

**Hawaii Immunization Registry**  
*HL7 – 2.4 Batch & Real-time*  
*Transfer Specification*

**GTS Version 1.9**  
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# Hawaii Immunization Registry

## HL7 – 2.4 & Real-time Transfer Specification

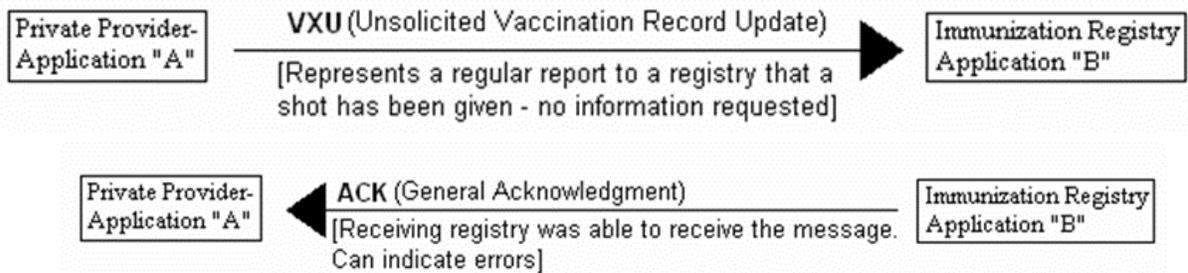
### Change History

Published / Revised Date	Version #	Author	Section / Nature of Change
06/12/2008	1.0	EDS	Version 1.0 HIR
08/08/2011	1.4	DOH	Update fields and terminology
10/01/2012	1.5	HP	Remove references to PHINMS, add Web Service information
11/19/2012	1.6	HP	Update responsible person relationship table
01/23/2013	1.7	HP/DOH	Update fields and correct errors
2/18/2013	1.8	HP	PID 29 change to correct error update tables
4/5/2013	1.9	HP	Removed the reference tables and moved them to a separate document, HL7 Reference Tables

### Introduction

The Hawaii Immunization Registry (HIR) has made available an interactive user interface on the World Wide Web for authorized users to enter, query, and update patient immunization records. The Web interface makes HIR information and functions available on desktops around the state. However, some immunization providers already store and process similar data in their own information systems and may wish to keep using those systems while also participating in the statewide central repository. Others may have different billing needs and may decide they don't want to enter data into two diverse systems. HIR has been enhanced to accept HL7 Version 2.4 for batch loads to submit patient and immunization information to HIR. HIR also allows providers to submit patient and immunization information via real-time system using HL7 2.4 formatted VXQ^V01 Message (Query for Vaccination Record) and a VXU^V04 Message (Unsolicited Vaccination Update) and receive from HIR the resulting HL7 2.4 Response Message in real time. Specifications for HL7 2.4 Real-time start on page 25.

For instructions on how to do data exchange with HIR please reference Chapter 13 of the User Manual.



### The Health Level Seven (HL7) Standard

The ANSI HL7 standard is widely used for data exchange in the health care industry. The full standard is quite lengthy, covering a variety of situations in patient care and health care finance and no single application is likely to use all of its content. The CDC has worked with HL7 developers to create a set of messages that permit exchange of immunization data. This document covers the subset of HL7 that will be used for patient and immunization records exchanged between HIR and outside systems.

- The basic unit transmitted in an HL7 implementation is the **message**.
- Messages are made up of several **segments**, each of which is one line of text, beginning with a three-letter code identifying the segment type.
- Segments are in turn made up of several **fields** separated by a delimiter character, “|”.

```

MSH|^~\&|VALLEY CLINIC^|HIR^|19991005032342||VXU^V04|682299|P^|2.4^|||ER
PID||79928^|A5SMIT0071^|SMITH^MARY^T^|JOHNSON^|19951212|F|||
RXA|0|999|19970903|19970903|^0701^DTP^CPT|0.5
  
```

The details of how HL7 messages are put together, for HIR purposes, will be explained later in this document. The example above shows the essentials of what a message looks like. In this example, a message is being sent on behalf of Valley Clinic to HIR. The message consists of three segments. NOTE: Valley Clinic may or may not be the actual transmitter of the message. The transmitter of the message will be identified by HIR from log-in information and not from an HL7 message.

- The Message Header segment (**MSH**) identifies the owner (**VALLEY CLINIC**) of the information being sent and the receiver (**HIR**). It also identifies the message as being of type **VXU**. The VXU is an Unsolicited Vaccination Record Update, which is one of the message types defined by HL7.
- The Patient Identification segment (**PID**) gives the patient’s name (**MARY T SMITH**), birth date (19951212, in YYYYMMDD format), and other identifying fields.
- The Pharmacy Administration segment (**RXA**) tells that a DTP vaccine, with CPT code 90701, was administered on September 3, 1997 (formatted as 19970903). Many fields are optional and this example may have more information included in it. Some segments can be repeated within a single message. In this example, the message could have included a second RXA segment to record another immunization given.

HL7 does not specify how messages are transmitted. It is flexible enough to be used for both real-time interaction and large batches. The standard defines file header and file trailer segments that are used when a number of messages are gathered into a batch for transmission as a file. HIR will use batch files of messages to communicate with outside systems.

## Scope of This Document

The General Transfer Specification (GTS) documented here supports automated exchange of data between the HIR repository and outside systems. This allows both the patient and immunization records to be available in both systems, so as to avoid the need to enter data twice. The remainder of this document specifies how HL7 file messages are constructed for the purposes of HIR. This document does not cover the step by step methods that are used to transmit files between HIR central repository and any outside systems such as Web Services messaging for Real-time or batch transactions. It covers only a small subset of the very extensive HL7 standard. Files of messages constructed from the guidelines in this document will fall within the HL7 standard, but there is a wide variety of other possible HL7 messages that are outside the scope of this document.

## References

- The National Immunization Program within the Center for Disease Control ([www.cdc.gov/nip](http://www.cdc.gov/nip)) has published an Implementation Guide for Immunization Data with the purpose of keeping the use of HL7 for immunization data as uniform as possible.

## HL7 Message Types Used in HIR BATCH Transmissions

HIR uses three message types for batch transmissions: ADT, VXU and ACK. The ADT is used for sending patient demographic information updates without any immunizations. The VXU is used for sending new and/or updated patient demographic information and immunizations. The ACK is used to acknowledge to the sender that a message has been received. Table 1 below shows the segments that are used to construct each message type. Each segment is one line of text ending with the carriage return character. The carriage return is needed so that the HL7 messages are readable and printable. The messages may appear somewhat cryptic due to the scarcity of white space. (The standard has provisions for inclusion of binary data, but HIR will not use these features.) Square brackets [ ] enclose optional segments and curly braces { } enclose segments that can be repeated; thus, an ADT message type could be composed of just MSH and PID segments. Also, any number of NK1 segments could be included in the message. The full HL7 standard allows additional segments within these message types, but they are unused by HIR. In order to remain compliant with HL7, their use will not result in an error, but the recipient can ignore the content of the message. The segments that are documented here are sufficient to support the principal HIR functions of storing data about patients and immunizations.

Table 1

### ADT

Update Patient Information

MSH	Message Header
PID	Patient Identification
[{NK1}]	Next of Kin / Associated Parties
[{*OBX}]	Observation/Result

### VXU

Unsolicited Vaccination Record Update

MSH	Message Header
-----	----------------

PID	Patient Identification
[PD1]	Patient Additional Demographic
[{NK1}]	Next of Kin / Associated Parties
[PV1]	Patient Visit
{RXA}	Pharmacy / Treatment Administration
[RXR]	Pharmacy / Treatment Route (Only one RXR per RXA segment)
[{OBX}]	Observation/Result*

### ACK

General Acknowledgment

MSH	Message Header
MSA	Message Acknowledgment
[ERR]	Error

\*The only OBX segment that is valid within an ADT message is one that specifies a CONTRAINDICATION in the OBX-03 Value Type field. (i.e., 30945-0^Contraindication^LN)

### RECOMMENDATIONS:

HIR will NOT accept an ADT message (unsolicited demographic update) for a new patient. ADT message is only used to update existing patient demographic information to patients existing in HIR. Therefore, it is best to include the demographic information in a VXU message whenever possible, as this message type accommodates BOTH immunization information and demographic update information. If submitting a new patient it must follow the VXU message format for the new patient within the file.

## Message Segments: Field Specifications and Usage

### Reference and Code Tables

The tables referenced in this guide can be found in the HL7 Reference Tables document on the HIR website under the forms tab and the CDC HL7 Specifications posted at <http://www.cdc.gov/vaccines/programs/iis/technical-guidance/hl7.html>.

### HL7 Segment Structure

Each segment consists of several fields that are separated by “|”, which is the field separator character. The tables below define how each segment is structured and contain the following columns:

- SEQ** The ordinal position of the field in the segment. Since HIR does not use all possible fields in the HL7 standard, these are not always consecutive.
  - LEN** Maximum length of the field.
  - DT** HL7 data type of the field. See below for definition of HL7 data types.
  - R/M** R means required by HL7, and M means mandatory for HIR. Blank indicates an optional field.
  - RP/#** Y means the field may be repeated any number of times, an integer gives the maximum number of repetitions, and a blank means no repetition is permitted.
  - TBL#** Number of the table giving valid values for the field.
  - ELEMENT NAME** HL7 name for the field.
- HL7 data types.** Each field has an HL7 data type. Appendix A of this document lists and defines the HL7 data types needed for HIR. The elemental data types Numeric (NM) and String (ST) consist of one value, while some data types, such as Extended Person Name (XPN) are composites.
  - Delimiter characters.** Field values of composite data types consist of several components separated by the **component separator**, “^”. When components are further divided into sub-components, these are separated by the **sub-component separator**, “&”. Some fields are defined to permit repetition separated by the **repetition character**, “~”. When these special characters need to be included within text data, their special interpretations are prevented by preceding them with the **escape character**, “\”.

```
MSH|^~\&| .....
XXX|field1|component1^component2^subcomponent3.1&subcomponent3.2^component4| .....
YYY|repetition1~repetition2| .....
ZZZ|data includes escaped \|~ special characters| .....
```

In the example above, the Message Header segment uses the field separator, “|”, immediately after the “MSH” code that identifies the segment. This establishes what character serves as the field separator throughout the message. The next field, the four characters “^~\&”, establishes, in order, the component separator character, the repetition character, the escape character, and the sub-component separator character that will apply throughout the message. The hypothetical “XXX” segment includes field1 with no internal structure, but the next field has several components separated by “^”, and the third of these is made up of two sub-components separated by “&”. The hypothetical “YYY” segment’s first field permits repetition, in this example the two values “repetition1” and “repetition2”. The hypothetical “ZZZ” segment’s field has a text value that includes the characters “|~”, and these are escaped to prevent their normal structural interpretation.

In HIR, sub-components, repetition and text values requiring the escape character will be rare. Components within fields are common, since names and addresses are represented this way. HL7 permits the use of other delimiters besides the recommended ones and the delimiters used in each message are given in the Message Header segment. HIR will always use the recommended delimiters when sending files and requires their use for files received.

### Rules for Sending Systems

The following rules are used by sending systems to construct HL7 messages.

- Encode each segment in the order specified in the message format.
- Begin the segment with the 3-letter segment ID (for example RXA).
- Precede each field with the data field separator (“|”).
- Use HL7 recommended encoding characters (“^~\&”).
- Encode the data fields in the order given in the table defining segment structure.
- Encode the data field according to its HL7 data type format.
- Do not include any characters for fields not present in the segment. Since later fields in the segment are encoded by ordinal position, fields that are not present do not reduce the number of field separators in the segment. For example, when the second and third fields are not present, the field separators maintain the ordinal position of the fourth field: |field1|||field4
- Data fields that are present but explicitly null are represented by empty double quotes “”.
- Trailing separators may optionally be omitted. For example, |field1|field2||| is equivalent to |field1|field2, when field3 and subsequent fields are not present.
- End each segment with the segment terminator (the linefeed/carriage return characters, ASCII hex 0D 0A).

The following rules are used by receiving systems to process HL7 messages.

- Treat data segments that are expected but not present as if all data fields in the segment were not present.
- Require use of HL7 recommended Field Separator |, and Encoding characters ^~\& for encoding messages.
- Ignore any data segment that is included but not expected, rather than treating it as an error. The HL7 message types used by HIR may include many segments besides the ones in this document, and HIR ignores them. HIR will not send messages with segments not documented in this specification, but reserves the right to specify more segments at a later date. The rule to ignore unexpected segments facilitates this kind of change.
- Ignore data fields found but not expected within a segment.

The message segments below are needed to construct message types that are used by HIR. Each segment is given a brief description excerpted from the HL7 standard. The tables define what fields make up each segment. Since HIR does not use all the fields that HL7 defines, there are sometimes gaps in the ordinal sequence of fields. Following HL7 rules, the gaps do not diminish the number of field separators within the segment. For example, if the second and third fields in a segment are not present, their field separators remain in order to indicate that the next field present is the fourth: field1|||field4 .

### ERR

The ERR segment is used to add error comments to acknowledgment messages.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	80	CM	R	Y		Error Code and Location

#### Field Notes:

ERR-1 A composite field with four components.

<segment ID (ST)>^<sequence (NM)>^<field position (NM)>^<field component ordinal number (NM)>

The first component identifies the segment ID containing the error. The second component identifies the input file line number of the segment containing the error. The third component identifies by ordinal number the field containing the error. The fourth component identifies, by ordinal number, the field component containing the error (0 is used if not applicable). The remaining five components of the CE data type are not valued and their '^' separators are not generated. Note that error text is transmitted in field MSA-3. For example, if the NK1 segment is missing a mandatory field:

Example: ERR|NK1^10^2^1

This error message identifies the NK1 segment occurring on line 10 of the input file whose mandatory second field (Name) is missing the mandatory 1<sup>st</sup> component (Family Name).

## MSA

The MSA segment contains information sent while acknowledging another message.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	2	ID	R		0008	Acknowledgment Code
2	20	ST	R			Message Control ID
3	80	ST				Text Message

### Field Notes:

- MSA-1 Acknowledgement code giving receiver's response to a message. AA (Application Accept) means the message was processed normally. AE (Application Error) means an error prevented normal processing. An error message will be put in MSA-3, and for ACK messages the optional ERR segment will be included.
- MSA-2 The message control ID from MSH-10 in the message being acknowledged. This allows the sending system to associate this response with the message being responded to.
- MSA-3 Text of error message, an optional field to further describe an error condition.

Example: MSA|AA|6987H87G|Relationship missing last name.**MSH**

The MSH segment defines the intent, source, destination and some specifics of the syntax of a message.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	1	ST	R			Field Separator
2	4	ST	R			Encoding Characters
3	180	HD				Sending Application
4	180	HD	R			Sending Facility
5	180	HD				Receiving Application
6	180	HD				Receiving Facility
7	26	TS	R			Date/Time Of Message
9	7	CM	R			Message Type
10	20	ST	R			Message Control ID
11	3	PT	R		0103	Processing ID
12	60	VID	R		0104	Version ID
15	2	ID			0155	Accept Acknowledgment Type

### Field Notes:

- MSH-1 Determines the field separator in effect for the rest of this message. HIR requires the HL7 recommended field separator of "|".
- MSH-2 Determines the component separator, repetition separator, escape character, and sub-component separator in effect for the rest of this message. HIR requires the HL7 recommended values of "~\&".
- MSH-3 Name of the sending application. When sending, HIR will use "HIR" followed by the current version number of the registry. See MSH-4 and MSH-6 for the fields principally used to identify sender and receiver of the message.
- MSH-4 Identifies for whom the message is being sent (the owner of the message information). When sending, HIR will use "HIR". When the message is being sent to HIR and the Provider Organization owning the information is different than the organization transmitting the message (as in a Parent/Child or Vendor/Child relationship), use either the HIR Provider ID of the Provider Organization that owns the information preceded by a component separator (e.g., ^3601^ ) or the short Provider Organization name (e.g., Valley^^.) Contact the HIR Help Desk for the appropriate organization ID.
- When transmitting via web services, both MSH-4.1 (the Provider Organization name) and MSH-4.2 (the HIR Provider ID) must be provided, e.g. Valley^3601^.
- MSH-5 First Component identifies the application receiving the message. When sending to HIR, this application is "HIR".

- MSH-6 Identifies the message receiver. When sending, HIR will use the short Provider Organization name assigned when the provider first registers with the HIR database and HIR-Web interface.
- MSH-7 Date and time the message was created. HIR ignores any time component. See the TS data type. This is a required field for web services transmission.
- MSH-9 This is a required field. Two components of this field give the HL7 message type (see Table 0076) and the HL7 triggering event (see Table 0003). Within HL7, the triggering event is considered to be the real-world circumstance causing the message to be sent. For HIR purposes, this field should have the value ADT^A31 for a message conveying patient information or the value VXU^V04 for a message conveying patient and immunization information. In acknowledgement messages the value ACK is sufficient and the second component may be omitted.
- MSH-10 This is a required field. Message rejection will result if nothing is received in this field. The message control ID is a string (which may be a number) uniquely identifying the message among all those ever sent by the sending system. It is assigned by the sending system and echoed back in the ACK message sent in response.
- MSH-11 The processing ID to be used by HIR is **P** for production processing, **T** is used for Testing. If this field is null, an informational message is generated indicating that HIR is defaulting to **P**. This is a required field for web services transmission and will result in a rejection of the message if the field is null.
- MSH-12 This is a required field. For the parser, the version number that is read in the first MSH segment, of the file, will be the version assumed for the whole file. For example, use a value of “2.3.1” to indicate HL7 Version 2.3.1 or “2.4” to indicate HL7 Version 2.4. If there is no version number found in the first MSH segment, a hard error will occur and the file will not be processed.  
 \*\*For HIR to PO providers, the Exchange Data screen will need to be set to the version number that the organization has selected, in which to receive their data files. Setting the version number “tells” the writer which HL7 version format to use when generating the file (the default will be the most recent version).
- MSH-15 This field controls whether an acknowledgement is generated for the message sent. HIR suggests a value of ER to ask that acknowledgements be sent only for messages that cannot be processed normally. If the field is empty, HIR will assume the value of ER.

Example: MSH|^~\&| HIR9.6| Valley^3601^||HIR^^^|20100920155154||VXU^V04|682299|P^|2.4^^||ER|||

**PID**

The PID segment is used by all applications as the primary means of communicating patient identification information. This segment contains permanent patient identifying and demographic information that, for the most part, is not likely to change frequently.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
3	20	CX	R	Y	0203	Patient ID (Internal ID)
5	48	XPN	R	Y		Patient Name
6	48	XPN		Y		Mother's Maiden Name
7	26	TS	R			Date/Time of Birth
8	1	IS			0001	Sex
10	80	CE		Y	0005	Race
11	106	XAD		Y		Patient Address
13	40	XTN				Phone number – home
22	80	CE		Y	0189	Ethnic Group
24	1	ID			0136	Multiple Birth Indicator
25	2	NM				Birth Order
29	26	TS				Patient Death Date and Time

**Field Notes:**

- PID-3 Sub-components 1 (ID) and 5 (identifier type code in Table 0203) are required in the PID-3 field. When a Provider Organization is sending to HIR, use the sending system's Patient ID or other unique identifier if available. When HIR is sending to an outside system it will use the patient's HIR ID and Patient ID when it is available.
- PID-5 See the XPN data type. Last name and first name are required in the first two components. If the Name Type Code component is included, use L-Legal **NOTE: If patient does not have a first name, NO FIRST NAME must be entered.** HIR does not support repetition of this field.
- PID-6 See the XPN data type. In this context, where the mother's name is used for patient identification, HIR uses only last name and first name. A mother's legal name might also appear in the context of an NK1 segment. HIR does not support repetition of this field.
- PID-7 Give the year, month, and day of birth (YYYYMMDD). HIR ignores any time component.
- PID-8 See Table 0001. Use F, M, or U.
- PID-10 See Table 0005. HIR stores and writes “Unknown” values as null. HIR does not support repetition of this field.
- PID-11 See the XAD data type. HIR does not support repetition of this field.

- PID-13 See the XTN data type. Version 2.4 includes the support of the N, X, B and C sequences. HIR does not support repetition of this field. If PRN is specified in component 2 (telecommunication use code (ID) from table 0201) HIR will use the 6<sup>th</sup> 7<sup>th</sup> 8<sup>th</sup> and 9<sup>th</sup> components for specification of area code, phone number, extension and text, respectively. Otherwise, HIR will assume that the phone number is specified in the first component in the [NNN] [(999)]999-9999[X99999][B99999][C any text] format
- PID-22 See Table 0189. HIR stores and writes “Unknown” values as null. HIR supports repetition of this field.
- PID-24 Use Y to indicate that the patient was born in a multiple birth.
- PID-25 Relevant when patient was born in a multiple birth. Use 1 for the first born, 2 for the second, etc. This field is useful in matching patient data to existing records.
- PID-29 The date of death, if patient is deceased. Give the year, month, and day (YYYYMMDD). HIR ignores any time component. If a death date is sent, then the Patient Registry Status in PD1-16 must indicate a value of “P” for permanently inactive/deceased.

Example: PID|||79928^^^PI||SMITH^MARY^T^^^^|JOHNSON^^^^^^|19951212|F|||

**PD1**

The PD1 carries additional patient demographic information that is likely to change.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
11	80	CE			0215	Publicity Code
12	1	ID			0136	Protection Indicator
13	8	DT				Protection Indicator effective date
16	1	IS			0441	Immunization registry status
17	8	DT				Immunization registry status effective date
18	8	DT				Publicity Code effective date

**Field Notes:**

- PD1-11 Controls whether recall/reminder notices are sent. HIR will recognize “01” to indicate no recall/reminder notices or “02” recall/reminder notices any method.
- PD1-12 Controls visibility of records to other organizations. Indicates whether or not consent has been given (or assumed) for record sharing. Two values include: Y – sharing is allowed and N- sharing is not allowed.
- PD1-13 Effective date for protection indicator reported in PD1-12. Format is YYYYMMDD.
- PD1-16 Identifies the registry status of the patient. See table NIP006. If a code of P is specified the PID-29 segment must be filled in with Patient Death Date or record will be rejected.
- PD1-17 Effective date for registry status reported in PD1-16. Format is YYYYMMDD.
- PD1-18 Effective date for publicity code reported in PD1-11. Format is YYYYMMDD.

Example: PD1|||||||02|Y|||A|

**NK1**

The NK1 segment contains information about the patient’s other related parties. Any associated parties may be identified. Utilizing *NK1-I-set ID*, multiple NK1 segments can be sent to patient accounts.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
<b>1</b>	<b>4</b>	<b>SI</b>	<b>R</b>			<b>Set ID - NK1</b>
2	48	XPN		Y		Name
3	60	CE			0063	Relationship
4	106	XAD		Y		Address
5	40	XTN		Y		Phone Number

**Field Notes:**

- NK1-1 Sequential numbers. Use “1” for the first NK1 within the message, “2” for the second, and so forth. Although this field is required by HL7, HIR will ignore its value, and there is no requirement that the record for the same responsible person keep the same sequence number across multiple messages, in the case that information from the same record is transmitted more than once.
- NK1-2 Name of the responsible person who cares for the patient. See the XPN data type. HIR does not support repetition of this field.
- NK1-3 Relationship of the responsible person to the patient. See data type CE and Table 0063 in the HL7 tables. Use the first three components of the CE data type, for example |MTH^Mother^HL70063|.

- NK1-4 Responsible person's mailing address. See the XAD data type. HIR does not support repetition of this field. If responsible person is Mother, the Address that is used in this field will become the patients address.
- NK1-5 Responsible person's phone number. HIR does not support repetition of this field. If PRN is specified in component 2 (telecommunication use code (ID) from table 0201) HIR will use the 6<sup>th</sup> 7<sup>th</sup> 8<sup>th</sup> and 9<sup>th</sup> components for specification of area code, phone number, extension and text, respectively. Otherwise, HIR will assume that the phone number is specified in the first component in the [NNN] [(999)]999-9999[X99999][B99999][C any text] format. The 3<sup>rd</sup> component is the telecommunication equipment type (ID) from table 0202

Example: NK1|1|JOHNSON^SARA^ELIZA^^^L^|MTH^MOTHER^HL70063|34  
ELM^OAHU^HI^83220^^^| (808)933-3007^PH^^^|

## PV1

The PV1 segment is used to send visit-specific information.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
2	1	IS	R		0004	Patient Class
20	50	FC		Y	0064	Financial Class (VFC Eligibility)

### Field Notes:

- PV1-2 See table 0004. HIR will store and write a value of "R" (recurring patient) for this field.
- PV1-20 See table 0064. HIR defines this field as a required field and is used to report VFC eligibility. If an invalid financial class or date format is received, an INFORMATIONAL error message is generated. The entire message is NOT rejected, as this is an optional HL7 segment. The format of this field is Financial Class code as described in table 0064 ^ then the date in YYYYMMDD format. The date is used to associate the VFC eligibility code with shots administered starting with the same data. The VFC eligibility reported will be considered the current status until such time a new VFC eligibility and date is reported. This field can be repeated.

Example: PV1|R|||||||||||||V01^20120905

## RXA

The RXA carries pharmacy/immunization administration data. It is a repeating segment and can record unlimited numbers of vaccinations.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	4	NM	R			Give Sub-ID Counter
2	4	NM	R			Administration Sub-ID Counter
3	26	TS	R			Date/Time Start of Administration
4	26	TS	R			Date/Time End of Administration
5	100	CE	R			Administered Code
6	20	NM	R			Administered Amount
9	200	CE		Y	NIP001	Administration Notes
10	200	XCN		Y		Administering Provider
11	200	CM				Administered-at location
15	20	ST		Y		Substance Lot Number
17	60	CE		Y	0227	Substance Manufacturer Name
18	200	CE		Y	NIP002	Substance Refusal Reason
20	2	ID			0322	Completion Status
21	2	ID			0323	Action Code – RXA

### Field Notes:

- RXA-1 Required by HL7. Use "0" for HIR.
- RXA-2 Required by HL7. For Provider-HIR loads, Data Exchange expects incoming values of 999 for this field. Other numeric values are ignored.

HIR Data Exchange may be configured to return series information in this field, based on HL7 file format and individual provider data exchange configuration settings. For example, if a dose evaluates to (3 of 4) in the Wizard, then the system sends the number 3 in RXA-2. If the dose violates a specific Wizard rule, then the system sends 777 in RXA-2. In all other cases, the number 999 is sent in RXA-2. For combination vaccines, 999 is always sent in RXA-

2, and the series count for each component antigen in the combination vaccine is sent in grouped OBX segments, which follow the RXA segment. Please see the field notes on OBX-3, OBX-4 and OBX-5.

The ability to send series information in RXA-2 only applies to HL7 Version 2.4. It applies to Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract. Some configuration is needed to send series information in RXA-2. On the Manage Data Exchange Screen, the **Send HL7 Series/Recommend** option displays, and the user must select either “Series Only” or “Both” from the pick list. (This option is hidden if Flat File or HL7 Provider-HIR is chosen.)

The Send Series/Recommend option also displays on the Organization Extract Screen when the user chooses the HL7 2.4 Transaction Format.

If the user configures the system so that it will **not** send series information, then the system always sends 999 RXA-2.

In the following example, the dose of Encephalitis is the 3<sup>rd</sup> dose in the series.

```
RXA|0|3|20010207|20010207|39^Japanese encephalitis^CVX^90735^Japanese  
encephalitis^CPT|1.0||01^^^^~32851911^HIR immunization id^IMM_ID^^^^|||
```

RXA-3 This is a required field. Date the vaccine was given. HIR ignores any time component.

RXA-4 Required by HL7. Ignored by HIR, which will use the value in RXA-3.

RXA-5 This is a required field. This field identifies the vaccine administered. HIR accepts the CVX code, CPT code, Vaccine Trade Name, or Vaccine Group Code for the vaccine administered. If using the CVX code, give the CVX code in the first component and “CVX” in the third component. If using the CPT code, the vaccine group code or vaccine trade name, use components four through six. For example, give the CPT code in the fourth component and “CPT” in the sixth component, [^^^90700^DtaP^CPT]. If using vaccine group code, use “WVGC” as the name of the coding system. If using vaccine trade name, use “WVTN” as the name of the coding system. See the CE data type and HL7 - Table 0292 (CVX Codes), HIR – Table WCPT (CPT Codes), HIR – Table WVGC (Vaccine Group Codes), and HIR – Table WVTN (Vaccine Trade Names).

RXA-6 Dose Magnitude is the number of age appropriate doses administered. For example, a dose magnitude of 2 of a pediatric formulation would be adequate for an adult. HIR and HL7 require this field to contain a value. However, a value of 1.0 will be stored in its place regardless of the value submitted.

RXA-9 HIR will recognize 00 to indicate New Immunization Administered *owned by the sending organization* or 01 to indicate Historical Record – Source Unspecified. If the source for a historical record is known, please use values 02 through 08 in Table NIP001. For outgoing HIR-Provider processing, Data Exchange will write out the corresponding immunization ID in the second repeating segment.

```
|01^^^^~9999999^HIR immunization id^IMM_ID^^|
```

RXA-10 Identifies the name of the administering clinician (VEI), ordering authority (OEI), and recorder (REI) of the immunization in HIR. The recorder is not supported on incoming data transfers and only returns if the immunization is owned by the provider requesting the data. HIR will use components 2 – 7 to record the names.

For incoming loads, it is recommended that license information (LPN, RN, MD) be put in the 5<sup>th</sup> component so that it processes as the clinician suffix in HIR, as in the following example:

```
|^GROBBERTS^DELIA^S^RN^MS^^^^^^^VEI^^^SHAFFER^TERRENCE^P^MD^DR^^^^^^^OEI^^|
```

For incoming loads, the system automatically creates clinician records in HIR if a match is not found.

RXA-11 HIR will use this field to identify the facility where the vaccine was administered. Place the facility name in component 4.

RXA-15 Manufacturer’s lot number for the vaccine. HIR does not support repetition of this field.

RXA-17 Vaccine manufacturer from Table 0227, for example [AB^Abbott^ MVX^^]. The HL7 2.4 specification recommends use of the external code set MVX. “When using this code system to identify vaccines, the coding system component of the CE field should be valued as “MVX” not as “HL70227.” HIR does not support repetition of this field.

RXA-18 When applicable, this field records the reason the patient refused the vaccine. See table NIP002. Any entry in this field indicates that the patient did not take the substance. The vaccine that was offered should be recorded in RXA-5, with the number 0 recorded for the dose number in RXA-2. Do not record contraindications, immunities or reactions in this field. HIR does not support repetition of this field.

#### Notes on Refusals:

- a) HIR only stores the fact that a refusal of a vaccine occurred, not a specific type of refusal, so all outgoing refusals will be designated as “PARENTAL DECISION.” Please see the example below.
- b) HIR will not write out refusals which do not have an applies-to date. It will write out multiple refusals for the same vaccine on different dates for those patients who have them.
- c) The HIR system will accept incoming refusals of the same vaccine on different dates and file them both. However, if they both have the same applies-to date, then only one will be stored.
- d) The sending organization will become the refusal owner. In general, only the organization who owns the refusal is permitted to edit it. However, in the case of parent and child organizations, the parent may edit the child’s refusals and vice versa.

Here is a sample RXA segment for an MMR refusal given on the date 01/01/2007:

RXA|0|0|20070101|20070101|^^MMR^MMR^WVGC|1.0||||||||||00^PARENTAL REFUSAL^NIP002^^

**RXA-20** For Batch HL7 HIR-PO, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract, this field records the value PA for doses which are partially administered. A partially administered dose refers to the scenario where the patient pulls away before full dose was administered, resulting in an unknown quantity of vaccine entering the patient’s system.

**RXA-21** This field provides a method of correcting vaccination information previously transmitted with incorrect patient identifying information. Refer to HL7 Table 0323 – Action code for valid values

Example: RXA|0|999|20120905|20120905|39^JAPANESE  
 ENCEPHALITIS^CVX^^^|1.0||00^^^|^GROBBERTS^DELIA^S^ARN^^^^^^^VEI~  
 ^SHAFFER^TERRENCE^P^MD^DR^^^^^^^OEI|^VALLEY  
 CLINIC&36|||XYZ73465|AB^Abbott^MVX^^^||PA|A|

**RXR**

The Pharmacy/Treatment Route Segment contains the alternative combination of route and site.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	60	CE	R		0162	Route
2	60	CE			0163	Site

**Field Notes:**

RXR-1 This is the route of administration from table 0162.

RXR-2 This is the site of administration from table 0163.

Example: RXR|IM|RA

**OBX**

The Observation/Result Segment is used to transmit an observation.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	4	SI	R			Set ID-OBX
2	3	ID	R			Value type
3	80	CE	R			Observation Identifier
4	20	ST				Observation sub-ID
5	65536	-	R	Y		Observation Value
11	1	ID	R		0085	Observation Result Status
14	26	TS				Date/Time of the observation

**Field Notes:**

OBX-1 This is a required field when segment is present. Sequential numbers. Use “1” for the first OBX within the message, “2” for the second, and so forth.

OBX-2 This is a required field when segment is present. This field contains the data type which defines the format of the observation value in OBX-5. For incoming Provider-HIR data, Data Exchange accepts CE for Coded Entry. However, for HIR-Provider, the system will send out values of CE, TS, NM for Coded Entry, Timestamp, and Number respectively, depending on what is actually sent in OBX-5.

OBX-3 This is a required field when segment is present. When indicating a **Vaccination Contraindication/Precaution**, use 30945-0 in this field and enter a Contraindication, Precaution, or Immunity code (NIP004) in OBX-5.

Example: OBX|1|CE|30945-0^Contraindication^LN||21^acute illness^NIP^^^|F|

When indicating a **Reaction to Immunization**, use 31044-1 in this field and enter a Reaction code (HIR001) in OBX-5.

Example: OBX|1|CE|31044-1^Reaction^LN||HYPOTON^hypotonic^HIR^^^|F|

When indicating a **Vaccination Adverse Event Outcome**, use 30948-4 in this field and enter an Event Consequence code (NIP005) in OBX-5.

Example: OBX|1|CE|30948-4^Adverse Outcome^LN||E^er room^NIP^^^|F|

For Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract, the system uses this field to send the LOINC Codes for **Series information** for combination vaccines. For each component of a combination vaccine, the system sends out a grouped set of two OBX segments. The first segment identifies the component antigen, and the second segment identifies the Series count. OBX-3 is used to identify whether the component antigen or the valid series count is noted in OBX-5 respectively.

Here are the LOINC Codes that the system sends in OBX-3 for Series information for combination vaccines.

LOINC Code	Description
38890-0	Component Vaccine Type. This term is used to distinguish separate vaccine components of a multiple antigen vaccine. Included in LOINC 1/2005.
38890-0&30973-2	Dose Number in Series

In the following example, the LOINC Codes are highlighted in OBX-3. These two OBX segments together express that a dose of combination vaccine counts for the 1<sup>st</sup> dose of DTaP in the DTaP series.

**OBX|1|CE|38890-0^COMPONENT VACCINE TYPE^LN|1|20^DTaP^CVX^90700^DTaP^CPT|||||F|**

**OBX|2|NM|38890-0&30973-2^Dose number in series^LN|1|1|||||F|**

Please see the end of the OBX field notes for a complete example of how HIR sends Series information for combination vaccines.

For Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract, the system uses this field to send the LOINC Codes for **Recommendations**. For each recommendation, the system sends a grouped set of five OBX segments. Here are the LOINC Codes that the system sends out in OBX-3 for Recommendations. The LOINC itself is sent in OBX-3 in order to identify what the value in OBX-5 represents.

LOINC Code	Description
30979-9	Vaccines Due Next
30979-9&30980-7	Date Vaccine Due
30979-9&30973-2	Vaccine due next dose number
30979-9&30981-5	Earliest date to give
30979-9&30982-3	Reason applied by forecast logic to project this vaccine

In the following example, the LOINC Codes are highlighted in OBX-3 for a single recommendation of HepB.

**OBX|11|CE|30979-9^Vaccines Due Next^LN^^^|3|45^HepB^CVX^90731^HepB^CPT|||||F|**

**OBX|12|TS|30979-9&30980-7^Date Vaccine Due^LN^^^|3|20050103|||||F|**

**OBX|13|NM|30979-9&30973-2^Vaccine due next dose number^LN^^^|3|1|||||F|**

**OBX|14|TS|30979-9&30981-5^Earliest date to give^LN^^^|3|20050103|||||F|**

**OBX**|15|CE|30979-9&30982-3^Reason applied by forecast logic to project this vaccine^LN^^|3|^ACIP schedule|||||F|

Please see the end of the OBX field notes for a complete example of how HIR sends Recommendations.

**OBX-4** For sending out Series Information and Recommendations, the number in this field groups together related OBX segments. For example, a single recommendation for DTP/aP is sent in a grouped set of five OBX segments, all with the same sub-identifier in OBX-4. The sub-identifier increments sequentially.

For example, HIR sends out five grouped OBX segments for each recommendation. The following is a single MMR recommendation, all sharing the same Observation sub-ID of 4 in OBX-4.

**OBX**|16|CE|30979-9^Vaccines Due Next^LN^^|4|03^MMR^CVX^90707^MMR^CPT|||||F|

**OBX**|17|TS|30979-9&30980-7^Date Vaccine Due^LN^^|4|20050407|||||F|

**OBX**|18|NM|30979-9&30973-2^Vaccine due next dose number^LN^^|4|2|||||F|

**OBX**|19|TS|30979-9&30981-5^Earliest date to give^LN^^|4|20021105|||||F|

**OBX**|20|CE|30979-9&30982-3^Reason applied by forecast logic to project this vaccine^LN^^|4|^ACIP schedule|||||F|

**OBX-5** This is a required field when segment is present. Text reporting Contraindication, Precaution, or Immunity (NIP004), Reaction (HIR001), or Event Consequence (NIP005). HIR has imposed a CE data type upon this field. The first component of which is required.

(e.g., |PERTCONT^Pertussis contra^HIR^^|)

For Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract, this field holds the value observed for series information and recommendations. The value corresponds to the LOINC in OBX-3. For example, for recommendations, the fourth OBX segment is for the Earliest date. OBX-3 contains the code 30979-9&30981-5 and OBX-5 contains the actual earliest date as follows:

**OBX**|4|TS|30979-9&30981-5^Earliest date to give^LN^^|1|20010519|||||F|

Please see the end of the OBX field notes for complete examples of how HIR sends Series for combination vaccines and Recommendations.

**OBX-11** This is a required field when segment is present. for HL7. Use “F” for HIR.

**OBX-14** Records the date of the observation. HIR ignores any time component.

**NOTE 1:** The only valid OBX Observation Identifier (OBX-03) for an **ADT^A31** message type is Contraindication/Precaution (30945-0).

**NOTE 2:** All OBX messages with an observation identifier of Vaccination Contraindication/Precaution will be returned in an outgoing file in a separate ADT message for the patient.

**NOTE 3:** Complete Example of HIR’s use of OBX to send Series Information for Combination Vaccines

A single dose of combination vaccine may have a different series dose count for each component. For Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract, the system sends a grouped set of two OBX segments for each component in a combination vaccine. For example, a single dose of Dtap-Hib is sent as below. The first and second OBX segments express the dose count of 1 for DTaP. The third and fourth OBX segments express the dose count of 3 for Hib.

**RXA**|0|999|19810807|19810807|50^DtaP-Hib^CVX^90721^DtaP-Hib^CPT|1.0||01^^~32851914^HIR immunization id^IMM\_ID^^|

**OBX**|1|CE|38890-0^COMPONENT VACCINE TYPE^LN|1|20^DTaP^CVX^90700^DTaP^CPT|||||F|

**OBX**|2|NM|38890-0&30973-2^Dose number in series^LN|1|1|||||F|

**OBX**|3|CE|38890-0^COMPONENT VACCINE TYPE^LN|2|17^Hib^CVX^90737^Hib^CPT|||||F|

**OBX**|4|NM|38890-0&30973-2^Dose number in series^LN|2|3|||||F|

**NOTE 4:** Complete Example of HIR’s use of OBX to send Recommendation Information

For Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract, a single recommendation is sent in a grouped set of five OBX-segments, which follow a place-holder RXA segment that does not represent any actual immunization administered to the patient. The five OBX segments in order express the

Vaccine of the recommendation, the recommended date, the dose of the next vaccine due, the earliest date to give, and the reason for the recommendation, which is always the ACIP schedule.

**RXA**|0|0|20010407|20010407|998^No Vaccine Administered^CVX|999|0  
**OBX**|1|CE|30979-9^Vaccines Due Next^LN^^^|1|20^DTP/aP^CVX^90700^DTP/aP^CPT|||||F|  
**OBX**|2|TS|30979-9&30980-7^Date Vaccine Due^LN^^^|1|20010607|||||F|  
**OBX**|3|NM|30979-9&30973-2^Vaccine due next dose number^LN^^^|1|1|||||F|  
**OBX**|4|TS|30979-9&30981-5^Earliest date to give^LN^^^|1|20010519|||||F|  
**OBX**|5|CE|30979-9&30982-3^Reason applied by forecast logic to project this vaccine^LN^^^|1|^ACIP schedule|||||F|  
**OBX**|6|CE|30979-9^Vaccines Due Next^LN^^^|2|85^HepA^CVX^90730^HepA^CPT|||||F|  
**OBX**|7|TS|30979-9&30980-7^Date Vaccine Due^LN^^^|2|20030407|||||F|  
**OBX**|8|NM|30979-9&30973-2^Vaccine due next dose number^LN^^^|2|1|||||F|  
**OBX**|9|TS|30979-9&30981-5^Earliest date to give^LN^^^|2|20020407|||||F|  
**OBX**|10|CE|30979-9&30982-3^Reason applied by forecast logic to project this vaccine^LN^^^|2|^ACIP schedule|||||F|  
**OBX**|11|CE|30979-9^Vaccines Due Next^LN^^^|3|45^HepB^CVX^90731^HepB^CPT|||||F|  
**OBX**|12|TS|30979-9&30980-7^Date Vaccine Due^LN^^^|3|20010407|||||F|  
**OBX**|13|NM|30979-9&30973-2^Vaccine due next dose number^LN^^^|3|1|||||F|  
**OBX**|14|TS|30979-9&30981-5^Earliest date to give^LN^^^|3|20010407|||||F|  
**OBX**|15|CE|30979-9&30982-3^Reason applied by forecast logic to project this vaccine^LN^^^|3|^ACIP schedule|||||F|

The ability to send Recommendations in these grouped OBX segments only applies to HL7 Version 2.4. It applies to Batch HL7 HIR-Provider, Batch HL7 Bi-directional, Real-time HL7, and Organizational Extract. Some configuration is needed to send Recommendations in this way. On the Manage Data Exchange Screen, the **Send HL7 Series/Recommend** option displays, and the user must select either “Recommendations Only” or “Both” from the pick list. (This option is hidden if Flat File or HL7 Provider-HIR is chosen.)

The Send Series/Recommend option also displays on the Organization Extract Screen when the user chooses the HL7 2.4 Transaction Format.

If the user configures the system so that it will **not** send recommendations, then the system will omit sending the grouped set of five OBX segments entirely.

## Batch Files of HL7 Messages

The definitions above tell how to create messages containing patient and immunization data. Each message can logically stand on its own and HL7 is compatible with various methods of online and batch transmission. HIR uses batch files to transmit many messages together. HL7 provides special header and footer segments to structure batch files. These segments are not part of any message, but serve to bracket the messages defined above. The structure of a batch file is as follows.

```

FHS                (file header segment)

{ BHS              (batch header segment)
  { [MSH           (zero or more HL7 messages)
    ....
    ....
    ....
  ] }
  BTS              (batch trailer segment)
}
FTS                (file trailer segment)

```

### FHS

#### File Header Segment

The FHS segment is used to head a file (group of batches).

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	1	ST	R			<b>File Field Separator</b>
2	4	ST	R			<b>File Encoding Characters</b>
3	15	ST				File Sending Application
4	20	ST	M			<b>File Sending Facility</b>
6	20	ST	M			<b>File Receiving Facility</b>
7	26	TS	M			<b>File Creation Date/Time</b>
9	20	ST	M			<b>File Name/ID</b>
10	80	ST				File Header Comment
11	20	ST	M			<b>File Control ID</b>
12	20	ST				Reference File Control ID

#### **Field Notes:**

FHS-1 Same definition as the corresponding field in the MSH segment.

FHS-2 Same definition as the corresponding field in the MSH segment.

FHS-3 Same definition as the corresponding field in the MSH segment.

FHS-4 Same definition as the corresponding field in the MSH segment.

FHS-6 Same definition as the corresponding field in the MSH segment.

FHS-7 Same definition as the corresponding field in the MSH segment.

FHS-9 Name of the file as transmitted from the initiating system.

FHS-10 Free text, which may be included for convenience, but has no effect on processing.

FHS-11 This field is used to identify a particular file uniquely among all files sent from the sending facility identified in FHS-4.

FHS-12 Contains the value of FHS-11-file control ID when this file was originally transmitted. Not present if this file is being transmitted for the first time.

### FTS

#### File Trailer Segment

The FTS segment defines the end of a file.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	10	NM	M			<b>File Batch Count</b>
2	80	ST				File Trailer Comment

#### **Field Notes:**

FTS-1 The number of batches contained in this file. HIR normally sends one batch per file and discourages sending multiple batches per file.

FTS-2 Free text, which may be included for convenience, but has no effect on processing.

**BHS**

Batch Header Segment

The BHS segment defines the start of a batch.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	1	ST	R			<b>Batch Field Separator</b>
2	4	ST	R			<b>Batch Encoding Characters</b>
3	15	ST				Batch Sending Application
4	20	ST	M			<b>Batch Sending Facility</b>
6	20	ST	M			<b>Batch Receiving Facility</b>
7	26	TS	M			<b>Batch Creation Date/Time</b>
10	80	ST				Batch Comment
11	20	ST	M			<b>Batch Control ID</b>
12	20	ST				Reference Batch Control ID

**Field Notes:**

BHS-1 This field contains the separator between the segment ID and the first real field, *BHS-2-batch encoding characters*. As such it serves as the separator and defines the character to be used as a separator for the rest of the segment. HIR requires | (ASCII 124).

BHS-2 This field contains the four characters in the following order: the component separator, repetition separator, escape characters and sub-component separator. HIR requires ^~\&, (ASCII 94, 126, 92 and 38 respectively).

BHS-3 Same definition as the corresponding field in the MSH segment.

BHS-4 Same definition as the corresponding field in the MSH segment.

BHS-6 Same definition as the corresponding field in the MSH segment.

BHS-7 Same definition as the corresponding field in the MSH segment.

BHS-10 Free text, which may be included for convenience, but has no effect on processing.

BHS-11 This field is used to uniquely identify a particular batch. It can be echoed back in *BHS-12-reference batch control ID* if an answering batch is needed. For HIR purposes, the answering batch will contain ACK messages.

BHS-12 This field contains the value of *BHS-11-batch control ID* when this batch was originally transmitted. Not present if this batch is being sent for the first time. See definition for *BHS-11-batch control ID*.

**BTS**

Batch Trailer Segment

The BTS segment defines the end of a batch.

SEQ	LEN	DT	R/M	RP/#	TBL#	ELEMENT NAME
1	10	ST	M			<b>Batch Message Count</b>
2	80	ST				Batch Comment

**Field Notes:**

BTS-1 This field contains the count of the individual messages contained within the batch.

BTS-2 Free text, which can be included for convenience, has no effect on processing.

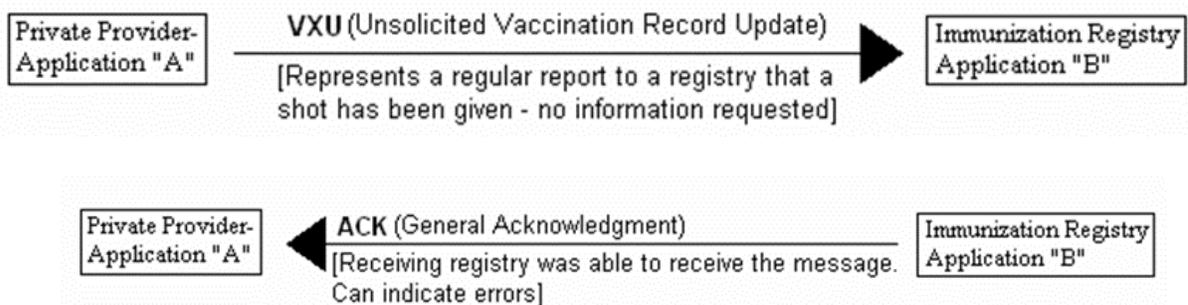
## File Interchange between HIR and Outside Systems using an interface

The central repository of HIR contains records of patients from around the state. Patient and immunization records flow both ways between HIR and outside systems. Data, for a particular patient, is transmitted by HIR to an outside system (Provider Organization) only if the patient is identified as having an Active relationship with that Organization AND the relationship was created by transmitting the patient's record to HIR or by creating the relationship via the HIR-Web interface. So, an exchange of information about a given patient is always initiated by the outside system. There are three options for exchanging data with HIR:

- (1) The Provider Organization can send data to HIR and request that no data is returned from HIR, which is a Provider Organization to HIR data transfer.
- (2) The Provider Organization can request data from HIR while not providing data to HIR, which is a HIR to Provider Organization data transfer.
- (3) The Provider Organization can send data to HIR and HIR will return any updated information regarding any patients that have an Active relationship with that Provider Organization, which is a Bi-directional data transfer.

HL7 messages are always part of a two-way exchange between an initiating system and a responder. Sometimes the initial message implies specific data to be sent in a response. Other times, as is the case with HIR patient and immunization data, the principal response of the responder is to process the message and post whatever it contains to its own database. For these cases, the responder provides the ACK message type in an HL7 format, which contains no new application data, but allows the receiver to inform the initiator that the message has been received and processed successfully. If an error prevents successful processing, optional parts of the ACK message will allow this to be communicated as well.

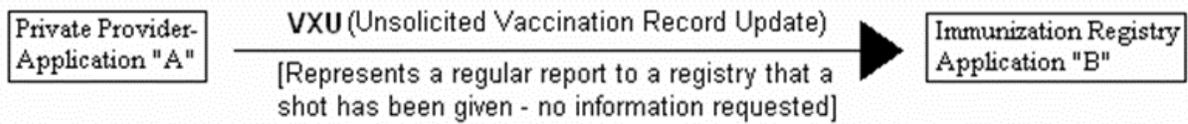
For exchanges between HIR and outside systems, which is a Provider Organization to HIR data transfer, it is the responsibility of the outside system to initiate the transfer of the first file, containing ADT (only for updating demographic information) and/or VXU messages with patient and immunization data for adding or updating patient and immunization data. After processing those messages, HIR responds with a response file of ACK messages.



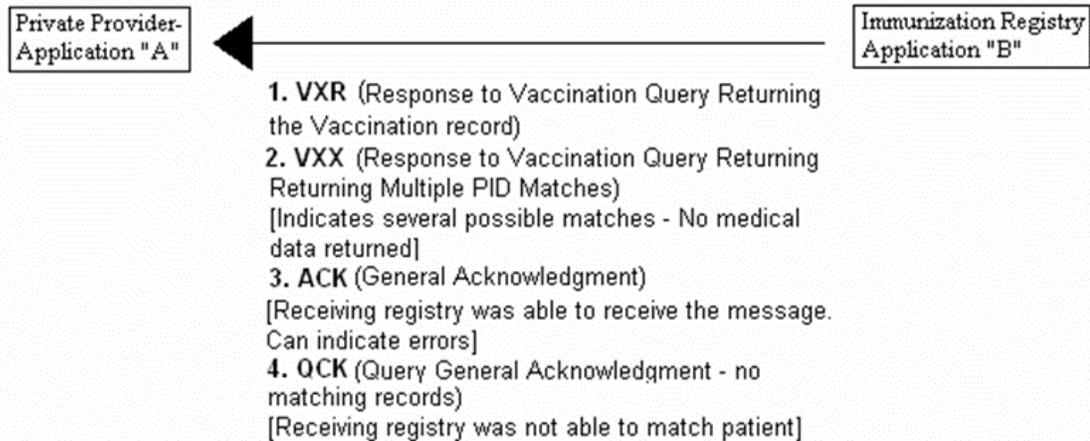
Provider Organization		HIR	
		Outgoing	Receiving
1.	Creates a file of patient and immunization records that are new or have changed since they were last transmitted to HIR.		
2.	Transmits the file to HIR through the user interface.		
3.			Processes the file received, creates a file of ACK messages.
4.		Posts the ACK file for the initiator to pick up via the web-interface of the original file submitted.	
5.	Processes the ACK file to confirm success of the file transmission.		

For exchanges between HIR and outside systems, which is a Bi-directional data transfer, it is the responsibility of the outside system to initiate the transfer of the first file, containing ADT (only for updating demographic information) and/or VXU messages with patient and immunization data for adding or updating patient and immunization data. After processing those messages, HIR responds with a response file of ACK messages. At the same time or soon after, HIR also creates another file

of ADT and VXU messages, containing the full patient record (if the patient was new), to send to the Provider Organization that initiated the first transfer. It is the responsibility of the Provider Organization as receiver to transmit back a file of ACK messages.



Possible responses:



Provider Organization		HIR	
		Outgoing	Receiving
1.	Creates a file of patient and immunization records that are new or have changed since they were last transmitted to HIR.		
2.	Transmits the file to HIR through the user interface.		
3.			Processes the file received, creates a file of ACK messages.
4.			Creates a file of any active patient and immunization records that have changed since they were last transmitted to this Provider Organization.
5.		Posts the ACK file for the initiator to pick up via the web-interface of the original file submitted.	
6.		Posts the file of patient and immunization records that have changed since they were last transmitted to this Provider Organization to pick up via the web-interface.	
7.	Processes the ACK file to confirm success of the file transmission.		
8.	Processes the file of patient and immunization records that have changed since they were last transmitted to this Provider Organization.		

The 15<sup>th</sup> field, in the MSH message header segment, allows the initiator to ask that the message be acknowledged only in the case of an error and HIR supports this in order to minimize the number of ACK messages transmitted. In this case, the ACK

file contains only error messages (an optional form of the ACK message type). The original messages, with no answering error messages, are implicitly acknowledged as successfully processed. If all messages in a batch are successful, the answering ACK file will only contain file batch headers and footers, with no actual ACK messages. For Step 2, in the above table, it is permissible for a Provider Organization to send a file containing only file batch headers and footers as a way of triggering the file that HIR creates in Step 6. It is also possible that the file, HIR creates in Step 6, will contain only file batch headers and footers if there are no records to send.

## Examples

To illustrate how a HIR HL7 file is put together we will document how the fictional organization, Valley Clinic, formats patient and immunization records to be transmitted to HIR. The following table displays the information to be transmitted and it is organized into HL7 segments and fields. For example, PID-3 refers to the third field in the Patient Identification segment.

Information to transmit	Data value to be entered	HL7 Format
• Patient #1		PID segment
• Chart Number (ID on Valley Clinic's system)	45LR999	PID-3
• Name	GEORGE M MILLER JR	PID-5
• Mother's maiden name	MARTHA OLSON	PID-6
• Birth date	February 27, 1995	PID-7
• Sex	M	PID-8
• Address	123 MAIN ST ALBANY, NY 53000, 1843	PID-11
• Birth Place	WI025, WI	PID-23
• Multiple Birth Indicator	Y (patient was born as part of a multiple birth)	PID-24
• Birth Order	2 (second birth of a multiple birth)	PID-25
• Publicity Code	02	PD1-11
• Protection Indicator	Y (patient consents to share immunization data)	PD1-12
• Patient Registry Status	A (patient is active in the registry)	PD1-14
• Responsible Person (parent or other person who cares for patient)		NK1 segment
• Name	MARTHA MILLER	NK1-2
• Relationship to patient	MTH	NK1-3
• Address	123 MAIN ST ALBANY, NY 53000, 1843	NK1-4
• Phone	608 123 4567	NK1-5
• Responsible Person		NK1 segment
• Name	GEORGE MILLER	NK1-2
• Relationship to patient	FTH	NK1-3
• Patient #2		PID segment
• Chart Number	23LK729	PID-3
• Name	MARIA CALIFANO	PID-5
• Mother's maiden name	ANGELICA DISTEFANO	PID-6
• Birth date	April 13, 1998	PID-7
• Sex	F	PID-8
• Patient Class	R	PV1-2
• Financial Class	V04	PV1-20
• Immunization		RXA segment
• Date administered	July 23, 1999	RXA-3
• Vaccine	DtaP	RXA-5
• CPT Code	90700	RXA-5
• Dose size	0.5	RXA-6
• Administering Provider Organization	Valley Clinic	RXA-10
• Immunization		RXA segment
• Date administered	July 23, 1999	RXA-3
• Vaccine	MMR	RXA-5

Information to transmit	Data value to be entered	HL7 Format
• CPT Code	90707	RXA-5
• Dose size	0.5	RXA-6
• Administering Provider Organization	Valley Clinic	RXA-10
• Patient #3		PID segment
• Chart Number	92HG9257	PID-3
• Name	JOSEPH FISHER	PID-5
• Mother's maiden name	MARY LASOWSKI	PID-6
• Birth date	May 28, 1998	PID-7
• Sex	M	PID-8
• Immunization		RXA segment
• Patient Class	R	PV1-2
• Financial Class	V04	PV1-20
• Date administered	July 29, 1999	RXA-3
• Vaccine	MMR	RXA-5
• CPT Code	90707	RXA-5
• Dose	0.5	RXA-6
• Administering Provider Organization	Valley Clinic	RXA-10
• Lot number	AD19487	RXA-15
• Lot expiration date	December 12, 1999	RXA-16
• Lot manufacturer	FLYBYNIGHT LABORATORIES (this manufacturer is not found in the valid list in HL7 Table 0227. The message will still be accepted in HIR, with the manufacturer set to unknown.)	RXA-17

In an HL7 message, each segment is a single text line, ending with the carriage return character. In the examples, long lines are broken artificially for display purposes and the carriage return character is denoted by <CR>.

```
*FHS|^~\&|VALSYS|VALCLIN||HIR|19990802091523||filename1.hl7|WEEKLY HL7
  UPLOAD|00009972<CR>
*BHS|^~\&|VALSYS|VALCLIN||HIR|19990802091523|||00010223<CR>
MSH|^~\&|VALSYS|VALCLIN||HIR|19990802091524||ADT^A31|00000123|P|2.4|||AL<CR>
PID|||45LR999^^^^PI||MILLER^GEORGE^M^JR|OLSON^MARTHA|19950227|M|||123 MAIN
  ST^^ALBANY^NY^53000^US^^^FULTON|||000111222|||US^WI^1843|Y|2<CR>
PD1|0|0000000000|02^REMINDER/RECALL - ANY MENTOD^HL70215|Y|A<CR>
NK1|1|MILLER^MARTHA|MTH^Mother^HL70063|123 MAIN ST^^ALBANY^NY^53000^US^^^1843
  |(608)123-4567<CR>
NK1|2|MILLER^GEORGE|FTH^Father^HL70063<CR>
MSH|^~\&|VALSYS|VALCLIN||HIR|19990802091524||VXU^04|00000124|P|2.4|||ER<CR>
PID|||66782^^^SR^^23LK729^^^^PI|CALIFANO^MARIA|DISTEFANO^ANGELICA|19980413|F<CR>
PV1||R|||||V04^19990723|<CR>
RXA|0|999|19990723|19990723|^^^90700^DTaP^CPT|0.5|||VALCLIN<CR>
RXA|0|999|19990723|19990723|^^^90707^MMR^CPT|0.5|||VALCLIN<CR>
MSH|^~\&|VALSYS|VALCLIN||HIR|19990802091526||VXU^04|00000125|P|2.4|||ER<CR>
PID|||927389^^^^SR^^92HG9257^^^^PI|FISHER^JOSEPH|LASOWSKI^MARY|19980528|M<CR>
PV1||R|||||V04^19990729|<CR>
RXA|0|999|19990729|19990729|^^^90707^MMR^CPT|0.5|||VALCLIN|||AD19487|
  19991212|ZZ^FLYBYNIGHT LABORATORIES^HL70227|||A<CR>
*BTS|3<CR>
*FTS|1<CR>
```

**\*These fields are optional for batch only, if used in Web Services the message will be rejected.**

Note: When a patient is being introduced to HIR, the VXU message must precede the ADT message, since HIR must have at least one immunization for a patient before being added to the database. Sending ADT and VXU messages for the same patient is redundant, since the VXU message is capable of reporting all information that is also found in the ADT.

In the example above, Valley Clinic sends a file of three HL7 messages to HIR. Batch header/footer segments bracket the messages. The first message type is an ADT, which is used to send patient demographic data without including immunization information. This message type MUST follow a VXU message for the patient if the patient is new to the HIR system. HIR recommends that VXU's be used for updating both demographic and immunization information.

Patient George M Miller Jr. is identified by Valley Clinic's Patient ID, 45LR999, in his PID segment. The message could have included George's HIR ID number in field PID-3, but does not have to, if it is not recorded in Valley Clinic's system. George's mother's maiden name, birth date, sex, and address also serve to identify him. Some other optional fields are not present, including some fields from the full HL7 standard not defined in this document because they are not used by HIR. Fields not present do not diminish the number of "|" delimiters, so later fields can be identified by ordinal position in the segment. Two NK1 segments give some information for George's mother and father, just the minimum required for his father, with address and telephone fields for his mother.

The next two PID segments in the second and third messages give a HIR patient ID in field PID-3. This must have been transmitted earlier from HIR to Valley Clinic's system. In this case it is legitimate to omit more of the optional PID fields, since HIR must have at least the minimum required information for these patients even to create a record. However, if there is a possibility that Valley Clinic has new or changed information to send to HIR, these fields should be present, and it does no harm to repeat fields even if they have been transmitted previously.

```
*FHS|^~\&|HIR|HIR||VALCLIN|19990803200106||filename2.hl7||000023479|00009972<CR>
*BHS|^~\&|HIR|HIR||VALCLIN|19990803200116|||00004321|00010223<CR>
MSH|^~\&|HIR|HIR||VALCLIN|19990803200117||ACK|00000456|P|2.4<CR>
MSA|AA|00000123<CR>
MSH|^~\&|HIR|HIR||VALCLIN|19990803200119||ACK|00000458|P|2.4<CR>
MSA|AE|00000125|INVALID MANUFACTURER CODE<CR>
ERR|RXA^152^17^1<CR>
*BTS|2|<CR>
*FTS|1<CR>
```

**\*These fields are optional for batch only, if used in Web Services the message will be rejected.**

HIR answers the file from the above example with a file of ACK messages. Valley Clinic's message 00000123 had the value AL in field MSH-15, asking for acknowledgements of all messages. The value AA in MSA-1 indicates that this message was processed without error. The next message, 00000124, uses the value ER to ask for acknowledgement only in case of errors, so this message is acknowledged implicitly by the absence of an ACK message for it. This example while legitimate is for purposes of illustration and most providers will probably prefer to follow the HIR recommendation of error acknowledgements only. The last message, 00000125, did contain an error, and the ERR segment in its acknowledgement indicates the segment ID (RXA) of the segment, the line number (152) where it appears in the input file, the errant field (17) and the field component (1). The MSA segment contains the error message. Errors will be generated for missing required data, invalid data or any other deviance from the form and content of messages as specified in this document. If all three messages in the first file above had requested error acknowledgement only and none had any errors, then the answering file from HIR would contain just the FSH, BHS, BTS, and FTS segments. All the messages would be implicitly acknowledged as successfully processed.

In the sample file exchange above, the outside system initiated the exchange with the file of ADT and VXU segments and HIR responded with ACK segments. The format is identical when HIR sends ADT and VXU segments out and the ACK responses are similar too. In the FHS, BHS, and MSH segments, the values of the fourth and sixth fields are reversed to show sender and receiver. HIR always sends its own patient identifier in the required field PID-03 and includes the outside system's identifier in PID-03 if known. Outside systems are encouraged to store HIR's patient ID, and use it in PID-03 when sending to HIR. This provides a firm basis for patient identification makes processing easier for the HIR system and avoids errors in storing patient information, such as creation of duplicate records when an insufficiently identified patient record cannot be matched with a record already in the HIR database. Though HIR makes a great effort to match patient records effectively, use of the HIR patient ID is the best guarantee of clean and useful data.

## Real-time Processing through Web Services

“Real time” processing refers to the ability to transmit an HL7 2.4 formatted VXQ^V01 Message (Query for Vaccination Record) and a VXU^V04 Message (Unsolicited Vaccination Update) and receive from HIR the resulting HL7 2.4 Response Message in real time. A provider organization will query a registry to get information on a certain client (i.e. send an HL7 2.4 VXQ^V01 message) and will receive an HL7 2.4 Message Response (i.e. VXR^V03, VXX^V02, ACK or QAK) to that query in real time.

Web Services will require installing a working web service to enable interoperability between our java based real time codebase and the various web service clients designed/implemented by the participants. The underlying web service operation will be defined to be generic, and can exchange HL7 2.4 Messages and their appropriate Message Responses. The HL7 2.4 vaccination query (VXQ^V01) or HL7 2.4 Unsolicited Vaccination Update (VXU^V04) transactions and their Response Messages will be utilized under the same web service interface. The web services security and other technologies will be communicated via Web Services Policy statements, in addition to Web Services Security Policy statements which will in our case be contained with the WSDL document for the defined web service. More details about the actual policies are explained in the below sections.

HIR will use Simple Object Access Protocol (SOAP) to exchange messages using an Extensible Markup Language (XML) format. To get a more in-depth understanding of SOAP, refer to the following brief tutorial: <http://www.w3schools.com/soap/default.asp>

Web services are for only one message and a single response to that message at a time. If a group of messages (batch file) is transmitted. It will be rejected. To get a more in-depth understanding of web services, refer to the following brief tutorial: <http://www.w3schools.com/webservices/default.asp>

HIR will make available to providers the CDC Web Services Description Language (WSDL). The WSDL will contain information describing the publicly accessible ports that will be used by HIR to exchange HL7 messages. Providers will use this information to establish communication with HIR and exchange HL7 messages. To get a more in-depth understanding of WSDL, refer to the following brief tutorial: <http://www.w3schools.com/wsdl/default.asp>

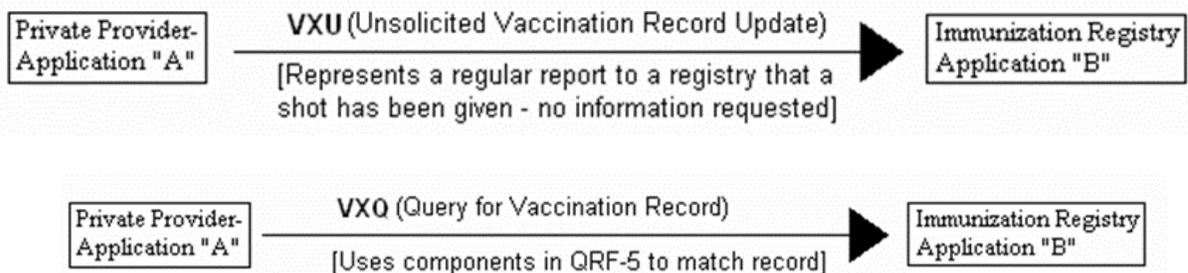
HIR will give providers a secure connection between HIR and the provider’s Electronic Health Records (EHR) system

Unbundled (Username token) Providers will need to create their own WS Client. Components that HIR will provide.  
WSDL  
Username/password  
Signed SSL.

It is the responsibility of the provider organization to obtain or develop, install and configure an XML client Message Sender for sending the HL7 2.4 formatted Message Requests and receiving the resulting HL7 2.4 formatted Message Response file generated by HIR

**\*\*HIR PROVIDES NEITHER INSTALLATION, CONFIGURATION NOR TECHNICAL SUPPORT FOR THE EBXML PATIENT MESSAGE SENDER.**

The following section outlines the various message types that are sent in real-time files.



Possible responses:

Private Provider-  
Application "A"



Immunization Registry  
Application "B"

1. **VXR** (Response to Vaccination Query Returning the Vaccination record)
2. **VXX** (Response to Vaccination Query Returning Multiple PID Matches)  
[Indicates several possible matches - No medical data returned]
3. **ACK** (General Acknowledgment)  
[Receiving registry was able to receive the message. Can indicate errors]
4. **QCK** (Query General Acknowledgment - no matching records)  
[Receiving registry was not able to match patient]

Real-time files that provider organizations send to the HIR can contain any of the following message types:

VXU^V04

Unsolicited Vaccination Update

MSH	Message Header
PID	Patient Identification
[PD1]	Patient Additional Demographic
[{NK1}]	Next of Kin / Associated Parties
[PV1]	Patient Visit
RXA	Pharmacy / Treatment Administration (at least ONE RXA is REQUIRED by HIR)
[RXR]	Pharmacy / Treatment Route (Only one RXR per RXA segment)
[{OBX}]	Observation/Result

VXQ^V01

Query for Vaccination Record

MSH	Message Header Segment
QRD	Query Definition Segment
QRF	Query Filter Segment (HIR has made this segment REQUIRED)

Real-time (response) files that the HIR sends to provider organizations can contain any of the following message types:

VXR^V03

Response TO Vaccination Query Returning the Vaccination Record

MSH	Message Header Segment (One per message)
MSA	Message Acknowledgment Segment (One per message)
QRD	Query Definition Segment (One per message)
QRF	Query Filter Segment (One per message—required by HIR)
PID	Patient Identification Segment (One per matching patient)
[PD1]	Additional Demographics
[{NK1}]	Next of Kin Segment (Optional, zero or more per matching patient)
[PV1]	
{	
RXA	Pharmacy Administration
[RXR]	Pharmacy Route
[{OBX}]	Observation/Result Contraindications or Reactions
}	
[{OBX}]	Observation/Result Vaccines Due Next

### VXX^V03

Response TO Vaccination Query (Returning Multiple PID Matches)

Returning Multiple PID Matches will occur if any number other than 1 is in the QRD-07 segment of the query being sent in as explained on page 28 explaining the QRD segment.

MSH	Message Header Segment (One per message)
MSA	Message Acknowledgment Segment (One per message)
QRD	Query Definition Segment (One per message)
QRF	Query Filter Segment (One per message—required by HIR)
{	
PID	Patient Identification Segment (One per matching patient)
[ <u>{NK1}</u> ]	Next of Kin Segment (Optional, zero or more per matching patient)
}	

### ACK

General Acknowledgment

MSH	Message Header Segment
MSA	Message Acknowledgment Segment
[ERR]	Error

### QCK

Query General Acknowledgment

MSH	Message Header Segment
MSA	Message Acknowledgment Segment
[ERR]	Error
[QAK]	Query Acknowledgment Segment

Page 5 of this document outlines the rules/specifications needed to construct a HL7 message. These same rules must be applied for Real-time message processing. **\*\*Note:** Batch Message Headers (i.e. FHS, BHS) and footers (i.e. FTS, BTS) are NOT required for Real-time processing.

The message segments below are needed to construct message types that are used by HIR. Each segment is given a brief description excerpted from the HL7 standard. The tables define what fields make up each segment. Since HIR does not use all the fields that HL7 defines, there are sometimes gaps in the ordinal sequence of fields. Following HL7 rules, the gaps do not diminish the number of field separators within the segment. For example, if the second and third fields in a segment are not present, their field separators remain in order to indicate that the next field present is the fourth: field1|||field4.

### MSH

Message Header Segment

For VXU and VXQ message types, the MSH segment must be constructed according to normal HL7 format specifications (refer to Pg. 5 of this document). For Real-time processing, HIR limits the number of MSH segments that can be processed in a single file. Files containing more than 1 MSH segments will be rejected and an ACK message will be generated, informing the provider that 1 is the maximum number of MSH segments that HIR accepts for Real-time processing.

### VXU^V04

Unsolicited Vaccination Record Update

As stated earlier in this document, the VXU message is used for sending patient demographic and immunization specific data. This message type can be sent via Real-time. VXU segments should be constructed according to normal HL7 format specifications (refer to pages 5-9 of this document). A VXU message must be received in the HL7 2.4 format; HIR does not support prior HL7 versions for Real-time processing. HIR validates the version by reading the MSH-12 field. A VXU message must contain |2.4^^| in MSH-12.

Immunization deletions can be submitted for both batch HL7 2.4 and Real-time submissions. To indicate a deletion, the RXA-21 field must be populated with a value of “D”. Below is an example of a RXA deletion segment. If the number of deletions received through batch exceeds 5% of the total number of immunizations or more than 50 immunizations are marked for deletion, HIR will reject the file.

```
RXA|0|999|19860715|19860715|^0718^TdT^CPT|0|||05^^^^^||^208^^^^^^^^^^^^^^|D|
```

### VXQ^V01 - Query for Vaccination Record

When a health care provider (participating in an immunization registry) needs to obtain a complete patient vaccination record, a VXQ (query) is sent to the immunization registry for the definitive (last updated) immunization record. The three segments

that make up a VXQ message are the MSH (message header), QRD (query definition) and QRF (query filter). For a VXQ message, the MSH-09 field must contain |VXQ^V01| and the segments must be in the following sequence order:

**MSH**|^~&|HIRPH|HIRPH|HIRPH|HIRPH|200212091511||VXQ^V01|0000001|P^2.4|||ER  
**QRD**|19970522|R||000000001||25^RD|4211^KENNEDY^JOHN^FITZGERALD^JR|VXI|^VACCINE INFORMATION^HL700048|^S11S|  
**QRF**|MA0000|||256946789~19900607~MA~MA9999999~8888888~KENNEDY^JACQUELINE^LEE~BOUVIER~898666725~KENNEDY^JOHN^FITZGERALD~822546618|

The QRD and QRF segments are outlined in detail below.

**QRD**

Query Definition Segment

Used to define a query.

SEQ	LEN	DT	R/O	RP/#	TBL#	ELEMENT NAME
1	26	TS	R			Query date/time
2	1	ID	R		0106	Query Format Code
3	1	ID	R		0091	Query Priority
4	10	ST	R			Query ID
5	1	ID	O		0107	Deferred response type
6	26	TS	O			Deferred response date/time
7	10	CQ	R		0126	Quantity limited request
8	60	XCN	R	Y		<b>Who subject filter</b>
9	60	CE	R	Y	0048	<b>What subject filter</b>
10	60	CE	R	Y		<b>What department data code</b>
11	20	CM	O	Y		<b>What data code value qualifier</b>
12	1	ID	O		0108	Query results level

**Field Notes:**

- QRD-01 Date the query was generated by the application program. HIR requires this field and verifies that a valid date is received. The minimum format of YYYYMMDD is required. A null/invalid value results in message rejection.
- QRD-02 Query/response format code. HIR requires this field and only accepts a value of “R”. A null/invalid value results in message rejection.
- QRD-03 Time frame in which the response is expected. HIR requires this field and only accepts a value of “I”. A null/invalid value results in message rejection.
- QRD-04 Unique identifier for the query assigned by the querying application. HIR requires this field and null/invalid values result in message rejection. This field is returned intact by HIR in a response (VXR or VXX).
- QRD-05 Used to indicate a deferred response. This is an optional field. HIR does not support a deferred response.
- QRD-06 Used to indicate the date/time of the deferred response. This is an optional field. HIR does not support a deferred response.
- QRD-07 Maximum length of the response that can be accepted by the requesting system. HIR requires this field and only accepts a value of “RD” in the 2nd component. The 1st component is a numerical value. A null/invalid value in either sub-component results in message rejection. HIR will interpret the units as the maximum number of patient MATCHES to be returned via a VXX response message.

**Note:** HIR will return a maximum of 10 records per query message submitted. If a value of 0 (zero) is received (i.e. |0^RD|) then HIR will return the maximum allowable number of patients found to be matching the HIR.

- QRD-08 Identifies the subject of the query or whom the inquiry is about. The 1<sup>st</sup> component is optional. It is used to identify the HIR ID for the patient, if known. The 2<sup>nd</sup> component is required by HIR. If the first or last name OR both names are missing (regardless if there are repeating full names after the first) it results in message rejection. HIR supports repetition of this field.

**Note:** If the 1<sup>st</sup> component is used, HIR will find the patient in the registry with the matching internal ID. If a match is found, HIR will then compare the first and last name along with the birth date of both the matched patient and the patient in the QRD. If the name and birth date is exact, the patient is returned in a VXR. If a patient isn’t found using the internal ID, HIR will ignore that value and find patients that match the remaining information.

- QRD-09 Describes the kind of information required to satisfy the request. HIR requires this field and a value of “VXI” must populate the 1<sup>st</sup> component. HIR supports repetition of this field. Null/invalid values result in message rejection if the field does not repeat. If the field repeats there must be at least one value of “VXI” to be valid.
- QRD-10 Identifies the “what” department data code. HIR requires this field and supports repetition of it. Null/invalid values will result in message rejection.
- QRD-11 Further refines the inquiry by data code qualifiers by providing a window or range. This is an optional and repeatable field.
- QRD-12 Used to control level of detail in results. This field is optional and will be populated by HIR with the total count of PID matches found in HIR when Query results in a VXX Response Message.

**Example:**

QRD|19970522|R|I|0000001|||25^RD|4211^KENNEDY^JOHN^FITZGERALD^JR|VXI|^VACCINEINFORMATION^HL700048|^S11S|20

**QRF – Query Filter Segment – REQUIRED by HIR**

Used with the QRD segment to further refine the content of a query.

SEQ	LEN	DT	R/O	RP/#	TBL#	ELEMENT NAME
1	20	ST	R	Y		<b>Where subject filter</b>
2	26	TS	O			When data start date/time
3	26	TS	O			When data end date/time
4	60	ST	O	Y		<b>What user qualifier</b>
5	60	ST	R	Y		<b>Other query subject filter</b>
6	12	ID	O	Y	0156	<b>Which data/time qualifier</b>
7	12	ID	O	Y	0157	<b>Which date/time status qualifier</b>
8	12	ID	O	Y	0158	<b>Date/time selection qualifier</b>
9	60	TQ	O	Y		<b>When quantity/timing qualifier</b>

**Field Notes:**

- QRF-01 Identifies the department, system or subsystem to which the query pertains. HIR requires this field. HIR will validate that this field has a value, but will not save this value.
- QRF-02 Data representing dates and times (registries do not value this component). This is an optional field.
- QRF-03 Data representing dates and times (registries do not value this component). This is an optional field.
- QRF-04 An identifier to further define characteristics of the data of interest. This is an optional field.
- QRF-05 This field is used by registries to transmit up to ten separate search “keys”. HIR requires this field and does NOT support repetition. The 2<sup>nd</sup> component (patient DOB) is minimally required by HIR. A null/invalid format results in message rejection. Format is YYYYMMDD.

**Example:**

QRF|MA0000|||256946789~19900607~MA~MA99999999~88888888~KENNEDY^JACQUELINE^LEE~BOUVIER~898666725~KENNEDY^JOHN^FITZGERALD~822546618|

**VXR^V03 – Response TO Vaccination Query (Returning the Vaccination Record)**

When a patient has been uniquely identified (there is only one “match” to the query), the response to the query is a VXR^V03 message that is generated and sent back to the querying organization.

**VXR segment detail**

Several segments make up the VXR message type. The following segments have been outlined previously in this document and will follow the same formatting for the VXR message type.

MSH, MSA, QRD, QRF, PID, PD1, NK1, PV1, RXA, RXR, OBX (Observation/Result Contraindications or Reactions)

In addition to supplying the querying organization with patient specific demographic and immunization data (contained in the above segments), the VXR message also specifies “Observation/Result Vaccines Due Next” information. This information is supplied by generating a minimum of 3 OBX segments per 1 recommendation. HIR will report the Vaccination Schedule in the OBX segments through the specification of the LOINC code 30979-9 (Vaccines Due Next) and its sub-components in OBX-03. HIR requires specification of OBX-05 when OBX-03 is specified and valid. Further, HIR has superimposed a CE data type on the OBX-05 field. The corresponding observation values will be specified in OBX-05. Combinations are as follows:

**OBX-03**

30979-9  
 30979-9&30980-7  
 30979-9&30981-5

**OBX-05**

HL70292 (Codes for vaccines administered CVX)  
 Date Vaccine Due (HIR provides date recommended)  
 Earliest date to give (HIR provides)

Below you'll find an example of what a recommendation might look like in a VXR message response (see **bolded** OBX's below).

```
MSH|^~\&||HIR||QUERYING ORG|20040101101||VXR^V04|001|P^|2.4|||ER
MSA|AA|001|
QRD|20040120|R||001||1^RD|01^LAST NAME^FIRST^MIDDLE^JR|VXI^VACCINE INFORMATION^HL700048|^S11S||1|
QRF|MA000|||~19900607~WI~STATEBIR#~MA#~KENNEDY^JACQUELINE^LEE~BOUVIER~898666725~KENNEDY^JOHN^FITZ
GERALD~822546618~587421369~19630119~MN~MN99999999~88888888~DOE^JANE^ROSE~SMITH~999999999~SMITH^JOHN^I~
999999999|
PID|||1912484^^^^PI^~1234567^^^^SR^||Trolly^Eliot^J^Sr^|19090509|M||12017 N ROCK INN
RD^^ALBANY^NY^54412^USA^^^|(715)384-8649^^^^^^|
PD1|||||01^^^^^Y|||A||
NK1|1|Hamus^Eugene^J^Sr^|SEL^SELF^HL70063|12017 N ROCK INN RD^^ALBANY^NY^54412^USA^^^|(715)384-8649^^^^^^|
PV1|||V00^20031208|
RXA|0|999|20021001|20021001|^90721^Diphtheria, Tetanus, Acellular Pertussis + HIB^CPT|0||^Health Assessment & Promotion
(HAP)^Y|||HL70227|||200210141430
RXR|IM^^^|LA^^^
OBX|1|CE|30979-9^Vaccine due next^LN|1|20^DTAP^CVX^^^|
OBX|2|TS|30979-9&30980-7^Date vaccine due^LN|1|20040130^^^|
OBX|3|NM|30979-9&30981-5^Earliest date to give^LN|1|20040111^^^|
```

**VXX^V03 - Response TO Vaccination Query (Returning Multiple PID Matches)**

When a health care provider participating in an immunization registry needs to obtain a complete patient vaccination record, a query (VXQ message) is sent to the immunization registry for the definitive (last updated) immunization record. When a query results in multiple patient matches, the VXX message response is generated. The VXX contains multiple patients and their demographic information but does not contain their vaccination information. The number of matches that HIR generates will depend on what is specified in the first component of the incoming VXQ (QRD-07 Quantity Limited request field). HIR will interpret the quantity specified in this field as the maximum number of patient matches that the requester desires.

For example:

If the query results in 100 matches and the original quantity specified in QRD-07 was 10, then HIR generates 10 PID (and if applicable, associated NK1) segments in the VXX response message.

**ACK**

Acknowledgment Messages (with Errors)

ACK messages are generated for message rejections and for informational error messages. Three conditions that result in message rejection are:

1. Sequencing (i.e. a PID segment must follow an MSH segment).
2. Segment required fields contain no data.
3. Segment required fields contain invalid data.

An ACK is also generated when an informational error message has occurred, but it has not resulted in message rejection (i.e. NK1 segment contains no last name). In this case, the segment is ignored but the remainder of the message is processed. An ACK message is generated with a message informing the sender of the problem. The error message in the text does NOT include "Message Rejected". The ACK contains the MSH, MSA and ERR segments.

The MSH segment is generated according to normal HL7 processing guidelines. The MSA and ERR segments are detailed below:

## VXQ^V01 – Query for Vaccination Record

### MSA

#### Message Acknowledgment Segment

SEQ	LEN	DT	R/O	RP/#	TBL#	ELEMENT NAME
1	2	ID	R		0008	Acknowledgment code
2	20	ST	R			Message control ID
3	80	ST	O			Text message
4	15	NM	O			Expected sequence number
5	1	ID	B		0102	Delayed acknowledgment type
6	100	CE	O			Error condition

### Field Notes:

- MSA-01 The acknowledgment code indicates whether the message was accepted, rejected, error, etc... This is a required field. HIR generates an “AE” for messages resulting in informational or rejection errors. An “AA” is generated for a simple acknowledgment acceptance. MSA-02. The message control ID is the unique ID that is sent by the sending system. This is a required field. It allows the sending system to associate each message with a response. In a response, this will be the same as the control ID that was sent in MSH-10 by the sending system.
- MSA-03 This optional field further describes an error condition. When a message has been rejected, HIR generates “Message Rejection” as the first portion of the text describing the error message. Informational messages will not contain “Message Rejection”.
- MSA-04 This optional numeric field is used in the sequence number protocol. HIR does not generate this field.
- MSA-05 Delayed Acknowledgement type. HIR does not generate this field.
- MSA-06 Error Condition. HIR does not generate this field.

### ERR

#### Error Segment

The Error segment (ERR) is used to add error comments to acknowledgment messages. If the message was rejected for functional reasons, this segment will locate the error and describe it using locally established codes. Field components include: <segment ID (ST)>^<sequence (NM)>^<field position (NM)>^<code identifying error (CE)>

SEQ	LEN	DT	R/O	RP/#	TBL#	ELEMENT NAME
1	80	CM	R		0357	Error code and location

### Example:

#### ACK

```
MSH|^~\&||ZZ000||QUERYING ORG|20040101101||VXQ^V01|001|P^|2.4||ER
MSA|AE|001|Invalid relationship code. Defaulting to Guardian|3||102^Invalid data value^HL70357^^^
ERR|NK1^16^3^0
```

### QCK

#### Query General Acknowledgment

A QCK message is generated when HIR has processed the query message, but no match was found to the query parameters in the database. HIR does NOT generate this response message for anything other than no match found (for successful VXQ processing). Remember, error messages are reported through the use of the ACK response message; therefore, the optional [ERR] segment will never be generated for the QCK response message.

The MSH segment is generated according to normal HL7 processing guidelines. The MSA and QAK segments are detailed below:

## VXX^V02 Query General Acknowledgment

### MSA

Message Acknowledgment Segment

SEQ	LEN	DT	R/O	RP/#	TBL#	ELEMENT NAME
1	2	ID	R		0008	Acknowledgment code
2	20	ST	R			Message control ID
3	80	ST	O			Text message
4	15	NM	O			Expected sequence number
5	1	ID	B		0102	Delayed acknowledgment type
6	100	CE	O			Error condition

### Field Notes:

MSA-01 The acknowledgment code indicates whether the message was accepted, rejected, error, etc... This is a required field. HIR generates an AA for this field if no match is found in HIR. An AR is generated if a match is found, but the "Allow sharing of data" indicator is No.

MSA-02 The message control ID is the unique ID that is sent by the sending system. This is a required field. It allows the sending system to associate each message with a response. In a response, this will be the same as the control ID that was sent in MSH-10 by the sending system.

MSA-03 This optional field further describes an error condition. When a message has been rejected, HIR generates "Message Rejection" as the first portion of the text describing the error message. Informational messages will not contain "Message Rejection".

MSA-04 This optional numeric field is used in the sequence number protocol. HIR does not generate this field.

MSA-05 Delayed Acknowledgement type. HIR does not generate this field.

MSA-06 Error Condition. Refer to HL7 table 0357 for possible values.

### QAK

Query Acknowledgment Segment

SEQ	LEN	DT	R/O	RP/#	TBL#	ELEMENT NAME
1	32	ST			00696	Query Tag
2	2	ID	O		00708	Query response status

### Field Notes:

QAK-01 This field is valued by the initiating system to identify the query and can be used to match response messages to the originating query. If it is valued, the responding system is required to echo it back as the first field in the QAK. HIR uses the value specified in the QRD-04 (of the VXQ) for the QAK-01 query tag value.

QAK-02 This field allows the responding system to return a precise response status. Refer to HL7 table 0208 for values. HIR only generates NF (no data found, no errors) for this field.

Example:

### QCK

MSH|^~\&||ZZ000||QUERYING ORG|20040101101||VXX^V02|007|P^|2.4||ER

MSA|AR|007|Patient has an Allow sharing of immunization data indicator = No||500^Record Not Released^HL70357^^|

QAK|01|NF|

This concludes real-time processing.

## Appendix A -- HL7 Data Types

The following descriptions of HL7 data types are excerpted or adapted from the HL7 standard. See the field notes within each segment definition above on how to use data types in particular fields. Some data types have complex definitions much of which do not apply to HIR usage, and for these we omit much of the HL7 definition of the data type, referring instead to the field notes in the segment definitions.

### CE

#### Coded Element

Components: <identifier (ST)> ^ <text (ST)> ^ <name of coding system (ST)> ^ <alternate identifier (ST)> ^ <alternate text (ST)> ^ <name of alternate coding system (ST)>

Example:

```
|F-11380^CREATININE^I9^2148-5^CREATININE^LN|
```

This data type transmits codes and the text associated with the code. To allow all six components of a CE data type to be valued, the maximum length of this data type must be at least 60.

#### Identifier (ST)

Sequence of characters (the code) that uniquely identifies the item being referenced by the <text>. Different coding schemes will have different elements here.

#### Text (ST)

Name or description of the item in question. E.g., myocardial infarction or X-ray impression. Its data type is string (ST).

#### Name of coding system (ST)

Each coding system is assigned a unique identifier. This component will serve to identify the coding scheme being used in the identifier component. The combination of the **identifier** and **name of coding system** components will be a unique code for a data item. Each system has a unique identifier. ASTM E1238-94, Diagnostic, procedure, observation, drug ID, and health outcomes coding systems are identified in the tables in Section 7.1.4 [of the full HL7 standard], "Coding schemes." Others may be added as needed. When an HL7 table is used for a CE data type, the **name of coding system** component is defined as **HL7nnnn** where **nnnn** is the HL7 table number.

#### Alternate components

These three components are defined analogously to the above for the alternate or local coding system. If the Alternate Text component is absent, and the Alternate Identifier is present, the Alternate Text will be taken to be the same as the Text component. If the Alternate Coding System component is absent, it will be taken to mean the locally defined system.

**Note:** The presence of two sets of equivalent codes in this data type is semantically different from a repetition of a CE-type field. With repetition, several distinct codes (with distinct meanings) may be transmitted.

**Note:** For HL7-defined tables which have not been adopted from some existing standard, the third component, "name of coding system," is constructed by appending the table number to the string "HL7." Thus, the field *RXR-2-site*, is a CE data type which refers to HL7 table number 0163. Its "name of coding system" component is "HL70163".

### CM

#### Composite

Components: <point of care (IS)> ^ <room (IS)> ^ <bed (IS)> ^ <facility (HD)> ^ <location status (IS)> ^ <patient location type (IS)> ^ <building (IS)> ^ <floor (IS)> ^ <street address (ST)> ^ <other designation (ST)> ^ <city (ST)> ^ <state or province (ST)> ^ <zip or postal code (ST)> ^ <country (ID)> ^ <address type (ID)> ^ <other geographic designation (ST)>

Subcomponents of facility (HD): <namespace ID (IS)> & <universal ID (ST)> & <universal ID type (ID)>

Example:

```
|^^^Valley Clinic|
```

Definition: The first component contains the inpatient or outpatient location at which the drug or treatment was administered (if applicable). The default (null) value is the current census location for the patient. Site-specific table. The first eight components have the same form as the first eight components of *PVI-3-assigned patient location*. The final eight components replace the ninth component of *PVI-3-assigned patient location* and represent the full address specification.

## CX

Extended Composite ID with Check Digit

HIR uses this data type only for patient identification in Patient Identification (PID) segments. See the field notes for values used for HIR.

## HD

Hierarchic Designator

HIR uses this data type only to identify sender and receiver in Message Header (MSH) segments. See the field notes for values used for HIR.

## ID

Coded Value for HL7 Defined Tables

The value of such a field follows the formatting rules for a ST field except that it is drawn from a table of legal values. There shall be an HL7 table number associated with ID data types. Examples of ID fields include religion and sex. This data type should be used only for HL7 tables. The reverse is not true, since in some circumstances it is more appropriate to use the CE data type for HL7 tables.

## IS

Coded Value for User Defined Tables

The value of such a field follows the formatting rules for a ST field except that it is drawn from a site-defined (or user-defined) table of legal values. There shall be an HL7 table number associated with IS data types. An example of an IS field is the *Event reason code* defined in Section 3.3.1.4 [of the full HL7 standard], "Event reason code." This data type should be used only for user-defined tables. The reverse is not true, since in some circumstances, it is more appropriate to use the CE data type for user-defined tables.

## NM

Numeric

A number represented as a series of ASCII numeric characters consisting of an optional leading sign (+ or -), the digits and an optional decimal point. In the absence of a sign, the number is assumed to be positive. If there is no decimal point the number is assumed to be an integer. Examples:

| 999 |

| -123.792 |

Leading zeros, or trailing zeros after a decimal point, are not significant. For example, the following two values with different representations, "01.20" and "1.2", are identical. Except for the optional leading sign (+ or -) and the optional decimal point (.), no non-numeric ASCII characters are allowed. Thus, the value <12 should be encoded as a structured numeric (SN) (preferred) or as a string (ST) (allowed, but not preferred) data type.

## SI

Sequence ID

A non-negative integer in the form of a NM field. See the field notes in segments using this data type for specifications of SI fields.

## ST

String Data

String data is left justified with trailing blanks optional. Any displayable (printable) ACSII characters (hexadecimal values between 20 and 7E, inclusive, or ASCII decimal values between 32 and 126), except the defined delimiter characters.

Example:

|almost any data at all|

To include any HL7 delimiter character (except the segment terminator) within a string data field, use the appropriate HL7 escape sequence.

Usage note: the ST data type is intended for short strings (e.g., less than 200 characters). For longer strings the TX or FT data types should be used.

## TS

Time Stamp

Format: YYYY[MM[DD[HHMM[SS[.S[S[S[S]]]]]]][+/-ZZZZ]^<degree of precision>

Contains the exact time of an event, including the date and time. The date portion of a time stamp follows the rules of a date field and the time portion follows the rules of a time field. The specific data representations used in the HL7 encoding rules are compatible with ISO 8824-1987(E).

**In prior versions of HL7, an optional second component indicates the degree of precision of the time stamp (Y = year, L = month, D = day, H = hour, M = minute, S = second). This optional second component is retained only for purposes of backward compatibility.**

By site-specific agreement, YYYYMMDD[HHMM[SS[.S[S[S[S]]]]][+/-ZZZZ]^<degree of precision> may be used where backward compatibility must be maintained.

In the current and future versions of HL7, the precision is indicated by limiting the number of digits used, unless the optional second component is present. Thus, YYYY is used to specify a precision of “year,” YYYYMM specifies a precision of “month,” YYYYMMDD specifies a precision of “day,” YYYYMMDDHH is used to specify a precision of “hour,” YYYYMMDDHHMM is used to specify a precision of “minute,” YYYYMMDDHHMMSS is used to specify a precision of seconds, and YYYYMMDDHHMMSS.SSSS is used to specify a precision of ten thousandths of a second. In each of these cases, the time zone is an optional component. Maximum length of the time stamp is 26. Examples:

```
|19760704010159-1000| 1:01:59 on July 4, 1976 in the Hawaii
                        Standard Time zone.

|198807050000|      Midnight of the night extending from July 4 to
                        July 5, 1988 in the local time zone of the sender.

|19880705|          Same as prior example, but precision extends
                        only to the day. Could be used for a
                        birthdate, if the time of birth is unknown.
```

The HL7 Standard strongly recommends that all systems routinely send the time zone offset but does not require it. All HL7 systems are required to accept the time zone offset, but its implementation is application specific. For many applications the time of interest is the local time of the sender. For example, an application in the Eastern Standard Time zone receiving notification of an admission that takes place at 11:00 PM in San Francisco on December 11 would prefer to treat the admission as having occurred on December 11 rather than advancing the date to December 12.

One exception to this rule would be a clinical system that processed patient data collected in a clinic and a nearby hospital that happens to be in a different time zone. Such applications may choose to convert the data to a common representation. Similar concerns apply to the transitions to and from daylight saving time. HL7 supports such requirements by requiring that the time zone information be present when the information is sent. It does not, however, specify which of the treatments discussed here will be applied by the receiving system.

## XAD

### Address

Components: <street address (ST)> ^ <other designation (ST)> ^ <city (ST)> ^ <state or province (ST)> ^ <zip or postal code (ST)> ^ <country (ID)> ^ <address type (ID)> ^ <other geographic designation (ST)> ^ <county/parish code (IS)> ^ <census tract (IS)> ^ <address representation code (ID)>

### Example:

```
|1234 Easy St.^Ste. 123^San Francisco^CA^95123^USA^B^^SF^^|
```

## Street address (ST)

The street or mailing address of a person or institution.

## Other designation (ST)

Second line of address. In general, it qualifies address. Examples: Suite 555 or Fourth Floor.

## City (ST)

## State or province (ST)

State or province should be represented by the official postal service codes for that country.

## Zip or postal code (ST)

Zip or postal codes should be represented by the official codes for that country. In the US, the zip code takes the form 99999[-9999], while the Canadian postal code takes the form A9A-9A9.

**Country (ID)**

Defines the country of the address. See Table 0212.

**Address type (ID)**

Address type is optional.

**Other geographic designation (ST)**

Other geographic designation includes country, bioregion, SMSA, etc.

**County code (IS)**

A code that represents the county in which the specified address resides. Refer to *user-defined table 0289 - County*. When this component is used to represent the county, component 8 “other geographic designation” should not duplicate it (i.e., the use of “other geographic designation” to represent the county is allowed only for the purpose of backward compatibility, and should be discouraged in this and future versions of HL7).

**Census tract (IS)**

An optional code that represents the census track in which the specified address resides. HIR does not store this value.

**XCN**

Extended Composite ID Number and Name for Persons

HIR uses this data type only to identify Provider Organizations that administer immunizations. See the field notes for segment RXA.

**XPN**

Extended Person Name

Components: <family name (ST)> & <last name prefix (ST)> ^ <given name (ST)> ^ <middle initial or name (ST)> ^ <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^ <degree (e.g., MD) (ST)> ^ <name type code (ID) > ^ <name representation code (ID)>

Example:

|Smith&St^John^J^III^DR^PHD^L|

Family name (ST)

Last Name Prefix (ST)

Given name (ST)

Middle initial or name (ST)

**Suffix (ST)**

Used to specify a name suffix (e.g., Jr. or III).

**Prefix (ST)**

Used to specify a name prefix (e.g., Dr.).

**Degree (ST)**

Used to specify an educational degree (e.g., MD).

**Name type code (ID)**

A code that represents the type of name. Refer to *HL7 table 0200 - Name type* for valid values.

Table 0200 - Name type

Value	Description
A	Alias Name
L	Legal Name
D	Display Name
M	Maiden Name
C	Adopted Name

Note: The legal name is the same as the current married name.

**Name representation code (ID)**

This component can be used when names are represented in ideographic or non-alphabetic systems. HIR ignores this component.

**XTN**

Extended Telecommunication Number

Components: [MNN] [(999)]999-9999 [X999999] [B999999] [C any text] ^ <telecommunication use code (ID)> ^ <telecommunication equipment type (ID)> ^ <email address (ST)> ^ <country code (NM)> ^ <area/city code (NM)> ^ <phone number (NM)> ^ <extension (NM)> ^ <any text (ST)>

Example:

(415) 555-3210^ORN^FX^

**[(999)] 999-9999 [X999999] [C any text]**

Defined as the TN data type, except that the length of the country access code has been increased to three.

**Telecommunication use code (ID)**

A code that represents a specific use of a telecommunication number. Refer to HL7 table 0201 - Telecommunication use code for valid values.

Table 0201 - Telecommunication use code

Value	Description
PRN	Primary Residence Number
ORN	Other Residence Number
WPN	Work Number
VHN	Vacation Home Number
ASN	Answering Service Number
EMR	Emergency Number
NET	Network (email) Address
BPN	Beeper Number

**Telecommunication equipment type (ID)**

A code that represents the type of telecommunication equipment. Refer to HL7 table 0202 - Telecommunication equipment type for valid values. Table 0202 - Telecommunication equipment type

Value	Description
PH	Telephone
FX	Fax
MD	Modem
CP	Cellular Phone
BP	Beeper
Internet	Internet Address: Use Only If Telecommunication Use Code Is NET
X.400	X.400 email address: Use Only If Telecommunication Use Code Is NET

- Email address (ST)
- Country code (NM)
- Area/city code (NM)
- Phone number (NM)
- Extension (NM)
- Any text (ST)