Introduction to Health Level Seven
Standard Version 2.8.2

National Resource Centre for EHR Standards (NRCeS)
Project of Ministry of Health and Family welfare (MoHFW)
C-DAC, Pune
Agenda

• Why Medical Standard?
• What is Health Level Seven (HL7)?
• Purpose
• Timeline of HL7 Standards
• HL7 in Communication
• HL7 Systems
• HL7 Message
• Understanding HL7 Message Structure
Why Medical Standard?

• In order to reduce disconnects between all health care systems, there must some standard to achieve interoperability.

• Provide quality improvement and greater value.

• Improve information access.

• Helps to identify the mechanisms for protecting the privacy & confidentiality of individual’s health data.
What is Health Level Seven (HL7)?
Version 2.8.2

• An Application Protocol for Electronic Data Exchange in Healthcare Environments
• Health Level-7 or HL7 refers to a set of international standards for transfer of clinical and administrative data
• Language that describes you, and your medical information, to all the Hospital information systems
• Produced by the Health Level Seven International
  • A not-for-profit, international standards developing organization
  • ANSI-accredited
  • Founded in 1987
HL7 - What Does it Mean?

**HL7 – Health Level 7**

1. **Physical Layer**
2. **Data Link Layer**
3. **Network Layer**
4. **Transport Layer**
5. **Session Layer**
6. **Presentation Layer**
7. **Application Layer**

**OSI Model**
Purpose

• To provide a comprehensive framework and related standards for the exchange, integration, sharing and retrieval of electronic health information that supports clinical practice and the management, delivery and evaluation of health services

• **HL7 Vision** - A world in which everyone can securely access and use the right health data when and where they need it

• **HL7 Mission** - To provide standards that empower global health data interoperability
Timeline of HL7 Standards

• 1987    Founded and Version 1.0
• 1988    Version 2.0
• 1990-2000 Version 2.1 to 2.4
• 2000-2007 Version 2.5
• 2007-2014 Version 2.6 to Version 2.7
• 2014    Version 2.8 to version 2.8.2
• 2015    Version 2.8.2
HL7 in Communication

- Health Information System
- Patient Registration
- Clinical Laboratory Information System
- Financial Management Information System
- Radiology Information System
- ... and more
HL7 in Communication

Patient Arrives

Patient goes for Lab test

Patient Discharge

Patient Registration

Clinical Laboratory Information System

Financial Management Information System
HL7 in Communication

Patient Registration Scenario

Patient Admit

sends information to Finance department (ADT_A01)
HL7 in Communication

Patient Lab Test Scenario

- Goes for lab test
- Query Patient Admin (QBP_Q21)
- Retrieves Info (RSP_K21)
- Sends info to finance (ORU_R01)
HL7 in Communication

Patient Discharge Scenario

Generates Bill

Sends discharge notification (ADT_A03)
HL7 Systems

• There are large number of Messages present for different departments in Health information system.

• HL7 standard categories these messages according to their purpose in different HL7 Systems.

• In HL7 v2.8.2, total 15 Systems are stated.

• Patient Administration, Observation Reporting, Medical Records, Order entry, Application Management, Scheduling, Patient Referral, Financial Management, Master Files, Patient Care, Clinical Laboratory Automation, Personnel Management, Claims and Reimbursement, Materials Management.
HL7 Message

• Atomic unit of data transferred between systems
• Group of segments in a defined sequence
• Each message has a message type that defines its purpose
• Message Code
  - A three-character code contained within each message identifies its type.

For example: the ADT Message type is used to transmit portions of a patient’s Patient Administration (ADT) data from one system to another.
Message

• Trigger Event
  - The real-world event that initiates an exchange of messages.
  - Event type

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A01</td>
<td>ADT/ACK - Admit/visit notification</td>
</tr>
<tr>
<td>A02</td>
<td>ADT/ACK - Transfer a patient</td>
</tr>
<tr>
<td>A03</td>
<td>ADT/ACK - Discharge/end visit</td>
</tr>
<tr>
<td>A04</td>
<td>ADT/ACK - Register a patient</td>
</tr>
<tr>
<td>A05</td>
<td>ADT/ACK - Pre-admit a patient</td>
</tr>
</tbody>
</table>
Segment

- A segment is a logical grouping of data fields.
- Segments of a message may be required or optional.
- A segment may occur only once in a message or they may be allowed to repeat.
- Each segment contains a unique three-character code which defines nature of Segment.
Segment Group

• Two or more segments may be organized as a logical unit called a segment group.

• A segment group may be required or optional and might or might not repeat.

• A segment group is assigned a name that represents a permanent identifier that may not be changed.
Field

• A field is a string of characters.
• Fields for use within HL7 segments are defined by HL7.
• HL7 does not care how systems actually store data within an application. When fields are transmitted, they are sent as character strings.
Data Type

• The basic building block used to construct or restrict the contents of a data field.

• Each field is assigned a data type that defines the value domain of the field.
Data Type Types

• Primitive
  - Series of characters
  - E.g. DT, DTM, ID, ST etc.

• Composite
  - Series of components that are themselves assigned to a data type, which may again be either primitive or composite data types
  - The components of a component are called sub-components, and they SHALL only be assigned primitive data types.
  - E.g. AD, CNE, CWE, XCN, XPN etc.
## Message delimiters

<table>
<thead>
<tr>
<th>Delimiter</th>
<th>Suggested Value</th>
<th>Encoding Character Position</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Terminator</td>
<td><code>&lt;cr&gt;</code></td>
<td>-</td>
<td>Terminates a segment record. This value cannot be changed by implementers.</td>
</tr>
<tr>
<td>Field Separator</td>
<td>`</td>
<td>`</td>
<td>-</td>
</tr>
<tr>
<td>Component Separator</td>
<td><code>^</code></td>
<td>1</td>
<td>Separates adjacent components of data fields where allowed.</td>
</tr>
<tr>
<td>Repetition Separator</td>
<td><code>~</code></td>
<td>2</td>
<td>Separates multiple occurrences of a field where allowed.</td>
</tr>
<tr>
<td>Escape Character</td>
<td><code>\</code></td>
<td>3</td>
<td>Escape character for use with any field, component, or sub-component represented by an ST, TX or FT data type.</td>
</tr>
<tr>
<td>Subcomponent Separator</td>
<td><code>&amp;</code></td>
<td>4</td>
<td>Separates adjacent subcomponents of data fields where allowed.</td>
</tr>
<tr>
<td>Truncation character</td>
<td><code>#</code></td>
<td>5</td>
<td>Indicated character to be used for the truncation pattern.</td>
</tr>
</tbody>
</table>
Understanding HL7 Message Structure

MSH|^~\&|MegaReg|XYZHospC|SuperOE|XYZImgCtr|20060529090131-0500||ADT^A01^ADT_A01|01052901|P|2.5
EVN|200605290901|200605290900

PID|56782445^^UAReg^PI||KLEINSAMPLE^BARRY^Q^JR|19620910|M|2028-9^HL70005^RA99113^^XYZ|260 GOODWIN CREST D
PV1|I|W^389^1^UABH^^^3||12345^MORGAN^REX^J^^MD^0010^UAMC^L||67890^GRAINGER^LUCY^X^^MD^0010^UAMC^L|MED|
OBX|1|NM^Body Height|1.80|m^Meter^ISO+|||F
OBX|2|NM^Body Weight|79|kg^Kilogram^ISO+|||F
AL1|1|ASPIRIN
DG1|1|786.50^CHEST PAIN, UNSPECIFIED^I9||A
Understanding HL7 Message Structure
Understanding HL7 Message Structure

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</table>
Understanding HL7 Message Structure

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSH</td>
<td>Message Header</td>
<td></td>
</tr>
<tr>
<td>SFT</td>
<td>Software Segment</td>
<td></td>
</tr>
<tr>
<td>UAC</td>
<td>User Authentication Credential</td>
<td></td>
</tr>
<tr>
<td>EVN</td>
<td>Event Type</td>
<td></td>
</tr>
<tr>
<td>PID</td>
<td>Patient Identification</td>
<td></td>
</tr>
</tbody>
</table>
Understanding HL7 Message Structure

Segment -

PID

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Understanding HL7 Message Structure

PID | Name | DOB | Address
---|------|-----|---------

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AL1|1|ASPIRIN
DG1|1|CHEST PAIN, UNSPECIFIED|I9|A
```
Understanding HL7 Message Structure

- **Field Separator**
- **Component Separator**
- **Subcomponent Separator**
- **Repetition Separator**
References

Thank You

nrc-help@cdac.in