare with Collaborative Innovations



From Clinical care To Research



- HADCL data originated from clinical data, which was collected during patient care
- Data is **anonymised** and customized for research purpose

HA Data Collaboration Lab





What HADCL Offers to our Collaborators





Structured, Unstructured and Image Data





In-house Health Informatics Expertise



HADCL Data Catalogue





HADCL Technical Infrastructure





Principles of Data Sharing



'Five Safes' Framework (5S)

(Being adopted in overseas countries)

1.	Safe Data	
2.	Safe Projects	Is this use of the data appropriate?
3.	Safe People	Can the researchers be trusted to use it appropriately?
4.	Safe Settings	Does the access facility limit unauthorised use?
5.	Safe Outputs	Are the statistical results non-disclosive?

Desai T et al. Five Safes: designing data access for research. Economics working paper series 1601. Bristol: University of the West of England, 2016.

HA DCL Services Offering



Data Exploration Workshop

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



Data Collaboration Projects (allow remote access*)

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



Self-service Data Platform (allow remote access*)

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



HKSTP HADCL Agency (allow remote access#)

- For HKSTP member companies
- Anonymized longitudinal sample data of around 200,000 patients

*HKU, CUHK, HKUST, PolyU, CityU, HKBU #HKSTP



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症



對比外國只有幾百至幾千條病人數據供研究,本港暫管局總行政經理 应信息) 影音重表示,本添數總易總一儲存存與床發佈管理資訊系統內,; 警管局轄下醫院及診所於95年來改集所得的逾50億條病人數據,包括病] 録、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

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: :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; 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! •的實驗室心,由請使用時能免深類外手續及根存計劃書,研究人員能輕易; 和使用自助數據平台、進行不同額新的科研假設

遥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1 行,中大和科大分别於7月及本月初開通。其他院校亦在申請中。李稱,1 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 料流出或被黑客入侵。

「去識別化」保障病人私隱

為了保障病人的私题。所有資料都被「去識別化」,例如不會顯示病. 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應 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,」 有工作人員作技術支援。實驗室佔地約2,000呎,比之前在同一大度內6樓。 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

Researchers given

HEALTH

access to records of 100,000 patients

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

"It took a lot of time collecting Nadia Lam and integrating data in the past hadia.lam@scmp.com obtaining hundreds to thousands of pieces of data was already very difficult," said Dr Joanna Pang

Local university researchers will soon be able to access a vast trove of government health care data rom the comfort of their campuses following a move by authorities aimed at accelerating medical novation 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 ailable since 2019 for research ers 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 was installed, the lab has received

But starting from later this month, three designated rooms will be set up at the University of Hong Kong, Chinese University and University of Science and tions-to help detect hip fractures. Technology. Researchers will be Pang said the laboratory able to access the self-service big data platform on a computer in the dedicated room via a secured network connection. The anonymised data on offer includes patients' demographic

Asked whether the authority dures, medications, and lab and radiology exam results. It can be ased to inform data analytics, the industry's standard practice. algorithms and research.

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





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

醫局數據實驗室連接大學助科研

【明報專課】醫管局2019年正式啓動「數據實 驗室」,協助科研關隊深入分析醫療數據,實驗室 2020年推出「自助數據平台」,今年再擴展至「遙 控連接服務:,,讓研究人員在8問資助大學直接取用 數據·醫管局總行政經理(醫療信息)彭育華指出· 科研人員以往要花大量時間蒐集數據·新系統有助 加快研究

醫管局高級系統經理李璧堅表示,自助數據平台 協助研究人員構思研究資念。平台包含約20萬名從 2007及2017年储楼抽取的病人敷握,包括就診纪錄、 手術及其他醫療程序等資料。現時8間資助大學的研 究人員可申請使用平台,李璧堅稱,審批申請只需 遥交身分證明文件和教授證明等·至今已有44個中 訪選批

研究人員過往須親自到訪數據實驗室取資料,醫 管局今年推出遙控連接服務,大學科研人員可在校 **国取得平台数據,保安要求與實地前往相同。李璧** 堅透露,中文大學和科技大學已完成系統接駁,香 港大學的工程則正在進行。

取用保安嚴 病人「去名化」身分保密

李璧堅表示,實驗室病人資料「去名化」,研究 人員取得數據後不能反向找出患者身分。數據實驗 室保安有颐格规定,谁人须人脸識别,亦有工作人 員核對身分證。爲防止有人偷拍患者資料,實驗室 設有閉路電視對準電腦萎幕。

數據實驗室同時提供數據協作項目服務,資料庫 儲存逾25年「臨牀管理資訊系統(CMS)」的病人 數據,現包含超過50億項紀錄。彭育華透露,項目 已支持28個科研項目,當中包括港大放射診斷學系 奉頭的「髋關節骨折辨識系统」和中大利用腦掃描 分辨急性出血性中風的研究項目。



醫管局總行政經理(醫療信息)彭育華(右)表示, 數據實驗室讓科研團隊可在安全及受控的環境下深 入分析醫療數據,有助促進生物科技研究和改善本 港臨牀及醫療服務。旁為醫管局高級系統經理李璧 88 (何珮瑚摄

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cants] 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

form at the Kowloon Bay lab.

representative sample data to ob-serve the evolution of diseases." The laboratory has supported 28 data collaboration projects involving more than 200 researchers. Since the self-service platform

75 applications. The projects involve such innovations as rapid automated evaluation of CT brain scans, and using so-called deep learning - in which computers synthesise data to make predic-

would not only benefit researchers, but also patients. "We hope that this academic research can be applied by the Hospital Authority and improve the quality of our service," she said. characteristics, attendance re-cords, clinical diagnoses, proce-

had a plan to extend access to private research bodies, Lee said they could partner with the universities, which was similar to





HADCL projects 2019-2024

Institution	Number of project
CityU	2
CUHK	33
HKBU	2
HKU	16
HKUST	12
PolyU	6
Grand Total	71











DCL Self Service Data Platform

As of 12 Sep 2024

Self-service Data Platform (Remote + On Prem.)



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







296 (95%)

Completed applications*; (Onsite & Remote access)

7

Continued research via Collaboration Project

 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.
 * Including normal completion, withdrawn & termination cases

Data Collaboration Research Outcome

Projec			
1	Publication Type	Publication life	Journal/Conference
A/3	Manuscript	lime and dose-dependent effect of systemic glucocorricolds on major	Annals of Rheumatic Diseases
		adverse caraiovascular event in patients with rheumatola arthritis: a	
A 41	Deve e r	population-based study	The Declicitric lefe sticks Discours
A41	Paper	Epidemiological changes of neonatal early-onset sepsis after the	Ine Pedialitic Intectious Disease
		Implementation of Universal Indiental screening for group B	Journal
400	Abstract 8	Silepiococcos in Hong Kong	American Dicheter Association
A0U	Absiluci &	menas in air-cause and cause-specific monainy in older adults with and	American Diaberes Association
	Procontation	Hong Kong	(ADA) 83 - SCIETIIIIC SESSIONS
A 0 1	Papar	Caucal Effect Estimation on Imaging and Clinical Data for Treatment	IEEE Transactions on Modical
A91	ruper	Cubsal Effect Estimation of Anguny and Cullical Data for frediment	International International International
A 1 1 Z	Abstract	Al blood signature in common blood tests for detection of agetric	2023 ASCO Appual Monting
ALIO	Absilder	cancer in a cohort of 190 000 individuals	
A145	Abstract	A Routine Blood Test Big Data Signature Demonstrating the Role of	World Stroke Congress 2023
		Inflammation in Intracranial Aneurysm Pathogenesis: A Territory-wide	
		Study in Hong Kong	
A145	Abstract	High Sensitivity Routine Blood Based Detection of HCC: An Al model from	Furopean Society for Medical
		220k patients	Oncology Congress 2023
A206	Abstract	Thyroid Eve Disease: A Territory-wide Epidemiological Study from 2000-	The 16 th Congress of Asig-Pacific
		2017 in Hong Kong with 123,889 Autoimmune Thyroid Disease Patients	Vitreo-Retina Society 2023
A206	Abstract	Epidemiology and Predictive Modelling for Moderate-to-severe Thyroid	Association for Research in Vision
		Eye Disease in Hong Kong – a Territory-wide study of 140,776	and Ophthalmology – Annual
		Autoimmune Thyroid Disease Patients	Meeting 2024
A202	Manuscript	Reduced risks of dementia incidence among diabetes mellitus patients	Jama Network Open
		in a multidisciplinary, primary care management program: an over 8-	
		year follow-up, territorywide, retrospective, matched cohort study	
A62	Abstract	Post-hospital Falls in Older Patients: Investigating Associated Factors in	27 th East Asian Forum of Nursing
		Domain of Hospitalization and Subsequent Care	Scholars
A107	Manuscript	A machine learning-based risk score for prediction of infective	
		endocarditis among patients with Staphylococcus aureus bacteraemia	Journal of Infectious Diseases
		– The SABIER score	
A80	Paper	Trends in all-cause and cause-specific mortality in older adults with and	American Diabetes Association
		without diabetes – A territory-wide analysis in one million older adults in	(ADA) 83rd Scientific Sessions
		Hong Kong	
A80	Paper	A novel electronic-health-record based, machine-learning model to	PLOS Medicine
		predict severe hypoglycemia leading to hospitalizations in older adults	
		with diabetes: a territory-wide cohort and modeling study	

34 Publications in international conference / journals (as of 26 Aug 2024)



From Research to HA Services



Algorithms from HA internal / HADCL Collaborators / External Suppliers

1st DCL deployment to HA service



Automatic Hip Fracture Detection Using Deep Learning

More upcoming (under AI lab exploration):



Chronic Viral Hepatitis X

Machine Learning Models to Predict Hepatocellular Carcinoma in Patients with Chronic Viral Hepatitis



Blood stream infection complication A Machine Learning Based Risk Score for Prediction of Infective Endocarditis Among Patients With Staphylococcus aureus Bacteremia

Future Vision for HADCL



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

Data as a Service



64. Clinical data, clinical trials and drug registration are some of the key areas essential to the development of life and health technology

Objective:

Policy Address



Build a new biomedical / healthcare pillar for Hong Kong Create better healthcare solutions to improve life

Enhance the healthcare system of Hong Kong

Better use of technology to increase capacity & quality of care

Opportunities & Challenges

- Al Proof of Concept to Scalable Al solution implementation
 - for value realization & acceleration of more new innovative solutions creation
- Regulations & Clinical Relevance; Integration complexity into the healthcare environment
 - Start small but show cases, aligning with strategies and priorities
 - Trust, Transparency & Diversity
 - Fear of the Unknown; Build Trust in AI Through Explainability
 - Privacy and Security concerns
 - Formulate Al Governance
 - Reduce risks and tolerate ambiguity intrinsic to Al's predictive value

Table 1 Interdisciplin from different catego	ary teams may consist of stakeholders ries		
Stakeholder categories	Examples		
Knowledge experts	Clinical experts ML researchers Health information and technology experts Implementation experts		
Decision makers	Hospital administrators Institutional leadership Regulatory agencies State and federal government		
Users	 Nurses Physicians Laboratory technicians Patients Friends and family (framily) 	Choosing the right problems • clinical relevance? • appropriate data? • collaborators? • definition of success?	Developing a useful solution data provenance? ground truth?
		Figorous evaluation and thoughtful reporting • model use? • scholad predictions? • shared model/code? • failure modes?	Considering the othical implications • ethicist engagement? • bias correction? • Deploying responsibly • prospective performance? • clinical trial?
		Making it to market • modical device? • model updates?	safety monitoring?

Fig. 1 | A roadmap for deploying effective ML systems in health care.

By following these steps and engaging relevant stakeholders early in the process, many issues stemming from the complexity of adopting ML in practice can be successfully avoided.





Questions around AI explainability help us understand how data, predictions and algorithms influence decisions.

Source :

https://miro.medium.com/max/1864/1*1wy_l-q16tmNbVkLOaCwOQ.png https://editor.analyticsvidhya.com/uploads/56833AI-Explainability-1024x620.jpg

Potential use of LLMs in Healthcare

- facilitate clinical documentation
- create discharge summaries
- generate clinic, operation, and procedure notes
- obtaining insurance pre-authorization
- summarize research papers
- as a chatbot answer questions for the patients with specific data, symptoms, and concerns
- assist physicians in diagnosing conditions based on medical records, images, laboratory results, and suggest treatment options or plans.

Source : <u>The imperative for regulatory oversight of large language models (or</u> <u>generative AI) in healthcare | npj Digital Medicine (nature.com)</u>

採AI醫學軟體漸增 美定規管框架

人工智能(AI)在醫學上可以用於診斷 和治療,例如分析放射診斷影像、導航手 術等。美國食品藥物管理局(FDA)現有 制度規管和註册醫療器材軟體(Software as a Medical Device, SaMD),随着近年使 用AI的軟體漸多,FDA正制定規管框架, 加强監管自適應學習人工智能(adaptive AI) °

加强監管「自適應學習AI」

目前AI可用於分析X光、磁力共振或電 腦掃描,以識别骨折或腫瘤等,也可配以 手術導航,在術前爲醫生制定落刀路線, 另有科研企業研發使用AI監察病人血糖指 數和癲癇等。

◀醫衛局長盧寵茂昨於立法會衛生事務委 員會稱,擬設的「香港藥物及醫療器械監督 管理中心」長遠亦須研究為人工智能(AI) 落實監管和審批註冊制度。 (直播截圖)

FDA於2019年提出加强規管AI,將 其分爲兩類,其一是出産前已「鎖定 (Locked)」的AI,該類AI的演算法在註 册時已獲審批,現行 SaMD 規管制度有效 監管;另一類是自適應學習 AI,在出產後 仍會使用現實操作數據繼續訓練演算法。 FDA稱自適應學習AI有潛力即時調整和改 善設備性能,持續改善患者醫療保健,但 **演算結果可能與審批時不同。**

FDA於2021年制定行動方案,提出會考 慮按兩方面將 AI 的風險分級,包括 AI 提 供的資訊對治療決定的影響,若僅提供資 訊則風險較低,若是直接診斷或治療則風 險較高;另一方面是患者病情,疾病愈嚴 重風險愈高。

Source : Ming Pao, 9 Nov 2024
Clinical Al products (> 10 products in HA)





TEST YOUR SKILLS

CAN YOU SPOT WHAT AI SEES?



ISSUE 71 OCT 2023

A Risk Management Newsletter for Hospital Authority Healthcare Professionals

IN THIS ISSUE

Sentinel Events (SEs) (2Q 2023)

- ✤ Retained Instruments / Material
- Wrong Body Part

Serious Untoward Events (SUEs) (2Q 2023) Local Sharing \diamond CXR AI

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.

Al models must be carefully validated against HA data in HA's Al 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 Al, particularly the impact on clinical decision making. Al development must be a collaborative process led by clinicians, to ensure that the Al 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.

Head of Information Technology and Health Informatics, HAHO



Thank you

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