Standards for eHR

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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
Organisation Structure for eHR Information Standards

Steering Committee on eHealth Record Sharing

WG-IA  |  WG-ERP  |  WG-LPS  |  Working Group on eHealth Record & Information Standards (eHR IS WG)

Technical Task Force

Co-ordinating Group on eHR Content & Information Standards

Domain Group on eHR Content & Information Standards

Note:
WG-LPS  Working Group on Legal, Privacy & Security Issues
WG-IA  Working Group on Institutional Arrangement
WG-ERP  Working Group on eHealth Record Partnership

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## Guiding Principles of eHR Development

<table>
<thead>
<tr>
<th>Guiding Principle</th>
<th>eHR Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government-led model for development</td>
<td>Set up dedicated eHR office to co-ordinate development, leveraging HA’s expertise and experience</td>
</tr>
<tr>
<td>Compelling but not compulsory record sharing</td>
<td>Voluntary participation by both providers and patients, promoting and incentivising eHR sharing</td>
</tr>
<tr>
<td>Data privacy and security of paramount importance</td>
<td>Develop legal framework and incorporate eHR privacy and security throughout development</td>
</tr>
<tr>
<td>Open technical standards for private participation</td>
<td>Engage private healthcare and IT sectors in development of eHR standards and solutions</td>
</tr>
<tr>
<td>Building block approach</td>
<td>Develop individual eHR components through pilots and partnerships with private sector</td>
</tr>
</tbody>
</table>
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

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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
Aims

- 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

Major key identifiers

Demographics

Contact

Communication Means

Substitute Decision Maker

Contact Person

eHR Participant Master Index (PMI)
# eHR Major Key Identifiers

<table>
<thead>
<tr>
<th>HKIC holder</th>
<th>Non-HKIC holder</th>
</tr>
</thead>
<tbody>
<tr>
<td>HKIC number</td>
<td>Yes</td>
</tr>
<tr>
<td>Document type</td>
<td>Yes</td>
</tr>
<tr>
<td>Document number</td>
<td>Yes</td>
</tr>
<tr>
<td>Name</td>
<td>Yes</td>
</tr>
<tr>
<td>Sex</td>
<td>Yes</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Exact match for major keys + eHR Number for:
- Uploading clinical data to eHR
- Accessing eHR
### Matching eHR PMI – Impact to HCP PMI

<table>
<thead>
<tr>
<th>HKID Number</th>
<th>HCP system</th>
<th>Patient registration at HCP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Able to differentiate HKID from the other number</td>
<td>• Enter the eHR participant’s HKID number according to HKID card</td>
</tr>
<tr>
<td></td>
<td>• Validation rules on HKID number</td>
<td>• Include check digit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Exclude ( )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify the HKID number on various types of identity / travel documents issued by the HKSAR ImmD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document Type</th>
<th>HCP system</th>
<th>Patient registration at HCP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Reference to eHR PMI code table on Document Type</td>
<td>• For patients who do present other types of identity document apart from HKID card</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Document Number</th>
<th>HCP system</th>
<th>Patient registration at HCP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Check field length as defined in the eHR PMI dataset</td>
<td></td>
</tr>
</tbody>
</table>
## Matching eHR PMI – Impact to HCP PMI

<table>
<thead>
<tr>
<th></th>
<th>HCP system</th>
<th>Patient registration at HCP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>• 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</td>
<td>• Enter the eHR participant’s name according to eHR participant’s identity document in the ‘name’ field</td>
</tr>
<tr>
<td><strong>Baby’s Name</strong></td>
<td></td>
<td>• Special eHR format for entering baby’s name before issuance of birth certificate</td>
</tr>
</tbody>
</table>
## Matching eHR PMI – Impact to HCP PMI

<table>
<thead>
<tr>
<th></th>
<th>HCP system</th>
<th>Patient registration at HCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>• Watch out for the sex table as defined in the eHR Content</td>
<td>• Enter the eHR participant’s sex according to eHR participant’s identity document in the ‘name’ field</td>
</tr>
<tr>
<td>Date of Birth</td>
<td></td>
<td>• Enter the eHR participant’s date of birth according to eHR participant’s identity document in the ‘date of birth’ field</td>
</tr>
</tbody>
</table>
Enrolment of newborn participants
Handling – interim eHR record creation VS record completion

Interim eHR Record Creation

<table>
<thead>
<tr>
<th>eHR PMI identifiers</th>
<th>Newborn w/o HK Birth Cert</th>
<th>eHR PMI record (interim eHR record creation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHR No.</td>
<td>---</td>
<td>System-generated eHR no.</td>
</tr>
<tr>
<td>HKID number</td>
<td>---</td>
<td>= eHR No.</td>
</tr>
<tr>
<td>Name</td>
<td>B/O mother’s name</td>
<td>B/O mother’s name</td>
</tr>
<tr>
<td>Sex</td>
<td>Sex</td>
<td>Sex</td>
</tr>
<tr>
<td>DOB</td>
<td>DOB</td>
<td>DOB</td>
</tr>
<tr>
<td>Document Type</td>
<td>Immunisation Record Card (DH6)</td>
<td>Immunisation Record Card (DH6)</td>
</tr>
</tbody>
</table>
| 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

<table>
<thead>
<tr>
<th>eHR PMI identifiers</th>
<th>eHR PMI record (interim PMI record creation)</th>
<th>eHR PMI record (record completion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHR No.</td>
<td>System-generated eHR no.</td>
<td>System-generated eHR no.</td>
</tr>
<tr>
<td>HKID number</td>
<td>= eHR No.</td>
<td>HK Birth Cert number</td>
</tr>
<tr>
<td>Name</td>
<td>B/O mother’s name</td>
<td>Baby’s name</td>
</tr>
<tr>
<td>Sex</td>
<td>Sex</td>
<td>Sex</td>
</tr>
<tr>
<td>DOB</td>
<td>DOB</td>
<td>DOB</td>
</tr>
<tr>
<td>Document Type</td>
<td>Immunisation Record Card (DH6)</td>
<td>HK Birth Cert</td>
</tr>
</tbody>
</table>
| Document Number     | • Birth Hospital + newborn’s birth episode number  
                      • Birth Hospital + newborn’s unique identifier | ---                               |

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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

Problem: diab. mellitus

1. Automated paper
2. Diagnosis
   - DM
3. Fully Interoperable eHR

HKCTT (Diagnosis)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3983</td>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>3985</td>
<td>Type II Diabetes Mellitus</td>
</tr>
<tr>
<td>3987</td>
<td>Type I Diabetes Mellitus</td>
</tr>
</tbody>
</table>

Introduction of Message Standard for eHR, Part I
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<table>
<thead>
<tr>
<th>eHR Section</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>eHR Participant</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Encounter</td>
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</tr>
<tr>
<td>Referral</td>
<td></td>
<td></td>
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<tr>
<td><strong>Clinical note / summary</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adverse reaction / allergy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clinical alert</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Problem</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedure</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Birth record</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment / physical exam</td>
<td></td>
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<tr>
<td>Social history</td>
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<tr>
<td>Past medical history</td>
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<tr>
<td>Family history</td>
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<td></td>
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<tr>
<td>Drug – prescription record</td>
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<tr>
<td>Drug – dispensary record</td>
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<tr>
<td>Immunization</td>
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<tr>
<td>Clinical request</td>
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<tr>
<td>Diagnostic test result – Laboratory</td>
<td></td>
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<tr>
<td>Diagnostic test result – Radiology</td>
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<tr>
<td>Diagnostic test result – Other investigation</td>
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<tr>
<td>Care &amp; treatment plan</td>
<td></td>
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</tr>
</tbody>
</table>

**Key:**
- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Phase 5
eHR Phase 1

Based on PPI-ePR
<table>
<thead>
<tr>
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<th>Level 3</th>
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<tr>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Problem</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedure</td>
<td></td>
<td></td>
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<tr>
<td>Birth record</td>
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<td></td>
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<tr>
<td>Assessment / physical exam</td>
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<td></td>
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<tr>
<td>Social history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past medical history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug – prescription record</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug – dispensary record</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical request</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic test result – Laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic test result – Radiology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic test result – Other investigation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care &amp; treatment plan</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Workflow to Prepare Domain Dataset

1. Study and refer: references, local & international standards
2. Develop initial set of eHR content, code sets (tables), interoperability standards
3. Gap analysis: HA-ePR, eHR on-ramp, eHR adaptation, proposed eHR viewer
4. Seek consultation from Domain Groups, Expert advice group
5. 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)

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eHR Content: 21 Domains

1. eHR Participant
2. Encounter
3. Referral
4. Clinical note / summary
5. 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)
Immunisation Dataset
Legend

1. Mandatory for all Levels
2. Mandatory for Level 1
3. Mandatory for Level 2
4. Mandatory for Level 3
5. Conditional mandatory
6. Repeated data
7. Encrypted eHR storage
8. Code table
9. Recognised terminology
## Data Schema

<table>
<thead>
<tr>
<th>Entity Name</th>
<th>Entity ID</th>
<th>Definition</th>
<th>Data Type (code)</th>
<th>Data Type Description</th>
<th>Validation Rule</th>
<th>Repeated Data</th>
<th>Code Table</th>
<th>Remark</th>
<th>Data Requirement (Certified Level 1)</th>
<th>Data Requirement (Certified Level 2)</th>
<th>Data Requirement (Certified Level 3)</th>
<th>Data Requirement (Certified Level 4)</th>
<th>Example (Certified Level 1)</th>
<th>Example (Certified Level 2)</th>
<th>Example (Certified Level 3)</th>
<th>Example (Certified Level 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration number</td>
<td>1001002</td>
<td>A unique identifier for each vaccine administration record, defined by HL7.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Vaccine identifier</td>
<td>1001003</td>
<td>A unique identifier for each vaccine identifier, defined by HL7.</td>
<td>ST</td>
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</tr>
<tr>
<td>Vaccine identifier</td>
<td>1001004</td>
<td>A unique identifier for each vaccine, defined by HL7.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
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<td></td>
</tr>
<tr>
<td>Vaccine identifier</td>
<td>1001005</td>
<td>A unique identifier for each vaccine given to the vaccine recipient, defined by HL7.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaccine Administration date</td>
<td>1001006</td>
<td>The date on which the vaccine was given to the vaccine recipient.</td>
<td>DT</td>
<td>Date</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Vaccine date</td>
<td>1001007</td>
<td>The date on which the vaccine was given to the vaccine recipient.</td>
<td>DT</td>
<td>Date</td>
<td></td>
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</tr>
<tr>
<td>Route of administration code</td>
<td>1001008</td>
<td>The route of administration code is given.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
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<tr>
<td>Administration route</td>
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<td>The route of administration code is given.</td>
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<td>String</td>
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</tr>
<tr>
<td>Administered by</td>
<td>1001010</td>
<td>The name of the person who administers the vaccine.</td>
<td>ST</td>
<td>String</td>
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</tr>
<tr>
<td>Provider</td>
<td>1001011</td>
<td>The name of the healthcare provider who performs the vaccine.</td>
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<td>String</td>
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</tr>
<tr>
<td>Vaccine provider</td>
<td>1001012</td>
<td>The name of the healthcare provider who performs the vaccine.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaccine Administration site</td>
<td>1001013</td>
<td>The site on which the vaccine was administered.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration site</td>
<td>1001014</td>
<td>The site on which the vaccine was administered.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection site</td>
<td>1001015</td>
<td>The site on which the vaccine was administered.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection site</td>
<td>1001016</td>
<td>The site on which the vaccine was administered.</td>
<td>ST</td>
<td>String</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time stamp</td>
<td>1001017</td>
<td>The time stamp of the vaccine administration record in text format.</td>
<td>DT</td>
<td>Date Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Communication record report</td>
<td>1001018</td>
<td>The date stamp of the vaccine communication record in text format.</td>
<td>DT</td>
<td>Date Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication record report</td>
<td>1001019</td>
<td>The date stamp of the vaccine communication record in text format.</td>
<td>DT</td>
<td>Date Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Communication record report</td>
<td>1001020</td>
<td>The date stamp of the vaccine communication record in text format.</td>
<td>DT</td>
<td>Date Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication record report</td>
<td>1001021</td>
<td>The date stamp of the vaccine communication record in text format.</td>
<td>DT</td>
<td>Date Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
**Data Schema**

<table>
<thead>
<tr>
<th>Entity Name</th>
<th>Entity ID</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of birth</td>
<td>ST String</td>
<td>Vaccination date for each vaccine administration record defined by HL7 standard.</td>
</tr>
<tr>
<td>Report title</td>
<td>CT Coded Element</td>
<td>Vaccine recognition by individual healthcare providers who give the vaccine to the person.</td>
</tr>
</tbody>
</table>

**Entity ID**
- Unique identifier for each Entity
- Issued by eHRISO

**Definition**
- Definition of the entity
### Data Schema

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>Coded element</td>
<td>Coding systems/tables specified by eHR project</td>
</tr>
<tr>
<td>ED</td>
<td>Encapsulated data</td>
<td>Encapsulated data, e.g. PDF document</td>
</tr>
<tr>
<td>ST</td>
<td>String data</td>
<td>Text data upto 1,000 characters</td>
</tr>
<tr>
<td>TS</td>
<td>Time stamp</td>
<td>Date and time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permits varying degrees of granularity from days, hours, to decimal seconds</td>
</tr>
<tr>
<td>TX</td>
<td>Text</td>
<td>Text data upto 65536 characters, for display purpose</td>
</tr>
</tbody>
</table>

### Repeated Data

Whether multiple entry for same entity is allowed

<table>
<thead>
<tr>
<th>Section</th>
<th>Entity</th>
<th>Repeated data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>Date of birth</td>
<td>N</td>
</tr>
<tr>
<td>Prescription Record</td>
<td>Prescribed drug</td>
<td>Y</td>
</tr>
</tbody>
</table>
Validation Rules

For data quality, e.g.

- **Section**: Birth Record
- **Entity**: [Apgar Score ]
- **Validation**: value is 0 to 10

Code Table

- Name of the code table from which the data value for a particular entity is referenced to
- In Codex – around 80 tables

<table>
<thead>
<tr>
<th>Section</th>
<th>Entity</th>
<th>Code Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>Sex</td>
<td>Sex</td>
</tr>
<tr>
<td>Encounter</td>
<td>Specialty</td>
<td>Specialty</td>
</tr>
</tbody>
</table>
### Laboratory Category Table

<table>
<thead>
<tr>
<th>TermID</th>
<th>eHR Value</th>
<th>eHR Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM</td>
<td></td>
<td>Chemical Pathology Laboratory</td>
</tr>
<tr>
<td>HAEM</td>
<td></td>
<td>Haematology Laboratory</td>
</tr>
<tr>
<td>IMMUN</td>
<td></td>
<td>Immunology Laboratory</td>
</tr>
<tr>
<td>MICRO</td>
<td></td>
<td>Microbiology Laboratory</td>
</tr>
<tr>
<td>VIRO</td>
<td></td>
<td>Virology Laboratory</td>
</tr>
<tr>
<td>PATH</td>
<td></td>
<td>Anatomical Pathology Laboratory</td>
</tr>
<tr>
<td>TRL</td>
<td></td>
<td>Toxicology Reference Laboratory</td>
</tr>
<tr>
<td>BLDBK</td>
<td></td>
<td>Blood Bank</td>
</tr>
<tr>
<td>T&amp;I</td>
<td></td>
<td>Transplantation &amp; Immunogenetic Laboratory</td>
</tr>
<tr>
<td>MOLPATH</td>
<td></td>
<td>Molecular Pathology Laboratory</td>
</tr>
<tr>
<td>LAB</td>
<td></td>
<td>Clinical Laboratory</td>
</tr>
</tbody>
</table>

### Code Tables

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Certified Level</th>
<th>Laboratory Category Code</th>
<th>Laboratory Category Description</th>
<th>Laboratory Category Local Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Level 2</td>
<td>---</td>
<td>---</td>
<td>Chem</td>
</tr>
<tr>
<td>B</td>
<td>Level 3</td>
<td>Chem</td>
<td>Chemical Pathology Laboratory</td>
<td>ChemPath</td>
</tr>
<tr>
<td>C</td>
<td>Level 3</td>
<td>HAEM</td>
<td>Haematology Laboratory</td>
<td>Haematology Laboratory</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Example</th>
<th>Diagnosis Local Code</th>
<th>Diagnosis Local Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>----</td>
<td>Haemorrhoid</td>
</tr>
<tr>
<td>2</td>
<td>HM</td>
<td>Hemorrhoid</td>
</tr>
<tr>
<td>3</td>
<td>123</td>
<td>Piles</td>
</tr>
</tbody>
</table>

- **optional**
- **mandatory**
### Set of 5 Diagnosis – Level 3 Compliance

<table>
<thead>
<tr>
<th>Example</th>
<th>Rcg T Name</th>
<th>Rcg T ID</th>
<th>Rcg T Des</th>
<th>Local Code</th>
<th>Local Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SNOMED CT</td>
<td>233604007</td>
<td>Pneumonia</td>
<td>----</td>
<td>Pneumonia</td>
</tr>
<tr>
<td>2</td>
<td>ICD 10</td>
<td>J18.9</td>
<td>Pneumonia</td>
<td>PN</td>
<td>Pneumonia</td>
</tr>
<tr>
<td>3</td>
<td>HKCTT</td>
<td>8471</td>
<td>Pneumonia</td>
<td>123</td>
<td>Chest infection</td>
</tr>
<tr>
<td>4</td>
<td>HKCTT</td>
<td>8471</td>
<td>Pneumonia</td>
<td>---</td>
<td>Pneumonia</td>
</tr>
</tbody>
</table>
### Data to eHR

**Declared Standard Level**

<table>
<thead>
<tr>
<th>Unstructured data</th>
<th>Local structured data</th>
<th>Recognised structured data</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDF, Free Text</td>
<td>Local Code</td>
<td>Types</td>
</tr>
<tr>
<td></td>
<td>Local Description</td>
<td>Recognised Terminology Name</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recognised Description</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Declared Level</th>
<th>Unstructured data</th>
<th>Local structured data</th>
<th>Recognised structured data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mandatory</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Optional</td>
<td>Optional, Mandatory</td>
<td>Recognised Terminology Name, Mandatory</td>
</tr>
<tr>
<td>3</td>
<td>Optional</td>
<td>Optional, Mandatory</td>
<td>Recognised Code Tables, Mandatory</td>
</tr>
</tbody>
</table>

**For displaying data in eHR viewer**
- If data is required, local description must be sent to eHR, but local code is optional.

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

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<table>
<thead>
<tr>
<th>RT Name</th>
<th>Diagnosis</th>
<th>Procedure</th>
<th>Drug</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>HKCTT</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SNOMED CT</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>ICD10</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICPC2</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOINC</td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>CPP</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>
### Data Schema

#### Data Requirement

Whether data is required for the certified level as indicated by the healthcare provider

- **M** – mandatory
- **O** – optional
- **NA** – not applicable

<table>
<thead>
<tr>
<th>Section</th>
<th>Entity Name</th>
<th>Certified Level</th>
<th>Data Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>Sex</td>
<td>3</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Birth Record</td>
<td>Apgar Score</td>
<td>2</td>
<td>Optional</td>
</tr>
<tr>
<td>Immunisation Record</td>
<td>Vaccine Name</td>
<td>1</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
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 IT WITH 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

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 – 9:30 am</td>
<td>Registration</td>
<td></td>
</tr>
<tr>
<td>9:30 – 9:45 am</td>
<td>Introduction to HL7 HK &amp; eHR</td>
<td>Dr C P Wong</td>
</tr>
<tr>
<td>9:45 – 11:00 am</td>
<td>Introduction to eHR Standards</td>
<td>Vicky Fung</td>
</tr>
<tr>
<td>11:00 – 11:15 am</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:15 – 12:30 pm</td>
<td>Introduction of Message Standard for eHR, part I</td>
<td>Michael Cheung</td>
</tr>
<tr>
<td>12:30 – 1:45 pm</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>1:45 – 2:30 pm</td>
<td>Introduction of Message Standard for eHR, part II</td>
<td>Michael Cheung</td>
</tr>
<tr>
<td>2:30 – 3:30 pm</td>
<td>Implementation of Message Standard for eHR</td>
<td>Michael Cheung</td>
</tr>
<tr>
<td>3:30 – 3:45 pm</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:45 – 4:30 pm</td>
<td>Experience with Validation Platform</td>
<td>Pascal Tse</td>
</tr>
<tr>
<td>4:30 – 5:00 pm</td>
<td>Implementation Consideration</td>
<td>Michael Cheung</td>
</tr>
<tr>
<td>5:00 – 5:30 pm</td>
<td>Q &amp; A</td>
<td></td>
</tr>
</tbody>
</table>

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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 HL7 V2.5 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 – HL7 V2 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

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

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Update Participant Death Data

- DR System
  - Send death information to eHR (Refer to ST1)

- eHR System
  - Update the Participant Registry
  - Broadcast notification of event ‘ADT^A08’ to related HCP

- HCP Local EMR System
  - Get detailed HL7 message from eHR via predefined communication protocol
  - Mark the eHR Participant’s death status
## Update Participant Death Data - Message Structure

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

- Enrol as eHR Participant (Refer to ST2); Or Rejoin eHR after Withdraw (Refer to ST3)
- Generate eHR Number
- Update the Participant Registry
- Broadcast notification of event 'ADT^A28' to related HCP
- Get detailed HL7 message from eHR via predefined communication protocol
- Match participant with local data
- Store eHR Number
- Upload participant clinical data to eHR
Enroll/Rejoin to eHR - Message Structure

<table>
<thead>
<tr>
<th>eHR Segment</th>
<th>ADT^A28</th>
<th>ADT Message</th>
<th>Chapter in HL7 Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>MSH</td>
<td>Message Header</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>[ { SFT } ]</td>
<td>Software Segment</td>
<td>2</td>
</tr>
<tr>
<td>✓</td>
<td>EVN</td>
<td>Event Type</td>
<td>3</td>
</tr>
<tr>
<td>✓</td>
<td>PID</td>
<td>Patient Identification</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>[ PD1 ]</td>
<td>Additional Demographics</td>
<td>3</td>
</tr>
<tr>
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<tr>
<td>✓</td>
<td>PV1</td>
<td>Patient Visit</td>
<td>3</td>
</tr>
</tbody>
</table>
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

- Give Consent-to-Provider to HCP (Refer to ST4)
- Update the Participant Registry
- Broadcast notification of event ‘ADT^A28’ to related HCP
- Get detailed HL7 message from eHR via predefined communication protocol
- Match participant with local data
- Store eHR Number
- Upload participant clinical data to eHR

HCP Local EMR System
## Consent to Provider - Message Structure

<table>
<thead>
<tr>
<th>Required</th>
<th>eHR Segment</th>
<th>ADT^A28</th>
<th>ADT Message</th>
<th>Chapter in HL7 Specification</th>
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<tbody>
<tr>
<td>✓</td>
<td>MSH</td>
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<tr>
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<td>[ { SFT } ]</td>
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<tr>
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<td>Role</td>
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<tr>
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<td>[{ NK1 }]</td>
<td>Next of Kin</td>
<td>3</td>
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</tr>
<tr>
<td>✓</td>
<td>PV1</td>
<td>Patient Visit</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
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 registry
- Broadcast notification of ADT^A29 message to HA and DH

**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

Notification of ADT^A29
## Withdraw from eHR - Message Structure

<table>
<thead>
<tr>
<th>eHR Segment</th>
<th>ADT^A29</th>
<th>ADT Message</th>
<th>Chapter in HL7 Specification</th>
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</thead>
<tbody>
<tr>
<td>✓</td>
<td>MSH</td>
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</tr>
<tr>
<td></td>
<td>[ { SFT } ]</td>
<td>Software Segment</td>
<td>2</td>
</tr>
<tr>
<td>✓</td>
<td>EVN</td>
<td>Event Type</td>
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<tr>
<td>✓</td>
<td>PID</td>
<td>Patient Identification</td>
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<tr>
<td></td>
<td>[ PD1 ]</td>
<td>Additional Demographics</td>
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<td>[ { ROL } ]</td>
<td>Role</td>
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</tr>
<tr>
<td></td>
<td>[ { NK1 } ]</td>
<td>Next of Kin</td>
<td>3</td>
</tr>
<tr>
<td>✓</td>
<td>PV1</td>
<td>Patient Visit</td>
<td>3</td>
</tr>
</tbody>
</table>
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
- 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

<table>
<thead>
<tr>
<th>Required</th>
<th>eHR Segment</th>
<th>ADT^A29</th>
<th>ADT Message</th>
<th>Chapter in HL7 Specification</th>
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<tr>
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<td>Event Type</td>
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</tr>
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<td>Patient Identification</td>
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<td>Patient Visit</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
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
Update Participant Identifier

**eHR Participant**
- Change eHR PMI Data – Major Keys (Refer to ST7)

**eHR System**
1. Update the Participant Registry
2. Broadcast notification of event ‘ADT^A47’ to related HCP

**HCP Local EMR System**
1. Get detailed HL7 message from eHR via predefined communication protocol
2. Flag the HCP PMI for change of the eHR Participant’s major keys
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 PMI
Update Participant Identifier

- Change eHR PMI Data – Major Keys (Refer to ST7)
- Update the Participant Registry
- Broadcast notification of event ‘ADT^A47’ to related HCP
- Get detailed HL7 message from eHR via predefined communication protocol
- Flag the HCP PMI for change of the eHR Participant’s major keys
- 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 PMI
## Update Participant Identifier
- Message Structure

<table>
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</tbody>
</table>

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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

<table>
<thead>
<tr>
<th>Action</th>
<th>Scenario</th>
<th>HL7 Event Code</th>
<th>Message Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update Participant Death Data</td>
<td>Mark Decease / Death Data of eHR Participant from HCP (SF1)</td>
<td>ADT^A08</td>
<td>ADT_A01</td>
</tr>
<tr>
<td></td>
<td>Cancel Decease / Death Data of eHR Participant from HCP (SF2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Move Participant Episode</td>
<td>Manage eHR Data – Move Participant’s Episode (SF3)</td>
<td>ADT^A45</td>
<td>ADT_A45</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Required</th>
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<th>ADT^A08</th>
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<tr>
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<tr>
<td>✓</td>
<td>PV1</td>
<td>Patient Visit</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Required</th>
<th>eHR Segment</th>
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<td>✓</td>
<td>PVI</td>
<td>Patient Visit</td>
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</table>
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

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Message Components

HL7 Message (ORU^R01)

CDA
Clinical Record

Image of Original Copy (PDF)
Message Structure Overview

HL7 ORU Message
- MSH - Message Header
- OBR - Observation Request
  - OBX - Observation/Result
    - OBX.2 - Value Type
    - OBX.3 - Observation Identifier
    - OBX.4 - Observation Sub-Id
    - OBX.5 - Observation Value
      - ED.2 - Type of Data
      - ED.4 - Encoding
      - ED.5 - Data
        - MIME
          - CDA of Clinical Record
    - OBX.11 - Observation Result Status
CDA Structure Overview

CDA

CDA General Information

component\nonXMLBody\clinicalDoc

Clinical Information

- Participant Identity Information
- Healthcare Provider Information
- Clinical Data

CDA Header Section

CDA Body Section
<?xml version="1.0" encoding="UTF-8"?>

    <!--
    *************************************
    CDA General Information
    *************************************
    -->
    <typeId root="2.16.840.1.113883.1.3" extension="POCD_HD000040"/>
    <id/>
    <code code="IMMU"/>
    <title>Immunisation</title>
    ...
    ...

Copyright 2012 HL7 Hong Kong Ltd. All Rights Reserved.
<component>
  <nonXMLBody>
    <clinicalDoc>
      <participant>
        <ehr_no>201000000001</ehr_no>
        <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</birth_date>
      </participant>
    </clinicalDoc>
    <detail>
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    </detail>
  </nonXMLBody>
</component>
<vaccine_adm>
  <record_key>RECKEY0001</record_key>
  <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>
</vaccine_adm>
<?xml version="1.0" encoding="utf-8"?>
<ORU_R01 xmlns="urn:hl7-org:v2xml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:hl7-org:v2xml ORU_R01.xsd">
  
  <MSH>
    ...
  </MSH>

  <ORU_R01.PATIENT_RESULT>
    <ORU_R01.ORDER_OBSERVATION>
      <OBR>
        <OBR.4>
          <CE.1>IMMU</CE.1>
        </OBR.4>
      </OBR>
    </ORU_R01.ORDER_OBSERVATION>
    <ORU_R01.OBSERVATION>
      <OBX>
        <OBX.2>ED</OBX.2>
        <OBX.3>
          <CE.1>IMMU</CE.1>
        </OBX.3>
      </OBX>
    </ORU_R01.OBSERVATION>
  </ORU_R01.PATIENT_RESULT>
</ORU_R01>
Message Sample - IMMU (2)

<OBX.4>NBL</OBX.4>
<OBX.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

PD94bWwgdmVyc2lvbj0iMS4wIiBlbmNvZGluZz0iVVRGLTgiPz4NCjwhLS0gQ0RBIFNhbXBsZSBmb3IgSEtlSFIgSW50ZXJvcGVyYWN0dXJlIHRvIHN0cmluZw==

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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

JVBERi0xLjUNCiW1tbWlDQoxIDAgb2JqDQo8PC9UeXBlL0NhdGFsb2cvUGFnZXMiAwIFIV
TGFuZyh6aC1UVykglL1N0cnVjdFRyZWVSB290IDM2OSAwIFlTWFya0luZm88PC9NYXJrZWQg
dHJ1ZT4+Pj4NCmVuZG9iag0KMiAwIG9iag0KPDwvVHlwZS9QYWdlcy9Db3VudCA0L0tpZHNg
IDMgMCBSIDEzMSAwIFIgMjQwIDAguAzNjAgMCBSXSA+Pg0KZWh5kb2JqDQozIDAgb2JqDQo8
PC9UeXB1L1BhZ2UvUGFyZW50IDIgMCBSL1Jlc291cmNlc3w8L1hPympY3Q8PC9JbWFnZTUg
...

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CDA + PDF Embed in HL7 message

Encoding (by MIME)

HL7 Message (ORU)

Embed

Send
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

File Types
- Participant Identifier List (PL)
- Data File List (DL)

HL7 Message ORU^R01
- MSH
- OBR
- OBX
- OBX.5

File names of PL and DL will be attached in OBX.5
# Bulk-Load Sample

- Participant List (PL)

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender</th>
<th>Birthdate</th>
<th>Time</th>
<th>Social Security Number</th>
<th>First Name</th>
<th>Last Name</th>
<th>Other Identifiers</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1234563</td>
<td>M</td>
<td>2009-01-1</td>
<td>00:00:00.000</td>
<td></td>
<td>MAN</td>
<td>CHAN, TAI MAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>201000000001</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>F</td>
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<td>00:00:00.000</td>
<td></td>
<td></td>
<td>HO</td>
<td>LEE, HO</td>
<td></td>
</tr>
</tbody>
</table>

EOF.2.8088450656.CORP.IMMU.PL.1.20110702084530

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## Bulk-Load Sample
- Data File (DF)

<table>
<thead>
<tr>
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<th>RECKEY</th>
<th>Date/Time</th>
<th>Type</th>
<th>Date/Time</th>
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<th>Status</th>
<th>Date/Time</th>
<th>Category</th>
<th>Status</th>
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<td>201000000002</td>
<td>RECKEY0002</td>
<td>2011-07-01 09:00:00.000</td>
<td>I</td>
<td>2011-07-01 09:00:00.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hepatitis</td>
<td></td>
</tr>
</tbody>
</table>

EOF.2.8088450656.CORP.IMMU.DF.1.20110702084530
Bulk-Load Sample
- Message (2)

```xml
<OBX.5>
  <RP.1>
    8088450656.CORP.IMMU.DF.1.20110702084530:2a2a2eefa21bea02aed0449f9f7a5c
    ...
  </RP.1>
</OBX.5>

<OBX.5>
  <RP.1>
    8088450656.CORP.IMMU.PWH019999.123.pdf.201000000001.20110702084530:9d810
    ...
  </RP.1>
</OBX.5>

<OBX.11>F</OBX.11>
</OBX>
```
Non-reputation

- Signed the message by Provider e-Cert using XML Signature
## Overview – eHR Sharable Dataset

<table>
<thead>
<tr>
<th>Phase 1 Sharable Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse Drug Reaction (ADR)</td>
</tr>
<tr>
<td>Allergy (ALLE)</td>
</tr>
<tr>
<td>Birth Record (BIRTH)</td>
</tr>
<tr>
<td>Clinical Note / Summary (NOTE)</td>
</tr>
<tr>
<td>Dispensing Record (DISP)</td>
</tr>
<tr>
<td>Immunisation (IMMU)</td>
</tr>
<tr>
<td>eHR Participant (PMI) *</td>
</tr>
<tr>
<td>Encounter (ENCOUN) *</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>eHR Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse Drug Reaction (ADR)</td>
<td>Investigation Report (IX)</td>
</tr>
<tr>
<td>Allergy (ALLE)</td>
<td>Laboratory Result (LAB)</td>
</tr>
<tr>
<td>Birth Record (BIRTH)</td>
<td>Prescribing Record (RX)</td>
</tr>
<tr>
<td>Clinical Note / Summary (NOTE)</td>
<td>Problem (PROB)</td>
</tr>
<tr>
<td>Dispensing Record (DISP)</td>
<td>Procedure (PROC)</td>
</tr>
<tr>
<td>Immunisation (IMMU)</td>
<td>Referral (REFER)</td>
</tr>
<tr>
<td>eHR Participant (PMI) *</td>
<td>Radiology Examination (RAD) *</td>
</tr>
<tr>
<td>Encounter (ENCOUN) *</td>
<td></td>
</tr>
</tbody>
</table>
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

- Signed HL7 Message
- Partnership ID (HCP ID)
- Private key for digital signature

HCP EMR System with ebMS client

Signed ebXML Message

HTTPS

ebMS acknowledgement will be returned

eHR System
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)

<table>
<thead>
<tr>
<th>HCP EMR System with ebMS client</th>
<th>eHR System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare and sign HL7 message</td>
<td>Receive ebXML from HTTPS connection</td>
</tr>
<tr>
<td>Prepare ebXML message</td>
<td>eHR message processing on ebXML</td>
</tr>
<tr>
<td>Sign the ebXML message</td>
<td>succeed</td>
</tr>
<tr>
<td>Send out ebXML via HTTPS connection</td>
<td>Return positive ebMS acknowledgement</td>
</tr>
<tr>
<td></td>
<td>Receive Replied message from eHR</td>
</tr>
</tbody>
</table>

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Technical Protocols Supported – SFTP (1)

HL7-HK Localised Bulk Load Standards via. SFTP

HL7 Message
PL, DF and image files
Private key for digital signature

HCP EMR System with SFTP client

SFTP PUT
PL, DF and image files
Signed HL7 Message

eHR System

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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)

<table>
<thead>
<tr>
<th>HCP EMR System with SFTP client</th>
<th>eHR System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare PL, DF and image files</td>
<td></td>
</tr>
<tr>
<td>Prepare HL7 message</td>
<td></td>
</tr>
<tr>
<td>Sign the HL7 message</td>
<td></td>
</tr>
<tr>
<td>Login eHR SFTP server</td>
<td>Establish SFTP connection</td>
</tr>
<tr>
<td>Upload HL7 message following by its control file</td>
<td>Receive HL7 message</td>
</tr>
<tr>
<td>Upload each PL, DF or image file following by its control file one by one</td>
<td>Receive one PL, DF or image file</td>
</tr>
</tbody>
</table>

SFTP Server

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Loading Job

Start validation

Validate Participant Identity of the Records

Validate the consent period of the participant

Validate the data compliance

Deliver to CDR

User

Email Service

Inbox Viewer

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Data Compliance Check

- Deliver to CDR
- CDR
- Validate the Recognised Terminology
- Inbox Viewer
- Email Service
- User

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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

Email

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
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
Understanding XML, MIME

- HL7 CDA R2 to carry Clinical Structure Data
- PDF to represent the Original Image
- HL7 V3 Messages (RCMR) to embed CDA and PDF in MIME attachment
Understanding XML, MIME

```xml
<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"/>¶
</patientRole>

<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"/>¶
</patient>

<!--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" -->

<html>
  <head>
    <title>PATIENT YEUNG</title>
  </head>
  <body>
    <p><b>NAME</b>: PATIENT YEUNG</p>
    <p><b>GENDER</b>: M</p>
    <p><b>BIRTH DATE</b>: 20090101</p>
  </body>
</html>

<providerOrganization>
  <id root="2.16.840.1.113883.3.186" extension="CMS"/>
  <name>Good Health</name>
</providerOrganization>
</patient>
</patientRole>

◆ Embedding Patient Data
Understanding XML, MIME

Text Report details

---

Note:

BP 147/69, BW 60 Kg

GGFD deficiency and Thalassemia trait, on HD from China (祈福醫院), 5 times per 2 weeks of dialysis, 3 hours each.

due to palpitation, charged 500-600$,

expressed financial difficulties, actually living in TKO PHE for few months,

UCK appt 24/4/2006, to advance appt

Cr 705, alb 35, Hb 6, urine output 200 ml/day

Plan of Management:

---

To Nan Long Hospital for further Mx,

monitor HTA, vco and E'kstix

Patient Clinical Data
Understanding XML, MIME

---
<v3:controlActProcess classCode="CACT" moodCode="EVN">,
<v3:subject typeCode="SUBJ">,
<v3:clinicalDocument classCode="DOCCLIN" moodCode="EVN">,
<v3:template root="2.16.840.1.113883.1.3" extension="POCD_HDR000040" />
<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" display="Problem Summary" />
<v3:title>Problem Summary</v3:title>
<--- Embed the CDA and PDF in MIME package (eHR Data Interoperability Standards Section 6.6) --->
<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-Id: f_tvqdehi70

PD94bWwgdmVyc2lvbIjIwMjAxNjcgAllwYW5nYWxnL0NvbnRlbnRzLnJhY2tncm91bmQuc3RSU0c2L2NvbGluZy9MRjAxMjIwMTk5Nzg5NjZ1eXBlL0xhZGRlbnRzL0xhZGRlbnRzL01lYy5wYXluZ3pucy5hbCI=

---

• 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
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
UAT findings

- 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])' for type 'ts'.

Total 2 error occurred.
Error message sample

Removing part of the MIME file

Schema
ID Extension: 0
Line Number: 0
Column Number: 0
Message: 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

```
Content
ID Extension:  
Line Number:95 
Column Number:68 
Messages :cvc-minLength-valid: Value " with length = "0" is not facet-valid with respect to minLength '1' for type 'st'.
```

```
Content
ID Extension:  
Line Number:95 
Column Number:68 
Messages :cvc-attribute.3: The value " of attribute 'extension' on 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)
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

File Server

CT, MR, NM, PET

CR, DR, US, MG

Angiogram
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

- Admission
- Pharmacy
- Finance

STH Gateway

Vendor Gateway

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 / real-time)?

- 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!