Wyoming Immunization Registry
Query by Parameter (QBP)
Testing and Implementation Guide for HL7, 2.5.1

June 2, 2017

Query By Parameter (QBP) Implementation Steps for Providers

Any provider and their certified Electronic Health Record software system (EHRs) ready to send QBPs must first hold the ability to send VXU messages and messages are sent in the HL7 format 2.5.1 version outlined in this guide. For providers that are newly on-boarding to be WyIR, QBP testing is conducted in Stage 3: Testing along with all other HL7 messaging. For providers currently in Testing and in Production testing is conducted in your current environment and will need to use the appropriate indicator in the ***MSH 10*** segment. Please follow the steps below to start testing QBPs:

1. ***Identification:*** Initial testing will be performed through e-mail with the WyIR Interoperability Specialist: Jenni Gray (jennifer.gray1@wyo.gov). Providers and their EHR/IT team will contact Jenni when they are ready to start testing QBPs.

2. ***Message Transport:*** Using this guide, providers will format QBP messages with their own patient data and send them to Jenni in a secure email for review and verification. The patient data must be in WyIR and available in the environment the provider is currently in or the query response will come back as NF (not found). If the message is correctly formatted, Jenni will email letting the providers know they can start sending QBPs along with any additional information needed for successful transmission. If it is not, she will request that edits be made to the message. Once the response is received she will send it back to the provider site for data quality verification. (Sample messages can be found on the next page).

3. ***Contact Validation:*** It is important to verify that all data is included in the response message and that it matches the provider site's data. Once both the provider site and WyIR Staff are confident in the successful transmission of initially sent QBPs, Jenni will let the provider know that they continue to sending QBP messages. Continual support for providers is available at all times.

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QBP Sample Test Messages

1. **Complete Patient Record and History**

MSH|^~\&|IMMSLINK-WY|**SIISCLIENT1234^WALMART^**|WYIR|WYIR|1255-60-20|2012070
61315420400||QBP^Q11^QBP_Q11|48077894|T|2.5.1|0||NE|AL|||||Z34^CDCPHINVS
QPD|Z34^RequestImmunizationHistory^HL70471|5328989|197436^^^^SR~0600382767^^^Wal
mart^MR|Charles^Lola^^^^^||20020401|M|245ChestnutDr^^Cheyenne^WY^82007^USA^L
RCP|I|R^real-time^HL70394||||

2. **Opt Out Record**

MSH|^~\&|eCW|**SIISCLIENT1234^MyOffice^**|WYIR|WYIR|1255-60-20|20120706131542-04
00||QBP^Q11^QBP_Q11|48077894|T|2.5.1|||NE|||||Z34^CDCPHINVS
QPD|Z34^RequestImmunizationHistory^HL70471|5328989|197436^^^^SR~0600382767^^^MY
EHR^MA|Charles^OPTOUT^Lola^^^^^|WYOMING^MOM^^^^^A|20020401|F|245ChestnutDr^^C
heyenne^WY^82007^USA^L
RCP|I|100^RD^HL70126|R^real-time^HL70394

3. **Forecast Query**

MSH|^~\&|IMMSLINK-WY|**SIISCLIENT1234^WALMART^**|WYIR|WYIR|2012070613154204
00||QBP^Q11^QBP_Q11|48077894|T|2.5.1|||NE|||||Z44^CDCPHINVS
QPD|Z44^RequestEvaluatedImmunizationHistory^CDCPHINVS|37374859|123456^^^MYEHR^
MR|Child^Bobbie^Q^^^^L|Que^Suzy^^^^^M|20090 214|M|10 East Main St^^CASPER^WY^^^L
RCP|I|100^RD^HL70126|R^real-time^HL70394

Required Fields

Symbol	Definition	Implementation Requirement	Operation Requirement
R	Required	The application ***SHALL*** implement“R”elements.	The application ***SHALL*** populate “R” elements with non-empty value.
RE	REquired but may be empty	The application ***SHALL*** implement “RE” elements.	The application ***SHALL*** populate “RE” elements with a non-empty value if there is relevant data.The term “relevant”has a confounding interpretation in this definition.
X	Not Supported	The application (or as configured) ***SHALL NOT*** implement “X” elements.	The application ***SHALL NOT*** populate “X” elements.
O	Optional	None. The usage indicator for this element has not yet been defined. For an implementation profile all optional elements must be profiled to R, RE, C(a/b), or X.	Not Applicable.

Message Segment Header Fields (MSH)

SEQ	DATA TYPE	ELEMENT NAME	HL7 USAGE	WYIR USAGE	Description/ Constraint
1	ST	Field Separator	R	R	The MSH-1 field shall be "|"
2	ST	Encoding Characters	R	R	The MSH-2 field shall be "^~\&"
3	HD	Sending Application	RE	R	The system that created this message
4	HD	Sending Facility SIISCLIENTID ^ NAME	RE	R	The Immunization History Consumer
5	HD	Receiving Application	RE	R	The system receiving this message
6	HD	Receiving Facility	RE	RE	The Immunization History Consumer or Immunization History Supplier, depending on the message
7	TS	Date/Time of Message	R	R	The degree of precision must be at least to the second; time zone to be included
8	ST	Security	O	X	
9	MSG	Message Type	R	R	QBP^Q11^QBP_Q11
10	ST	Message Control ID	R	R	
11	PT	Processing ID	R	R	T or P (Test or Production)
12	VID	Version ID	R	R	2.5.1
13	NM	Sequence Number	O	X	
14	ST	Continuation Pointer	O	X	

15	ID	Accept Acknowledgement Type	R	RE	Default value is NE (always)
16	ID	Application Acknowledgement Type	R	RE	
17	ID	Country Code	O	X	BLANK
18	ID	Character Set	O	X	BLANK
19	CE	Principal Language of Message	O	X	BLANK
20	ID	Alternate Character Set Handling Scheme	O	X	BLANK
21	EI	Message Profile	R	R	Z34^CDCPHINVS

MSH Field Definitions

MSH-1 Field Separator (ST) 00001

Definition: This field contains the separator between the segment ID and the first real field, MSH-2-encoding characters. As such it serves as the separator and defines the character to be used as a separator for the rest of the message. Required value is **|**.
Example: MSH|

MSH-2 Encoding Characters (ST) 00002

Definition: This field contains the four characters in the following order: the component separator, repetition separator, escape character, and subcomponent separator. Required values are **^~\&**.

Special characters that are utilized within HL7 messages as separators (also referred to as delimiters) should not be included within those same HL7 messages as data because their presence would interfere with the parsing of the message. If an HL7 message does contain one of these special delimiter characters as part of the message content (e.g., an ampersand as part of an address: "Apartment A & B"), then the HL7 data exchange partner must utilize a special escape sequence to indicate that the character is a text character and not a delimiter; otherwise, the CIR HL7 Web Service cannot distinguish between the delimiter character and a character that is part of the text.

In order to include any one of these special characters as data within an HL7 message, those characters must be converted into a predefined sequence of characters that begin and end with the escape character "\". HL7 Data Exchange Partners should utilize the table below to convert special characters into escape sequences when creating outbound messages to the CIR HL7 Web Service and to convert escape sequences to special characters when parsing inbound messages from the CIR HL7 Web Service:

Special Character Description	Special Character	Escape Sequence
Escape character	****	**\E**
Field separator	**|**	**\F**
Repetition separator	**~**	**\R**
Component separator	**^**	**\S**
Subcomponent separator	**&**	**\T**

In the example below, in the QPD-8 address field when representing "Apartment A&B", the "&" has been replaced with the escape sequence "\T\" to indicate that "&" is part of the message text, rather than a subcomponent separator:

QPD|Z34^REQUESTIMMUNIZATIONHISTORY^HL70471|QT216987|16300592300^^^MIA^SR|HOYLE^THERESE^ANNE^^^^L|HOYLE^THERESE^^^^^A|19590126|F|100 Main Street&Main Street&100^ Apartment A\T\B^CASPER^WY^12345-1234^^P|

MSH-3 Sending Application (HD) 00003

Definition: This field uniquely identifies the sending application.

Example: MSH|^~\&|IMMSLINK-WY

MSH-4 Sending Facility (HD) 00004

Definition: This field identifies the organization responsible for the operations of the sending application. By Wyoming requirement MSH 4.1 MUSt be your facility's SIISCLIENTID and 4.2 is Your Facility Name.

Example: |SIISCLIENT1234^WALMART^|

MSH-5 Receiving Application (HD) 00005

Definition: This field uniquely identifies the receiving application (IIS). The code is assigned as |**WYIR|**.

MSH-6 Receiving Facility (HD) 00006

Definition: This field identifies the organization responsible for the operations of the receiving application. The code is assigned as |**WYIR|**.

MSH-7 Date/Time Of Message (TS) 00007

Definition: This field contains the date/time that the sending system created the message. The degree of precision must be at least to the minute. The expected format is "YYYYMMDDHHMMSSZZZZ." Additional precision, if sent, will be ignored. If the Date Time of Message is not sent or is invalid (i.e., not a valid date or not in the correct format), a fatal error will be reported.

Example: |20140204030159-0500|

*This sequence represents February 4, 2014 at 3:01:59 Eastern Standard Time (EST). V.1.0 1.

MSH-9 Message Type (MSG) 00009

Definition: This field contains the message type, trigger event, and the message structure ID for the message.

Example: |QBP^Q11^QBP_Q11|

MSH-10 Message Control ID (ST) 00010

Definition: This field contains the identifier assigned by the sending application (**MSH-3**) that uniquely identifies a message instance. This identifier is unique within the scope of the sending application (**MSH-3**) and sending facility (**MSH-4**), and the YYYYMMDD portion of message date (MSH-7). The receiving system echoes this ID back to the sending system in the Message acknowledgment segment (**MSA**). The content and

format of the data sent in this field is the responsibility of the sender. The receiver returns exactly what was sent in response messages.

MSH-11 Processing ID (PT) 00011

Definition: This field is used to decide whether to process the message as defined in HL7 Application Processing rules. Use “P” for Production and “T” for Testing, all other values will be considered a fatal error. Also, if “P” is sent for a Test message or “T” is sent for a Production message, it will be considered a fatal error.

MSH-12 Version ID (VID) 00012

Definition: This field contains the identifier of the version of the HL7 messaging standard used in constructing, interpreting, and validating the message. Only the first component need be populated. When sending a 2.5.1 message, value **MSH-12** with “2.5.1”.

MSH-15 Accept Acknowledgment Type (ID) 00015

Definition: This field identifies the conditions under which accept acknowledgments are required to be returned in response to this message. Per the CDC IG, this field is constrained to a value of “NE” (never). If **MSH-15** is blank or contains a value other than “NE” (never) type, **MSH- 15** will be treated as if “NE” was sent and no error will be reported.

MSH-16 Application Acknowledgment Type (ID) 00016

Definition: This field contains the conditions under which application acknowledgments are required to be returned in response to this message. If **MSH-16** is blank or contains a value other than “AL” (always) type, MSH-16 will be treated as if “AL” was sent and no error will be reported.

MSH-21 Message Profile Identifier (EI) 01598

Definition: Sites may use this field to assert adherence to, or reference, a message profile.

Query Parameter Definition Fields (QPD)

SEQ	DATA TYPE	ELEMENT NAME	HL7 USAGE	WYIR USAGE	Description/ Constraint
1	CE	Message Query name	R	R	Z34^Request Immunization History^HL70471
2	ST	Query Tag	R	R	OT's #
3	CX	Patient List	RE	R	PID-3: Patient Identifier List
4	XPN	Patient Name	RE	R	PID-5: Patient Name
5	XPN	Patient Mother Maiden Name	RE	RE	PID-6: Mother's Maiden Name
6	TS	Patient Date of Birth	RE	R	PID-7: Patient Date of Birth
7	IS	Patient Sex	RE	R	PID-8: Patient Sex
8	XAD	Patient Address	RE	RE	PID-11: Patient Address
9	XTN	Patient Home Phone	RE	RE	PID-13: Patient Home Phone
10	ID	Patient Multiple Birth Indicator	RE	RE	PID-24: Patient Multiple Birth Indicator
11	NM	Patient Birth Order	RE	RE	PID-25: Patient Birth Order
12	TS	Client Last Updated Date	RE	X	PID-33:Patient Last Update Date

13	**HD**	**Client Last Update Facility**	**RE**	**X**	**PID-34: Patient Last Update Facility**
14	**XPN**	**Guardian or Next of Kin**	**RE**	**RE**	

QPD Field Usage Notes

QPD-1 Message Query Name (CE)

Definition: This field contains the name of the query. If **QPD-1** is not valued or contains a value other than the expected value, the CIR HL7 Web Service will send a non-fatal error and will try to parse the query as if it conforms to the Z34 profile.

Example: The only acceptable value is |Z34^Request Immunization History^HL70471|

QPD-2 Query Tag (ST)

Definition: This field 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.

QPD-3 Patient List (CX)

Definition: This field contains identifiers that are intended to allow unique identification of the patient. If multiple identifiers of the same type are sent (e.g., multiple Medicaid Numbers), only the first identifier of that type (e.g., the first Medicaid Number) will be processed. Other identifiers of that same type will be ignored. The Medical Record Number (MRN) cannot exceed 15 characters. The Medicaid Number cannot exceed 8 characters. If the field limits are exceeded the identifier will be disregarded (not considered when seeking matching patients) and reported as a non-fatal error. The Medicaid number must also be in the correct format (e.g., AA12345A). Invalid formatting of the Medicaid number will also cause the Medicaid number to be disregarded (not considered when seeking matching patients) and reported as a non-fatal error. The Medicare number must have at least 10 characters and cannot exceed 15 characters. The PHC Hub does not support the full data set of identifiers; for example, Social Security Number (SSN) and Birth Registry Number (BR) are currently not supported and, if sent, will be reported as a non-fatal error and will not be included in the search criteria.

Example: |62000368^^^MR^MR|

- **LN – License Number**
- **LR – Local Registry ID**
- **MA – Patient Medicaid Number**

- **MC – Patient Medicare Number**
- **MR – Medical Record Number**

QPD-4 Patient Name (XPN)

Definition: This field contains the patient's legal name. Since this field should represent the patient's primary/legal name, if a name type of "L" is not provided, the name will still be considered the legal name when searching for matching patients and no error will be reported. Both the Patient Last/Family Name and Patient First/Given Name are required. If either field is not valued the PHC Hub will return a RSP with an "AR" in QAK-2 (Query Response Status) indicating that there was an error that prohibited the search for a matching patient. The Patient Middle Name should be included, if available, but is not required. The First Name, Last Name, and Middle Name must each be 25 characters or less; otherwise it will be truncated and reported as a non-fatal error. Only the first 25 characters will be used when searching for a matching patient. Other **QPD-4** components, (e.g., Last Name Prefix, Suffix, Prefix, and Degree), are not required and,if provided, will be ignored and not considered when searching for a matching patient.

Example: |LAST^ FIRST^MIDDLE^^^^L|

QPD-5 Patient Mother Maiden Name (XPN)

Definition: This field contains the maiden name of the patient's mother. If the name type is omitted or other than "M" (Maiden Name), the name will still be considered the mother's maiden name when searching for matching patients and no error will be reported. Only the Last/Family Name is used when searching for matching patients. Other **QPD-5** components, (e.g., First/Given Name, Last Name Prefix, Suffix, Prefix, and Degree),are not required and, if provided, will be ignored and not considered when searching for a matching patient.

Example: |Wyoming^MOM^^^^^M|

QPD-6 Patient Date of Birth (TS)

Definition: This field contains the patient's date of birth. The date must be in the "YYYYMMDD" format and must be on or before the current date, otherwise it will be considered a fatal error. The time component of the data will be ignored if it is provided. If **QPD-6** does not contain a valid date the PHC Hub will return a RSP with an "AR" in QAK-2 (Query Response Status) indicating that there was an error that prohibited the search for a matching patient.

QPD-7 Patient Sex (IS)

Definition: This field contains the patient's sex. In a QBP message, CIR supports all of the Administrative Sex codes (F, M, and U). If **QPD-7** is valued with "U," sex will not be considered when searching for a matching patient.

QPD-8 Patient Address (XAD)

Definition: This field contains the patient's primary address. If any **QPD-8** component is valued then all of the following components must be valued: Street Address, City, State, and Zip; otherwise, address will not be included in the patient search and a non-fatal error will be reported for each omitted component.

QPD-8 should be valued as follows:

- Street or Mailing Address should contain the house (dwelling) number in the beginning of the field followed by the street name.
- If the value exceeds 40 characters it will be truncated.
- If address is valued, then street name and dwelling should also be valued but is not required;however, valuing these components (especially the House/Dwelling Number) will aid in patient searches.
- Other Designation should contain the apartment or suite number, if applicable.The apartment number cannot exceed 10 characters, otherwise it will be truncated.
- City cannot exceed 40 characters, otherwise it will be truncated.
- The State cannot exceed 2 characters; otherwise, the state will be set to "WY".
- ZIP Code cannot exceed 10 characters; otherwise it will be ignored. The PHC Hub supports the standard ZIP code formats of either ##### (5 digit ZIP only) or #####-#### (ZIP+4 including hyphen). If ZIP+4 is sent, the hyphen may be included but is not required.

Example: |305 Big Apple Blvd&Big Apple Blvd&305^7C^New York^NY^12345^^P|

The PHC Hub will process the first address; additional addresses, if sent, will be ignored. Address Type will be ignored, if sent. The address included in the query will be compared to all addresses on record for the patient. Errors, (e.g., character maximum exceeded, invalid state code, ZIP less than 5 digits,missing component, etc.) will be reported as non-fatal.

QPD-9 Patient Home Phone (XTN)

Definition: This field contains the patient's home phone number. **Example:|^PRN^^^^212^5551212|**
The PHC Hub will process the first phone number. All other phone numbers will be ignored.

The PHC Hub will process the 6th and 7th components (area code and local phone number) of the first phone number. If **QPD-9** is valued then both the area code and local phone number must be valued; otherwise, the phone number will be disregarded and a nonfatal error will be reported for the omitted component.

Telecommunication Use Code will be ignored, if sent. The phone number included in the query will be compared to all phone numbers on record for the patient.

If **QPD-9** contains errors, (e.g., area code is not 3 digits, phone number is not 7 digits,or area code is provided but the phone number is missing), those errors will be reported as non-fatal errors and the phone number will not be considered when searching for a matching patient.

QPD-10 Multiple Birth Indicator (ID)
Definition: This field indicates whether the patient was part of a multiple birth. If the status is undetermined, then field should be empty.

The acceptable values are Y (if the patient was part of a multiple birth) and N (if the patient was a single birth); all other values will be disregarded (not considered when searching for a matching patient)and reported as a non-fatal error.

QPD-11 Birth Order (NM)
Definition: For patients that were part of a multiple birth, this field indicates the birth order. If Multiple Birth Indicator (**QPD-10**) is populated with Y, then this field should contain the number indicating the person's birth order, with 1 for the first child born and 2 for the second.

Birth order is stored in the WyIR and utilized in a patient search. If the HL7 Data Exchange Partner knows the birth order, the birth order should be sent in **QPD-11** of the QBP. **QPD-11** will be ignored if it is not valued or its value is not a number.

Response Control Parameter Segment (RCP)

SEQ	DATA TYPE	ELEMENT NAME	HL7 USAGE	WYIR USAGE	Description/ Constraint
1	ID	Query Priority	RE	RE	If this field is not valued then it shall default to I. The only value permitted is I.
2	CQ	Quantity Limited Request	RE		
	NM			RE	The maximum number of patients that may be returned. This shall be valued as 1 (one)
	CWE			RE	This value shall be RD (records).
3	CWE		O	RE	Default is R (Real-Time).

RCP Field Usage Notes

RCP-1 Query Priority (ID)

Definition: This field contains the time frame that the response is expected. The PHC Hub will always respond immediately to a QPD request for immunization history. If **RCP-1** is not valued or contains a value other than “I” (Immediate) the PHC Hub will ignore the field and will process the message as if “I” was sent.

RCP-2 Quantity Limited Request (CQ)

Definition: This field contains the maximum length of the response that can be accepted by the HL7 Data Exchange Partner. A numerical value is given in the first component and the units are specified in the second component.

The PHC Hub will never return more than one patient record in response to a QPD request for immunization history. If **RCP-2** is not valued or contains a value other than “1” in and “RD” (records) the PHC Hub will ignore the field and will process the message asif “1^RD” was sent.

RCP-3 Response Modality (CE)

Definition: This field specifies the timing and grouping of the response message(s). The PHC Hub does not support batch processing; only real time messages are supported. If **RCP-3** is not valued or contains a value other than “R” the PHC Hub will ignore the field and will process the message asif “R” was sent.

Key Definitions

WyIR: Wyoming Immunization Registry
PHC Hub: Public Health Connection Hub
Message: A message is the entire unit of data transferred between systems in a single transmission. It is a series of segments in a sequence defined by the message specifications. These specifications are based on constraints to the HL7 specifications.
Segment Group: A segment group is a logical collection of segments. Segment groups defined within a message may be required or optional, may occur only once or may be allowed to repeat.
Segment: A segment is a logical grouping of data fields. Segments within a defined message may be required or optional, may occur only once, or may be allowed to repeat. Each segment is named and is identified by a segment ID, a unique 3-character code.
Field: Afield is a string of characters and is of a specific data type. Each field is identified by the segment it is in and its position within the segment; e.g., **MHS-5** is the fifth field of the MHS segment. A field is preceded by the | character.
Component: A component is one of a logical grouping of items that comprise the contents of a coded or composite field. Within a field having several components, not all components are required to be valued.
Data type: A data type restricts the contents and format of the data field. Data types are given a 2- or 3- letter code. Some data types are coded or composite types with several components.
Code Sets/Systems and Value sets: Most data elements will have associated lists of acceptable values in tables supported by a standards organization such as HL7 or CDC. These code sets will include definitions to support common usage.
Delimiters: Delimiter characters are used to separate segments, fields, and components in an HL7 message. The delimiter values are given in MSH-2 and used throughout the message. Applications must use agreed upon delimiters to parse the message.

<CR> = Segment Terminator;
| = Field Separator;
^ = Component Separator;
& = Sub-Component Separator;
~ = Repetition Separator;
**** = Escape Character.