IMMPACT HL7 v2.5.1 Bi-Directional (QBP/RSP) Data Exchange Implementation Guide

REVISION HISTORY

Editor	Edit Date	Version	Changes
E. Dansby/S. Nickell	May 10, 2017	1.0	
E. Dansby	August 9, 2017	1.01	• Updated Sample QBP/RSP messages • Added text to MSH table (pg9) • Updated Addendum text • Updated formatting
E. Dansby	October 17, 2017	1.01	• Added information on LOINC codes for Reactions • Added RSP example for multiple patients found
ImmPact DEX Team	September 10, 2020	2.0.0	• CAIR to ImmPact

IMMPACT DATA EXCHANGE CONTACT INFORMATION

For data exchange questions and support, please email MEIIS.DEXCDC@maine.gov

To get the latest information regarding data exchange with IMMPACT, please visit the data exchange page on the IMMPACT website at: immunizeme.org

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Bi-directional Data Exchange (BiDX)

The bi-directional HL7 messaging capability in IMMPACT allows medical care providers to send an HL7 QBP ('query by parameter') patient query message and receive in return an HL7 RSP message containing either a patient immunization history or an evaluated patient history and forecast.

A formal testing and 'onboarding' process for BiDX will be required. Onboarding of Sites to BiDX will begin in the Summer of 2017. Please consult with your EHR vendor support as to the BiDX readiness of your EHR. This document summarizes the formatting specifications for BiDX messages sent to IMMPACT.

Value of Historical Data

To get the most value from the BiDX process, each site should consider submitting all active patient historical doses to IMMPACT so that patient vaccination recommendations returned to your EHR will be correct. One option would be to have your vendor set up your EHR system to send full patient histories when your site submits VXU message to IMMPACT for a period of 6-12 mos. Another option would be to submit data in batch files. Consult with one of our IMMPACT Data Exchange Specialist about submitting prior immunizations records (historical data) for your active patients.

Bi-Directional Capability – QBP/RSP

IMMPACT will support real-time immunization record query messages (QBP) and will return immunization histories or immunization histories plus forecasting in a response file (RSP). This bidirectional messaging functionality (BiDX) will be made available to IMMPACT DX sites beginning in April 2018. Specifications on query/response messaging with IMMPACT will be identical those found in the
 HL7 Version 2.5.1 Implementation Guide for Immunization Messaging Release
1.5 (URL: http://www.cdc.gov/vaccines/programs/iis/technical-guidance/downloads/hl7guide-1- 5-2014-11.pdf)

QUERY MESSAGE PROFILE TYPES

IMMPACT supports two types of query message profiles; Z34 – Request Complete Immunization History, and Z44 – Request Evaluated Immunization History and Forecast. The breakdown for these profiles can be found in the following table. Please consult with your vendor as to which message type is the most appropriate for your clinic. For example, if your EHR has its own vaccine forecaster, you will probably wish to send QBP messages using the Z34 profile.

	Z34 profile	**Z44 profile**
Type	Query	Query
Query Name	Request Complete Immunization History	Request Evaluated Immunization History and Forecast
MSH-9 Value	QBP^Q11^QBP_Q11	QBP^Q11^QBP_Q11
QPD-1 Value	**Z34^Request Complete Immunization History^HL70471**	**Z44^Request Evaluated History and Forecast^HL70471**
Purpose	The purpose is to request a complete immunization history for one client.	The purpose is to request an evaluated immunization history and forecast for one client
Characteristics	A complete immunization history consists of: • Demographic information about the patient • History of immunizations administered.	An evaluated immunization history and forecast consists of: • Demographic information about the patient • History of immunizations administered. • Forecast of what immunization the patient is due to receive next and

		the dates when due. *
Response Characteristics	- In the case where no candidates are found, the acknowledgement response will indicate that no candidates were found. - In the case where exactly one high-confidence candidate is found, an immunization history may be returned. - In the case where at least one lower confidence match is found, but is less than the maximum number allowed in the query, then the response will return one PID with associated PD1 and NK1 segments for each potential match. No immunization history is returned. This allows for a re-query by the initiating system. - If more than the maximum number is allowed is found, the acknowledgement response will indicate too many matches and no records will be returned. - In the case where one high confidence candidate is found, but that candidate does not allow sharing of data, the acknowledgement response will return "PD" (protected data) in QAK-2 (See Addendum). No records will be returned. - In the case where IMMPACT can't process the query, IMMPACT will indicate an error in the acknowledgement.	- In the case where no candidates are found, the acknowledgement response will indicate that no candidates were found. - In the case where exactly one high-confidence candidate is found, an evaluated immunization history and forecasting will be returned. - In the case where at least one lower confidence match is found, but is less than the maximum number allowed in the query, then the response will return one PID with associated PD1 and NK1 segments for each potential match. No immunization history is returned. This allows for a re-query by the initiating system. - If more than the maximum number is allowed is found, the acknowledgement response will indicate too many matches and no records will be returned. - In the case where one high confidence candidate is found, but that candidate does not allow sharing of data, the acknowledgement response will return "PD" (protected data) in QAK-2 (See Addendum). No records will be returned. - In the case where IMMPACT can't process the query, IMMPACT will indicate an error in the acknowledgement.

*To get the most value from the BiDX process, each site should consider **submitting ALL active patient historical doses to IMMPACT** so that patient vaccination recommendations returned to your EHR will be correct.

HL7 QBP / RSP MESSAGE STRUCTURE

IMMPACT supports real-time immunization record query messages (QBP) and will return immunization histories (Z34 Profile) or immunization histories plus forecasting (Z44 Profile) in a response file (RSP). The following tables show the message grammar of the QBP and RSP message types.

QBP – Query by Parameter message grammar

Segment	Cardinality	Description	Usage	Notes
MSH	[1..1]	Message Header	R	Every message begins with an MSH.
QPD	[1..1]	Query Parameter Definition	R	
RCP	[1..1]	Response Control Parameter	R	The RCP segment is used to restrict the amount of data that should be returned in response to a query.

RSP – Query Response Profile message grammar

Segment	Cardinality	Description	Usage	Notes
MSH	[1..1]	Message Header	R	Every message begins with an MSH.
MSA	[1..1]	Message Acknowledgment	R	
[ERR]	[0..*]	Error Segment	RE	If an error exists, then this segment is populated. Each error will have its own ERR segment.
QAK	[1..1]	Query Acknowledgement	R	
QPD	[1..1]	Query Parameter Definition	R	Query Parameter Definition segment matches the information in the requesting QBP message.
[{	[0..*]		O	***Begin Response Group*** If a query errors out or if no matching persons are found, the segments in the Response Group will not be returned.
[{	[0..*]		O	***Begin patient identifier Group***
PID	[1..1]	Patient Identifier	R	
[PD1]	[0..0]	Patient Demographic	R	
[{NK1}]	[0..0]	Next of Kin	RE	
}]				***End Patient Identifier***
[	[0..1]		O	***Begin Immunization History Group***
[{	[0..*]		RE	***Begin Order Group***
ORC	[1..1]	Order Request	R	Required if the patient has immunization records (RXA). There is one ORC for each RXA.
RXA	[1..1]	Pharmacy / Treatment Administration	R	
[RXR]	[0..1]	Pharmacy / Treatment Route	RE	

[{	[0..*]			RE	*Begin Observation Group*
OBX	[1..*]	Observation		R	
}]					*End observation*
}]					*End Order*
]					*End Immunization History*
}]					*End Response Group*

RSP segments that are not supported by IMMPACT are not shown in the above table.

NOTE: [XYZ] **Square brackets enclose optional segments**
{XYZ} **Curly brackets enclose segments which can be repeated**
[{XYZ}] Defines an optional segment which can be repeated

USAGE DEFINITIONS

Symbol	Definition
R	**Required**
RE	Required but may be empty
O	Optional
X	Not supported in this guide

QUERY BY PARAMETER (QBP): SEGMENT DETAILS

MSH: MESSAGE HEADER SEGMENT

The Message Header (MSH) segment is required for each QBP sent.

Position	Field Name	IMMPACT Usage	Comments
1	**Field separator**	R	**The MSH-1 field shall be |**
2	**Encoding characters**	R	**The MSH-2 field shall be ^~\&**
3	Sending application	RE	
4	**Sending facility**	R	**Sending facility ID supplied by IMMPACT.**
5	Receiving application	RE	
6	Receiving facility	RE	If supplied, '**IMMPACT**' expected
7	**Date/time of message**	R	
8	Security	O	
9	**Message type**	R	**QBP^Q11^QBP_Q11**
10	**Message control id**	R	**Used to tie acknowledgment to message. Must be unique for each message**
11	**Processing id**	R	**MSH-11 field shall be 'P'**
12	**Version id**	R	**2.5.1**
13	Sequence number	O	
14	Continuation pointer	O	
15	**Accept acknowledgment type**	R	**ER**
16	**Application acknowledgment type**	R	**AL**
17	Country code	X	
18	Character set	X	
19	Principal language of message	X	
20	Alternate character set handling scheme	X	
21	Message Profile Identifier	RE	Z34^CDCPHINVS or Z44^CDCPHINVS
22	Sending Responsible Organization	RE	IMMPACT Org Code of site initiating the QBP
23	Receiving Responsible Organization	RE	If supplied, '**IMMPACT**' expected

MSH FIELD USAGE NOTES

MSH-1: Field separator
IMMPACT expects to receive standard character: '**|**'
NOTE: The CDC Immunization Guide requires senders to only use the standard character.

MSH-2: Encoding characters
IMMPACT expects standard encoding characters: **^~\&**
NOTE: The CDC Immunization Guide requires senders to only use the standard characters.

MSH-4: Sending facility ID

The IMMPACT sending facility ID is assigned automatically after registering through the Immunization Messaging Portal. The ID will be sent to the Site in a secure email. Data submitters will place their assigned IMMPACT Site ID in MSH-4. This assigned ID should be used for all messages sent.

Position	Field Name	Usage
1	namespace id	R
2	universal id	RE
3	universal id type	RE

MSH-7: Date/time of message

The date and time the message was created. This field is required.
Format: YYYYMMDDHHMMSS

If sending more than 14 digits, the following format is required:
YYYY[MM[DD[HH[MM[SS[.S[S[S[S]]]]]]]]][+/-ZZZZ]

Example: **19970716192030.45+0100**

MSH-9: Message type

This field contains the type of message being sent.
Message type: QBP
Trigger event: Q11
Message structure: QBP_Q11

Position	Field Name	Usage
1	message type	R
2	trigger event	R
3	message structure	R

MSH-10: Message Control ID

The Message Control ID is a unique id for the message that is generated by the sending system. This field is used to tie the acknowledgement to the message. Format: STRING

MSH-11: Processing ID

Only value accepted is **"P"** for production. All other values will cause the message to be rejected.

MSH-12: Version ID

Value: **2.5.1**

MSH-15: Accept Acknowledgment Type

Per the CDC Implementation Guide, this field shall be constrained to a value of "ER" - Error

MSH-16: Application acknowledgment type

The value in MSH-16 shall be constrained to "AL" – Always. If MSH-16 is empty or contains a value other than 'AL' type, MSH-16 will be treated as if "AL" was sent, and no error will be returned.

MSH-21 – Message Profile Identifier

MSH-21 Value	Description
Z34^CDCPHINVS	Request Complete Immunization History
Z44^CDCPHINVS	Request Evaluated Immunization History and Forecast

MSH-22: Sending Responsible Organization
The IMMPACT site ID (org code) for the location that initiated the QBP.

QPD: QUERY PARAMENTER DEFINITION SEGMENT

Position	Field Name	IMMPACT	Value or description
1	**Message Query Name**	**R**	**Z34^Request Complete Immunization History^HL7047** or **Z44^Request Evaluated History and Forecast^HL70471**
2	**Query Tag**	**R**	**Unique to each query message instance. Valued by the HL7 data submitter.**
3	Patient List	RE	PID-3: Patient Identifier (i.e. MRN)
4	**Patient Name**	**R**	**PID-5: Patient Name**
5	Patient Mother Maiden Name	RE	PID-6: Mother's Maiden Name
6	**Patient Date of Birth**	**R**	**PID-7: Patient Date of Birth**
7	Patient's Sex	RE	PID-8: Patient Sex
8	Patient Address	RE	PID-11: Patient Address
9	Patient Home Phone	RE	PID-13: Patient Home Phone
10	Patient Multiple Birth Indicator	RE	PID-24: Patient Multiple Birth Indicator
11	Patient Birth Order	RE	PID-25: Patient Birth Order
12	Client Last Updated Date	X	PID-33: Patient Last Updated Date
13	Client Last Update Facility	X	PID-34: Patient Last Update Facility

NOTE: The likelihood of finding a particular person is improved when all known parameters are populated. Requesting systems should strive to include values for each query parameter.

QPD FIELD USAGE NOTES

QPD-1: Message Query Name
This field contains the name of the query. Two types of queries are accepted in this field.

Value	Description
Z34^Request Complete Immunization History^HL7047	Request Complete Immunization History
Z44^Request Evaluated History and Forcast^HL70471	Request Evaluated Immunization History and Forecast

QPD-2: Query Tag

This is a required field. It must be valued by the HL7 Data Partner's system to identify the query and may be used to match response messages to the originating query. This query tag must be unique to each query message instance.

QPD-3: Patient List

This field contains identifiers that are intended to allow unique identification of the patient Multiple identifiers are accepted in this filed. The format of this field follows the same format of the PID-3 field in a VXU message.

QPD-4: Patient Name

This field contains the patient's legal name. Both the patient last/family name and patient first/given name are required. Middle name is not required. This field follows the format of the PID-5 field in a VXU message. Example: **|LAST^FIRST^MIDDLE^^^^L|**

QPD-5: Patient Mother Maiden Name

This field contains the maiden name of the patient's mother. This field follows the format of the PID-6 field in a VXU message. Only the last/family name (QPD-5.1) is used when searching for matching patients.

QPD-6: Patient Date of Birth

This field contains the patient's date of birth. The format of this field follows the format of the PID-7 field in a VXU message. **Example: |YYYYMMDD|**

QPD-7: Patient Sex

This field contains the patient's sex. The format of this field follows the format of the PID-7 field in a VXU message. All Administrative Sex codes (F, M, U) are accepted.

QPD-8: Patient Address

The patient's address is sent in this field. If the field is valued, the requirements below must be followed.

Position	Field	IMMPACT Usage
1	**street address**	**R**
2	other designation	RE
3	**city**	**R**
4	**state or province**	**R**
5	**zip or postal code**	**R**
6	country	optional
7	address type	RE
8	other geographic designation	ignored
9	county/parish code	optional

Example: |555 W. First Ave^Suite 200^Anywhere^CA^12345^^P|

QPD-9: Patient Home Phone

This field contains the patient's home phone number. Only the first phone number will be processed. All other phone numbers will be ignored. The format of this field follows the format of the PID-13 field in a VXU message. **Example: |^PRN^PH^^^555^5555555|**

QPD-10: Multiple Birth Indicator

This field indicates whether the patient was part of a multiple birth. If the status is undetermined, then the field should be empty.

Value	Description
Y	The patient was part of a multiple birth
N	The patient was a single birth

QPD-11: Birth Order

If the patient is part of a multiple birth, a value (number) indicating the patient's birth order is entered in this field. If PID-24 is populated with a 'Y', then this field shall be populated.

RCP: RESPONSE CONTROL PARAMETER SEGMENT

Position	Field Name	IMMPACT	Value or description
1	Query Priority	RE	If this field is not valued then it shall default to "I".
2	Quantity Limited Request	RE	The maximum number of patients that may be returned.
3	Response Modality	O	Default is "R" (Real-time).

RCP FIELD USAGE NOTES

RCP-1: Query Priority

This field contains the time frame that the response from a query is expected. If RCP-1 is empty or contains another value other than "I" (immediate), IMMPACT will ignore the field and will process the message as if "I" was sent.

RCP-2: Quantity Limited Request

This field is the maximum total records IMMPACT should return. A numerical value is given in the first component and the units are specified in the second component. **The units in the second component shall be 'RD'**. Empty component or another value submitted, other than a number, will cause the QPB to fail.
Example of RCP-2 formatting: |5RD|

RCP-3: Response Modality

This field is optional. The field specifies the timing and grouping of the response message. RCP-3 shall be "R" for real-time. IMMPACT HL7 Web Service does not support batch processing. If the field is empty or   another value submitted, IMMPACT will ignore and process as if "R" was sent.

QUERY RESPONSE (RSP): SEGMENT DETAILS

A properly formatted QBP message will return a RSP response message using the Z31, Z32, Z33, or Z42 profile.

NOTE: The below details of the RSP segments, are the details and/or values returned by IMMPACT in the query response. These segments and fields are populated by IMMPACT and are not populated by the data exchange submitter. Segment details not listed below can be found in the IMMPACT HL7 Data Exchange Specification

MSH: MESSAGE HEADER SEGMENT

Please see MSH field definitions beginning on page 8 of this guide. The below MSH fields notes are changes from what is submitted by the submitting site in the MSH of the QBP message.

MSH-3: Sending Application
The value returned is: **IMMPACT IIS**

MSH-4: Sending facility
The value returned is: **IMMPACT IIS**

MSH-6: Receiving Application
IMMPACT will value this field with what was provided in MSH-22.1 of the corresponding QBP.

MSH-9: Message type
The filed contains the type of message being returned to the submitter.

Message type: RSP
Trigger event: K11
Message structure: RSP_K11

MSH-21: Message Profile Identifier

MSH-21 Value	Description
Z31^CDCPHINVS	Return List of Candidates
Z32^CDCPHINVS	Return Immunization History
Z33^CDCPHINVS	No Patient Match Found or Too Many Matches Found
Z42^CDCPHINVS	Return Immunization History and Immunization Forecasting

MSH-23: Receiving Responsible Organization
IMMPACT will value this field with what was provided in MSH-4.1 of the corresponding QBP.

MSA: MESSAGE ACKNOWLEDGEMENT SEGMENT

Position	Field Name	IMMPACT Usage
1	Acknowledgment Code	R
2	Message Control ID	R

MSA FIELD USAGE NOTES

MSA-1: Acknowledgment code

This field contains an acknowledgment code from table HL70008.

In MSA-1 only the value shown in the table will be used.

Value (MSA-1)	Description	Comment
AA	Application Accept	QBP message was accepted without error
AE	Application Error	QBP message was parsed as a query and contains non-fatal errors.
AR	Application Reject	Message was rejected because one of the following occurred: • Unsupported message type • Unsupported event code • Unsupported processing ID Unable to process for reasons unrelated for format or content

MSA-2: Message Control ID

This field contains the message control ID of the message sent by the sending system. It allows the sending system to associate this response with the message for which it is intended. **This field echoes the message control id sent in MSH-10 by the initiating system.**

ERR: ERROR SEGMENT

An ERR segment will be returned in the response if there are any errors encountered with the QBP message. The format of the ERR segment follows the same formatting as the ERR segment in a standard ACK for a VXU message.

QAK: QUERY ACKNOWLEDGEMENT SEGMENT

Position	Field Name	IMMPACT	Value or description
1	Query Tag	R	Value sent by Data Exchange Partner in QPD-2 (query tag) of the corresponding QBP message
2	Query Response Status	R	
3	Message Query Name	O	

QAK FIELD USAGE NOTES

QAK-1: Query Tag
This field contains the value sent in QPD-2 (query tag) by the initiating system, and will be used to match the response message to the originating query.

QAK-2: Query Response Status
This field allows the responding system to return a precise response status.
The following table, User Defined Table 0208 contains the values that would be returned by IMMPACT in the QAK-2 field:

Value	Description	Comment
OK	Data found, no errors (this is the default)	
NF	No data found, no errors	Patient not found in IMMPACT based on query received.
AE	Application Error	Query had an error in content or format
AR	Application Reject	QBP message can be parsed as a query, but contains fatal errors (See Addendum)
TM	Too many candidates found	Too many possible matches to patient sent in the query. Query must be narrowed down.
PD	Protected Data	Patient's data marked as 'Not Shared' in IMMPACT (See Addendum)

QAK-3: Message Query Name
This field contains the name of the query. This shall mirror the QPD-1 (Message Query Name) found in the query message that is being responded to.

QPD: QUERY PARAMATER DEFINITION SEGMENT
The Response QPD segment echoes back the information exactly as it was received in the QPD segment of the QBP request sent by the HL7 Data Exchange site. Please see QPD field definitions beginning on page 11 of this guide.

PID: PATIENT IDENTIFIER SEGMENT
The PID segment returned in the RSP follows the same formatting as that found in the VXU message profile, with the exception of the PID-3 field. The PID-3 field will echo back the patient identifier submitted in the QPD of the QBP, along with the patient's IMMPACT ID number (State Registry ID number). If the patient identifier doesn't exist in IMMPACT, or the patient identifier is associated to another provider site other than the site submitting the query, then only the IMMPACT patient ID will be returned in PID-3.1 of the RSP.

PID-3 Examples:
- **Only IMMPACT ID returned**: **|123456^^^IMMPACT^SR|**
- **IMMPACT ID and Patient MRN returned:**
  |123456^^^IMMPACT^SR~2178167^^^IMMPACT^MR|

PD1: PATIENT DEMOGRAPHIC SEGMENT
The Patient Demographic segment contains patient demographic information that may change from time to time. There are three primary uses for PD1 in immunization messages. These include indicating whether the person wants his/her data protected, whether the person wants to receive recall/reminder notices, and the person's current status in the registry. For PD1 segment details, please see page 26 of the IMMPACT HL7 VXU specification.

NK1: NEXT OF KIN SEGMENT

The NK1 segment contains information about the patient's other related parties. For NK1 segment details, please see page 28 of the IMMPACT HL7 VXU specification.

ORC: ORDER REQUEST SEGMENT

The Order Request Segment is used to transmit fields that are common to all orders. If a patient has an immunization history, the RSP returned by IMMPACT will include an ORC segment and RXA segment combination for each immunization. Only the below fields are returned in the ORC segment of the RSP.

Position	Field Name	IMMPACT	Comment
1	**Order Control**	**R**	**Shall be constrained to "RE"**
2	Placer Order Number	X	
3	**Filler Order Number**	**R**	**This field will be valued with the IMMPACT unique identifier for the immunization record. For patient immunization forecasting/recommendations this field will be valued with a "0".**

RXA: PHARMACY/TREATMENT ADMINISTRATION SEGMENT

The RXA segment carries pharmacy administration data. The format of the RXA segment follows the same formatting as the RXA segment in a standard VXU message. Please see page 29 of the IMMPACT HL7 specification document for details on the RXA segment.

Position	Field Name	IMMPACT	Comment
1	**Give sub-ID counter**	**R**	**constrained to "0" (zero)**
2	**Administration sub-ID counter**	**R**	**constrained to "1"**
3	**Date/time start of administration**	**R**	
4	**Date/time end of administration**	**R**	
5	**Administered code**	**R**	**CVX code returned. CPT codes may also be returned in the second triplet if they are found in IMMPACT.**
6	**Administered amount**	**R**	
7	Administered units	X	
8	Administered dosage form	X	
9	**Administration notes**	**R**	
10	Administering provider	X	
11	**Administered-at location**	**R**	**The administered provider site name is returned in RXA-11.4**
12	Administered per (time unit)	X	
13	Administered strength	X	
14	Administered strength units	X	
15	Substance lot number	RE	
16	Substance expiration date	X	Expiration date not returned
17	Substance manufacturer name	RE	

18	Substance refusal reason	X	
19	Indication	X	
20	Completion status	RE	
21	Action code	X	

NOTE: For RXA segments associated with the forecasting/recommendations of the Z44 Profile, IMMPACT will value RXA-5 with **"998^No Vaccine Administered^CVX"**

RXR: PHARMACY/TREATMENT ROUTE SEGMENT

The Pharmacy/Treatment Route segment contains the alternative combination of route, site, administration device, and administration method that are prescribed as they apply to a particular order. For RXR segment details, please see page 34 of the IMMPACT HI7 VXU specification

OBX: OBSERVATION SEGMENT

In an RSP, the OBX segment carries observations associated with the RXA or the immunization record.

Position	Field Name	IMMPACT Usage
1	Set ID - OBX	R
2	Value Type	R
3	Observation Identifier	R
4	Observation Sub-ID	R
5	Observation Value	R
6	Units	X
7	Reference Ranges	X
8	Abnormal Flags	X
9	Probability	X
10	Nature of Abnormal Test	X
11	Observation Result Status	Constrained to "F" for Final

OBX FIELD USAGE NOTES

OBX-1: Set ID
This field contains the sequence number of the OBX segment. For each OBX segment under an RXA, the first OBX segment will be valued with a "1" in OBX-1. Each subsequent OBX segment will be valued with the next number in sequence. The OBX numbering schema will start again with "1" for the next set of OBX segments under the next RXA segment.

OBX-2: Value Type
This field contains the format of the observation value in OBX-5.

OBX-3: Observation Identifier

This field contains a unique identifier for the observation. One way to look at this is OBX-3 poses the question and OBX-5 answers it. The table below lists the possible values for OBX-3 in the RSP, the corresponding data types for OBX-2 and the corresponding observation example or value for OBX-5.

LOINC Code For OBX-3.1	Description	Corresponding data type in OBX-2	Corresponding observation Example or Value in OBX-5
30973-2	Dose number in series	NM	1, 2, 3, etc…If vaccine dose is invalid, then the number '777' appears in OBX-5
30979-9	Vaccines due next	CE	CVX (e.g. 03^MMR^CVX)
30980-7	Date vaccine due	TS	YYYYMMDD
30981-5	Earliest date to give	TS	YYYYMMDD format
30982-3	Reason applied by forecast logic to project this vaccine	CE	ACIP Schedule
38890-0	Component vaccine type	CE	CVX (e.g. 03^MMR^CVX)
31044-1	Reaction	CE	e.g. - VXC11^Seizure^CDCPHINVS

Example observations related to immunization history (Z34 profile) returned by IMMPACT.

Vaccine Component Administered: |38890-0^Component Vaccine Type^LN|

- OBX-5 sample answer: |17^Hib^CVX^90737^Hib^CPT|

Dose number in vaccine series: |30973-2^Dose number in series^LN|

- OBX-5 sample answer:
    - |2| - for second dose in the series
    - |777| - for invalid dose (not counted in series)

Example observations related to immunization recommendations and forecasting (Z44 profile) returned by IMMPACT.

Vaccine due next: |30979-9^Vaccines Due Next^LN|

- OBX-5 sample answer: |85^HepA^CVX^90730^HepA^CPT|

Vaccine due next dose number: |30973-2^Vaccine due next dose number^LN|

- OBX-5 sample answer: |2|

Earliest date to give vaccine: |30981-5^Earliest date to give^LN|

- OBX-5 sample answer: |20170711|

Immunization Schedule Used: |30982-3^Reason applied by forecast logic to project this vaccine^LN|

- OBX-5 answer: |ACIP schedule|

OBX-4: Observation Sub-ID
This field is used to group related observations by setting the value to the same number.

Example of shared sub-ID showing OBX segment grouping:

```
OBX|41|CE|30979-9^Vaccines    Due    Next^LN|6|21^Varicella^CVX^90716^Varicella^CPT||||||F
OBX|42|TS|30980-7^Date    VaccineDue^LN|6|20110101||||||F
OBX|43|NM|30973-2^Vaccine due next dose number^LN|6|1|||||||F
OBX|44|TS|30981-5^Earliest date to give^LN|6|20110101||||||F
```

OBX-5: Observation Value
This field contains the observation answer to the question that is posed in OBX-3. For a list of observations returned by IMMPACT, please see the field usage notes under OBX-3 above.

OBX-11: Observation Result Status
IMMPACT will value this field with "F" (Final)

APPENDIX A:
Sample QBP and associated RSP messages

Z34 QBP message submitted

```
MSH|^~\&|TESTAPP|DE-
000001|IMMUM|IMMPACT|20161215||QBP^Q11^QBP_Q11|200|P|2.5.1|||ER|AL|||||Z34^CDCPHINVS|DE-
000001||
QPD|Z34^RequestImmunizationHistory^CDCPHINVS|40005|||WALL^MIKE^^^^^L|WINDOWS^DOLLY|20170101|M|2222
ANYWHERE    Way^^Fresno^CA^93726^^|^PRN^PH^^^555^5555382|||
RCP|I|5^RD&records&HL70126
```

RSP with two immunization histories returned
- MSA-1 (Acknowledgement Code) = "AA" (QBP contained no errors)
- QAK-2 (Query Response Status) = "OK" (Match found and immunization history returned)

```
MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
000001|20170509||RSP^K11^RSP_K11|200|P|2.5.1|||||||||Z32^CDCPHINVS|IMMPACT IIS|DE-   000001
MSA|AA|200||0||0^Message    Accepted^HL70357
QAK|40005|OK|Z34
QPD|Z34^RequestImmunizationHistory^CDCPHINVS|40005|||WALL^MIKE^^^^^L|WINDOWS^DOLLY|20170101|M|2222
ANYWHERE    Way^^Fresno^CA^93726|^PRN^PH^^^555^7575382
PID|1||291235^^^ORA^SR||WALL^MIKE|WINDOW^DOLLY|20170101|M|||2222         ANYWHERE
WAY^^FRESNO^CA^93726^^H||^PRN^H^^^555^5555382|||||||||||||N|0
PD1||||||||||||02|N||||A
ORC|RE||11171795
RXA|0|1|20170101|20170101|08^HepB-Peds^CVX|1.0|||00||^^^VICTORIATEST||||HBV12345||SKB|||CP
RXR|IM|RT
OBX|1|CE|38890-0^COMPONENT    VACCINE    TYPE^LN|1|45^HepB^CVX^90731^HepB^CPT||||||F
OBX|2|NM|30973-2^Dose number in series^LN|1|1||||||F
ORC|RE||11173468
RXA|0|1|20170301|20170301|20^DTaP^CVX|1.0|||01||||||||||||CP
RXR|IM|RT
OBX|3|CE|38890-0^COMPONENT    VACCINE    TYPE^LN|1|107^DTP/aP^CVX^90700^DTP/aP^CPT||||||F
OBX|4|NM|30973-2^Dose number in series^LN|1|1||||||F
```

Z44 QBP message submitted

```
MSH|^~\&|TESTAPP|DE-
000001|IMMUM|IMMPACT|20161215||QBP^Q11^QBP_Q11|200|P|2.5.1|||ER|AL|||||Z44^CDCPHINVS|DE-
000001||
QPD|Z44^Request Immunization History and
Forecast^CDCPHINVS|40005|||WALL^MIKE^^^^^L|WINDOWS^DOLLY|20170101|M|2222         ANYWHERE
Way^^Fresno^CA^93726^^|^PRN^PH^^^555^5555382|||
RCP|I|5^RD&records&HL70126
```

RSP showing two immunization histories and immunization forecasting
- MSA-1 (Acknowledgement Code) = "AA" (QBP contained no errors)
- QAK-2 (Query Response Status) = "OK" (Match found and immunization history and forecasting returned)

```
MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
000001|20170509||RSP^K11^RSP_K11|200|P|2.5.1|||||||||Z42^CDCPHINVS|IMMPACT IIS|DE-   000001
MSA|AA|200||0||0^Message    Accepted^HL70357
QAK|40005|OK|Z44
QPD|Z44^Request Immunization History and
Forecast^CDCPHINVS|40005|||WALL^MIKE^^^^^L|WINDOWS^DOLLY|20170101|M|2222         ANYWHERE
Way^^Fresno^CA^93726|^PRN^PH^^^555^5555382
```

```
PID|1||291235^^^ORA^SR||WALL^MIKE|WINDOW^DOLLY|20170101|M|||2222          ANYWHERE
WAY^^FRESNO^CA^93726^^H||^PRN^H^^^555^7575382|||||||||||N|0
PD1|||||||||||02|N||||A
ORC|RE||11171795
RXA|0|1|20170101|20170101|08^HepB-Peds^CVX|1.0|||00||^^^VICTORIATEST|||||HBV12345||SKB|||CP
RXR|IM|RT
OBX|1|CE|38890-0^COMPONENT   VACCINE   TYPE^LN|1|45^HepB^CVX^90731^HepB^CPT|||||||F
OBX|2|NM|30973-2^Dose number in series^LN|1|1|||||||F
ORC|RE||11173468
RXA|0|1|20170301|20170301|20^DTaP^CVX|1.0|||01|||||||||||CP
RXR|IM|RT
OBX|3|CE|38890-0^COMPONENT   VACCINE   TYPE^LN|1|107^DTP/aP^CVX^90700^DTP/aP^CPT|||||||F
OBX|4|NM|30973-2^Dose number in series^LN|1|1|||||||F
ORC|RE||0
RXA|0|1|20170509|20170509|998^No   Vaccine   Administered^CVX|999
OBX|5|CE|30979-9^Vaccines   Due   Next^LN|0|107^DTP/aP^CVX^90700^DTP/aP^CPT|||||||F
OBX|6|TS|30980-7^Date Vaccine Due^LN|0|20170501|||||||F
OBX|7|NM|30973-2^Vaccine due next dose number^LN|0|2|||||||F
OBX|8|TS|30981-5^Earliest date to give^LN|0|20170329|||||||F
OBX|9|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|0|ACIP schedule|||||||F
OBX|10|CE|30979-9^Vaccines Due Next^LN|1|85^HepA^CVX^90730^HepA^CPT|||||||F
OBX|11|TS|30980-7^Date Vaccine Due^LN|1|20180101|||||||F
OBX|12|NM|30973-2^Vaccine due next dose number^LN|1|1|||||||F
OBX|13|TS|30981-5^Earliest date to give^LN|1|20180101|||||||F
OBX|14|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|1|ACIP schedule|||||||F
OBX|15|CE|30979-9^Vaccines Due Next^LN|2|45^HepB^CVX^90731^HepB^CPT|||||||F
OBX|16|TS|30980-7^Date Vaccine Due^LN|2|20170301|||||||F
OBX|17|NM|30973-2^Vaccine due next dose number^LN|2|2|||||||F
OBX|18|TS|30981-5^Earliest date to give^LN|2|20170129|||||||F
OBX|19|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|2|ACIP schedule|||||||F
OBX|20|CE|30979-9^Vaccines Due Next^LN|3|17^Hib^CVX^90737^Hib^CPT|||||||F
OBX|21|TS|30980-7^Date Vaccine Due^LN|3|20170301|||||||F
OBX|22|NM|30973-2^Vaccine due next dose number^LN|3|1|||||||F
OBX|23|TS|30981-5^Earliest date to give^LN|3|20170212|||||||F
OBX|24|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|3|ACIP schedule|||||||F
OBX|25|CE|30979-9^Vaccines Due Next^LN|4|88^Influenza-seasnl^CVX^90724^Influenza-seasnl^CPT|||||||F
OBX|26|TS|30980-7^Date Vaccine Due^LN|4|20170701|||||||F
OBX|27|NM|30973-2^Vaccine due next dose number^LN|4|1|||||||F
OBX|28|TS|30981-5^Earliest date to give^LN|4|20170701|||||||F
OBX|29|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|4|ACIP schedule|||||||F
OBX|30|CE|30979-9^Vaccines   Due   Next^LN|5|03^MMR^CVX^90707^MMR^CPT|||||||F
OBX|31|TS|30980-7^Date Vaccine Due^LN|5|20180101|||||||F
OBX|32|NM|30973-2^Vaccine due next dose number^LN|5|0|||||||F
OBX|33|TS|30981-5^Earliest date to give^LN|5|20180101|||||||F
OBX|34|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|5|ACIP schedule|||||||F
OBX|35|CE|30979-9^Vaccines   Due   Next^LN|6|133^PneumoConjugate^CVX^90670^PneumoConjugate^CPT|||||||F
OBX|36|TS|30980-7^Date Vaccine Due^LN|6|20170301|||||||F
OBX|37|NM|30973-2^Vaccine due next dose number^LN|6|1|||||||F
OBX|38|TS|30981-5^Earliest date to give^LN|6|20170212|||||||F
OBX|39|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|6|ACIP schedule|||||||F
OBX|40|CE|30979-9^Vaccines Due Next^LN|7|89^Polio^CVX|||||||F
OBX|41|TS|30980-7^Date Vaccine Due^LN|7|20170301|||||||F
OBX|42|NM|30973-2^Vaccine due next dose number^LN|7|1|||||||F
OBX|43|TS|30981-5^Earliest date to give^LN|7|20170212|||||||F
OBX|44|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|7|ACIP schedule|||||||F
OBX|45|CE|30979-9^Vaccines Due Next^LN|8|21^Varicella^CVX^90716^Varicella^CPT|||||||F
OBX|46|TS|30980-7^Date Vaccine Due^LN|8|20180101|||||||F
OBX|47|NM|30973-2^Vaccine due next dose number^LN|8|1|||||||F
```

OBX|48|TS|30981-5^Earliest date to give^LN|8|20180101||||||F
OBX|49|CE|30982-3^Reason applied by forecast logic to project this vaccine^LN|8|ACIP schedule||||||F

RSP showing a message processing error*

- MSA-1 (Acknowledgement Code) = "AE"
- ERR-4 (Error Severity) valued with "E"
- QAK-2 (Query Response Status) = "AE" (error, no immunization data returned)

MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
007957|20170119||RSP^K11^RSP_K11|300200|P|2.5.1||||||||||Z33^CDCPHINVS|IMMPACT   IIS|DE-007957
MSA|AE|300200||0||^Error^HL70357
ERR||MSH^1^0|101^Required field missing^HL70357|E|6^Required observation missing^HL70533|||Date of birth is a
required field
QAK|40004|AE|Z34
QPD|Z34^Request   Immunization   History^CDCPHINVS|40004|20130426^^^HLN^MR|Edmunds^Lucas^^^^^L|||M

RSP showing no patient found in the IMMPACT registry

- MSA-1 (Acknowledgement Code) = "AA" (QBP contained no errors)
- QAK-2 (Query Response Status) = "NF" (patient not found)

MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
000001|20170209||RSP^K11^RSP_K11|800105|P|2.5.1||||||||||Z34^CDCPHINVS|IMMPACT   IIS|DE-000001
MSA|AA|800105||0||0^Message   Accepted^HL70357
QAK|40005|NF|Z44
QPD|Z44^RequestImmunization
History^CDCPHINVS|40005|20130430^^^TESTCASES^MR|DAVIES^BOB^^^^^L|LILLIAN|20020501|M|9208   EMERALD
FOREST^^CHASSAHOWITZKA^CA^94443-8225^USA|^PRN^PH^^^555^7575382

RSP showing too many patient matches found in the IMMPACT registry*

- MSA-1 (Acknowledgement Code) = "AA" (QBP contained no errors)
- QAK-2 (Query Response Status) = "TM" (too many patient matches found)

MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
007957|20170222||RSP^K11^RSP_K11|TEST9051|P|2.5.1||||||||||Z33^CDCPHINVS|IMMPACT   IIS|DE-007957
MSA|AA| TEST9051
QAK|50000|TM|Z34
QPD|Z34^RequestImmunization   History^CDCPHINVS|50000|5001^^^HLN^MR|Jackson^Phil|Bell|20030219|M

RSP showing multiple patient matches returned

- MSA-1 (Acknowledgement Code) = "AA" (QBP contained no errors)
- QAK-2 (Query Response Status) = "OK"

MSH|^~\&|IMMPACT   IIS|IMMPACTIIS||DE-
000001|20171016||RSP^K11^RSP_K11|900|P|2.5.1||||||||||Z31^CDCPHINVS|IMMPACT   IIS|DE-000001
MSA|AA|900||0||0^Message   Accepted^HL70357
QAK|900|OK|Z34
QPD|Z34^RequestEvaluatedHistory andForecast^CDCPHINVS|900||Daniels^David^R|Stephens^Susanne|20050505|M|9208
Emerald   Forest^Chassahowitzk^CA^94443^USA^P
PID|1||^^^ORA^SR||DANIELS^DAVID^RANDEL|STEPHENS^SUSANNE|20050505|M||2028-9|9208   EMERALD
FOREST^^CHASSAHOWITZKA^CA^94443^^H||^PRN^PH^^^978^3222222||ENG|||||||2186-5||N|0
PD1||||||||||||02|N||||A
NK1|1|STEPHENS^SUSANNE|MTH|9208   EMERALDFOREST^^CHASSAHOWITZKA^CA^94443^^L|^^PH^^^415^4522222

```
PID|1||^^^ORA^SR||DANIELS^DAVID^ROBERT|STEPHENS^SUSANNE|20050505|M|||9208          EMERALD
FOREST^^CHASSAHOWITZKA^CA^94443^^H||||ENG||||||||Y|1
PD1|||||||||||02|N||||A
NK1|1|DANIELS^ROBERT|FTH
```

RSP showing the return of a protected immunization record**

- MSA-1 (Acknowledgement Code) = "AA" (QBP contained no errors)
- QAK-2 (Query Response Status) = "PD" ("protected data")

```
MSH|^~\&amp;|IMMPACT IIS|IMMPACT IIS||IRPH|20170302||RSP^K11^RSP_K11|140|P|2.5.1|||||||||Z33^CDCPHINVS|IMMPACT
IIS|IRPH   MSA|AA|140|
QAK|37374859|PD|Z34
QPD|Z34^Request Immunization History^HL70471|37374859||Test^Jojo^^^^^L||20140505
```

*See Addendum** Use of "PD" in QAK-2 is a future enhancement in discussion by HL7 for v2.8. IMMPACT is in the process of implementing this feature now to prepare for the future release of the document.   See Addendum for current RSP returned.

ADDENDUM

The *IMMPACT HL7 v2.5.1 Bi-Directional (QBP/RSP) Data Exchange Implementation Guide v1.0* is being released with   the following known 'bugs' found in the latest release of the IMMPACT QBP/RSP functionality. In order to conform to the   QBP/RSP message structure outlined in the CDC Implementation Guide, these 'bugs' are being addressed and will   be corrected in the future release of IMMPACT and the IMMPACT QBP/RSP implementation guide

- Format of the RSP when a message processing error occurs does not follow the RSP format found in the *IMMPACT BiDX (QBP/RSP) Implementation Guide*. A sample of how the current RSP is formatted when too   many patient matches are found is shown below:

MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
007957|20170119||RSP^K11^RSP_K11|300200|P|2.5.1|||||||||**Z34**^CDCPHINVS|IMMPACT   IIS|DE-007957
MSA|AE|300200||0||^Error^HL70357
ERR||MSH^1^0|101^Required field missing^HL70357|E|6^Required observation missing^HL70533|||Date of birth is a required field
QAK|40004|**AR**|Z34
QPD|Z34^Request   Immunization   History^CDCPHINVS|40004|20130426^^^HLN^MR|Edmunds^Lucas^^^^^L|||M

- Format of the RSP when too many potential patient matches are found does not follow the RSP format found in the *IMMPACT BiDX (QBP/RSP) Implementation Guide*. A sample of how the current RSP is formatted   when too many patient matches are found is shown below:

MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
007957|20170222||RSP^K11^RSP_K11|**TEST9051**|P|2.5.1|||||||||Z34^CDCPHINVS|IMMPACT   IIS|DE-007957
MSA|**AE**|TEST9051||0||^Error^HL70357
ERR|||207^Application internal error^HL70357|**W**|3^Illogical Value error^HL70533|||**More patients were found than requested (1). No patients returned.**
QAK|50000|**AR**|Z34
QPD|Z34^RequestImmunization   History^CDCPHINVS|50000|5001^^^HLN^MR|Jackson^Phil|Bell|20030219|M

- Format of the RSP when a patient is marked as 'Do Not Share' in IMMPACT does not follow the RSP format found in the *IMMPACT BiDX (QBP/RSP) Implementation Guide*. A sample of how the current RSP is formatted   when a protected patient record is queried is shown below:

MSH|^~\&|IMMPACT IIS|IMMPACT IIS||DE-
000001|20170405||RSP^K11^RSP_K11|900308|P|2.5.1|||||||||Z34^CDCPHINVS|IMMPACT   IIS|DE-000001
MSA|**AE**|900308||0||500^**Patient does not consent to sharing record**^HL70357
QAK|50000|**OK**|Z34
QPD|Z34^Request   Immunization   History^CDCPHINVS|50000||Skye^Blue||19890808|F

- The QPD-1.1 field in the QBP message is not currently required. However, the QPD-1.1 field is a required field in the CDC specifications.Only 'Z34' or 'Z44' values are accepted. Currently, if QPD-1.1 is left empty or contains any value other than 'Z34' or 'Z44', the RSP will return values consistent with a Z44 query.

- PID-3.4 in the RSP message returns a legacy value of 'ORA' for OR Alert, the registry software used to build IMMPACT. When returned, the value returned in the PID-3.1 field is the actual IMMPACT Patient ID.

- MSA segment of the RSP should be limited to only the MSA-1 and MSA-2 fields, but instead includes additional fields.

- MSH-21 field of the RSP does not currently return the proper coded values for all responses.

  - Z33 should be returned if no patient match found or too many matches found
  - Z42 should be returned when a Z44 QBP is submitted
  - Z32 should be returned when a Z34 QBP is submitted