

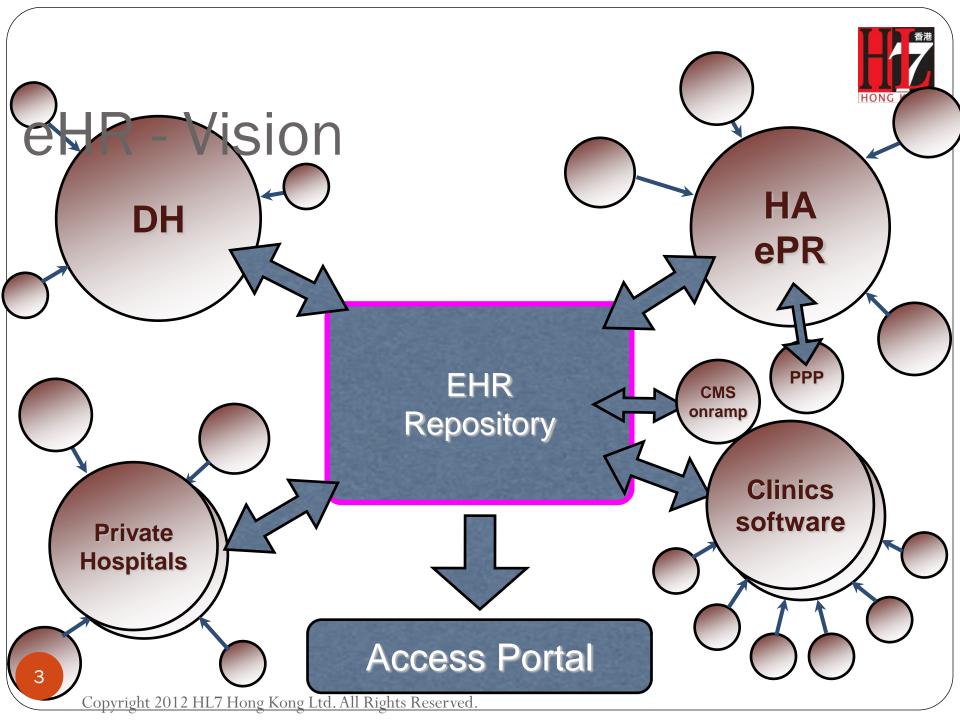
Standards for eHR

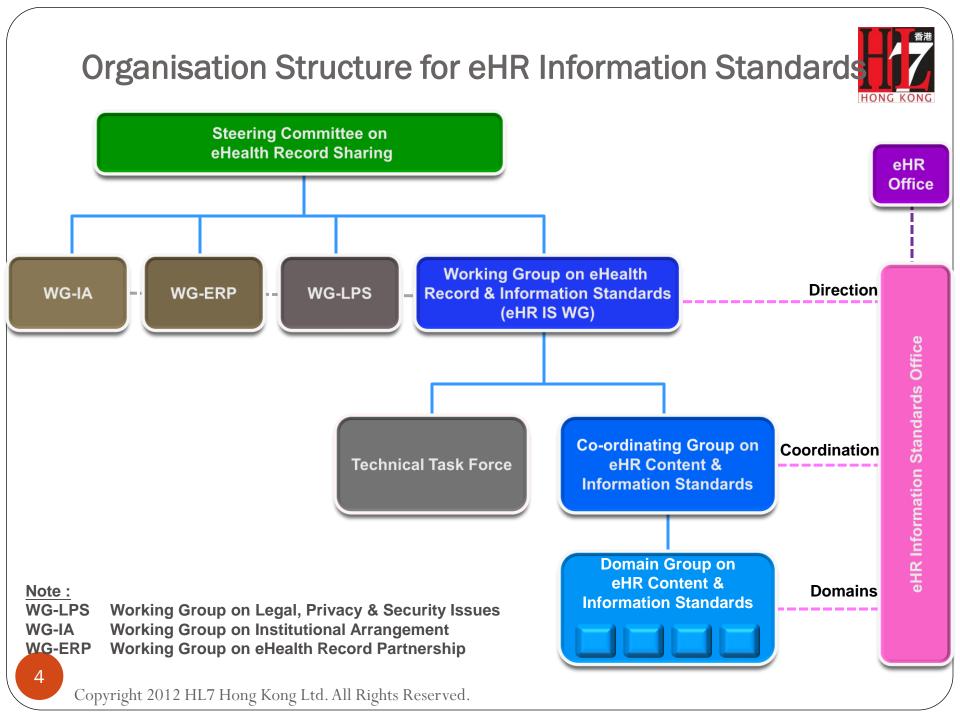
Vicky Fung
Senior Health Informatician
eHR Information Standards Office



Standardisation for eHR

- Ensure accurate interpretation of health data by all parties
- Support reuse of data
- Reduce duplicated efforts in data entry
- Facilitate interoperability of systems for data captured at different platforms
- Improve efficiency of healthcare services
- Assist in protection of public health





Guiding Principles of eHR Development





Government-led model for development



Set up dedicated eHR office to co-ordinate development, leveraging HA's expertise and experience

Compelling but not compulsory record sharing



Voluntary participation by both providers and patients, promoting and incentivising eHR sharing

Data privacy and security of paramount importance



Develop legal framework and incorporate eHR privacy and security throughout development

Open technical standards for private participation



Engage private healthcare and IT sectors in development of eHR standards and solutions

Building block approach



Develop individual eHR components through pilots and partnerships with private sector

Information Architecture



Every medical fact has a concept

What the data means

Every medical fact has a context

How data should be interpreted

Every medical fact has a presentation

How data are organized & presented

Analyze Reuse Display Store Capture Design



Standards for eHR

- Identification
 - Healthcare recipient
 - Healthcare provider



- Healthcare staff
- eHR content
- Terminology
- Message standard





eHR Participant Registry



eHR participants

• An individual who joins eHR sharing in order to share his/her health record with other parties via the eHR sharing system

eHR Participant Master Index (eHR PMI)



- List of eHR Participants who joins eHR for sharing their health record to other parties via the eHR
- Uniquely identify each eHR Participant
- Foundation to link all clinical data sent from various HCP
- For building longitudinal eHR



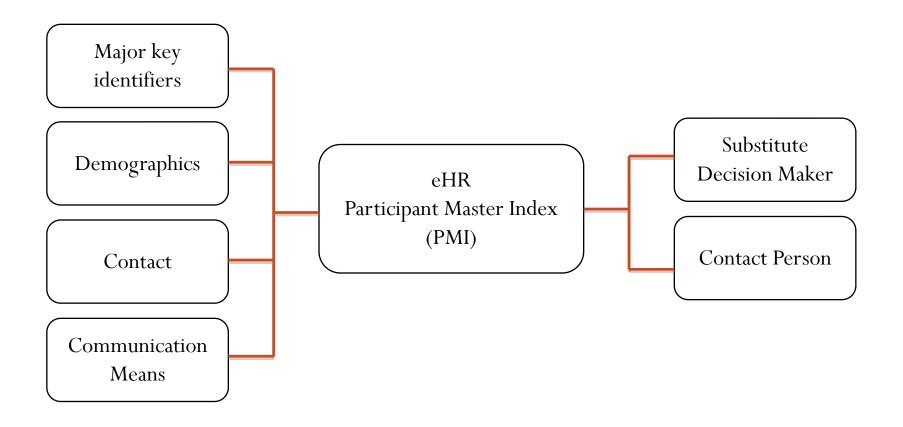




- Identify eHR participants uniquely in eHR participant registry
- Serve as a foundation to link all clinical data being sent from various healthcare providers to build the longitudinal eHR for a particular person
- Act as part of security framework for accessing eHR



eHR Participant Registry Data





eHR Major Key Identifiers

	HKIC holder	Non-HKIC holder
HKIC number	Yes	
Document type		Yes
Document number		Yes
Name	Yes	Yes
Sex	Yes	Yes
Date of Birth	Yes	Yes

Exact match for major keys + eHR Number for :

- Uploading clinical data to eHR
- Accessing eHR

Matching eHR PMI – Impact to HCP PMI



	HCP system	Patient registration at HCP
HKID Number	 Able to differentiate HKID from the other number Validation rules on HKID number? 	 Enter the eHR participant's HKID number according to HKID card Include check digit Exclude () Identify the HKID number on various types of identity / travel documents issued by the HKSAR ImmD
Document Type	• Reference to eHR PMI code table on Document Type	 For patients who do present other types of identity document apart from HKID card
Other Document Number	 Check field length as defined in the eHR PMI dataset 	

Matching eHR PMI – Impact to HCP PMI



	HCP system	Patient registration at HCP
Name	 Consider a separate field for eHR name if there is a practical need to store other name(s) for the eHR participant in the local system 	• Enter the eHR participant's name according to eHR participant's identity document in the 'name' field
Baby's Name		• Special eHR format for entering baby's name before issuance of birth certificate

Matching eHR PMI – Impact to HCP PMI



	HCP system	Patient registration at HCP
Sex	Watch out for the sex table as defined in the eHR Content	• Enter the eHR participant's sex according to eHR participant's identity document in the 'name' field
Date of Birth		• Enter the eHR participant's date of birth according to eHR participant's identity document in the 'date of birth' field

Enrolment of newborn participantsHandling – interim eHR record creation VS record completion

Newborr



Interim eHR Record Creation



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identifiers	w/o HK Birth Cert	(interim eHR record creation)
eHR No.		System-generated eHR no.
HKID number		= eHR No.
Name	B/O mother's name	B/O mother's name
Sex	Sex	Sex
DOB	DOB	DOB
Document Type	Immunisation Record Card (DH6)	Immunisation Record Card (DH6)
Document Number	 Birth Hospital + newborn's birth episode number Birth Hospital + newborn's unique identifier 	 Birth Hospital + newborn's birth episode number Birth Hospital + newborn's unique identifier

Enrolment of newborn participants Handling – interim eHR record creation VS record completion





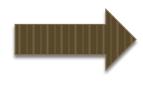
Record Completion



= eHR No.

Sex

DOB





System-generated eHR no.

HK Birth Cert number

епп
iden

Name

Sex

DOB

HR PMI tifiers eHR No.

HKID number

(interim PMI record creation) System-generated eHR no.

B/O mother's name

eHR PMI record

Immunisation Record Card (DH6)

HK Birth Cert

(record completion)

Mother's name

Birth Cert

Document Type Document Number

• Birth Hospital + newborn's birth episode number

• Birth Hospital + newborn's unique identifier

Sex

DOB

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Paby's name



Newborn

- Create a unique record for newborn
- Birth Hospital
 - Issue immunisation card bearing:
 - Name of birth hospital
 - Patient number and/or episode number of the newborn
 - Remind parents to bring along this document whenever seeking medical care for the newborn











Standards Compliance



Aims

- Support an interoperable eHR
- Facilitate searching data in the eHR
- Provide a reference for healthcare providers to develop / upgrade their systems



Background

- EHRSC Paper No. 5/07, WG-EHRIS suggested clear definition of scope of eHR sharing to build eHR
- On 2 Dec 2009 WG on Legal, Privacy & Security recommended:
 - only data necessary and beneficial for the continuity of healthcare included in scope of sharing
 - to avoid affecting integrity & completeness of eHR not allowed the exclusion of eHR sharable data



Scope of Sharable eHR Data

- Apply to patient's health records created by all healthcare professionals
- Sharable data requires accurate identification of patient
- Set out scope for healthcare provider to prioritise their system development/enhancement to meet the requirements of defined standards
- To implement in phased approach

Standards Compliance Automated paper **Problem: Diagnosis** diab. mellitus **Diabetes Mellitus** 3983 Fully Interoperable eHR **eHR Content Standards** Guidebook Diagnosis **HKCTT** (Diagnosis) DM 3983 **Diabetes Mellitus** 3985 Type II Diabetes Data Integration Mellitus 24 3987 Type I Diabetes Introduction of Message Standard for eHR, Part I **Mellitus** Copyright 2012 HL7 Hong Kong Ltd. All rights Reserved.

Phased Approach – A Proposal

eHR Section	Level 1	Level 2	Leve B
eHR Participant			G
Encounter			
Referral			
Clinical note / summary			
Adverse reaction / allergy			
Clinical alert			
Problem			
Procedure			
Birth record			
Assessment / physical exam			
Social history			
Past medical history			
Family history			
Drug – prescription record			
Drug – dispensary record			
Immunization			
Clinical request			
Diagnostic test result – Laboratory			
Diagnostic test result – Radiology			
Diagnostic test result – Other investigation			
Care & treatment plan			

Phase 4

Phase 5

2012 Jun

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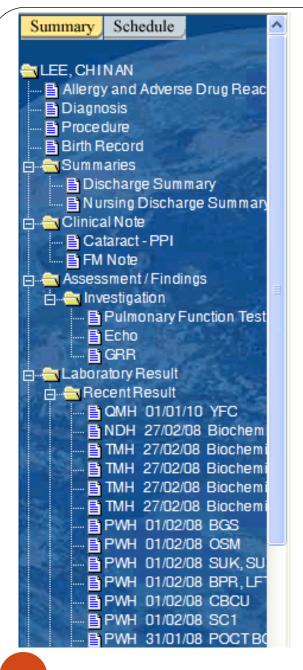
Phase 2

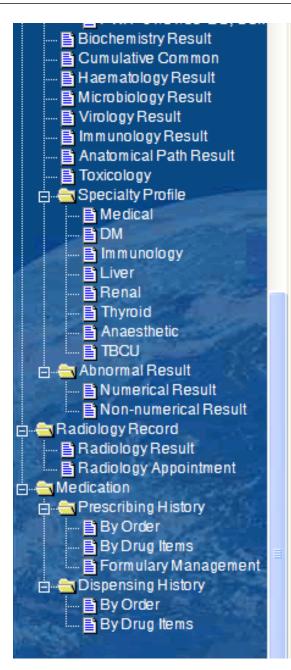
Phase 3

Phase 1

Key:

25







Based on PPI-ePR



eHR Implementation - Phase 1

eHR Section	Level 1	Level 2	Level
eHR Participant			NO
Encounter			
Referral			
Clinical note / summary			
Adverse reaction / allergy			
Clinical alert			
Problem			
Procedure			
Birth record			
Assessment / physical exam			
Social history			
Past medical history			
Family history			
Drug – prescription record			
Drug – dispensary record			
Immunization			
Clinical request			
Diagnostic test result – Laboratory			
Diagnostic test result – Radiology			
Diagnostic test result – Other investigation			
Care & treatment plan			

2012 Jun

Workflow to Prepare Domain Dataset



Study and refer: references, local & international standards



Develop initial set of eHR content, code sets (tables), interoperability standards

Gap analysis: HA-ePR, eHR on-ramp, eHR adaptation, proposed eHR viewer

Seek consultation from Domain Groups, Expert advice group

Briefing on eHR Content – 20 Jul 2012



Hong Kong eHR Standards

eHR Standards Guide

- eHR Content Standards Guidebook
- eHR Data Interoperability Standards

References

- ASTM
 - E1384 Content & structure of electronic health record
 - E2369 Continuity of care record (CCR)
- HL7 standards
- SNOMED CT
- HA data structure for electronic patient record (ePR)



eHR Content: 21 Domains

- 1. eHR Participant
- 2. Encounter
- 3. Referral
- 4. Clinical note / summary
- Adverse drug reaction / allergy
- 6. Clinical alert
- 7. Problem
- 8. Procedure
- 9. Birth Record
- 10. Assessment / physical exam

- 11. Social history
- 12. Past medical history
- 13. Family history
- 14. Drug prescribing record
- 15. Drug dispensing record
- 16. Immunisation
- 17. Clinical request
- 18. Laboratory Result
- 19. Radiology Result
- 20. Other Investigation
- 21. Care & Treatment Plan

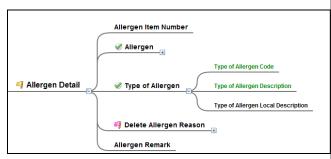
Managed by Domain Groups

Managed by Co-ordinating Groups



Domain: 3 Deliverables

- Mind map
 - show the hierarchy / relationship of data
- Data schema:
 - data name / description
 - data type (HL7)
 - data definition
 - entity ID & entity data type
 - mandatory / repeated data
 - validation rule
 - structure data: Recognised terminology
- Codex (code tables)



Form	Category 1 (Type)	Category 2	Category 3	Proposed Name	EntityID (not confirmed)	Definition	Data Type (code) - HL7 2.5	Data Type (description) - HL7 2.5	Mandator y Field	Validation Rule	Data	Code Table	Remark	Field Type	Example (Certified Level 1)	Example (Certified Level 2)	Example (Certified Level 3)	Certified Level 1	Certified Level 2	Certified Level
Allergy Record	Allergen Detail			Allergen item number		The number indicating the individual allergen	ST	String	Optional		R			ST		A12346	12356	NA	0	0
Allengy Record			Allergen - Recognised Terminology	Allergen - recognised terminology name	1003133		CE	Coded element	Mandatory		R		The recognised terminology will be accepted according to the following priority: 1. HKCTT 2. CPP 3. SNOMED ST	CE			CPP	NA	NA.	М
Allergy Record	Allergen Detail		Recognised	Allergen identifier - recognised terminology	1003134	Unique identifier of the allergen in the recognised terminology	Œ	Coded element	Mandatory	[Allergen identifier - recognised terminology] should be	R	- HKCTT - CPP - SNOMED CT		OE			56432	NA	NA	М
Allergy Record	Detail		Allergen - Recognised Terminology	Allergen description - recognised terminology	1003135	Description of the allergen in recognised terminology	CE	Coded element	Mandatory		R			0E			Pencilin			М
Record	Detail		Allergen - Local Terminology	Allergen local code		Local code of the allergen developed by the healthcare organization	ST	String	Mandatory		R			ST		abc	a1234	NA	0	0
Record	Detail			Allergen local description		Local description of the allergen developed by the healthcare organization	ST	String	Mandatory		R			ST		Fish				М
	Detail	Type of Allergen		Type of allergen code			Œ	Coded element			R	Type of Allergen		CE						М
Allergy Record	Detail	Type of Allergen		description		allergen	ST	String	Mandatory		R			ST			allergen			М
Allergy Record	Allergen	Type of Allergen		Type of allergen local description	1003140	Local description of the type of allergen		String	Mandatory		R			ST		Unknown	Penicilin alergen			М
Allergy Record	Allergen Detail	Delete Allergen Reason		Delete allergen reason item number	1003141	The number indicating the delete allergen reason	ST	String	Optional		R			ST		abc	abc	NA	0	0
Record	Detail	Delete Allergen Reason		Delete allergen reason code		Code of the reason of deletion of the allergen	Œ	Coded element	Optional		R	Delete allergen reason		CE						O or M if [Delete allerg reason description given
Allergy Record	Detail	Delete Allergen Reason		Delete allergen reason description		deletion of the allergen	ST	String	Optional		R			ST			this entry is not for this patient			M if [Delete allers reason code] is g
Record	Detail	Delete Allergen Reason		Delete allergen reason local description		Local description of the reason of deletion of the allergen		String	Optional		R			ST		error patient	wrong entry			O or M if [Delete allergen reason o is given
Allergy Record	Detail	Delete Allergen Reason		Delete allergen reason remark		Additional information of the reason of deletion of the allergen	ST	String	Optional		R			ST		abc			0	0
Allergy Record	Allergen Detail			Allergen remark	1003146	Additional information about the allergen	ST	String	Optional		R			ST	abc	abc	abc	0	0	0
Allergy Record	Allergy			Allergy note	1003147	The additional information about the allergy	TX	Text	Optional					TX	abc	abc	abc	м	0	0

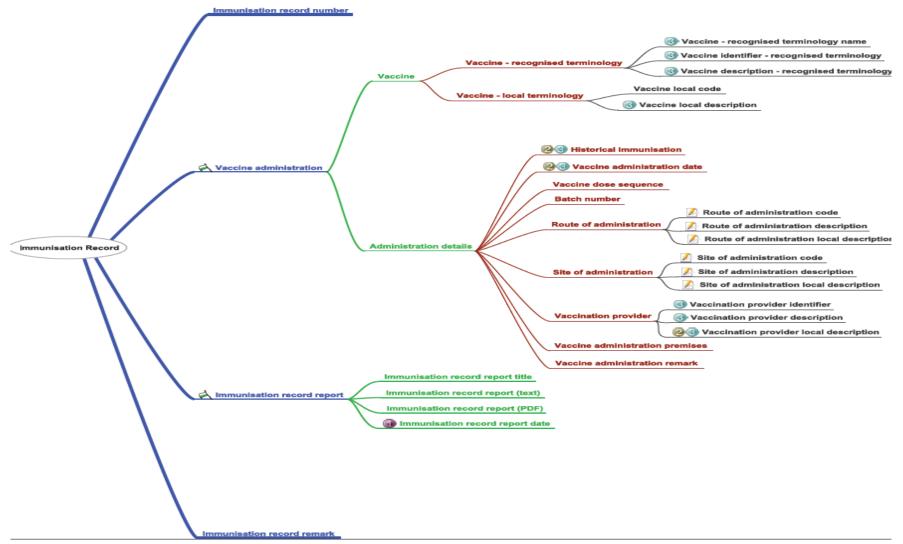
Birth Pl	ace							
Purpose	: to indicate	the place where	the birth was taken place					
Source : HA table with modification								
Item	Term ID	eHR Value	eHR Description					
1		BBA	Born before arrival					
2		ROA	Born on arrival in hospital					

Born in hospital

BIH

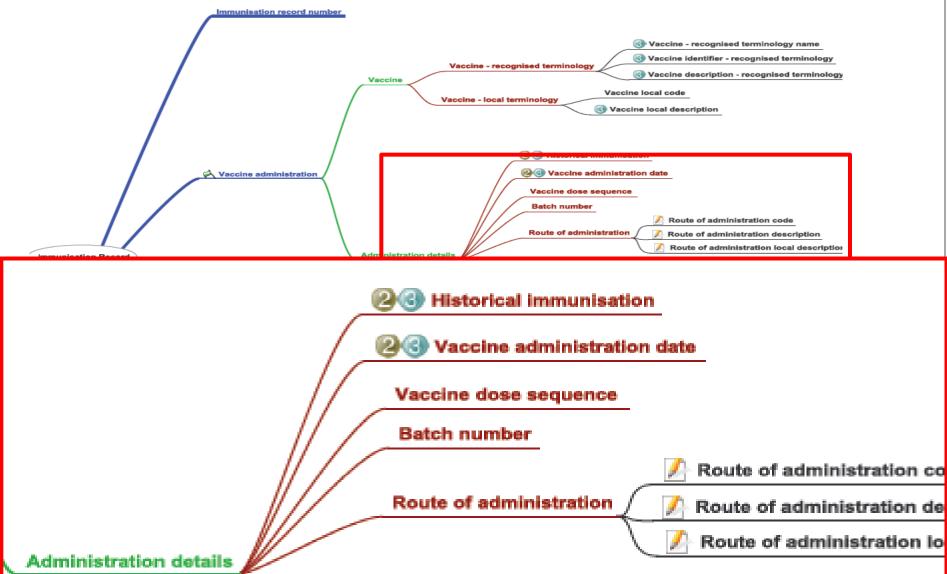
Immunisation Dataset





Immunisation Dataset





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Legend





Mandatory for all Levels



Mandatory for Level 1



Mandatory for Level 2



Mandatory for Level 3



Conditional mandatory



Repeated data



Encrypted eHR storage



Code table



Recognised terminology

Data Schema



Entity Name	Entity	Definition	Data Type	Data Type (description)	Validation Rule	Repeated Data	Code Table	Remark	Data Requirement	Data Requirement	Data Requirement	Example	Example	Example
			(code)						(Certified Level 1)	(Certified Level 2)	(Certified Level 3)		Example (Certified Level 2)	
Immunisation record number	1001804	A unique identifier for each vaccine administration record defined by individual institution	ST	String					0	0	0	5805 0000 XXXX	5805 0000 XXXX	5805 0000 XXX
Vaccine - recognised terminology name	1001808	Terminology name that is recognised by the eHR information Standards Office for vaccine	CE	Coded Element		У	Vaccine - recognised terminology name		N/A	N/A	м	N/A	N/A	CPP
Vaccine identifier -	1001809	A unique identifier of individual vaccine in the "Vaccine list"	CE	Coded Element		у	Vaccine list		N/A	N/A	м	N/A	N/A	01891
recognised terminology Vaccine description	- 1001810	Name of Individual vaccine in the	CE	Coded Element		у	Vaccine list		N/A	N/A	M	N/A	N/A	MMR II
recognised terminology Vaccine local code	1001806	A unique identifier issued to the vaccine defined by individual	ST	String		у			N/A	0	0	N/A	MMR	MMR II
	1001807	Institution							NIA			N/A	MMR	MMR II
Vaccine local description	1001814	The description of the vaccine defined by individual institution	CE	String Coded Element		y			N/A	M.	M.	N/A		1
Historical Immunisation		immunisation administered previously by other providers. All historical immunisation data should be based on the immunisation record documented by previous healthcare providers who gave the vaccine to the person.	CE			y	Yes No Unspecified		N/A	М	М	N/A	No	Unspecified
Vaccine administration date	1001805	The date on which the vaccine is given	TS	Time Stamp		У			N/A	M	M	N/A	1/11/2009	1/11/2009
Vaccine dose sequence	1001812	Immunisation dose in series, booster	ST	String		У			N/A	0	0	N/A	1st dose	2nd dose
Batch number	1001811	Batch number for drug product as assigned by the drug manufacturer	ST	String		У			N/A	0	0	N/A	09-33344-XX098	09-33355-XX09
Route of administration code	1001816	The path by which a drug / substance is taken into the body	CE	Coded Element		У	Route of drug administration table	a a	N/A	N/A	N/A or M if [Route of administration description] is given	N/A	N/A	IM
Route of administration description		Description of the path by which a drug / substance is taken into the body, defined by eHR	ST	String		У			N/A	N/A	N/A or M if [Route of administration code	N/A	N/A	Intramuscular
Route of administration local description	İ	Description of the path by which a drug / substance is taken into the body, defined by individual institution	ST	String		У			N/A	0	O or M if [Route of administration code)	N/A	IM	Intramuscular
Site of administration code	1001817	Code of the body site where the drug / substance is given	CE	Coded Element		У	Site of drug administration	,	N/A	N/A	Is given N/A or M if [Site of administration	N/A	N/A	LT
Site of administration description		Description of the body site where the drug / substance is given, defined by eHR	ST	String		У			N/A	N/A	description) is given N/A or M if (Site of administration code) is given	N/A	N/A	Left Thigh
Site of administration local description		Local description of the body site where the drug / substance is given, defined by Individual institution	ST	String		У			N/A	0	O or M if [Site of administration code] is given	N/A	L Thigh	Lt Thigh
Vaccination provider identifier	1001813	Code of the healthcare provider who administers the vaccine	CE	Coded Element		у	Vaccine provider	Display rule: If ([Historical Immunisation] = no, eHR will display the Attendance HCI available from system interface)	N/A	N/A	M	N/A	N/A	DH
Vaccination provider description		Description of the healthcare provider who administers the vaccline, defined by eHR	ST	String		У		Display rule: if ([Historical imminisation] = no, eHR will display the Attendance HCI available from system interface)	N/A	N/A	м	N/A	N/A	Department of Health
Vaccination provider local description		Local description of the healthcare provider who administers the vaccine, defined by individual institution	ST	String		У		Display rule: If ([Historical Immunisation] = no, eHR will display the Attendance HCI available from	N/A	M	M	N/A	Quality healthcare	Dept of Health
Vaccine administration premises Vaccine	1001815	Name of the premises where the vaccine is administered	ST	String		У			N/A	0	0	N/A	Causeway Bay Clinic	тко мене
administration		The additional information about the vaccine administration	TX	Text		У			N/A	0	0	N/A	NII	NII
remark Immunisation record report title		The title of immunisation report	ST	String		У			0	0	0	immunisation record	Immunisation record	immunisation record
immunisation record report (text)		Report of the immunisation record in text format	TX	Text		У			O or M if [immunisation record report (PDF)] is blank	0	0	immunisation vaccine given on dd/mm/yyyy	Immunisation vaccine given on dd/mm/yyyy	Immunisation vaccine given on dd/mm/yyyy
immunisation record report (PDF)	1001818	Report of the Immunisation record in Portable Document Format (PDF)	ED	Encapsulated data		У			O or M if [immunisation record report (text)] is blank	0	0			
immunisation record report date		The date when the immunisation record is documented, which also considered as the date when the vaccline is given	TS	Time Stamp		У		Oleptay rule: Certified Level 1: Clisplay level 1: Clisplay level 1: Certified Level 2 / 3: Clisplay [Vaccine administration date] or [immunisation record report (text)] or [immunisation record report (text)]	8.4 3	N/A	N/A	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy
immunisation record remark		The additional information about the immunisation record	TX	Text				Is given	0	0	0	next injection date is dd/mm/yyyy	next injection date is dd/mm/yyyy	next Injection dat
	I	I	I	1	I	I	I	I				1	1	1

Data Schema



Entity Name Entity Definition Data Data	Example 2) (Certified Level 5505 0000 XXXX
Immunisation record 1001904 A unique loenother for each vaccine administration record vaccine vacc	\$805 0000 XXXX
vaccine administration record defined by individual institution Vaccine 10018 of Terminology name that is Vaccine 20018 of Vaccine 10018 of V	CPP
Vaccine 100100 Terminology name that is CE Coded Element y Vaccine NIA	
Vaccine is notifier - 1001809 A 2 in le identifier of individual vaccine is the "Vaccine ilist" Vaccine is notifier - 1001809 A 2 in le identifier of individual vaccine ilist" Vaccine is the "Vaccine ilist" Vaccine is consistent of the "Vaccine ilis	01891
recognise vaccine of the "Vaccine illet" Vaccine of rightion - riccognise farminolog Vaccine of vaccine of vaccine in the va	
recognise Vaccine it v	
Vaccine to got 1001806 A unique identity and to the ST String v	MRII
vaccine defined by	AFR II
Vaccine to 1001807 The description of the ST String y	APR II
description defined by individual inet	specified
Immunisatio previously by other providers instancial immunisation data should be based on the immunisation precord	
occumented by previous healthcare providers who gave	
Vaccine administration (Value on which the vaccine is person. The date on which the vaccine is person. Fintity ID • Definition of the	1/2009
Vaccine dose V1812 Immunisation dose in series, ST	dose
	33355-XX099
Sation number 1611 Station number for drug product as ST String sealinghed by the drug Product ST String St	
Route of security of the path by which st string route of Route of Description of the path by which st string route of R	ramuscular
administration lo a drug / substance is taken into	Intramuscular
Is given Site of administration Site of administration NIA NIA ON NIA	LT
description) is given	
Site of administrate conjugate of the co	Left Thigh
	Lt Thigh
O O or Milif (Site of administration code) is given	Et inign
Vaccine Phility Name y vaccine Display rule: NVA NVA NVA NVA NVA NVA NVA NVA	DH
Immunisation) = no, eHR will display the Attendance HCI available from	
system interface)	Department of
y Disprisy rute: If gh-interioral immunisation] = no, ei+R* will display the N/A M N/A N/A	Health
Vac I (AIIIC OI CAA IICIC) C. 2. y Display rule: N/A M M N/A Quality healthcare local	Dept of Health
immunication j = no.	
Date of birth	тко мснс
pres L	NII
• [Report title]	Immunisation
u O or O Immunication Immunication	record
y Mili (immunisation report Mili (immunisation report (PDP)) Is blank Mili (immunisation didmm),yyyy dommny,yyy dommny,yyy dommny,yyy dommny,yyyy dommny,yyyyy dommny,yyyyy dommny,yyyyy dommny,yyyy dommny,yyyyy dommny,yyyy dommny,yyyyy dommny,yyyyy dommny,yyyyy dommny,yyyyy dommny,yyyyy dommny,yyyyy dommny,yyyyyyyy dommny,yyyyyy dommny,yyyyyyyyyy dommny,yyyyyyyyyyyyyyyyyyyyyyyyyyyyyyyyyy	vaccine given on dd/mm/yyyy
report (PDF) report (PDF) record in Portable Document Format (PDF) record in Portable Document Format (PDF)	1
immunisation record	dd/mm/yyyy
also considered as the date when the special space of the	
report date] Certified Level 2 / 3: clisplay [Vaccline administration date]	
administration dates	
or primuritaation in a service (PCPF)] is given in a given in the given in a given in the given	
Immunisation record The additional information about TX Text O O O next injection date is next injection date	

Data Schema



nunisation record noer coine - ognised nimology name coine identifier - ognised ninology cline description ognised	Entity Definition 3 1001804 A unique Identifier i Aucoline administration defined by Incidentifier i Terminisology name to recognised by the discount of Standard Vaccine 1001809 A unique Identifier of Vaccine Inter "Vaccine Inter	Institution vaccine - Vaccine - recognised	emark	Data Requirement (Certified Level 1) O NWA NWA	Data Requirement (Certified Level 2) NIA NIA NIA	Data Requireme (Certified Level 3) M M	Example (Certified Level 1) SSOS 0000 XXXX NUA NUA	Example (Certified Level 2) \$805,0000 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Example (Certified L 5803 0000 X CPP
rminology accline local code accline local secription laterical immunisation	1001806 A unique identifier is institution of the institution and by institution of the i	String T String Y TE Code Element Y Vis No Unspecified TS Time Stamp y		NUA NUA			eated D		
raccine dose equence latch n	Data Ty	pe (code) / (description)		N/A N/A	Wheth		ltiple ent cy is allow	· •	ame
		Data storage format		N/A N/A	Sectio	n	Entity	Repe	
Code	Description	Definition		N/A N/A	Participa		Date of oirth	N	1
СЕ	Coded element	Coding systems/tables specified by eHR project	-	N/A	Prescript	ion l	Prescribed	Ŋ	Y
ED	Encapsulated data	Encapsulated data, e.g. PDF document	<u></u>	NIA	Record		drug		
ST	String data	Text data upto 1,000 characters		N/A N/A	0		N/A	NII	NII
TS	Time stamp	Date and timePermits varying degrees of granularity from days, hours, to decimal seconds		O or All Information record report (POF) is blank O or M if [immunisation record report (bext)] is blank	0		Immunisation record Immunisation vaccine given on dolmmyggy	immunisation record immunisation vaccine given on did/mm/yyyy	Immunisation record Immunisation vaccine given dd/mm/yyyy
TX	Text	Text data upto 65536 characters, for display purpose	date] figure (text)] figure (text)] figure (text)	M 1	N/A	N/A	dd/mm/yyyy	did/imm/yyyy	did/mm/yyyy
munisation record	The additional informative immunisation red	nation about TX Text	ven	0	0	•	next injection date is dd/mm/yyyy	next Injection date is dd/mm/yyyy	next Injection dd/mm/yyyy

Data Schema



ntity Name	E-4'4-	Definition.		10			_	B	D-1-	B-4-	D-1-			
itity Name	ID ID	Definition	Type (code)	Data Type (description	ı) Rule	n Repe.	Table	Remark	Requirement (Certified Level 1)	Requirement (Certified Level 2)	Requirement (Certified Level 3)	Example (Certified Level 1)	Example (Certified Level 2)	Example (Certifi
unisation record ber	1001804	A unique identifier for each vaccine administration record defined by individual institution	ST	String					0	0	0	5805 0000 XXXX	5805 0000 XXXX	5805 000
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ine identifier -	1001809	A unique identifier of individual	CE	Coded Ele		У	Vaccine		N/A	N/A	M	N/A	N/A	01891
gnised Inology line description -	- 1001810	vaccine in the "Vaccine list" Name of individual vaccine in the "Vaccine list"	CE	-	/	у	Vaccine list		N/A	N/A	M	N/A	N/A	MMRII
gnised inology line local code	1001806	A unlove identifier issued to the										N/A	MMB	MMRII
the total	100.0.	A unique identifier issued to the vaccine defined by individual institution												
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,	'	also considered as the date when the vaccine is given	ĺ					display [immunisation record report date]	d					
,	'		ĺ					Certified Level 2 / 3: display [Vaccine administration date] if [immunisation						
,	'		ĺ					record report (text)] or [immunisation record report (PDF)						
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unisation record	+ ,	The additional information about the immunisation record	TX	Text	\neg				0	0	0	next injection date is dd/mm/yyyy	next injection date is dd/mm/yyyy	s next inj dd/mm/

Code Tables

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Laboratory Category

Laboratory Category Code

Laboratory Category Description

Laboratory Category Local Description

	Laboratory Category Table									
	TermID eHR Value		eHR Value	eHR Description						
•			CHEM	Chemical Pathology Laboratory						
			HAEM	Haematology Laboratory						
			IMMUN	Immunology Laboratory						
	D		MICRO	Microbiology Laboratory						
	gne		VIRO	Virology Laboratory						
	assigned 人		PATH	Anatomical Pathology Laboratory						
			TRL	Toxicology Reference Laboratory						
	To be		BLDBK	Blood Bank						
	2		T&I	Transplantation & Immunogenetic Laboratory						
			MOLPATH	Molecular Pathology Laboratory						
			LAB	Clinical Laboratory						

Laboratory	Certified Level	Laboratory Category Code	Laboratory Category Description	Laboratory Category Local Description
A	Level 2			Chem
В	Level 3	Chem	Chemical Pathology Laboratory	ChemPath
C	Level 3	HAEM	Haematology Laboratory	Haematology Laboratory

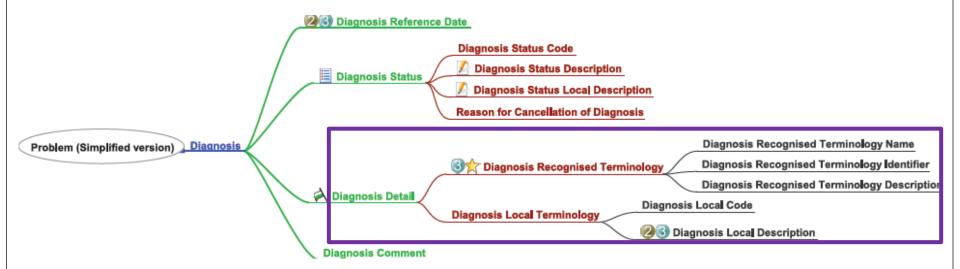
Recognised Terminologies for eHR

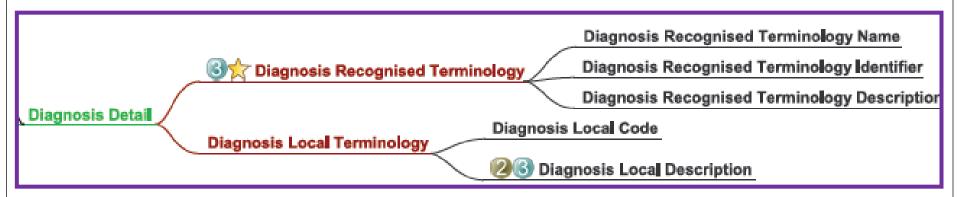


- Compendium of Pharmaceutical Products (CPP)
- Hong Kong Clinical Terminology Table (HKCTT)
- International Classification of Diseases, 10th Revision (ICD 10)
- International Classification for Primary Care, 2nd Edition (ICPC2)
- Logical Observations, Identifiers Names and Codes (LOINC)
- Systematized Nomenclature of Medicine, Clinical Terms (SNOMED CT)



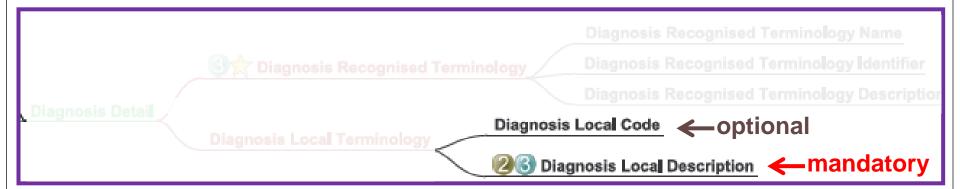
Set of 5





Set of 5 Diagnosis – Level 2 Compliance

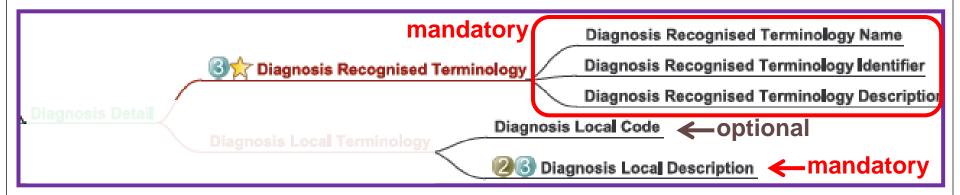




Example	Diagnosis Local Code	Diagnosis Local Description
1		Haemorrhoid
2	HM	Hemorrhoid
3	123	Piles

Set of 5 Diagnosis – Level 3 Compliance





Exampl e	RcgT Name	RcgT ID	RcgT Des	Local Code	Local Description
1	SNOMED CT	233604007	Pneumonia		Pneumonia
2	ICD 10	J18.9	Pneumonia	PN	Pneumonia
3	НКСТТ	8471	Pneumonia	123	Chest infection
4	НКСТТ	8471	Pneumonia		Pneumonia

Data to eHR

description must be sent to eHR,

but local code is optional.

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For displaying data in eHR viewer

For grouping data in eHR viewer / secondary use of eHR data

Declared Standard	Unstructured data	Local str	uctured data	Recognised structured data					
Level			Types	Recognised Terminology Name	Recognised Code	Recognised Description			
1	Mandatory	NA	NA		NA	NA	NA		
2	Optional	Optional	Mandatory		NA	NA	NA		
3	Optional	Optional	Mandatory	Recognised Terminology	Mandatory	Mandatory	Mandatory		
	1			Code Tables		Mandatory	Mandatory		
I	f data is requir	red, local							

When sending local description to eHR:

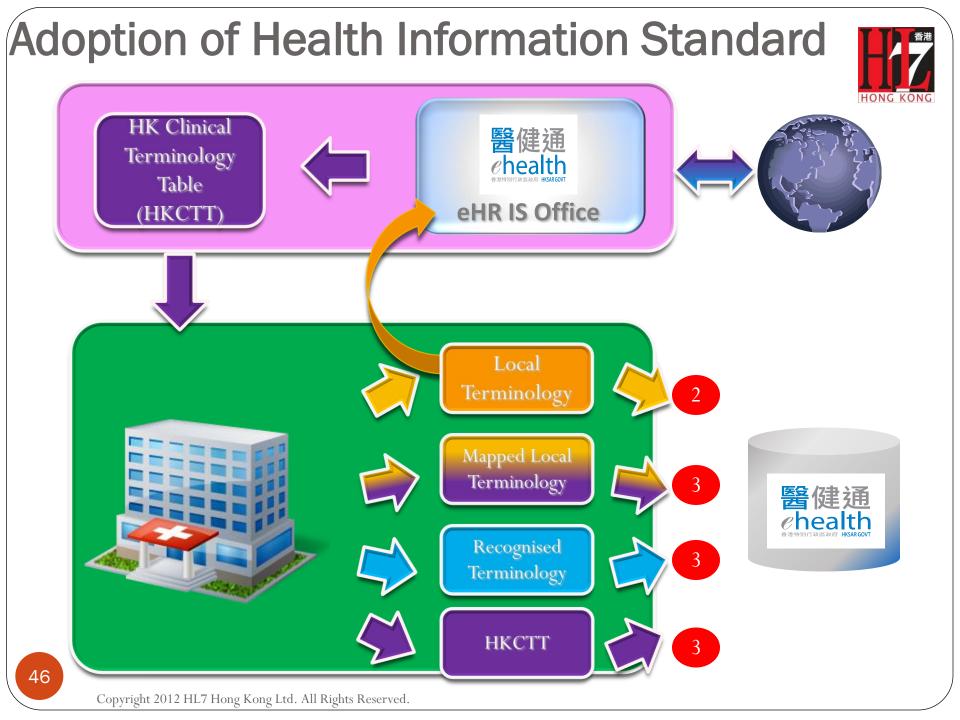
• Send local term if map local table to standard one

• Send term of the recognised terminology if adopt

recognised terminology in local system directly

Recognised Terminology (RT) as Level 3 Data

RT Name	Diagnosis	Procedur	Drug	Laborator
		e		y
HKCTT	Y	Y	Y	Y
SNOMED CT	Y	Y	Y	Y
ICD10	Y			
ICPC2	Y	Y		
LOINC				Y
CPP			Y	



Data Schema



Name Entity ID	Definition D.											
	Ty (c	Data Data Type Type (description code)	validation Report (No. 1) Rule Date	epeated Code ata Table	Remark	Requirement (Certified Level 1)	Requirement (Certified Level 2)	Require (Certif d	ent Example d (Certified Level 1	Example) (Certified Level 2)	Examp (Certif	11
tion record 1001804	A unique identifier for each vaccine administration record defined by individual institution	ST String				0	0		5805 0000 XXXX	5805 0000 XXXX	5805 00	, ,,
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1001809	A unique identifier of individual	CE Coded Elemen	nt	y Vaccine lis		N/A	NA N		N/A	NIA	01891	1
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806	"Vaccine list" A unique identifier issued to the	ST String							N/A	MMR	MMR	
	vaccine defined by Individual Institution	51 349		y			0					
001807	The description defined by ing								N/A	MMR	Unspec	
1001805	Immunication previous instances of the control of t		Data R	equiren	nent				N/A	1/11/2009	1/11/20	
1001805	9								N/A	1/11/2009	2nd dos	
1811	6								N/A	09-33344-XX098	09-333	
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Preparation at Healthcare Sector

- Participate in various eHR communication forums
- Check website for release/update of standard documents
- Analyse the gap between the local and eHR one
 - Scope of sharable data
 - Operation practice, e.g. patient registration
- Identify a champion to act as eHR catalyst
- Adopt standards as far as possible
 - Operation practice
 - Upgrade system : consider incorporating eHR standards
- Feedback & communicate

Gap Analysis on eHR Content & Local Data



- eHR content dataset
 - Check for the data requirement in eHR
 - Data definition
 - Interface requirements:
 - Data type
 - Mandatory data
 - Repeated data
 - Validation rules
 - Data reference to eHR Codex (code tables)
 - May require data mapping: DO ITWITH EXTRA CARE, must be verified
- Determine the level of data compliance for each domain area

The Revision



www.ehealth.gov.hk





Thank You





Application of HL7 Standards for eHR

Michael Cheung



Application of HL7 Standards for eHR

Time	Topic	Presenter
9:00 – 9:30 am	Registration	
9:30 – 9:45 am	Introduction to HL7 HK & eHR	Dr C PWong
9:45 – 11:00 am	Introduction to eHR Standards	Vicky Fung
11:00 – 11:15 am	Break	
11:15 – 12:30 pm	Introduction of Message Standard for eHR, part I	Michael Cheung
12:30 – 1:45 pm	Lunch	
1:45 – 2:30 pm	Introduction of Message Standard for eHR, part II	Michael Cheung
2:30 – 3:30 pm	Implementation of Message Standard for eHR	Michael Cheung
3:30 – 3:45 pm	Break	
3:45 – 4:30 pm	Experience with Validation Platform	PascalTse
4:30 – 5:00 pm	Implementation Consideration	Michael Cheung
5:00 – 5:30 pm	Q&A 7 Hong Kong Ltd. All Rights Reserved	

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Personal Introduction

- Working for information technology department of public health care organisation over 15 years
- Managed several Health Level 7 (HL7) integration projects
- Current involving integration development of electronic health record sharing system
- Certified HL7V2.5 Control specialist and CDA specialist
- Project Management Professional (PMP) and PRINCE2 foundation certified
- email: cheungkwm@gmail.com



Introduction of Message Standard for eHR, Part I

Application of HL7 Standards for eHR



Message standards for HK eHR

- Require common format for information exchange
- Need to provide the framework for event-driven message
- Capable to carry
 - Unstructured data (Free text / PDF)
 - Structured data (Fully codified data & values)



Proposed Framework

- Event
 - Exchange the information once the real work event happen
 - Trigger by Healthcare Recipient related events like Administration, Enrolment & Demographic update
- Clinical Document
 - Documentation of clinical observations and services
 - Once the document is authorized ("signed")



Standards Adopt

- Event HL7V2 Messaging of Patient Administration Domain
- Clinical Document Architecture (CDA) R2
 - Covered the HK eHR Level 1 (Text Report & PDF) to Level 3 (Codified data & content)
 - Embed inside Result Reporting message (ORU^R01) for delivery

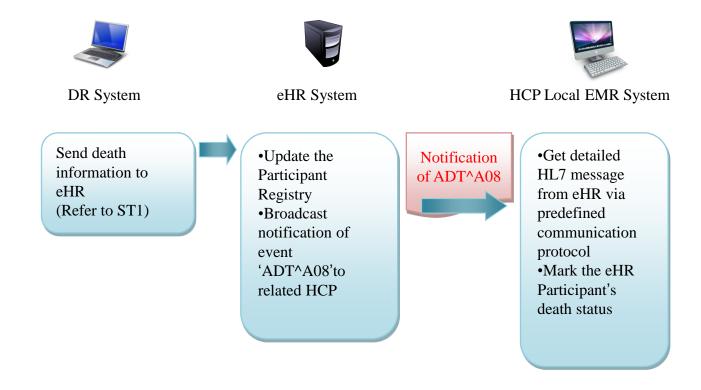
Events for eHR send to HCP



Action	Scenario	HL7 Event Code	Message Structure
Update Participant Death Data	Mark Decease / Death Data of eHR Participant from DR (ST1)	ADT^A08	ADT_A01
Enrol to eHR	Enrol as eHR Participant (ST2) Rejoin eHR after Withdraw (ST3)	ADT^A28	ADT_A05
Build Relationship with Healthcare Provider	Give Consent-to-Provider (ST4)	ADT^A28	ADT_A05
Withdraw from eHR	Deregister eHR Participant – Immediate Action upon Withdrawal from eHR (ST5)	ADT^A29	ADT_A21
Terminate Relationship	Revoke Consent-to-Provider from HCP (ST6)	ADT^A29	ADT_A21
Update Participant Identifier	Change eHR PMI Data – Major Keys (ST7)	ADT^A47	ADT_A30



Update Participant Death Data





Update Participant Death Data - Message Structure

Required

eHR Segment	ADT^A08	ADT Message	Chapter in HL7 Specification
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
\checkmark	EVN	EventType	3
\checkmark	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	[{ROL}]	Role	15
	[{ NK1 }]	Next of Kin	3
✓	PV1	Patient Visit	3

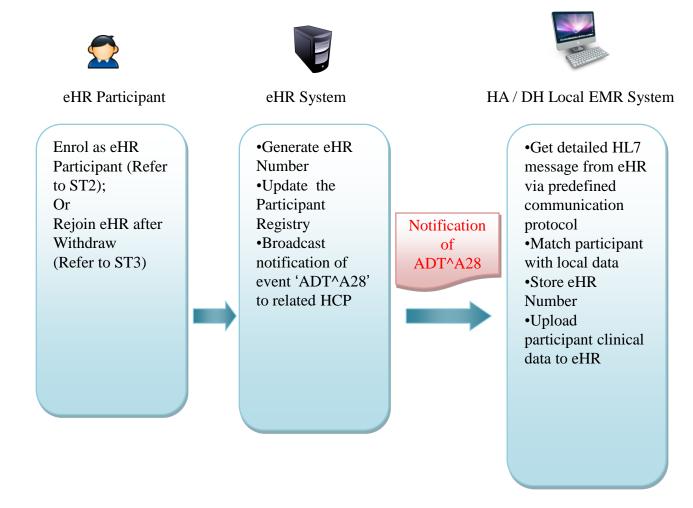


Update Participant Death Data

- Expected Action from HCP
- Update the healthcare recipient's death status in the local EMR system of the HCP
- HCPs should stop uploading deceased healthcare recipient's clinical record to eHR. Viewing of the participant's record is no longer allowed.



Enroll/Rejoin to eHR





Enroll/Rejoin to eHR - Message Structure

Required

eHR Segment	<u>ADT^A28</u>	ADT Message	Chapter in HL7 Specification
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
✓	EVN	EventType	3
✓	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	$[\{ROL\}]$	Role	15
	[{ NK1 }]	Next of Kin	3
✓	PV1	Patient Visit	3

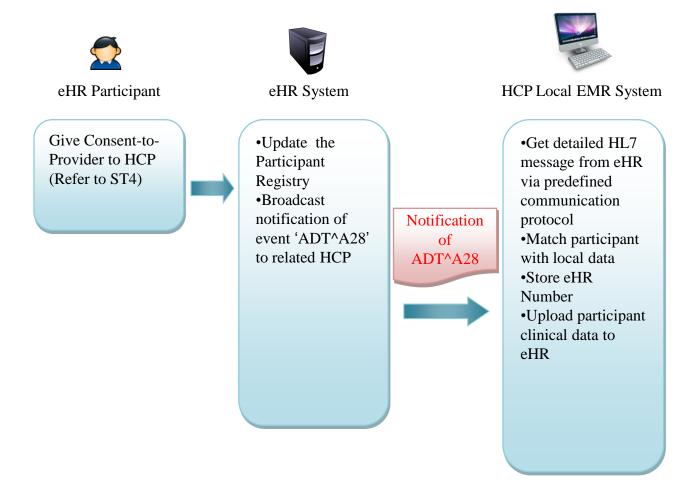


Enroll/Rejoin to eHR

- Expected Action from HA/DH
- Match healthcare recipient major keys with local data
- Store eHR number in local EMR system
- Upload ALL healthcare recipient's clinical data from local EMR system to eHR



Consent to Provider





Consent to Provider - Message Structure

Required

eHR Segment	<u>ADT^A28</u>	ADT Message	Chapter in HL7 Specification
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
✓	EVN	Event Type	3
✓	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	$[\{ROL\}]$	Role	15
	[{ NK1 }]	Next of Kin	3
✓	PV1	Patient Visit	3



Consent to Provider

- Expected Action from HCP
- Match healthcare recipient major keys with local data
- Store eHR number in local EMR system
- Upload ALL healthcare recipient's clinical data from local EMR system to eHR



Withdraw from eHR



eHR participant

Deregister eHR Participant (Refer to ST5)



eHR system

Update participant registryBroadcast notification of ADT^A29

message to HA

and DH



Notification of ADT^A29



HA/DH local EMR system

- •Get detailed HL7 message from eHR via predefined communication protocol
- •Match eHR participant with local data
- •Mark eHR deregistration date and status in local PMI
- •Need not send any data, including backdate data, to eHR after deregistration date



Withdraw from eHR - Message Structure

Required

eHR Segment	<u>ADT^A29</u>	ADT Message	Chapter in HL7 Specification
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
\checkmark	EVN	EventType	3
\checkmark	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	[{ROL}]	Role	15
	[{ NK1 }]	Next of Kin	3
✓	PV1	Patient Visit	3



Withdraw from eHR

- Expected Action from HA/DH
- Match healthcare recipient major keys with local data
- Mark eHR deregistration date and status in local PMI
- Stop to send any data, including backdate data, to eHR after deregistration date



Revoke Consent to Provider



eHR participant

Revoke Consent-to-Provider from HCP (Refer to ST6)



eHR system



- •Update participant registry
- •Broadcast notification of ADT^A29 message to related HCP



Notification of ADT^A29



HCP local EMR system

- •Get detailed HL7 message from eHR via predefined communication protocol
- •Match eHR participant with local data
- •Mark eHR deregistration date and status in local PMI
- •Need not send any data, including backdate data, to eHR after deregistration date



Revoke Consent to Provider - Message Structure

Required

eHR Segment	<u>ADT^A29</u>	ADT Message	Chapter in HL7 Specification
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
✓	EVN	EventType	3
✓	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	$[\{ROL\}]$	Role	15
	[{ NK1 }]	Next of Kin	3
✓	PV1	Patient Visit	3



Revoke Consent to Provider

- Expected Action from HCP
- Match healthcare recipient major keys with local data
- Mark the patient as non-eHR healthcare recipient in local PMI

• Stop to send any data, including backdate data, to eHR after deregistration date

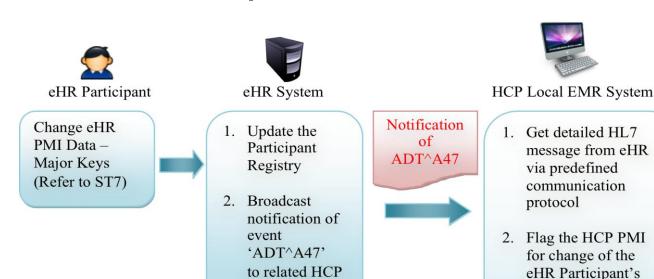


major keys

PMI

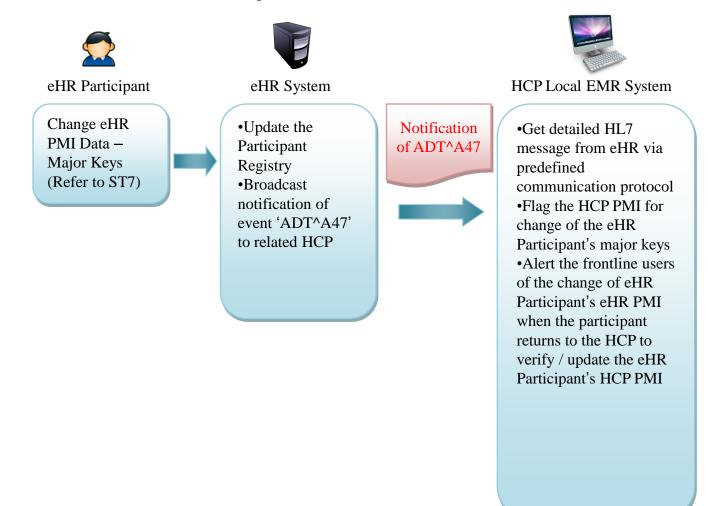
3. Alert the frontline users of the change of eHR Participant's eHR PMI when the participant returns to the HCP to verify / update the eHR Participant's HCP

Update Participant Identifier





Update Participant Identifier





Update Participant Identifier - Message Structure

Required

eHR Segment	<u>ADT^A47</u>	ADT Message	Chapter in HL7 Specification
\checkmark	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
\checkmark	EVN	Event Type	3
\checkmark	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
\checkmark	MRG	Merge Information	3



Update Participant Identifier

- Expected Action from HCP
- Flag the local PMI for change of that eHR healthcare recipient's major keys
- Alert the frontline users of the change of eHR healthcare recipient's major keys when the person returns to the HCP to verify / update the eHR Participant's HCP PMI.

Events for HCP send to eHR



Action	Scenario	HL7 Event Code	Message Structure
Update Participant Death Data	Mark Decease / Death Data of eHR Participant from HCP (SF1) Cancel Decease / Death Data of eHR Participant from HCP (SF2)	ADT^A08	ADT_A01
Move Participant Episode	Manage eHR Data – Move Participant's Episode (SF3)	ADT^A45	ADT_A45



Update Participant Death Data

- If there is an eHR participant death record created by HCP, the HCP should notify eHR by sending the death information to eHR.
- Upon receipt of death record from HCP, eHR healthcare recipient's clinical records could not be accessed or viewed in eHR portal.
- However, HCPs which still have effective relationship with the eHR healthcare recipient should continue to upload the clinical records of that eHR healthcare recipient.



Update Participant Death Data - Message Structure

Required

eHR Segment	<u>ADT^A08</u>	ADT Message	Chapter in HL7 Specification
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
✓	EVN	EventType	3
✓	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	[{ ROL }]	Role	15
	[{ NK1 }]	Next of Kin	3
✓	PV1	Patient Visit	3



Move Participant Episode

- If HCP discovers the episode of an eHR participant is recorded incorrectly to another person, HCP should notify eHR of the event of moving episode.
- Once the episode movement is completed, HCP should notify eHR for the completion of the action.



Move Participant Episode - Message Structure

Required

eHR Segment	ADT^A45	ADT Message	Chapter in HL7 Specification
\checkmark	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
✓	EVN	Event Type	3
✓	PID	Patient Identification	3
	[PD1]	Additional Demographics	3
	{		
✓	MRG	Merge Information	3
✓	PVI	Patient Visit	3
	}		



Question?

Application of HL7 Standards for eHR:

Introduction of Message Standard for eHR, Part I



Introduction of Message Standard for eHR, Part II

Application of HL7 Standards for eHR



Proposed Framework

- Event
 - Exchange the information once the real work event happen
 - Trigger by Healthcare Recipient related events like Administration, Enrolment & Demographic update
- Clinical Document
 - Documentation of clinical observations and services
 - Once the document is authorized ("signed")



Standards Adopt

- HL7-HK Message Standards
- HL7-HK Localised Bulk Load Standards

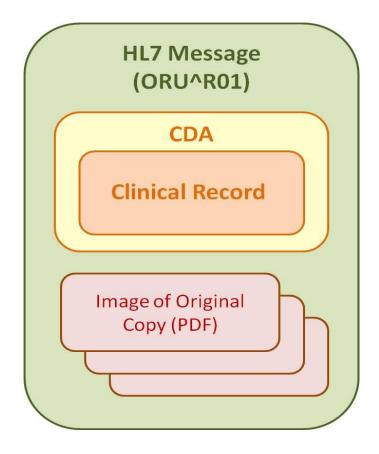
Overview – HL7-HK Message Standards



- ORU_R01 Event (Unsolicited Observation Message)
- Under eHR-HK Standards
 - HL7 ver.2.5 (in XML format)
 - HL7 ver. 2.5 (in XML format) + CDA document
 - HL7 ver.2.5 (in XML format) + CDA document + Image File
- CDA can contain any type of clinical content
- By participant

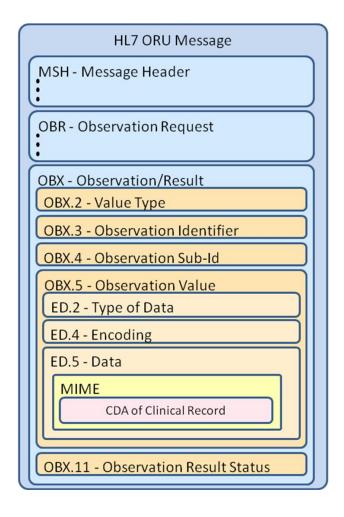


Message Components



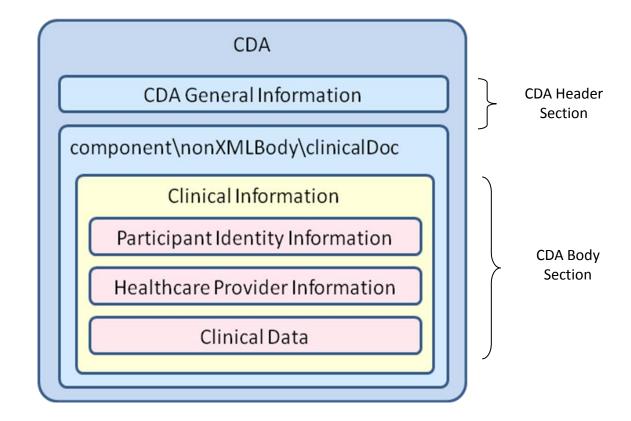


Message Structure Overview





CDA Structure Overview





CDA Sample – IMMU (1)

```
<?xml version="1.0" encoding="UTF-8"?>
<ClinicalDocument xsi:schemaLocation="urn:hl7-org:v3 CDA.xsd" xmlns="urn:hl7-</pre>
  org:v3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
 < ! --
 CDA General Information
 **********
 -->
 <typeId root="2.16.840.1.113883.1.3" extension="POCD HD000040"/>
 <id/>
 <code code="IMMU"/>
 <title>Immunisation</title>
```



CDA Sample - IMMU (2)

```
<component>
   <nonXMLBody>
     <clinicalDoc>
       <participant>
         <ehr no>20100000001
         <hkid>A1234563</hkid>
         <doc type>ID</doc type>
         <doc no>A1234563</doc no>
         <person eng surname>CHAN</person eng surname>
         <person eng given name>TAI MAN</person eng given name>
         <person eng full name>CHAN, TAI MAN</person eng full name>
         <sex>M</sex>
         <birth date>2009-01-01 00:00:00.000</pirth date>
       </participant>
       <detail>
         <record no>5805 0000 1234</record no>
```



CDA Sample - IMMU (3)

```
<vaccine adm>
          <record key>RECKEY0001
          <transaction dtm>2009-12-01 00:00:00.000/transaction dtm>
          <transaction type>I</transaction type>
          <last update dtm>2009-12-01 00:00:00.000/last update dtm>
          <episode no>EP-12345/episode no>
          <attendance inst id>1735455950</attendance inst id>
          <vaccine rt name>CPP</vaccine rt name>
          <vaccine rt id>01891</vaccine rt id>
          <vaccine rt desc>MMR II</vaccine rt desc>
          <vaccine lt id>MMR II</vaccine lt id>
          <vaccine lt desc>MMR II</vaccine lt desc>
          <route of adm cd>IM</route of adm cd>
          <route of adm desc>Intramuscular</route of adm desc>
          <route of adm lt desc>Intramuscular</route of adm lt desc>
          <site of adm cd>LT</site of adm cd>
          <site of adm desc>Left Thigh</site of adm desc>
```



Message Sample - IMMU (1)

```
<?xml version="1.0" encoding="utf-8"?>
<ORU R01 xmlns="urn:h17-org:v2xml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-</pre>
   instance" xsi:schemaLocation="urn:hl7-org:v2xml ORU R01.xsd">
 <MSH>
   <ORU R01.PATIENT RESULT>
    <ORU R01.ORDER OBSERVATION>
      <OBR>
        <OBR.4>
          <CE.1>IMMU</CE.1>
        </OBR.4>
      </OBR>
      <ORU R01.OBSERVATION>
        < OBX >
          <OBX.2>ED</OBX.2>
          <OBX.3>
            <CE.1>IMMU</CE.1>
          </obx.3>
```



Message Sample - IMMU (2)

```
<OBX.4>NBL</OBX.4>
          <0BX.5>
            <ED.2>multipart</ED.2>
            <ED.4>A</ED.4>
            <ED.5>
MIME-Version: 1.0
Content-Type: multipart/mixed; boundary=00163630f5f354355b046be66f6d
--00163630f5f354355b046be66f6d
Content-Type: text/xml; charset=UTF-8;
name="8088450656.BRANCHA.IMMU.CDA.20110702084530"
Content-Disposition: attachment;
filename="8088450656.BRANCHA.IMMU.CDA.20110702084530"
Content-Transfer-Encoding: base64
X-Attachment-Id: f fvqdehi70
PD94bWwqdmVyc2lvbj0iMS4wIiBlbmNvZGluZz0iVVRGLTqiPz4NCjwhLS0qQ0RBIFNhbXBs
ZSBmb3IqSEt1SFIqSW50ZXJvcGVyYWJpbG10eSAtLT4NCq0KPCEtLSBDb3B5cmlnaHQ6IFRo
```

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Message Sample - IMMU (3)

. . .

```
--00163630f5f354355b046be66f6d

Content-Type: application/pdf;

name="8088450656.BRANCHA.IMMU.PWH019999.123.pdf.201000000001.20110702084530"

Content-Disposition: attachment;

filename="8088450656.BRANCHA.IMMU.PWH019999.123.pdf.201000000001.20110702084530"

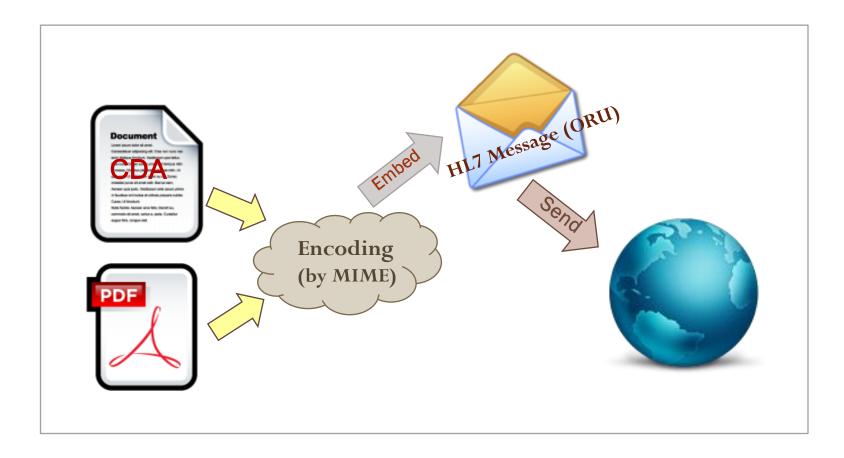
Content-Transfer-Encoding: base64

X-Attachment-Id: f fvqdelfx1
```

JVBERiOxLjUNCiW1tbW1DQoxIDAgb2JqDQo8PC9UeXB1L0NhdGFsb2cvUGFnZXMgMiAwIFIvTGFuZyh6aC1UVykgL1N0cnVjdFRyZWVSb290IDM2OSAwIFIvTWFya0luZm88PC9NYXJrZWQgdHJ1ZT4+Pj4NCmVuZG9iag0KMiAwIG9iag0KPDwvVHlwZS9QYWdlcy9Db3VudCA0L0tpZHNbIDMgMCBSIDEzMSAwIFIgMjQwIDAgUiAzNjAgMCBSXSA+Pg0KZW5kb2JqDQozIDAgb2JqDQo8PC9UeXB1L1BhZ2UvUGFyZW50IDIgMCBSL1Jlc291cmNlczw8L1hPYmplY3Q8PC9JbWFnZTUg







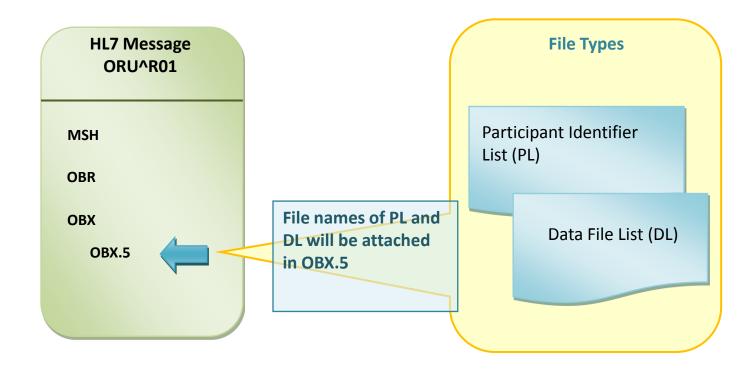
Overview – HL7-HK Localised Bulk Load Standards



- ORU_R01 Event (Unsolicited Observation Message)
- Batch Mode
- Three type of data files
 - Participants List (PL)
 - Clinical Data Files (DF)
 - Image file (in PDF) if applicable
- Data file uses "|" field delimiter
- Grouped by data domain for multiple participants



Bulk-Load Structure Overview





Bulk-Load Sample - Participant List (PL)

```
20100000001|M|2009-01-01 00:00:00.000|A1234563|ID|A1234563|CHAN|TAI MAN|CHAN, TAI MAN\CR\
201000000002|F|2001-01-01 00:00:00.000|A7654321|OC|10234567890|LEE| HO|LEE, HO\CR\
EOF.2.8088450656.CORP.IMMU.PL.1.20110702084530
```



Bulk-Load Sample - Data File (DF)

Bulk-Load Sample - Message (1)



```
<?xml version="1.0" encoding="utf-8"?>
<ORU R01 xmlns="urn:h17-org:v2xm1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-</pre>
   instance" xsi:schemaLocation="urn:hl7-org:v2xml ORU R01.xsd">
  <MSH>
   <ORU R01.OBSERVATION>
          <OBX>
                     <OBX.2>RP</OBX.2>
                     <OBX.3>
                               <CE.1>IMMU</CE.1>
                     </obx.3>
                     <OBX.4>BL-M</OBX.4>
                     <OBX.5>
                               <RP.1>
   8088450656.CORP.IMMU.PL.1.20110702084530:235962049f5eb154e3ae2ecb2d7b797c2e7371
                               \langle RP.1 \rangle
                     </OBX.5>
```

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Bulk-Load Sample

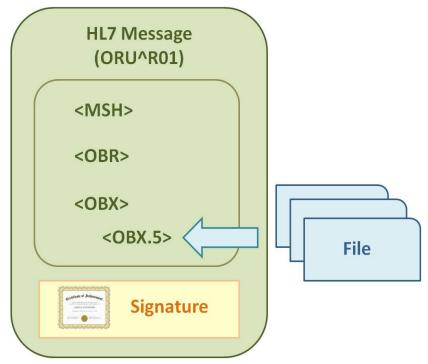


- Message (2)



Non-reputation

Signed the message by Provider e-Cert using XML
 Signature





Overview - eHR Sharable Dataset

Phase 1 Sharable Dataset			
Adverse Drug Reaction (ADR)	Investigation Report (IX)		
Allergy (ALLE)	Laboratory Result (LAB)		
Birth Record (BIRTH)	Prescribing Record (RX)		
Clinical Note / Summary (NOTE)	Problem (PROB)		
Dispensing Record (DISP)	Procedure (PROC)		
Immunisation (IMMU)	Referral (REFER)		
eHR Participant (PMI) *	Radiology Examination (RAD) *		
Encounter (ENCOUN) *			



Question?

Application of HL7 Standards for eHR:

Introduction of Message Standard for eHR, Part II



Implementation of Message Standard for eHR

Application of HL7 Standards for eHR



eHR Sharable Dataset

Phase 1 Sharable Dataset	
Adverse Drug Reaction (ADR)	Investigation Report (IX)
Allergy (ALLE)	Laboratory Result (LAB)
Birth Record (BIRTH)	Prescribing Record (RX)
Clinical Note / Summary (NOTE)	Problem (PROB)
Dispensing Record (DISP)	Procedure (PROC)
Immunisation (IMMU)	Referral (REFER)
eHR Participant (PMI) *	Radiology Examination (RAD) *
Encounter (ENCOUN) *	



Data Compliance Level

- Level 1:
 - PDF or free text for single report
 - e.g. discharge summary in scanned image
- Level 2:
 - Present in data format with local code and local description
 - e.g. code = "W1", desc="WBC", value = "6.4 103/ul (4.3-10.8)"
- Level 3
 - In addition to Level 2, required data must be fully specified with codex or recognised terminology in place

"What" domains shall be implemented?



- Participant event (Level 3 only) "Must"
 - Ensure the identity (major keys) of the participant between eHR and local PMI in sync
- Encounter event (Level 3 only) "Very Desirable"
 - Serve for "one year rolling" consent
- For the others domains, try the best to upload
 - It depends on whether the data are "available" in electronic form and "ready to send out"
 - Study the compliance level requirement

"What" messages shall be implemented?



- Participant events
 - ADT^A28 (Enrol/Rejoin to eHR, Consent to Provider)
 - Match healthcare recipient major keys with local PMI
 - Store eHR number in local EMR system
 - Upload ALL healthcare recipient's clinical data from local EMR system to eHR
 - ADT^A29 (Withdraw from eHR, Revoke Consent to Provider)
 - Match healthcare recipient major keys with local PMI
 - Stop to send any data, including backdate data



Clinical Data Upload

- After received ADT^A28 (Enrol/Rejoin to eHR, Consent to Provider)
 - Perform "Initial Load" (or Data Materialisation) of Clinical Data
- Upload the clinical data (available domains) after encounter occurred
- Stop to send after received ADT^A29 (Withdraw from eHR, Revoke Consent to Provider)



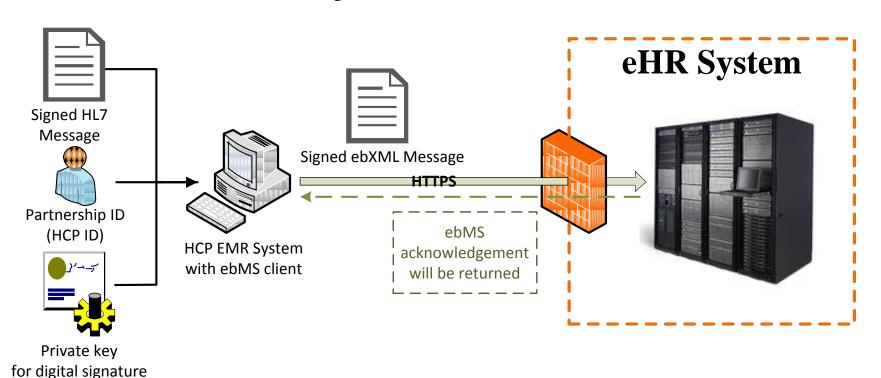
Technical implementation

- Technical Protocols Supported:
 - ebMS over HTTPS for real-time message
 - SFTP for bulk load format
 - Web Services (SOAP) over HTTPS (for PMI events only)
- Process Summary and Exception Report

Technical Protocols Supported – ebMS over HTTPS (1)



HL7-HK Message Standards via ebMS over HTTPS



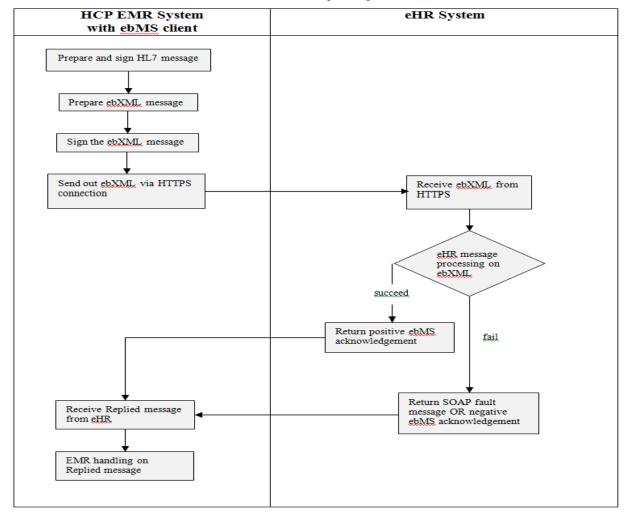
Technical Protocols Supported – ebMS over HTTPS (2)



- Register and establish ebMS partnership in eHR system
- Obtain a digital certificate issued by recognised CA and have it registered into the eHR system
- Obtain the eHR server certificate for connecting to eHR system via HTTPS protocol
- Implement an ebMS client which can:
 - Construct an ebXML message
 - Sign the ebXML with private key of the digital certificate
 - Send the ebXML to eHR system through HTTPS connection
 - Receive and process the returned ebMS acknowledgement or fault message

Technical Protocols Supported – ebMS over HTTPS (3)

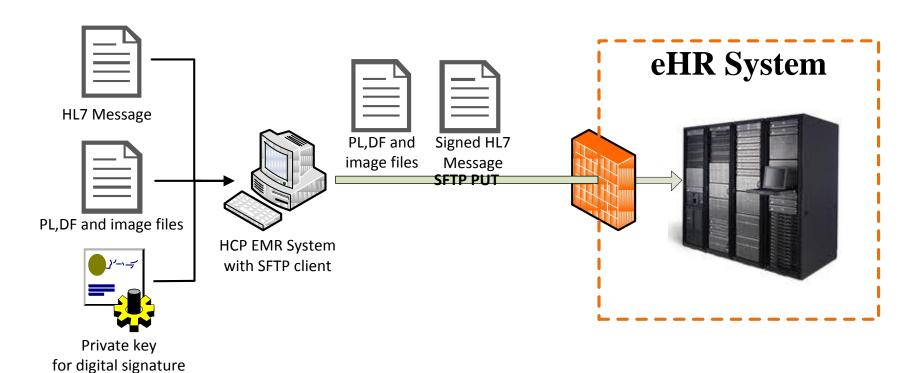




Technical Protocols Supported – SFTP (1)



HL7-HK Localised Bulk Load Standards via. SFTP



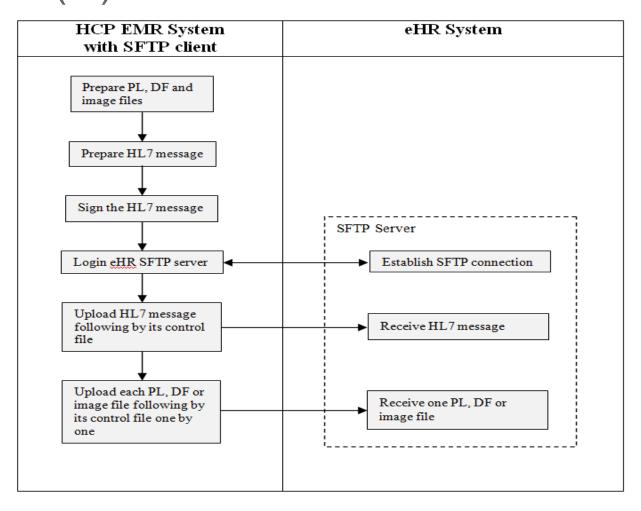
Technical Protocols Supported – SFTP (2)



- Obtain a digital certificate issued by recognised CA and have it registered into the eHR system
- Use the digital certificate to sign HL7 message in XML signature standard.
- Generate an RSA 2048-bits asymmetric key pairs and submit the public key to eHR for SFTP connection
- Prepare an SFTP client for connecting and uploading files to eHR SFTP server. Upload file one by one, following by an zero size control file to indicate completeness.

Technical Protocols Supported – SFTP (3)





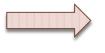
Data Upload













HCP File Upload





Verify digital signature









Inbox







User

Email Service





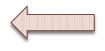


Validate HL7 Schema











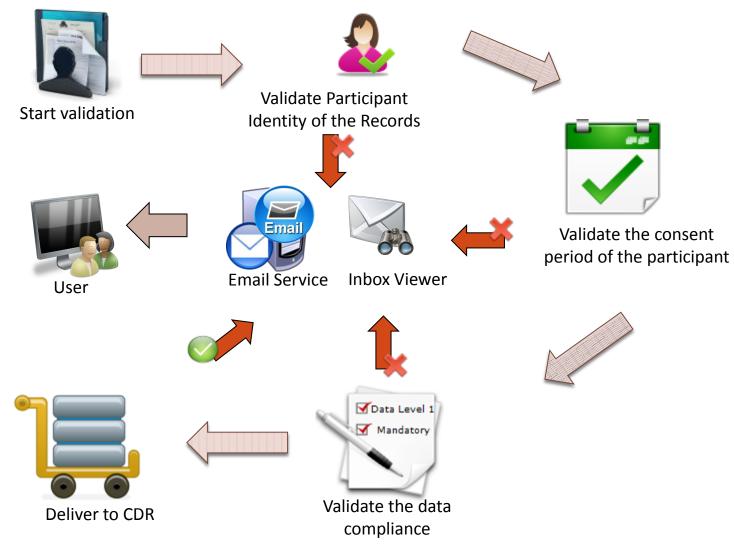
Loading Job

Compliance

File XML Threat & **Antivirus Scan**

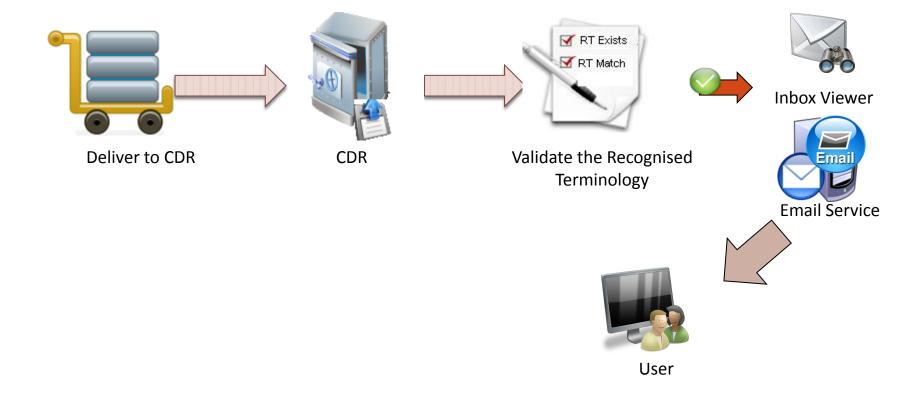
Loading Job





Data Compliance Check







Process Summary and Exception Report

- Process Summary will be sent to HCP after the data upload to eHR
- Exception report will be sent if there is any error, alert or follow-up action required



Notification Method



Process Summary & Exception Report



eHR Notification Service



Inbox Viewer

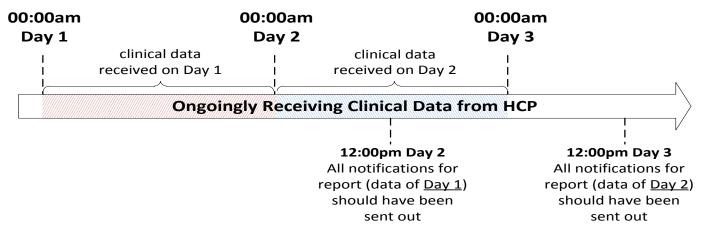


User



Notification Schedule

- Processing report notification email will be sent to HCP before 12:00pm on the following day for all submitted clinical data of the past day
- Notification email for all data submitted at or after 00:00:00am of Day 1 and before 00:00:00am of Day 2 will be sent out before 12:00pm of Day 2





Exception Handling

- HCP should review Process Summary Report and Exception Report
- Re-generate Data (from the exception batch to the latest batch)
- Message ID / File Generation Date should be updated. HCP requires to re-generate the corresponding identifiers:
 - ebXML Message ID
 - HL7 Message Control ID
 - File Generation Date



Question?

Application of HL7 Standards for eHR:

Implementation of Message Standard for eHR



Validation Platform Experience Sharing

Pascal TSE 8 November 2012



Agenda

- Background of Validation Platform (VP)
- Understanding technical requirement
- Data preparation and upload
- Issues encountered and workaround
- Image Sharing Project with Hospital Authority (HA)
- RIS /PACS integration
- Automated Dispensing Cabinet (ADC) Project

A Validation Platform For Electronic Health Record Data Standards Conformity

For the Hong Kong Community Wide eHealth Record Sharing: Paving the Road to the Future



Validation Platform

- A Validation Platform for eHR Standards Conformity
- Sponsored by Food and Health Bureau (FHB) and Office of the Government Chief Information Officer (OGCIO), this project will be implemented by eHealth Consortium Ltd (eHC)
- Purpose: Build a platform to test how electronic health information from various stakeholders could conform to the ultimate territory-wide standards and shared in the future sharing.



Project Schedule

- Project Kick off: May 2008
- Phase 1 Live Run: June 2009
 - Patient Identification
 - Case Summary
- Phase 2 Live Run: May 2010
 - Drugs
 - Allergies
 - Diagnosis



Project Findings

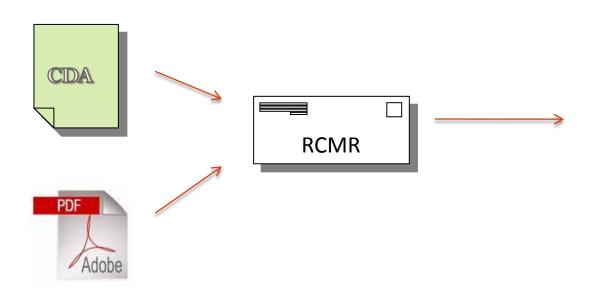
- More and more healthcare providers are interested to test their data conformity and interoperability
- There lacks industry standards for some ehealth record data fields, e.g. drugs
- The stakeholders appreciate the Project's briefing sessions on the eHealth Record Data Interoperability Guide published by Government
- The Project servers as a great opportunity for stakeholders to voice their opinions on eHR data sharing in the future eHR Platform



Understanding technical requirement



- HL7 CDA R2 to carry Clinical Structure Data
- PDF to represent the Original Image
- HL7V3 Messages (RCMR) to embed CDA and PDF in MIME attachment





```
<patientRole classCode="PAT">√
    <!--Patient / Person Internal ID assigned by Health care Provider; root code to be defined -->↓
    <id root="2.16.840.1.113883.3.2.8.6" extension="00123415451"/>

    <patient classCode="PSN">√
         <!--eHR Number: root code & ID format to be defined -->+
         <id root="2.16.840.1.113883.1.6.12.1" extension="000012341234123421"/>√
         <!--HKID; root code to be defined; existed only if eHR Number cannot be provided -->+
         <!-- id root="2.16.840.1.113883.3.186" extension="A1234563"/ -->→
          chame use="L">PATIENT YEUNG</name>
         <administrativeGenderCode code="M"/>₽
         <birthTime value="20090101000000"/>₽
     cproviderorganization>+/
         <id root="2.16.840.1.113883.3.186" extension="CMS"/>₽
         <name>Good Health</name>₽

<pre
</patientRole>↔
```

Embedding Patient Data



```
Text Report details√
            <component>√
                <section>+
                    <!-- Code should be same as document code -->+
                    <code code="34133-9" codeSystem="2.16.840.1.113883.6.1" displayName="Episode Summary"/>√
                    <title>Episode Summarv</title>₽
Note:⊬
BP 147/69, BW 60 Kg
G6PD deficiency and Thalamssemia trait, on HD from China (祈福醫院), 5 times per 2 weeks of dialysis, 3 hours each
due to palpitation, charged 500-6000, expressed financial difficulties, actually living in TKO PHE for few months,
UCH appt 24/4/2006, to advance appt +
Cr 705, alb 35, Hb 6, urine output 200 ml/day√
Plan of Management:√
<del>_____</del>4
To Nam Long Hospital for furhter Mx.
moritor his wcc and H'stix+
                   </text>⊬
                </section>
            </component>₽
        </structuredBody>+
    </component>₽
</ClinicalDocument>√
```

Patient Clinical Data



```
*********************
Message Body ...
*************
--≽<sub>-1</sub>
 <v3:controlActProcess classCode="CACT" moodCode="EVN">...
  <v3:subject typeCode="SUBJ">...
   <v3;clinicalDocument_classCode="DOCCLIN" mgodCode="EVN">...
    <v3:typeld root="2.16.840.1.113883.1.3" extension="POCD_HD000040" /> ...
    <v3;id root="2.16.840.1.113883.6.1" extension="12345678" />...
    <v3;code code="34133-9" codeSystem="2.16.840.1.113883.6.1" displayName="Problem Summary" />...
    <v3;title><mark>Problem Summary</mark></v3:title>...
    \leq!-- Embed the CDA and PDF in MIME package (eHR Data Interoperability Standards Section 6.6) \Rightarrow
    <v3;text mediaType="multipart/mixed">...
       MIME-Version: 1.0..
       Content-Type: multipart/mixed; boundary=00163630f5f354355b046be66f6d...
       --00163630f5f354355b046be66f6d...
       Content-Type: text/xml; charset=UTF-8; name="EHR_CDA_Dx_VP2_Level2_MDS_Sample.xml"...
       Content-Disposition: attachment; filename="EHR_CDA_Dx_VP2_Level2_MDS_Sample.xml"...
       Content-Transfer-Encoding: base64...
       X-Attachment-ld: f_fvqdehi70.
       PD94bWwqdmVyc2vbj0iMS4wliBlbmNvZGluZz0iVVRGLTqiPz4KPCEtLSBDREEqU2FtcGxllSZv
   ciBIS2VIUiBJbnRlcm9wZXJhYmIsaXR5IC0tPqoKPCEtLSBDb3B5cmInaHQ6IFRoZSBvd25lcnNo...
   aXAqb2YqdGhpcyBkb2N1bWVvdCBzaG91bGQqYmUqQ29vcmRpbmF0aW5n1Edyb3VwlG9ulGVlUiBJ...
   bmZvcm1hdGlvbiBTdGFuZGFyZHMqdW5kZXlqZUhSTENvbnRlbnQqYW5kTEluZm9ybWF0aW9ulFN0..
   YW5kYXJkcyBXb3JraW5nlEdyb3WwlGFuZCAgZUhSIFN0YW5kYXJkcyBvZmZpY2UulEFsbCBSaWdo..
   ىHMqUmVzZXJ2ZWQulC0tPqo8IS0tIERpc2NsYWftZXI6IFRoZSBJbmZvcm1hdGlvbiBwcm92aWRI.
   ZCBpblB8aGlzIGRvY3VtZW50lGlzIHVzZWQgZm9ylHJlZmVyZW5jZSBvbmx5LiBDb29vZGlu4/XRp.,
```

Report Image



Data preparation and upload

Choosing Patient Data For Upload



• De-identify patient demographic data for security purpose

– Example:

NAME:- CHAN TAI MAN

DOB:- 20 FEB 1983

ADDRESS:-

123 ST TERESA STREET..



Choosing Patient Data For Upload



- 1. Anonymous patient data only
- 2. Patient data with all types of clinical data, i.e. diagnosis, allergy, drug etc



Choosing Patient Data For Upload



- 3. Test to upload chinese characters e.g. in allergy, address etc
- 4. Test return error with different date type. e.g. for date fields, yyyy-mm-dd, dd-mm-yy etc



That's a fail, huh?



Smart Card Authentication

• The Smart Card will be locked after 3 incorrect PIN re-tries







Smart Card Authentication

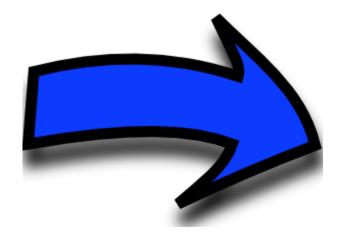
- Multiple open browser will cache the same incorrect login and password.
- Use only one browser to access the Validation Platform



Converting Patient Report

Medical reports has to be export in PDF format





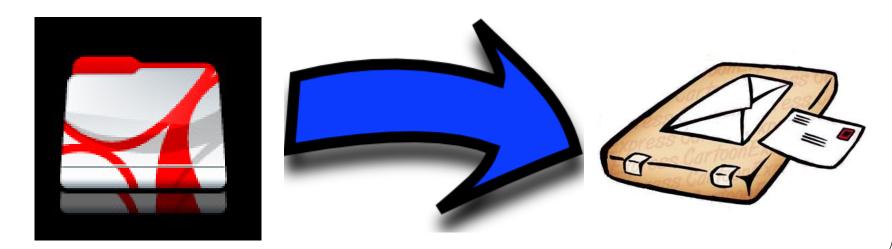




Converting Patient Report

Convert the PDF file to Base64 MIME format

 Embed the encoded data in the HL7 V3 message and upload to Validation Platform





Issues encountered and workaround



Uploading Data

- Testing sequence:
 - 1. Submit XML text online
 - Helps to confirm XML is valid
 - 2. Submit XML file online
 - Helps to confirm XML file can be generated successfully
 - 3. Upload batch file through SFTP
 - Helps to confirm no issues in volume upload





- Uploading with wrong file name
 - Refer to the UAT Briefing Notes for file naming convention
- Uploading the same file twice





UAT findings



- Missing data in mandatory fields, e.g. effective date in Allergy
 - Hint: check if this is due to missing data in systems where the data is extracted?
- Having English characters in date fields, e.g. 13-Sep-2010
 - Hint: Check if this is due to the format used in systems where the data is extracted?



Error message sample

Mandatory field report date is required



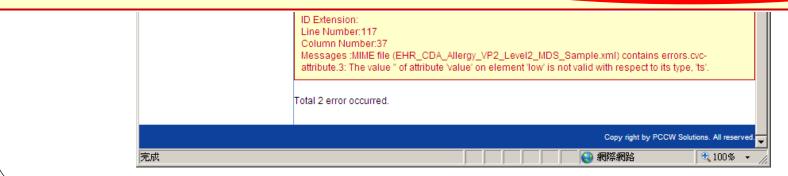
Content

ID Extension:

Line Number:117

Column Number:37

Messages :MIME file (EHR_CDA_Allergy_VP2_Level2_MDS_Sample.xml) contains errors.cvc-pattern-valid: Value " is not facet-valid with respect to pattern $[0-9]{1,8}[(0-9]{9,14}[0-9]{14,14}\.[0-9]+)([+\-][0-9]{1,4})$?' for type 'ts'.





Error message sample

Removing part of the MIME file



Schema
ID Extension:
Line Number:0
Column Number:0
Messages:Error of

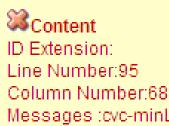
Messages: Error on line 1 of document: Content is not allowed in prolog. Nested exception: Content is not allowed in prolog.





Error message sample

Removing the organization



Messages :cvc-minLength-val (*) Value " with length = '0' is not facet-valid with respect to minLength '1' for type 'st'.



ID Extension:

Line Number:95

Column Number:68

Messages :cvc-attribute.3. The value " of attribute 'extension' op element 'v3:id' is not valid with respect to its type, 'st'.





HL7 Usage in STH

- Image Sharing with HA
- RIS / PACS integration
- Automated Dispensing Cabinet (ADC)



Image Sharing Project with Hospital Authority (HA)

Radiology Image Sharing

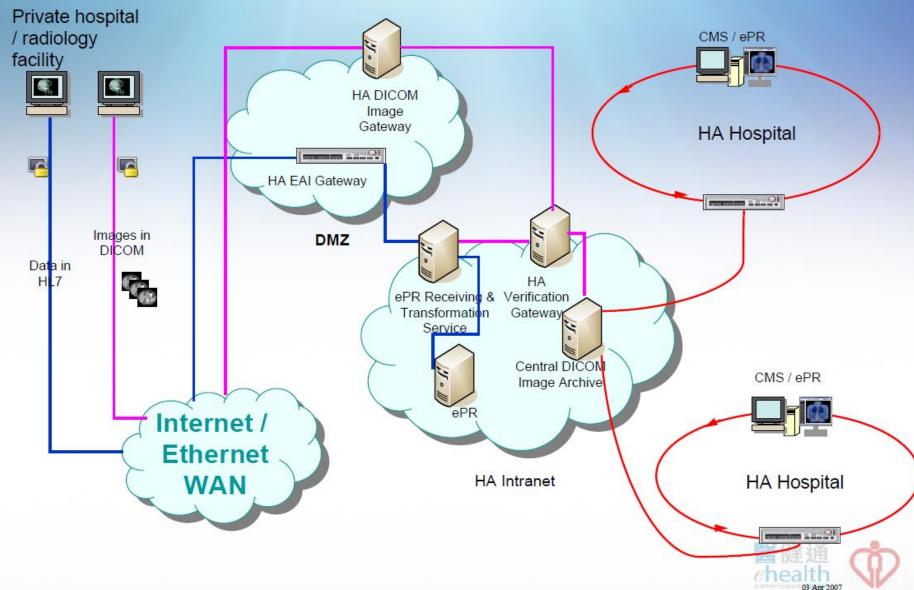




Image Sharing with HA

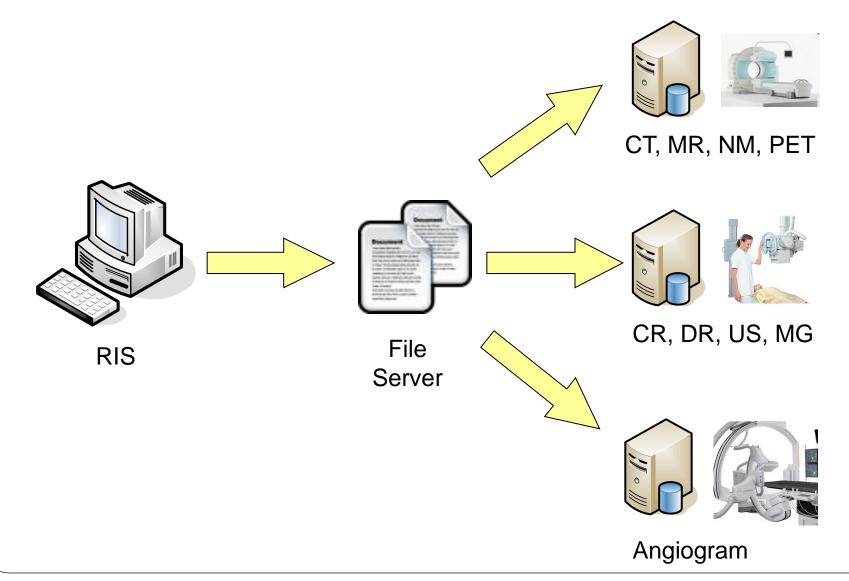
- Radiology report and DICOM images to HA
- HL7 message
 - Observation Result (ORU)
 - Version 2.5 XML
 - Radiology report in PDF format is encoded in Base64 format and encapsulated in an OBX segment



RIS / PACS integration



RIS / PACS Integration





RIS / PACS Integration

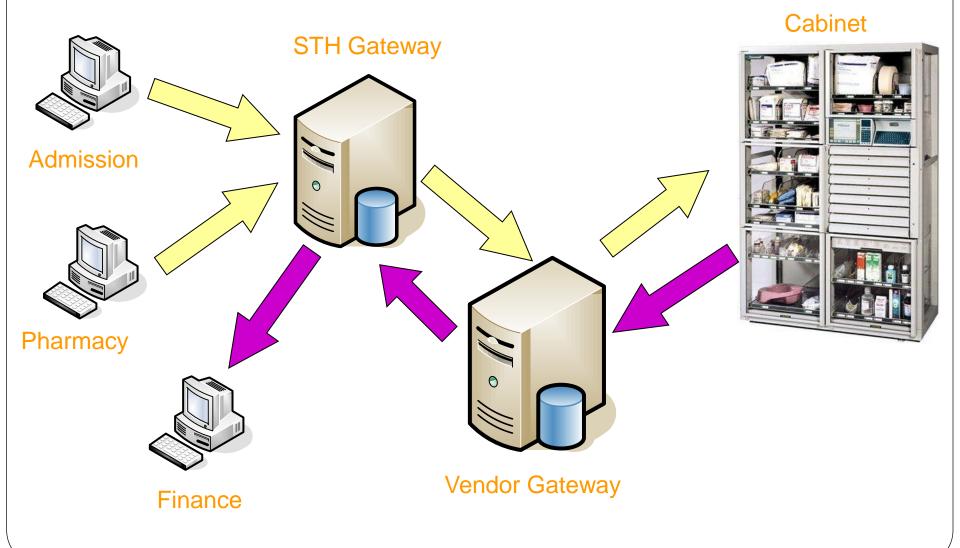
- Radiology exam order to PACS as modality worklist
- Centralised RIS integrated with different PACS
- HL7 message
 - Order Request (ORM)
 - Version 2.3.1



Automated Dispensing Cabinet (ADC) Project



Automated Dispensing Cabinet





Automated Dispensing Cabinet

- Satellite Pharmacy at point of care
- STH Gateway
 - Developed in-house
- HL7 message
 - Admission Discharge Transfer (ADT)
 - Medication Order (ORM)
 - Detailed Financial Transaction (DFT)
 - Request & Report (REQ)
 - Inventory Reorder (ORD)
 - Formulary Update (RXF)
 - Version 2.3.1



The End



Implementation Consideration

Application of HL7 Standards for eHR



Implementation Consideration

Data Readiness

Volume

Technical



Data Readiness Consideration

Involve business users ASAP

• What domain data can be contributed?

- Identify the compliance level
 - Adopt Recognised Terminologies
 - Any data patching / migration required?
- Can the EMR systems provided "transaction" information?





Volume Consideration

- How much of the daily transaction volume?
- How is frequency plan for data upload (daily / hourly / realtime)?
- What upload format will be used (Message / Bulk-load)?



Technical Consideration

- How to connect to eHR Sharing System (Mode A/B/C)?
- How to receive the PMI event?
 - Setup server to receive?
 - Poll the event notification service?
 - Manually open Inbox?



Question?

Application of HL7 Standards for eHR:

Implementation Consideration



THE END

THANK YOU!