

Medical Information Messaging

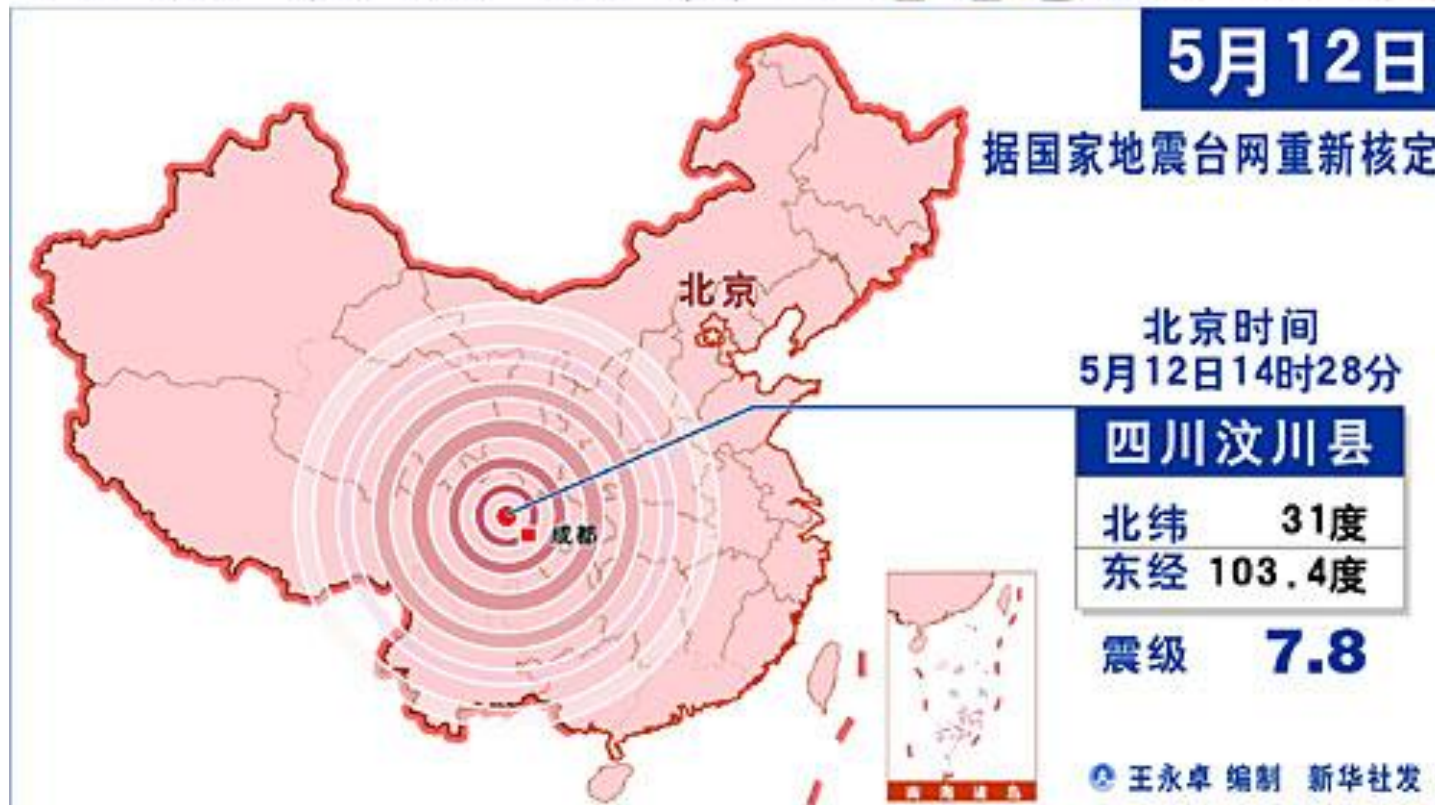
Lesson from Sichuan earthquake

Dr. Ho Chung Ping

四川汶川县发生7.8级地震

5月12日

根据国家地震台网重新核定







The May 12 Sichuan Earthquake is a kind of rare catastrophe, with heavy casualty and severe breakdown of infrastructure facilities such as transportation, power and telecommunication, which brought great difficulties for the rescue and relief work.

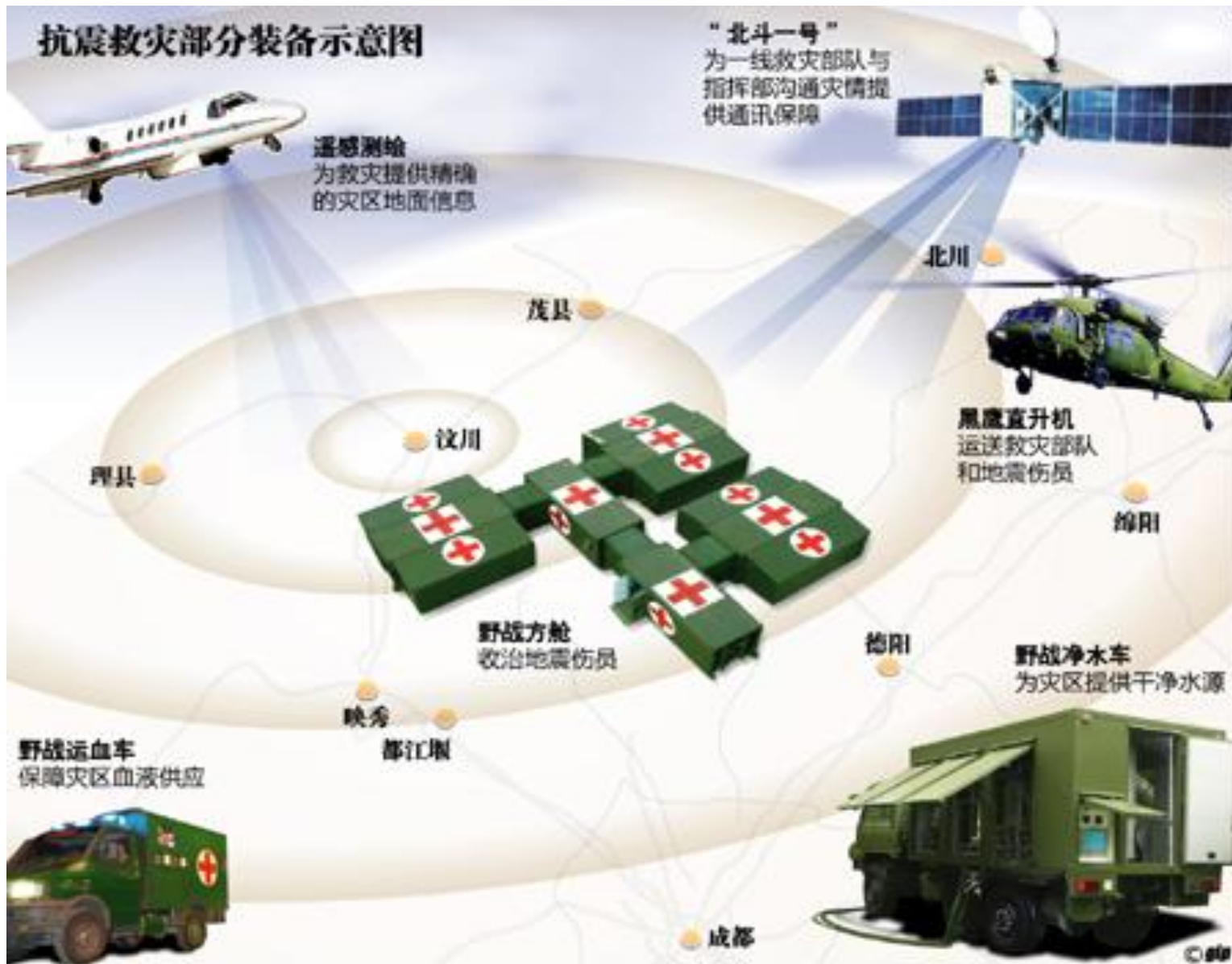




4. To provide the public emergency messaging service



- 成都軍區某部通過“北斗一號”發回信息：北川縣茶坪餘震不斷，海子(湖泊在當地的稱呼)水位迅速上升，隨時可能發生重大洪災。災民已棄家轉移高處，46名重傷員急需救助



Lesson from Sichuan earthquake

- In disaster management, communication is important
- Timely information saves lives
- Information exchange vital – eg satellite information can be transmitted to rescue workers (first responders)
- Information standardization and information messaging

Medical Information Exchange

- 2002 – HKMA Study Group on Medical Information Exchange
- Exchange of medical information among hospitals and clinics
 - Improve patient care
 - Laboratory tests need not be repeated
 - Records integrity
 - Improve patient safety

醫學會夥嘉諾撒 網上交換病歷



香港醫學會表示，將與嘉諾撒醫院及其12位駐院醫生，於最快本年底實踐「贏政計劃」，為醫生之間提供即時網上病人病歷查閱服務。

(邵瑞珊攝)

使用互聯網病歷資料庫步驟

- 1 用醫院員工證在電腦核准機拍卡*
- 2 在網頁輸入密碼，以登入網頁
- 3 登入網頁後，電腦系統會透過手機短訊，向使用者再發出另一個密碼
- 4 以該密碼再登入網頁，完成步驟

*不適用於非醫院員工

資料提供：嘉諾撒醫院高級院務主任蘇信超

【本報訊】現時本港私家醫院並無一個即時交換病人病歷資料的平台，單靠人手傳遞，有可能增加醫療失誤的情況；香港醫學會與嘉諾撒醫院及12位駐院醫生合作，最快可於本年底推出名為「贏政計劃」的互聯網病歷資料庫，藉以增進醫生之間對病人病歷的交流，期望可更快、更準確地為病人診症。

最快年底推 須密碼登入

香港醫學會「贏政計劃」統籌何仲平醫生表示，礙於10多間私家醫院的電腦系統不一，私家病人的資料庫至今仍一片空白；為加快醫生診症的速度，減少醫療失誤，醫學會與嘉諾撒醫院的員工，聯同12名駐院醫生，將於本年底或明年初推行網上病歷資料庫。

嘉諾撒醫院高級院務主任蘇信超解釋，當使用網上資料庫時，醫

院內約140名員工需先以員工證向電腦核對身份，然後輸入密碼，登入網頁後電腦系統會透過手機短訊，向使用者發出新密碼，再將新密碼填入網頁，方可在網上取閱自己負責的病人病歷。

斥逾200萬 兼載用藥手術史

蘇信超稱，認證方法是參考新加坡政府及銀行的保障私隱技術，加上醫院將網上的資料加密，若非透過密碼登入，使用者只會看到一堆亂碼字。另外，有關資料只限診症的醫生及護士參考，系統亦會紀錄使用者資料，以保障病人的私隱。

除了將病人病歷放入資料庫外，病人的手術史及使用的藥物均會記載。整個計劃的費用逾200萬，由醫院及政府的專業發展基金各付一半。

The YingZheng Project 2006





10562818 Form Type : Doctor's Order Page No. : 4 Order No. : MED11201626

to PHARMACY DEPT. SUCCESSFUL

HONG KONG BAPTIST HOSPITAL

Pharmacy (Order)

ID-1201938

S-8

11/20/21

35.26

PIENT

(0980) Dr. HO CHUNG PING

Clinical Information / Diagnosis:

Allergy:

• Panadol

20/11/2021 Patient 1207 allergy status QH.
Dr. ① ef

Information inter-operability

- Scanned documents has little inter-operability
- It would be ideal if information can be sorted, searched and directly used by other users
- Messaging standard important

Preparing for eHR: What You Need to Know About HL7 Version 2

HL7 Hong Kong

2 Nov 2012

Preparing for eHR: What You Need to Know About HL7 Version 2

Time	Topic	
9:00 – 9:30 am	<i>Registration</i>	
9:30 – 9:45 am	Introduction	Dr C P Ho
9:45 – 10:30am	Introduction of HL7	Michael Cheung
10:30 – 10:45 am	<i>Break</i>	
10:45 – 12:30 pm	Control and Data Type	Michael Cheung
12:30 – 1:30 pm	<i>Lunch</i>	
1:30 – 2:30 pm	Patient Administration	Michael Cheung
2:30 – 3:30 pm	Result Reporting	Michael Cheung
3:30 – 3:45 pm	<i>Break</i>	
3:45 – 4:30 pm	Case Study Sharing	Michael Cheung
4:30 – 5:30 pm	Management for HL7 Project	Michael Cheung
5:30 – 6:00 pm	Q & A	

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 to HL7

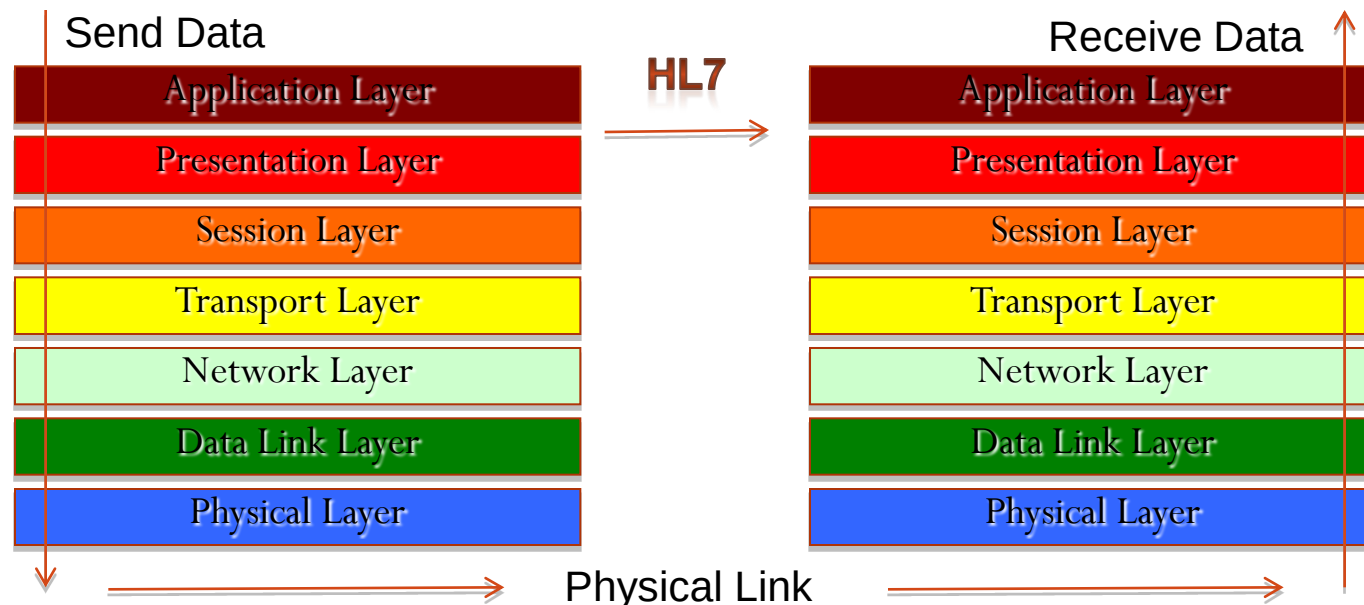
Preparing for eHR: What You Need to Know About HL7 Version 2

What is HL7?

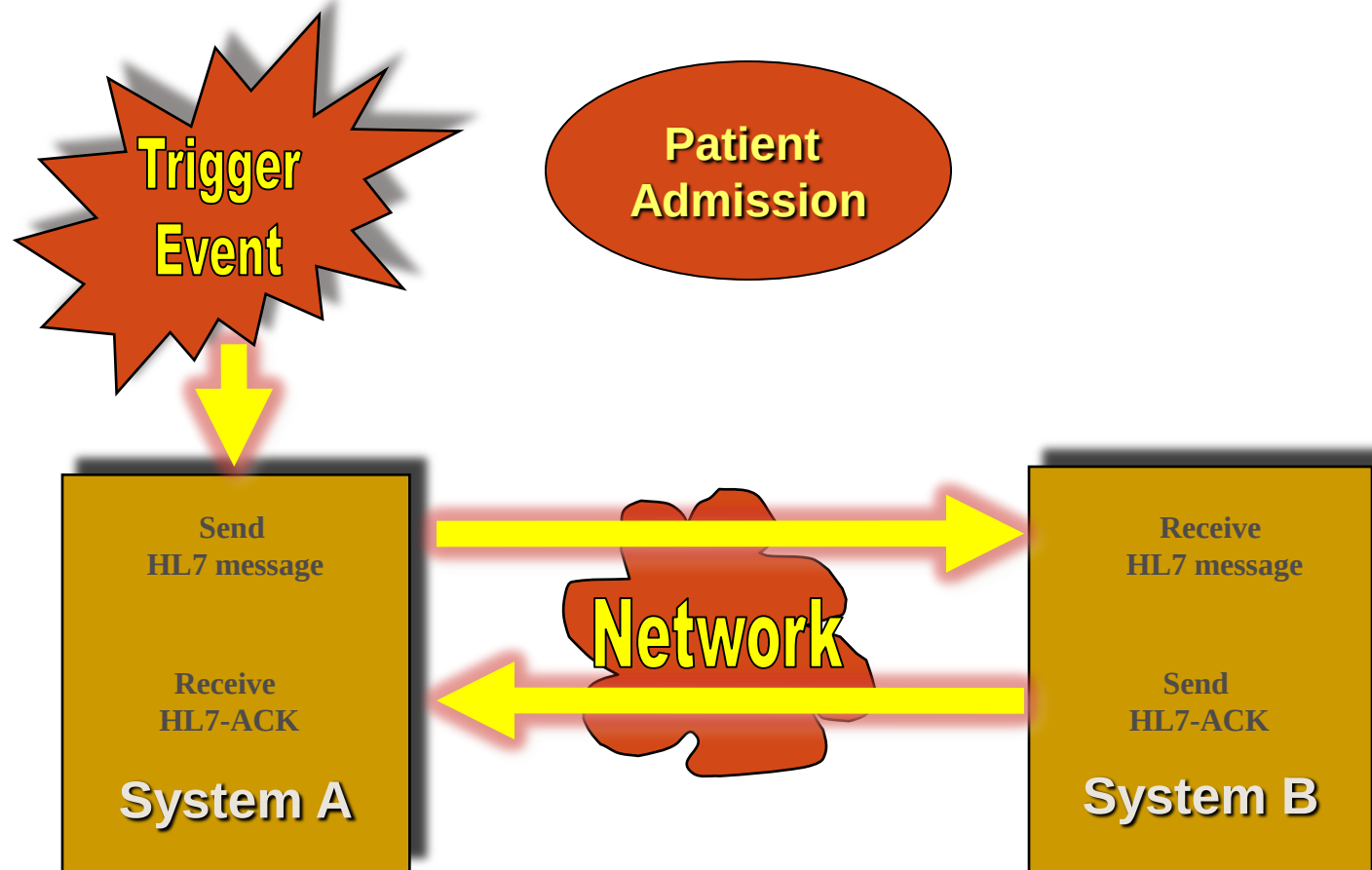
- Health Level Seven International
 - Non-profit organization develop and promote the healthcare information interoperability
 - Headquarter - US
 - Membership based including country/regional affiliate (e.g. HL7 Hong Kong)
- Interoperability Standards
 - Version 2 (V2)
 - Version 3 (V3)
 - Clinical Data Architecture (CDA)

What is the meaning of 'HL7'?

- Health 'Level 7'
- Refer to the 7th layer of ISO Open System Interconnection (OSI) model – Application Layer
- HL7 = Application Layer Protocol for Health care systems



Basic principle of HL7 V2 message



HL7 V2 Message Type (Domain)



Patient
Administration



Query



Financial
Management



Patient
Referral



Scheduling



Observation
Reporting



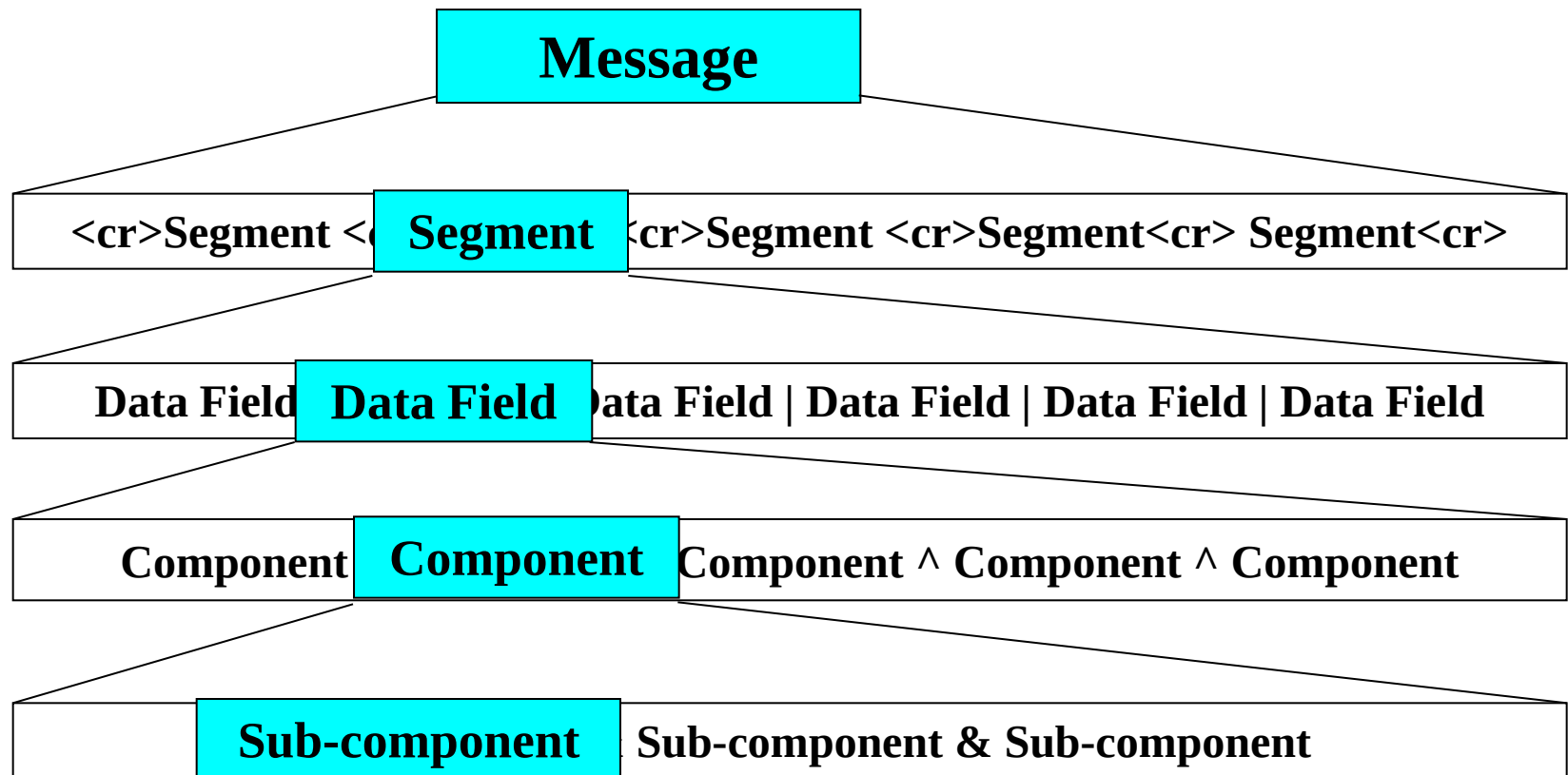
Order
Entry



Patient
Care

and more....

HL7 V2 Message Hierarchy



HL7 v2 Messages Structure Sample

ORU	<u>Observational Results (Unsolicited)</u>
MSH	<i>Message Header</i>
{	
[	
PID	Patient Identification
[PD1]	Additional Demographics
[{NTE}]	Notes and Comments
[PV1	Patient Visit
[PV2]]	Patient Visit - Additional Info
]	
{	
[ORC]	Order common
OBR	Observations Report ID
[{NTE}]	Notes and comments
{	
[OBX]	Observation/Result
[{NTE}]	Notes and comments
}	
{[CTI]}	Clinical Trial Identification
}	
}	
[DSC]	Continuation Pointer

HL7 Messages Sample

MSH|^~\&|OBIS|CMC|EPR|HAHO|20021029133345||ORU^R01|5355|P|2.5|||ER|ER|HKG|ASCII|ENG

PID|||A1234563^HKID||B/O Chan^Siu Man||20021029|M|||1517, 15, A, ABC Centre^TM|||S

PV1|1|I|A10^ICU^12|||||||||||||HN02000006A|||||||||||||20021029132425

OBR|1|X89-1501^OE|78912^RD|9274-2^NEONATAL APGAR 5M POST BIRTH^LN|R|2002010291330|19873290800||CS1A|N

OBX|1|ST|32411-1^NEONATAL APGAR.COLOR 5M POST BIRTH^LN||2|||F

OBX|2|ST|32412-9^NEONATAL APGAR.HEART RATE 5M POST BIRTH^LN||2|||F

OBX|3|ST|32413-7^NEONATAL APGAR.MUSCLE TONE 5M POST BIRTH^LN||2|||F

OBX|4|ST|32414-5^NEONATAL APGAR.REFLEX IRRITABILITY 5M POST BIRTH^LN||2|||F

OBX|5|ST|32415-2^NEONATAL APGAR.RESPIRATORY EFFORT 5M POST BIRTH^LN||2|||F

HL7 Messages Sample (XML)

```
<?xml version="1.0" encoding="UTF-8"?>
<ADT_A05 xmlns="urn:hl7-org:v2xml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <MSH>
    <MSH.1>|</MSH.1>
    <MSH.2>^~\&lt;/MSH.2>
    <MSH.3>
      <HD.1>EIF</HD.1>
    </MSH.3>
    <MSH.4>
      <HD.1>eHR</HD.1>
    </MSH.4>
    <MSH.7>
      <TS.1>20100203163005.005</TS.1>
    </MSH.7>
```

Control and Data Type

Preparing for eHR: What You Need to Know About HL7 Version 2

Control

- HL7 V2 Specification Chapter 2
- Most important chapter which describe the 'how' to read and understand the specification

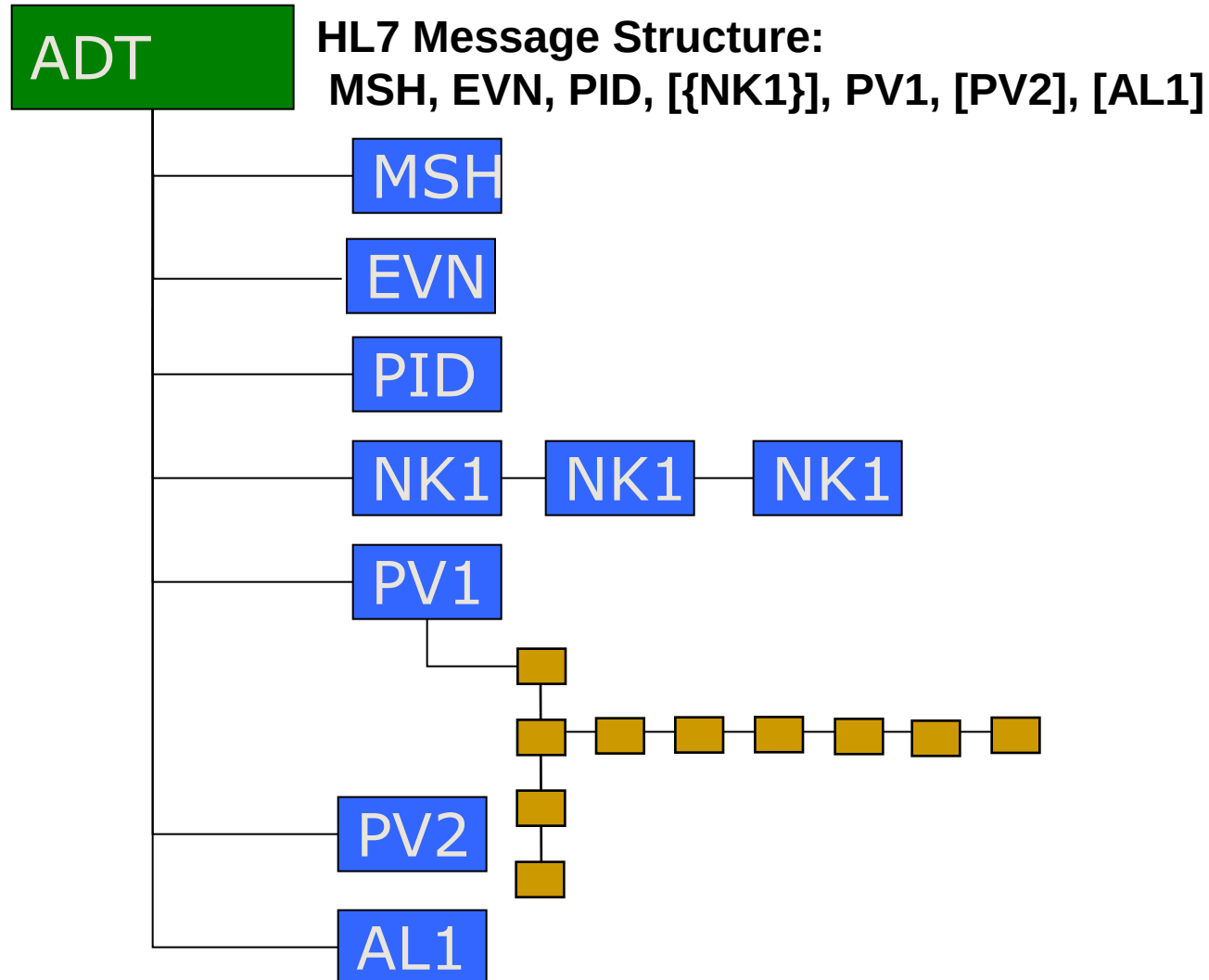
Trigger Events

- An event in the real world of healthcare creates the need for data to flow among systems
- Initiating Message (trigger)
 - Patient Registration
 - Pharmacy Order
 - Order Cancellation
 - Patient Referral
 - Radiology Report Available

HL7 Messages

- A **message** is the atomic unit of data transferred between systems. It is comprised of a group of segments in a defined sequence.
- The **message type** defines its purpose (unsolicited trigger, query, response)
- Message
 - Segments
 - Fields(Data types)
 - Components (complex data types)

Hierarchical Message Structure



Abstract Message Syntax

- Indicates the message structure:
- E.g. “ORU^R01”
 - MSH, PID, PV1, ORC, {OBR, [NTE], {OBX, [NTE]} }
- []
 - Optional segment or segment group
- {}
 - Repeating segment or segment group

Segment Groups

- Logical grouping of segments containing more than one type of segment
- Groups may be nested
 - Groups of groups...
- How many groups can you identify here?
 - {OBR, [NTE], {OBX, [{NTE}]}}

Message Structure

- Predefined abstract message definition that may be shared by more than one message type/event
- $\{ [\dots] \}$ equivalent to $[\{ \dots \}]$
- *MSH-9-message type* : **ORU^R01^ORU_R01**
 - Message Type: e.g. ORU
 - Event: e.g. R01
 - Structure: ORU_R01

HL7 v2 Messages Structure

ORU	Observational Results (Unsolicited)
MSH	Message Header
{	
[	
PID	Patient Identification
[PD1]	Additional Demographics
{[NTE]}	Notes and Comments
[PV1]	Patient Visit
[PV2]]	Patient Visit - Additional Info
]	
{	
[ORC]	Order common
OBR	Observations Report ID
{[NTE]}	Notes and comments
{	
[OBX]	Observation/Result
{[NTE]}	Notes and comments
}	
{[CTI]}	Clinical Trial Identification
}	
}	
[DSC]	Continuation Pointer

Message Header (MSH) Segment

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
1	1	ST	R			00001	Field Separator
2	4	ST	R			00002	Encoding Characters
3	227	HD	O		0361	00003	Sending Application
4	227	HD	O		0362	00004	Sending Facility
5	227	HD	O		0361	00005	Receiving Application
6	227	HD	O		0362	00006	Receiving Facility
7	24	DTM	R			00007	Date/Time of Message
8	40	ST	O			00008	Security
9	15	MSG	R			00009	Message Type
10	199	ST	R			00010	Message Control ID
11	3	PT	R			00011	Processing ID
12	60	VID	R			00012	Version ID

Message Header (MSH) Segment

SEQ	LEN	DT	OPT	RP/#	TBL#	ITEM#	ELEMENT NAME
13	15	NM	O			00013	Sequence Number
14	180	ST	O			00014	Continuation Pointer
15	2	ID	O		0155	00015	Accept Acknowledgment Type
16	2	ID	O		0155	00016	Application Acknowledgment Type
17	3	ID	O		0399	00017	Country Code
18	16	ID	O	Y	0211	00692	Character Set
19	250	CWE	O			00693	Principal Language of Message
20	20	ID	O		0356	01317	Alternate Character Set Handling Scheme
21	427	EI	O	Y		01598	Message Profile Identifier
22	567	XON	O			01823	Sending Responsible Organization
23	567	XON	O			01824	Receiving Responsible Organization
24	227	HD	O			01825	Sending Network Address
25	227	HD	O			01826	Receiving Network Address

Field Attributes: SEQ Position

- Definition: Ordinal position of the data field within the segment. This number is used to refer to the data field in the text comments that follow the segment definition table.

Field Attributes: LEN

Maximum Length

- Definition: Maximum number of characters that one occurrence of the data field may occupy.
 - “65536” is a conventional value used to express a very large field
 - “99999” indicates that the length may vary
- Normative, but can be changed on a site specific basis
- Includes components and sub-components
- Does not include repetitions

Field Attributes: DT

Data Type

- Definition: Restrictions on the contents of the data field.
- In the segment attribute tables this information is provided in the column labeled **DT**. If the data type of the field is variable, the notation “varies” will be displayed.
- HL7 defines 89 different data types.

Field Attributes: OPT

Optionality

- Definition: Whether the field is required, optional, or conditional in a segment.
- The designations for optionality are:
 - R-required
 - O-optional
 - C-conditional on trigger event or other field(s)
 - X-not used with this trigger event
 - B- left in for backward compatibility with previous versions
 - W- withdrawn

Field Attributes: REP Repetition

- Definition: Indicates whether the field may repeat.
- The designations for Repetition are:
 - N or blank - no repetition
 - Y - the field may repeat an indefinite or site-determined number of times
 - (integer) - the field may repeat up to the number of times specified by the integer
- Each occurrence may contain the number of characters specified by the field's maximum length

Field Attributes: TBL# Value Tables

- Definition: The table attribute of the data field definition specifies the HL7 identifier for a set of coded values.
- An entry in the table number column means that the table name and the element name are equivalent.
- If this attribute is not valued or blank, there is not a table of values defined for the field.

Field Attributes: TBL# Value Tables

- If more than one table is applicable, the format xxxx/yyyy is used
- ID or IS: a table number will be allocated even if, in the case of IS, there may be a notation "No Suggested Values"
- CF/CNE/CWE: one or more externally or locally defined tables may be used. The narrative may constrain which external tables can be used.

HL7 Tables

- HL7 table: set of values maintained and published by HL7.
- They are a part of the HL7 Standard because they affect the interpretation of the messages that contain them.
- May not be redefined locally; however, the table itself may be extended with locally defined values.
- **The ID** data type is most often used for elements that are populated with value from HL7 tables.

User-defined Tables

- A user-defined table is a set of values that are locally or site defined.
 - *E.g. PV1-3 - Assigned patient location, will vary from institution to institution.*
- HL7 sometimes publishes suggested values that a site may use as a starter set (e.g., *table 0001 - Sex*).
- The **IS** data type is most often used for elements that are populated with values from user-defined tables.

External Tables (Coded Values)

- A set of coded values defined and published by another standards organization (*e.g.*, ISO)
 - *FT1-19-Diagnosis Code - FT1.*
 - clinical observations using LOINC codes
- **CF/CNE/CWE** data type is used for elements that can be populated with values from external tables.

Message Delimiters Summary

Delimiter	Suggested Value	Encoding Character Position
Segment Terminator	<CR> (ASCII value: hex 0D, 13)	-
Field Separator		-
Component Separator	^	1
Subcomponent Separator	&	4
Repetition Separator	~	2
Escape Character	\	3

Message Delimiters: Segment Terminator, Field Separator



- **Segment Terminator** <CR>: Terminates a segment record.
 - Cannot be changed by implementers
- **Field Separator** (Suggested: |): Identifies the start of a data field within a segment. Will be the first character following the Segment ID as established by the MSH segment.
 - It may be changed by implementers

Configurable Delimiters: Component, Sub-component



- Specified in Message Header (MSH-2)
- **Component Separator:** Separates adjacent components of data fields where allowed.
- **Subcomponent Separator:** Separates adjacent subcomponents of data fields where allowed.

Configurable Delimiters: Repetition, Escape



- Specified in Message Header (MSH-2)
- **Repetition Separator:** Separates multiple occurrences of a field where allowed.
- **Escape Character:** Escape character for use in any field represented by an ST, TX or FT data type, including the data component of the ED data type (fourth), or the value field of the OBX segment (OBX-5) if so defined.

HL7 Messages Sample

```
MSH|^~\&|OBIS|CMC|EPR|HAHO|20021029133345||ORU^R01|5355|P|2.5|||ER|ER|
HKG|ASCII|ENG<cr>
```

```
PID|||A1234563^HKID||B/O Chan^Siu Man||20021029|M|||1517, 15, A, ABC
Centre^TM||||S <cr>
```

```
PV1|1|I|A10^ICU^12|||||||||||||
HN02000006A|||||||||||||||||20021029132425<cr>
```

```
OBR|1|X89-1501^OE|78912^RD|9274-2^NEONATAL APGAR 5M POST
BIRTH^LN|R|2002010291330|19873290800|||CS1A|N<cr>
```

```
OBX|1|ST|32411-1^NEONATAL APGAR.COLOR 5M POST BIRTH^LN||2|||F<cr>
```

```
OBX|2|ST|32412-9^NEONATAL APGAR.HEART RATE 5M POST
BIRTH^LN||2|||F<cr>
```

```
OBX|3|ST|32413-7^NEONATAL APGAR.MUSCLE TONE 5M POST
BIRTH^LN||2|||F<cr>
```

```
OBX|4|ST|32414-5^NEONATAL APGAR.REFLEX IRRITABILITY 5M POST
BIRTH^LN||2|||F<cr>
```

```
OBX|5|ST|32415-2^NEONATAL APGAR.RESPIRATORY EFFORT 5M POST
BIRTH^LN||2|||F<cr>
```

Message Type + Trigger Event

There is a one-to-many relationship between message types and trigger event codes. The same trigger event code may not be associated with more than one message type.

A.2 MESSAGE TYPES

Message	Description	Chapter
ACK	General acknowledgment message	2
ADR	ADT response	3
ADT	ADT message	3

ADT	ADT message
-----	-------------

Value	Description
A01	ADT/ACK - Admit / visit notification
A02	ADT/ACK - Transfer a patient
A03	ADT/ACK - Discharge/end visit
A04	ADT/ACK - Register a patient
A05	ADT/ACK - Pre-admit a patient

Message Structure

- A message is comprised of a group of segments in a defined sequence. A three-character code contained within each message header segment identifies the event type.
- Example structure id: **ADT_A01**

```
MSH|^~\&|...|ADT^A01^ADT_A01|...
```

ADT

MSH

EVN

PID

[PD1]

[{ NK1 }]

PV1

[PV2]

[{ DB1 }]

[{ OBX }]

[{ AL1 }]

[{ DG1 }]

[DRG]

Segment Characteristics

- An HL7 segment is a logical, sequential grouping of data fields.
- Segments of a message:
 - may be required or optional
 - may occur only once in a message or they may be allowed to repeat
 - are identified by a unique three character code known as the Segment ID.

Definition of Message Segments

Segment may be required or optional

PID is a required segment;
PD1 is an optional segment

[] means the segment or group is optional

ADT

MSH

EVN

PID

[PD1]

[{ NK1 }]

PV1

[PV2]

[{ DB1 }]

[{ OBX }]

[{ AL1 }]

[{ DG1 }]

[DRG]

Definition of Message Segments

Annotation sets cardinality

[...] means 0 to 1

{...} means 1 to many

[{...}] means 0 to many

PID may occur only once

NK1 is allowed to repeat

{ } means the segment or group may repeat

ADT

MSH

EVN

PID

[PD1]

[{ NK1 }]

PV1

[PV2]

[{ DB1 }]

[{ OBX }]

[{ AL1 }]

[{ DG1 }]

[DRG]

Definition of Message Segments

A segment is identified by a unique three character code (The Segment ID)

PV1 is a Segment ID

ADT

MSH

EVN

PID

[PD1]

[{ NK1 }]

PV1

[PV2]

[{ DB1 }]

[{ OBX }]

[{ AL1 }]

[{ DG1 }]

[DRG]

Field

- An HL7 data field is a string of characters defined by an HL7 data type. For example, PID-16 Marital Status .



<u>Value</u>	<u>Description</u>
A	Separated
D	Divorced
M	Married
S	Single
W	Widowed

Field Components

- A data field may also have discernable parts or components. For example, the patient's name is recorded as last name, first name, and middle name or initial, each of which is a distinct entity separated by the component delimiter “^”.

| Smith^John^J^III^Dr.^AMD |

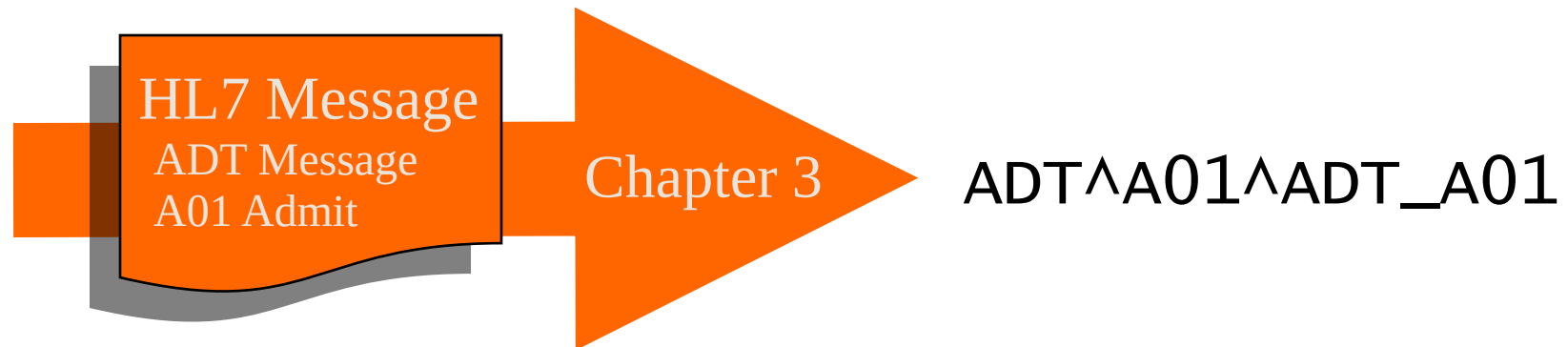
Repeating Values

- Some data fields may contain repeating values. For example, the diagnosis field may contain several diagnoses. Each iteration is separated by the repetition delimiter “~” .

```
| .61^RUL^ACR~.212^Bronchopneumonia^ACR|
```

Encoding Rules

- To determine the exact representation of an abstract message, one applies the HL7 encoding rules defined in Chapter 2 to the abstract definition from the relevant transaction definition chapter.



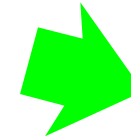
Sending Rules

For Encoding HL7 Messages

Encode each segment in the order specified in the abstract message format

Admit Message

```
MSH
EVN
PID
[ { NK1 } ]
PV1
[ PV2 ]
[ HL1 ]
[ { AL1 } ]
[ { DG1 } ]
[ { PR1 } ]
[ { GT1 } ]
[ { IN1
  [ IN2 ]
  [ IN3 ] } ]
[ ACC ]
[ UB1 ]
```



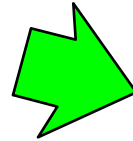
**PID** || | 2-68708-5 | 253763 | COX^JAMES...



Precede each data field with the data field separator

Sending Rules

For Encoding HL7 Messages

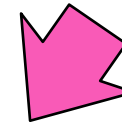


PID attributes

Sq	Ln	DT	O	Rp	Tbl	Item	Element Name
1	4	SI	O			00104	Set ID - PID
2	20	CX	B			00105	Patient ID
3	250	CX	R	Y		00106	Patient Identifier
4	20	CX	B	Y		00107	Alternate Patient
5	250	XP	R	Y	0200	00108	Patient Name
6	250	XP	O	Y		00109	Mother' s

Maide

Data fields 'present but null' are encoded with " "



PID || | 2-68708 | 253763 | COX^JAMES | " " | ...

Sending Rules

For Encoding HL7 Messages

- If components, subcomponents, or repetitions at the end of a data field are 'not present', their separators may be omitted

|Marotta^David^John^^^|



|Marotta^David^John|

- If no more fields are present in a segment, the data field separators may be omitted

PID|...|Last Field|_|_|_|_|_|_|<CR>



PID|...|Last Field<CR>

Sending Rules

For Encoding HL7 Messages

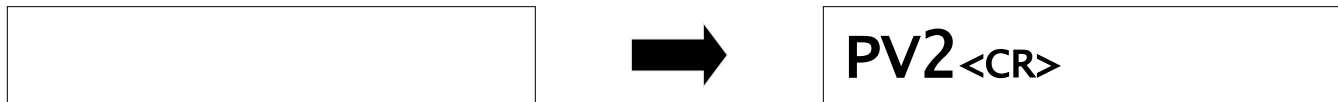
- End each segment with the segment terminator

```
PID|...|Last Field<CR>
```

Receiving Rules

For Decoding HL7 Messages

- If a data segment that is expected is not found, treat it as if all the data fields were 'not present'



- If a data segment is included that is not expected, ignore it; this is not an error



Message processing

- Syntax and HL7 encoding rules verification
- Depending on whether the message is valid:
 - response message, or
 - error message, or
 - reject message
- Sends the response, error, or reject message
- *MSH-10-message control ID*: Unique message identifier used to relate the response to the message.

Data Types

Alphanumeric (ST TX FT *SRT*)

Numeric (CQ MO NM SI SN)

Identifier (ID IS HD EI RP PL PT *VID*)

Date/Time (DT TM DTM)

Coded Values (CF CN CX XCN

CNE CWE)

Demographics (XAD XPN

XON XTN SAD FN)

Price Data (CP)

ADT/Finance (FC)

Extended Queries (QSC QIP RCD)

Master Files (DLN JCC VH)

Medical Records (PPN)

Time Series (DR RI SCV TQ)

Alphanumeric (ST, TX, FT)

- Any printable ASCII character allowed (unless another character set is specified in MSH-18)
- Escape sequences allowed

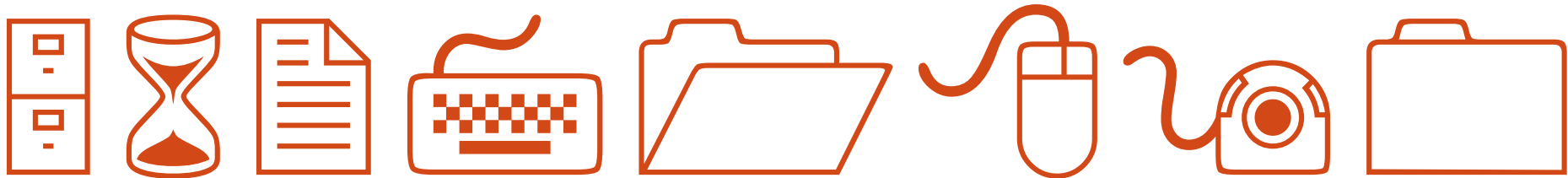
| \H\M\T\Ms\N\|

Alphanumeric (ST, TX, FT)

- ST - String
 - Left justified, trailing spaces optional
 - Small block of text (<1000 characters)
- TX - Text
 - Meant for user display
 - Allows leading spaces and paragraphing
 - Typically a larger block than ST
- FT - Formatted Text
 - TX that allows embedded “formatting codes”

Numeric

- CQ - Composite Quantity With Units
- MO - Money
- NM - Numeric
- SI - Sequence ID
- SN - Structured Numeric



Numeric (NM, SI)

- NM - Numeric
 - A series of ASCII numeric characters
 - Optional leading sign (+ or -)
 - Optional decimal point
- SI - Sequence ID
 - Non-negative integer
 - Data type used for “Set ID” fields for repeating segments.

| -999.99 |

| 5 |

OBX | 1 | ...<CR>
OBX | 2 | ...<CR>
OBX | 3 | ...<CR>

Numeric (SN)

- SN - Structured Numeric

`<comparator (ST)>^<num1(NM)>^<separator/suffix (ST)>^<num2 (NM)>`

`|>^100|` (greater than 100)

`|^100^–^200|` (equal to range of 100 through 200)

`|^1^:^128|` (ratio of 1 to 128, e.g., a serological test result)

`|^2^+|` (categorical response, e.g., occult blood positivity)

Date/time

- **DT:** Date
 - YYYY[MM[DD]]
- **TM:** Time
 - HH[MM[SS[.S[S[S[S]]]]]] [+ / -ZZZZ]
- **DTM:** Combined date/time (*supersedes TS*)
 - YYYY[MM[DD[HH[MM[SS[.S[S[S[S]]]]]]]] [+ / -ZZZZ]

ZZZZ = offset from the
coordinated universal
time (previously known
as Greenwich Mean
Time)

Is it a Date? Time? Date/Time?

Example

DT, TM, or DTM?

| 19760704010159 |

| 133000-0600 |

| 19880705 |

| 2004 |

Identifiers

- ID - value from HL7 defined table
- IS - value from uSer defined table
- HD - Hierarchic Designator
- EI - Entity Identifier
- RP - Reference Pointer
- PL - Patient Location
- PT - Processing Type

Identifiers (ID versus IS)

- ID - HL7 defined value set
- IS - User defined value set

Table 0136 - Yes/No indicator

<u>Value</u>	<u>Description</u>
Y	Yes
N	No

<u>Value</u>	<u>Description</u>
F	Female
M	Male
O	Other
U	Unknown

**Typically site specific.
HL7 may supply
suggested values.**

HD - Hierarchic Designator

- Identifies an entity that is responsible for managing or assigning identifiers
- Used for MSH Sending and Receiving Application and Facility
- Used for Assigning Authority for Patient Identifiers:
MRN^^^Facility A

<namespace ID (IS)>^<universal ID (ST)>^<universal ID type (ID)>

HD - Hierarchic Designator Notes #1

$\langle \text{namespace ID (IS)} \rangle \wedge \langle \text{universal ID (ST)} \rangle \wedge \langle \text{universal ID type (ID)} \rangle$



User-defined table
0300-Namespace
ID for suggested
values

If it is an entity defined locally,
only $\langle \text{namespace ID} \rangle$ will be
valued; example, “Hospital
A.”

HD – Hierarchic Designator

MSH-4-Sending Facility Example

- Sending Facility is General Hospital
 - MSH-4 has Data Type HD
 - Definition of MSH-4 in Chapter 2 specifies that Table 362 will be used for Component 1, Namespace ID
 - General Hospital is known by entry
Genhosp
in Table 362
 - General Hospital has been assigned ISO Object Identifier
1.2.344.24.1.1.362155

HD – Hierarchic Designator

MSH-4-Sending Facility Example

- Using only Component 1 of data type HD (Namespace ID)

MSH|^~\&|Newreg|**Genhosp**|...

- Using only Component 2 (Universal ID) and Component 3 (Universal ID Type)

MSH|^~\&|Newreg|^**1.2.344.24.1.1.362155****ISO**|...

- Using Components 1, 2, and 3

MSH|^~\&|Newreg|**Genhosp****1.2.344.24.1.1.362155****ISO**|...

(Note that this example only populates Component 1 of MSH-3-Sending Application)

EI - Entity Identifier

- A unique identifier across the specified entity

Unique identifier

Entity (HD)

<entity identifier (ST)>^
<namespace ID (IS)>^
<universal ID (ST)>^
< universal ID type (ID)>

Examples: Accession Number, Filler Order Number, Episode of Care ID, Authorization ID, External Referral ID, Facility ID, etc.

RP - Reference Pointer

- Transmits information about data stored on another system.

`<pointer (ST)>^<application ID (HD)>^<type of data (ID)>^< subtype (ID)>`

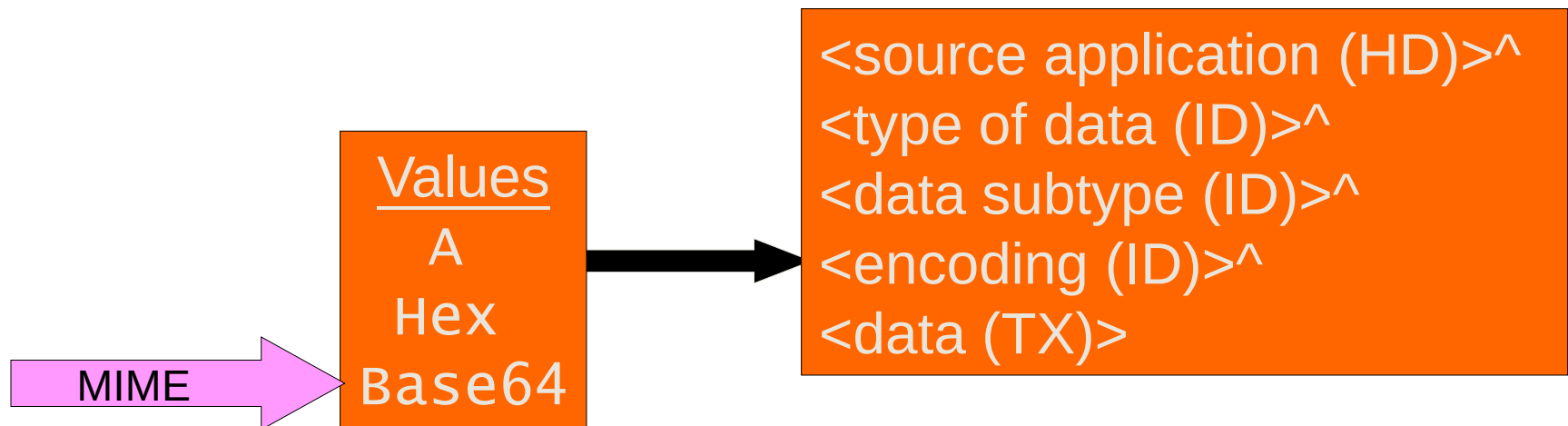


Example Types of Data:
Audio, JPEG, RF, TX, DICOM,
HTML, Application

Pointer is unique within the object
defined by the application ID (HD)

ED - Encapsulated Data

- Transmits encapsulated data from a source system to a destination system.
- Same as RP except that ED includes the data.



PT - Processing Type

- Indicates whether message is to be processed under production or other rules as defined in HL7 Application Processing rules.
- Used in MSH-11-Processing ID

<processing ID (ID)>^<processing mode (ID)>

Table 0103 - Processing ID

Value	Description
D	Debugging
P	Production
T	Training

Table 0207 - Processing mode

Value	Description
A	Archive
R	Restore from archive
I	Initial load
T	Current processing, transmitted at intervals
not present	Default; equates to current processing

Coded Values

- CE - Coded Element
- CF - Coded Element with Formatted Values
- CNE - Coded no Exceptions
- CWE - Coded with Exceptions
- CX - Extended Composite ID w/check digit
- XCN - Extended Composite ID Number and Name

Coded Elements

- CE - Coded Entry
- **Withdrawn as of V2.6. Use CWE and CNE instead.**
- CF - Coded Entry With Formatted Values.

```
<identifier (ST)>^<text (ST)>^  
<coding system (ID)>^  
<alternate identifier (ST)>^  
<alternate text (ST)>^  
<alternate coding system (ID)>
```

```
<identifier (ST)>^<text (FT)>^  
<coding system (ID)>^  
<alternate identifier (ST)>^  
<alternate text (FT)>^  
<alternate coding system (ID)>
```

```
| F-11380^CREATININE^I9^2148-6^CREATININE^LN |
```

CNE/CWE

- CNE - Coded No Exceptions
- CWE - Coded With Exceptions

```
<identifier (ST)>^<text (ST)>^<coding system (ID)>^  
<alternate identifier (ST)>^<alternate text (ST)>^<alternate coding system(ID)>^  
<coding system version ID (ST)>^ <alternate coding system version ID (ST)>^  
<original text (ST)>
```

XML Encoding

- "HL7 Version 2: XML Encoding Syntax, Release 1"
- Released at 2003 as ANSI standard
- Including the DTD and XML Schema files
- Encoding rules (tags) are based on the Message Structure, Segment ID and Data Type of the Fields

HL7 Messages Sample (XML)

```
<?xml version="1.0" encoding="UTF-8"?>
<ADT_A05 xmlns="urn:hl7-org:v2xml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <MSH>
    <MSH.1>|</MSH.1>
    <MSH.2>^~\&lt;/MSH.2>
    <MSH.3>
      <HD.1>EIF</HD.1>
    </MSH.3>
    <MSH.4>
      <HD.1>eHR</HD.1>
    </MSH.4>
    <MSH.7>
      <TS.1>20100203163005.005</TS.1>
    </MSH.7>
    <MSH.9>
      <MSG.1>ADT</MSG.1>
      <MSG.2>A28</MSG.2>
      <MSG.3>ADT_A05</MSG.3>
    </MSH.9>
  </MSH>
</ADT_A05>
```

Patient Administration

Preparing for eHR: What You Need to Know About HL7 Version 2

Patient Administration

- Chapter 3
- Events
 - Most Standard Messages use message type ADT:
 - Admission, Discharge, Transfer
 - Update
 - Merge
 - ...
 - Exception: Queries (A19, A60, A61, A62)
 - QRY/ADR, QBP/RSP, ..
- Message structures
- Segments

Admit/Visit Notification (Event A01)

- Sent for beginning of inpatient stay
- PV1-3 assignment to a bed
- PV1-44-admit date/time can be used for visit begin date/time
- Use A08 for changing other patient info

Most Important Trigger Events

- Admit/visit notification (event A01)
- Transfer a patient (event A02)
- Discharge/end visit (event A03)
- Register a patient (event A04)
- Update patient information (event A08)

Discharge/End Visit (Event A03)

- Sent when patient's stay ends
- Patient's location at discharge in PV1-3-assigned patient location
- PV1-45-discharge date/time can be used for visit end date/time
- Use A08 for changing other patient info

Register a Patient (Event A04)

- Sent for patient arriving or checking in at one-time, or recurring outpatient, and not assigned to a bed (*e.g.*, ER)
- Use PV1-44-admit date time for visit start date/time

Event Group: Updates

- Sent when any patient information has changed, but no other trigger event has occurred
- Event:
 - A08: Update patient information

Event Group: Movements

- Sent when patient changes location
- For other changes, use A08
- New loc in PV1-3-assigned patient location
- Old loc in PV1-6-prior patient location
- Use A09/A10 for temporary locations
- Events:
 - **A02:** Transfer a patient
 - A09: Patient departing – tracking
 - A10: Patient arriving – tracking
 - A21: Patient goes on a “leave of absence”
 - A22: Patient returns from a “leave of absence”

3 Types Of Message Structures

- Standard Generalized ADT Message Structure
 - used for most of the ADT messages
 - simple exceptions (e.g. A03)
- Merge
- Link

Standard ADT Message Structure

ADT^A01^ADT_A01	ADT Message	Chapter	
MSH	Message Header	2	} Standard Information
[{ SFT }]	Software Segment	2	
[UAC]	User Authentication Credential	2	
EVN	Event Type	3	
PID	Patient Identification	3	} Patient Data
[PD1]	Additional Demographics	3	
[ARV]	Access Restrictions	3	
[{ ROL }]	Role	12	
[{ NK1 }]	Next of Kin / Associated Parties	3	
PV1	Patient Visit	3	} Visit Information
[PV2]	Patient Visit - Additional Info.	3	
[{ ARV }]	Access Restrictions	3	
[{ ROL }]	Role	12	
[{ DB1 }]	Disability Information	3	
[{ OBX }]	Observation/Result	7	
[{ AL1 }]	Allergy Information	3	
[{ DG1 }]	Diagnosis Information	6	
[DRG]	Diagnosis Related Group	6	
.....			
.....			

Merge Message Structure

ADT^A40^ADT_A39	ADT Message	Chapter
MSH	Message Header	2
[{ SFT }]	Software Segment	2
[UAC]	User Authentication Credential	2
EVN	Event Type	3
{		
PID	Patient Identification	3
[PD1]	Additional Demographics	3
MRG	Merge Information	3
[PV1]	Patient Visit	3
}		

Patient from MRG (previous ID) to PID

Link Message Structure

ADT^A24^ADT_A24	ADT Message	Chapter	
MSH	Message Header	2	
[{ SFT }]	Software Segment	2	
[UAC]	User Authentication Credential	2	
EVN	Event Type	3	
PID	Patient Identification 3		} Patient 1
[PD1]	Patient Additional Demographics	3	
[PV1]	Patient Visit	3	
[{ DB1 }]	Patient Disability Information 3		
PID	Patient Identification 3		} Patient 2
[PD1]	Patient Additional Demographics	3	
[PV1]	Patient Visit	3	
[{ DB1 }]	Patient Disability Information 3		

Commonly Used Segments

- PID: Patient identification
- PV1, PV2: Visit related information
- NK1: Next of kin / associated parties

PID – Patient Identification



INDEX	LEN	DT	OPT	MOD	TABLE	FIELD	ELEMENT NAME
1	4	SI	O			00104	Set ID - PID
2	20	CX	B			00105	Patient ID
3	250	CX	R	Y		00106	Patient Identifier List
4	20	CX	B	Y		00107	Alternate Patient ID - PID
5	250	XPN	R	Y	0200	00108	Patient Name
6	250	XPN	O	Y		00109	Mother' s Maiden Name
7	24	DTM	O			00110	Date/Time of Birth
8	1	IS	O		0001	00111	Administrative Sex
9	250	XPN	B	Y		00112	Patient Alias
10	705	CWE	O	Y	0005	00113	Race
11	250	XAD	O	Y		00114	Patient Address
12	4	IS	B		0289	00115	County Code
13	250	XTN	O	Y		00116	Phone Number - Home
14	250	XTN	O	Y		00117	Phone Number - Business
15	705	CWE	O		0296	00118	Primary Language
16	705	CWE	O		0002	00119	Marital Status
17	705	CWE	O		0006	00120	Religion
18	250	CX	O			00121	Patient Account Number
19	16	ST	B			00122	SSN Number - Patient

PV1 Segment

Field	Length	DT	CT	RP	TR	TR	Field Name
1	4	SI	O			00131	Set ID - PV1
2	1	IS	R		0004	00132	Patient Class
3	80	PL	O			00133	Assigned Patient Location
4	2	IS	O		0007	00134	Admission Type
5	250	CX	O			00135	Preadmit Number
6	80	PL	O			00136	Prior Patient Location
7	250	XCN	O	Y	0010	00137	Attending Doctor
8	250	XCN	O	Y	0010	00138	Referring Doctor
9	250	XCN	B	Y	0010	00139	Consulting Doctor
10	3	IS	O		0069	00140	Hospital Service
11	80	PL	O			00141	Temporary Location
12	2	IS	O		0087	00142	Preadmit Test Indicator
13	2	IS	O		0092	00143	Re-admission Indicator
14	6	IS	O		0023	00144	Admit Source
15	2	IS	O	Y	0009	00145	Ambulatory Status
16	2	IS	O		0099	00146	VIP Indicator
17	250	XCN	O	Y	0010	00147	Admitting Doctor
18	2	IS	O		0018	00148	Patient Type
19	250	CX	O			00149	Visit Number
20	50	FC	O	Y	0064	00150	Financial Class

Inpatient/Outpatient

Room / Bed

Visit (encounter) Number

PV1 Segment (2)

Field	Length	Field	Field	Field	Field	Field	Field
21	2	IS	O		0032	00151	Charge Price Indicator
22	2	IS	O		0045	00152	Courtesy Code
23	2	IS	O		0046	00153	Credit Rating
24	2	IS	O	Y	0044	00154	Contract Code
25	8	DT	O	Y		00155	Contract Effective Date
26	12	NM	O	Y		00156	Contract Amount
27	3	NM	O	Y		00157	Contract Period
28	2	IS	O		0073	00158	Interest Code
29	4	IS	O		0110	00159	Transfer to Bad Debt Code
30	8	DT	O			00160	Transfer to Bad Debt Date
31	10	IS	O		0021	00161	Bad Debt Agency Code
32	12	NM	O			00162	Bad Debt Transfer Amount
33	12	NM	O			00163	Bad Debt Recovery Amount
34	1	IS	O		0111	00164	Delete Account Indicator
35	8	DT	O			00165	Delete Account Date
36	3	IS	O		0112	00166	Discharge Disposition
37	47	DLD	O		0113	00167	Discharged to Location
38	705	CWE	O		0114	00168	Diet Type
39	2	IS	O		0115	00169	Servicing Facility

PV1 Segment (3)

SEQ	LEN	DT	OPT	RPV	TOL	ITEM	ELEMENT NAME
40	1	IS	B		0116	00170	Bed Status
41	2	IS	O		0117	00171	Account Status
42	80	PL	O			00172	Pending Location
43	80	PL	O			00173	Prior Temporary Location
44	24	DTM	O			00174	Admit Date/Time
45	24	DTM	O			00175	Discharge Date/Time
46	12	NM	O			00176	Current Patient Balance
47	12	NM	O			00177	Total Charges
48	12	NM	O			00178	Total Adjustments
49	12	NM	O			00179	Total Payments
50	250	CX	O		0203	00180	Alternate Visit ID
51	1	IS	O		0326	01226	Visit Indicator
52	250	XCN	B	Y	0010	01274	Other Healthcare Provider

Admit date/time

Discharge date/time

NK1 – Next of Kin/Associated Parties

	LEN	DATA TYPE	OPTIONAL	REPEAT	FIELD NO.	DATA ELEMENT
1	4	SI	R		00190	Set ID - NK1
2	250	XPN	O	Y	0200	00191 Name
3	705	CWE	O		0063	00192 Relationship
4	250	XAD	O	Y		00193 Address
5	250	XTN	O	Y		00194 Phone Number
6	250	XTN	O	Y		00195 Business Phone Number
7	705	CWE	O		0131	00196 Contact Role
8	8	DT	O			00197 Start Date
9	8	DT	O			00198 End Date
10	60	ST	O			00199 Next of Kin / Associated Parties Job Title
11	20	JCC	O			00200 Next of Kin / Associated Parties Job Code/Class
12	250	CX	O			00201 Next of Kin / Associated Parties Empl Number
13	250	XON	O	Y		00202 Organization Name - NK1
14	705	CWE	O		0002	00119 Marital Status
15	1	IS	O		0001	00111 Administrative Sex
16	24	DTM	O			00110 Date/Time of Birth
17	2	IS	O	Y	0223	00755 Living Dependency
18	2	IS	O	Y	0009	00145 Ambulatory Status

Name of Next-of-Kin

Relationship to patient

Events for eHR

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)	ADT^A28	ADT_A05
	Rejoin eHR after Withdraw (ST3)		
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

Result Reporting

Preparing for eHR: What You Need to Know About HL7 Version 2

Result Report

- Chapter 7
- Events
 - ORU^R01 - Unsolicited observation/result
- Message structures
- Segments

ORU^R01 Message



ORU^R01	Unsolicited Observation Message	Chapter
MSH	Message Header	2
[{SFT}]	Software Segment	2
[UAC]	User Authentication Certification	2
{	--- PATIENT_RESULT BEGIN	
[	--- PATIENT BEGIN	
PID	Patient Identification	3
[PD1]	Additional Patient Identification	3
[{NTE}]	Notes and Comments (for Patient)	2
[{NK1}]	Next of Kin/Associated Parties	3
[	--- VISIT BEGIN	
PV1	Patient Visit	3
[PV2]	Additional Patient Visit	3
]	--- VISIT END	
]	--- PATIENT END	
{	--- OBSERVATION BEGIN	
[ORC]	Common Order	4
OBR	Observation Request	7
[{NTE}]	Notes and Comments (for Detail)	2
[{ROL}]	Role (for Observation)	15

ORU^R01 Message - cont' d

ORU^R01	Observation Results (Unsolicited)	Chapter
{	--- TIMING_QTY BEGIN	
TQ1	Timing/Quantity	4
[{TQ2}]	Timing/Quantity Order Sequence	4
}	--- TIMING_QTY END	
[CTD]	Contact Data	11
{	--- OBSERVATION BEGIN	
OBX	Observation/Result	7
[{NTE}]	Notes and Comments (for Detail)	2
}	--- OBSERVATION END	
[{FT1}]	Financial Transaction	6
[{CTI}]	Clinical Trial Identification	7
{	--- SPECIMEN BEGIN	
SPM	Specimen	7
[{OBX}]	Observation related to Specimen	7
}	--- SPECIMEN END	
}	--- OBSERVATION END	
}	--- PATIENT_RESULT END	
[DSC]	Continuation Pointer	2

OBR Data

1	Set ID	SI
2	Placer Order Number	EI
3	Filler Order Number	EI
4	Universal Service ID	CWE
5	Priority	ID
6	Requested Date/Time	DTM
7	Observation Date/Time	DTM
8	Observation End Date/Time	DTM
9	Collection Volume	CQ
10	Collector Identifier	XCN
11	Specimen Action Code	ID
12	Danger Code	CWE
13	Relevant Clinical Info	ST

14	Specimen Received Date/Time	DTM
15	Specimen Source	SPS
16	Ordering Provider	XCN
17	Order Call Back Phone	XTN
18	Placer Field 1	ST
19	Placer Field 2	ST
20	Filler Field 1	ST
21	Filler Field 2	ST
22	Change Date/Time	DTM
23	Charge to Practice	MOC
24	Diagnostic Serv Sect ID	ID
25	Result Status	ID
26	Parent Result	PRL

OBR Data - cont' d

27 Quantity/Timing	TQ
28 Result Copies To	XCN
29 Parent	EIP
30 Transportation Mode	ID
31 Reason for Study	CWE
32 Principal Result Interpreter	NDL
33 Assistant Result Interpreter	NDL
34 Technician	NDL
35 Transcriptionist	NDL
36 Scheduled Date/Time	DTM
37 No of Sample Containers	NM

38 Transport Logistics of Collected Sample	CWE
39 Collector' s Comments	CWE
40 Transport Arrangement Responsibility	CWE
41 Transport Arranged	ID
42 Escort Required	ID
43 Planned Patient Transport Comment	CWE
44 Procedure Code	CNE
45 Procedure Code Modifier	CNE
46 Placer Supplemental Service Information	CWE

OBR Data – cont' d

47 Filler Supplemental Service Information	CWE	49 Result Handling	IS
48 Medically Necessary Duplicate Procedure Reason	CWE	50 Parent Universal Service Identifier	CWE

OBX Data

1	Set ID	SI	12	Date Last Observation Normal Values	DTM
2	Value Type	ID	13	User Defined Access Checks	ST
3	Observation Identifier	CWE	14	Date/Time of the Observation	DTM
4	Observation Sub-ID	ST	15	Producer' s ID	CWE
5	Observation Value		16	Responsible Observer	XCN
6	Units	CWE	17	Observation Method	CWE
7	Reference Range	ST	18	Equipment Instance Identifier	EI
8	Abnormal Flags	ID	19	Date/Time of the Analysis	DTM
9	Probability	NM			
10	Nature of Abnormal Tests	ID			
11	Observation Result Status	ID			

OBX Data

1	Set ID	SI	12	Date Last Observation Normal Values	DTM
2	Value Type	ID	13	User Defined Access	ST
3	Observation Identifier	CWE	Identifies the format of the observation: CE, NM, ST, AD, DT, etc.		
4	Observation Sub-ID				
5	Observation Value		15	Producer's ID	CWE
6	Units	CWE	16	Responsible Observer	XCN
7	Reference Range	ST	17	Observation Method	CWE
8	Abnormal Flags	ID	18	Equipment Instance Identifier	EI
9	Probability	NM	19	Date/Time of the Analysis	DTM
10	Nature of Abnormal Tests	ID			
11	Observation Result Status	ID			

OBX Data

20 Observation Site	CWE	23 Performing Organization Name	XON
21 Observation Instance ID	EI	24 Performing Organization Address	XAD
22 Mood Code	CNE	25 Performing Organizaiton Medical Director	XCN

ORU Messages Sample (data)

MSH|^~\&|OBIS|CMC|EPR|HAHO|20021029133345||ORU^R01|5355|P|2.5|||ER|ER|HKG|ASCII|ENG

PID|||A1234563^HKID||B/O Chan^Siu Man||20021029|M|||1517, 15, A, ABC Centre^TM|||S

PV1|1|I|A10^ICU^12|||||||||||||HN02000006A|||||||||||||20021029132425

OBR|1|X89-1501^OE|78912^RD|9274-2^NEONATAL APGAR 5M POST BIRTH^LN|R|2002010291330|19873290800||CS1A|N

OBX|1|ST|32411-1^NEONATAL APGAR.COLOR 5M POST BIRTH^LN||2|||F

OBX|2|ST|32412-9^NEONATAL APGAR.HEART RATE 5M POST BIRTH^LN||2|||F

OBX|3|ST|32413-7^NEONATAL APGAR.MUSCLE TONE 5M POST BIRTH^LN||2|||F

OBX|4|ST|32414-5^NEONATAL APGAR.REFLEX IRRITABILITY 5M POST BIRTH^LN||2|||F

OBX|5|ST|32415-2^NEONATAL APGAR.RESPIRATORY EFFORT 5M POST BIRTH^LN||2|||F

ORU Messages Sample (ED)

```
MSH|^~\&|OBIS|CMC|EPR|HAHO|20021029133345||ORU^R01|5355|P|2.5|||ER|ER|
HKG|ASCII|ENG
```

```
PID|||A1234563^HKID||B/O Chan^Siu Man||20021029|M|||1517, 15, A, ABC
Centre^TM||||S
```

...

...

```
OBX|1|ED|^Clinical Note||^Base64^Content-Type: application/pdf;
charset=UTF-8; name=Clinical_note.pdf
```

Content-transfer-encoding: base64

```
JVBERi0xLjQNJeLjz9MNCjE5IDAgb2JqPDwvSFs2NzYgMjAyXS9MaW5lYXJp
emVkIDEvRSA0MTExMy9MIDc0MjU5L04gMi9PIDIyL1QgNzM4MzI+Pg1lbmRv
YmoNICAgICAgICAgICAgICAgICAgICAgICAgDQp4cmVmDQoxOSA0KMDAwMDAw
MDAxNiAwMDAwMCBuDQowMDAwMDAwODc4IDAuMDAwIG4NCjAwMDAwMDA2NzYg
MDAwMDAgbg0KMDAwMDAwMDk1OCAwMDAwMCBuDQowMDAwMDAxMDg3IDAuMDAw
||||F
```

ORU Messages Sample (RP)

MSH|^~\&|OBIS|CMC|EPR|HAHO|20021029133345||ORU^R01|5355|P|2.5|||ER|ER|HKG|ASCII|ENG

PID|||A1234563^HKID||B/O Chan^Siu Man||20021029|M|||1517, 15, A, ABC Centre^TM||||S

...

...

OBX|1|RP|^Clinical
Note||http://www.ehr.com/A1234563/Clinical_note.pdf||||F

...

...

Case Study Sharing

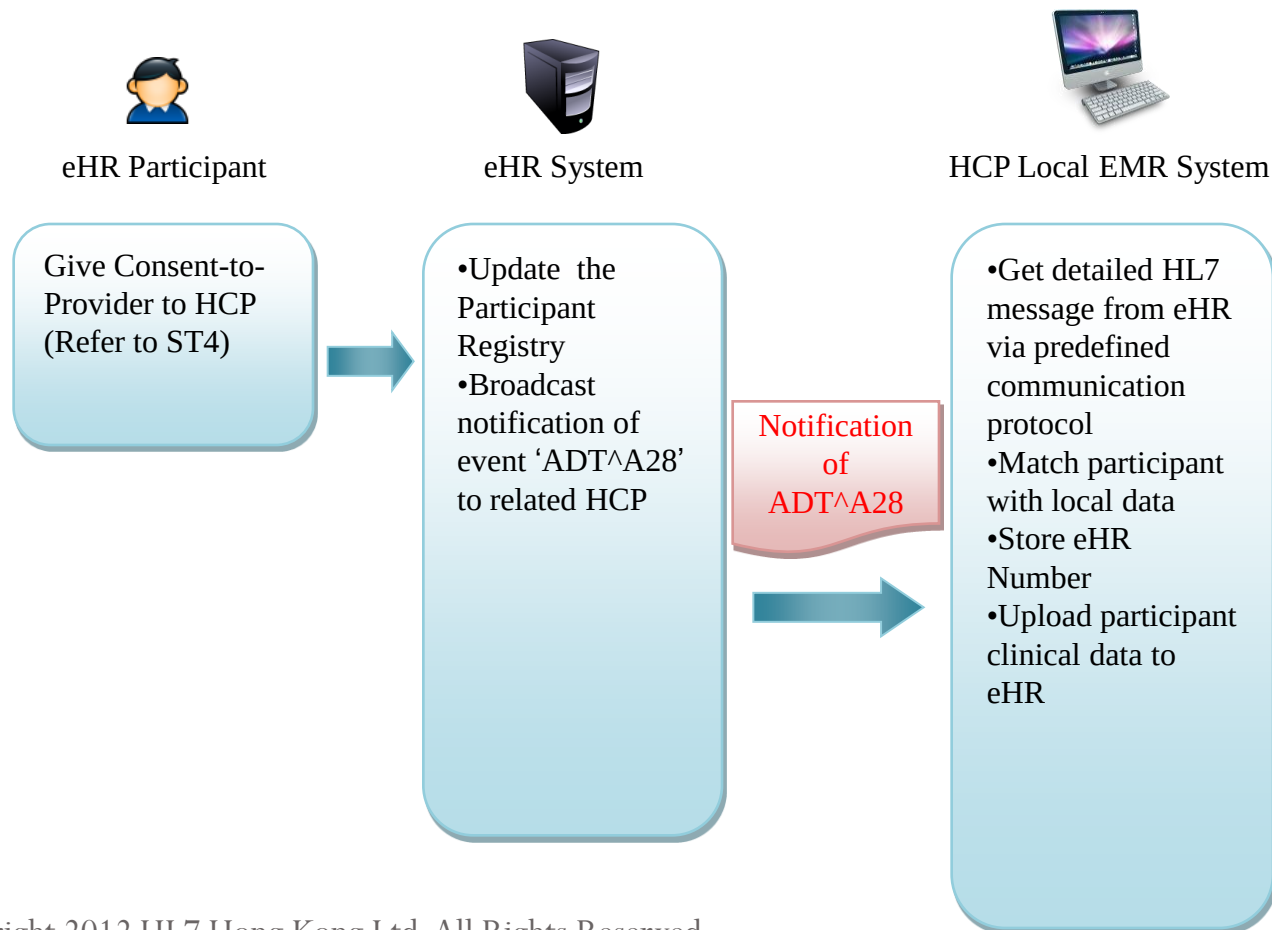
Preparing for eHR: What You Need to Know About HL7 Version 2

Two Scenarios

- PMI Notification from eHR to HCP
- Radiology data from HCP to eHR/HA

PMI Notification from eHR

- Consent to Provider



Consent to Provider

- Message Structure

Required

<u>eHR Segment</u>	<u>ADT^A28</u>	<u>ADT Message</u>	<u>Chapter in HL7 Specification</u>
✓	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

- Data to be received

Data Component	Data Element	Cardinality (M: Mandatory O: Optional)
Participant Identity	eHR number	M
	HKIC number	M if [Identity document number] is blank O if [Identity document number] is not blank
	Type of identity document	O if [Identity document number] is blank M if [Identity document number] is not blank
	Identity document number	O if [HKIC number] is not blank M if [HKIC number] is blank
	English surname	M
	English given name	O
	English full name	M
	Date of birth	M
	Exact date of birth indicator	M
	Sex	M
Functional Information	Message number	M
	Event code	M
	Transaction datetime	M

Consent to Provider

- Study the data mapping

Tag	Len	HL7 Data Type	RP /#	TB L #	Element Name	eHR Required Data Field						Remarks
						Compliance Level 3						
						A28 (ST2, ST3, ST4, SF5)	A29 (ST5, ST6)	A47 (ST7)	A08 (ST1, SF1, SF2)	A45 (SF3)	A08 (SF4)	
<PID.2> <CX.1>	20	CX ST			Patient ID ID Number	eHR Number						
<CX.7>		DT			Effective Date	eHR Enrolment Start Date (For ST2 and ST3 only)	Not Use				In format: YYYYMMDD	
<CX.8>		DT			Expiration Date	Not Use	eHR Enrolment End Date (For ST5 only)	Not Use				In format: YYYYMMDD

Extract data from the message

```
<PID>
  <!-- eHR Number -->
  <PID.2>
    <CX.1>201000000001</CX.1>
  </PID.2>
  <!-- Identity Document Number and Type of Identity Document-->
  <PID.3>
    <CX.1>A12345678</CX.1>
    <CX.5>ID</CX.5>
  </PID.3>
  <PID.5>
    <!-- Participant English Surname -->
    <XPN.1>
      <FN.1>CHAN</FN.1>
    </XPN.1>
    <!-- Participant English Given Name -->
    <XPN.2>TAI MAN</XPN.2>
    <!-- Participant English Full Name -->
    <XPN.9>
      <CE.2>CHAN, TAI MAN</CE.2>
    </XPN.9>
  </PID.5>
  <PID.7>
```

Radiology data send out

- Data Requirement

4	Radiology Examination Data				
4.1	Radiology examination datetime	Date / time when the radiology examination was performed. If the radiology procedure examination date / time is not available, can use the report creation date; if report creation date is not available, can use the submission date to eHR.	string(23)		M
4.2	Radiology modality code	eHR value of the "Radiology modality" code table, to define modality of the radiology examination	string(10)	Refer to the code set of "Radiology modality" in eHR Office website	M
4.3	Radiology examination name	The name of the radiology examination such as the examination region(s) or site(s)	string(2000)		O

Radiology data upload

- Message Structure

Required

<u>eHR Segment</u>	<u>ORU^R01</u>	<u>ORU Message</u>	<u>Chapter in HL7 Specification</u>
✓	MSH	Message Header	2
	[{ SFT }]	Software Segment	2
✓	EVN	Event Type	3
✓	PID	Patient Identification	3
	...	...	
✓	PV1	Patient Visit	3
	...	...	
✓	[ORC]	Order Common	4
✓	OBR	Observation Request	7
	...	...	
✓	[{OBX}]	Observation related to OBR7	

Radiology data upload

- Study the data mapping

Tag	Len	HL7 Data Type	RP/#	TBL#	Element Name	Fields	Remarks
<OBR.7> <TS.1>	26	TS DTM			Observation Date/Time # Time	Radiology report date	For Radiology Image Sharing project :Study Datetime In format: YYYYMMDDhhmmss[.s[s]]] e.g. 20100131163005.005
...	...	...	...	...	...	...	...
<OBR.24>	10	ID		0074	Diagnostic Serv Sect ID	Radiology modality code	For Radiology Image Sharing project : Type of Investigation Refer to the code set of “Radiology modality” in eHR Office website

Format the message

```
<OBR.2>
  <EI.1>RAD001</EI.1>
</OBR.2>
<OBR.4>
  <CE.1>Abdomen and pelvic</CE.1>
  <CE.5>RAD</CE.5>
</OBR.4>
<OBR.7>
  <TS.1>20100612000000.000</TS.1>
</OBR.7>
<OBR.24>CT</OBR.24>

...
<ORU_R01.OBSERVATION>
  <OBX>
    <OBX.2>ED</OBX.2>
    <OBX.3>
      <CE.1>1</CE.1>
      <CE.2>CT of abdomen report</CE.2>
    </OBX.3>
```

Management for HL7 Project

Preparing for eHR: What You Need to Know About HL7 Version 2

What is Project Management?

- According to the Project Management Institute (PMI):
 - A project is a temporary endeavor undertaken to create a unique product or service.
 - Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.
 - Project management is accomplished through the use of the processes such as: initiating, planning, executing, controlling and closing.

‘The Triple Constraint’



The Triple Constraint of Project Management

Triple constraint of HL7 Project

- Scope
 - Data Interface Requirement
 - Source and Target Systems
 - Frequency of data exchange
 - Technical Protocol

- Cost
 - H/W and S/W
 - Network connectivity
 - Man power

Triple constraint of HL7 Project

- Time
 - Requirement Gathering
 - Analysis and Design: Event & Data mapping
 - Interface development
 - Connectivity test
 - Pilot and Production

Works

- Data interface requirement
 - Event discovering, Data Mapping & localisation
- Source and Target Systems
 - Any interface engine in the middle?
 - Any transaction log at the Source system?
 - Can 'staging area' be provided by Target system?
- Frequency of data exchange
 - near real-time, per X minutes, per X hours, X times per day
- Technical Protocol
 - MLLP, E-mail, FTP, HTTP, SOAP, ebMS

Other major factors

- Support by Stakeholders
 - Management, Sponsors, End users, Vendors/developers of Source and Target systems
- Exception Handling
 - Schema error
 - Missing required fields
 - No data received or sent during agreed period
 - Missing Source / Target systems

Implementation

- Before -> Connectivity Test
 - By IP or DNS?
 - Any router, firewall setting missing?
 - Any testing environment between source and target?
 - Can perform pilot run?
- After -> Post-implementation review
 - Any further exception handling required?
 - Operational procedure after exception happened

Deliverable

- Interface specification
 - Scope and Scenario
 - Data dictionary
 - Event and Segment used
 - Data Mapping
 - Code table (External or user-specified)
- Interface program and application
 - May included the monitoring

Q & A

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THE END

THANK YOU!