

# Michigan Department of Community Health

*HL7 Version 2.5.1 Implementation Guide: Early Hearing Detection and Intervention (EHDI) Initial Screening Reporting*

DRAFT

Version 0.4

DRAFT – NOT for Implementation or Use



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## 1. Introduction

### 1.1. Background

The Early Hearing Detection and Intervention (EHDI) program in Michigan exists to help identify children with hearing loss. Because newborn hearing loss is a neuro-developmental emergency, children with hearing loss need to be identified as early as possible after birth to help them achieve better communication outcomes. Children identified with hearing loss can then be connected to appropriate early intervention services.

This implementation guide provides details on transmission of hearing screening data elements from the screening location (typically the birth hospital) to the Michigan Department of Community Health (MDCH) EHDI program.

### 1.2. Reporting Requirements and Legal Authorization to Collect

The Michigan Department of Community Health (MDCH) administers the statewide Early Hearing Detection and Intervention (EHDI) Program under authority of the Michigan Public Health Code. Multiple options are available for submission of EHDI data to MDCH including: 1) paper form that is attached to the metabolic blood spot card; 2) web-based reporting through the State of Michigan's Single Sign On portal; and 3) HL7 transmission through the Michigan Health Information Exchange (HIE) infrastructure. The EHDI Program will use the data collected from hospitals for quality assurance, evaluation, and monitoring to help assure all infants are appropriately screened.

### 1.3. Common Infant Demographics

Key demographic information as specified in Section 2.3.2 and 2.3.4 must be submitted to MDCH with each infant's results. The demographic information collected at the time of screening will be used to match the infant's EHDI screening results to the blood spot card sent to the MDCH Newborn Screening Laboratory and other newborn screening activities. Like the information needed on the blood spot card to properly identify the infant, mother, and specimen submitter, it is extremely important for the state Newborn Screening Program to receive data from the required hearing screening fields and for them to be complete and accurate. The post-discharge provider information is also vital for follow-up of missed and referred screens. In order to insure proper matching of the EHDI and other newborn screening results, it is strongly recommended that the screening facility utilize a bar code scanner to enter the blood spot card ID (barcode on the bottom right corner of the card) or some other automated quality control (dual entry with comparison, conformation screen, etc.).

### 1.4. Intended Audience

There are multiple intended audiences for this guide. The first audience for this guide is anyone involved in EHDI screening programs including hospitals or other implementers who will transmit data to MDCH. The second audience is screening device manufacturers and Electronic Health Record system vendors. This is an HL7 implementation guide and, as such, is a technical document. Readers are expected to have strong knowledge in HL7 standards and message flows.

### 1.5. Other Related Profiles

This guide is largely based on the Draft Standard for Trial Use "HL7 Version 2.6 Implementation Guide: Early Hearing Detection and Intervention (EHDI) Results, Release 1" from February 2014.

## 1.6. Conventions

This guide assumes that the implementer has access to the HL7 2.5.1 version standard. This implementation guide contains some of those standards. However some of the information has not been included. This Guide also uses standard HL7 terms, abbreviations, and usage codes. Please reference the version 2.5.1 HL7 standard for all details. Appendix B: Background and General HL7 Information has additional details and background material.

This guide includes examples of values and segments. The examples appear in Courier New font. These examples are informational only. In the case of any discrepancy between the text of the guide and the example, the text prevails. This guide also uses **bold** font for emphasis.

## 1.7. HL7 Version

This guide is written in version 2.5.1 of the HL7 messaging standard.

**Submission of version 2.5.1 messages is required.**

## 1.8. MDCH Point of Contact

Questions or comments should be directed to the MDCH EHD Program by email: [garciam@michigan.gov](mailto:garciam@michigan.gov) or call 517-335-8955.

## 1.9. Revisions of this Document

This document will be reviewed and possibly revised on an annual basis. Submitters are advised to monitor the web site for new versions. Revisions, along with major items changed, are tracked in Appendix D: Revision History.

## 1.10. Copyright Information

This guide contains copyrighted information from Health Level Seven International (HL7). For more information see the HL7 Policy Governing the use of HL7® International Standards and Other Intellectual Property at <http://www.hl7.org/legal/ippolicy.cfm>.

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## 2. Specification for the EHD ORU^R01 Message

Below is the specification of the EHD ORU^R01 message used in this implementation guide with all the "X" segments omitted for clarity.

Table 1 - Specification of EHD ORU^R01 Message

ORU^R01^ORU_R01	Unsolicited Observation Message	Optionality	Cardinality	HL7 Chapter	Description
MSH	Message Header	R	1..1	2	
[[SFT]]	Software Segment	O	[0..*]	2	
{	--- PATIENT_RESULT begin				
	--- PATIENT begin				
PID	Patient Identification	R	1..1	3	
{NK1}	Next of Kin/Associated Parties	R	1..*	3	The Next of Kin segment is used to communicate information on patient contacts including the birth mother.
[	---VISIT begin				
PV1	Patient Visit	RE	0..1	3	The patient visit segment is used to communicate information on a visit-specific basis.
]	---VISIT end				
	---PATIENT end				
{	--- ORDER_OBSERVATION begin				
OBR	Observations Request	R	3..3	7	The observation request (OBR) segment is used to capture information about the hearing screening panel performed. One OBR will report the newborn hearing loss panel. This SHALL be followed by an OBR for the newborn hearing screen panel of the right ear and an OBR for the newborn hearing screen panel of the left ear.
[[	--- OBSERVATION begin				

ORU^R01^ORU_R01	Unsolicited Observation Message	Optionality	Cardinality	HL7 Chapter	Description
OBX	Observation related to OBR	R	0..* 1..* (see note)	7	<p>The Observation Result (OBX) segment contains information regarding hearing screening results on the left ear and the right ear. This includes identification of the specific type of observation, the result for the observation, when the observation was made, etc.</p> <p>The newborn hearing screening panel shall have 3 OBRs; 1 overarching, 1 for the left ear and 1 for the right ear, and this structure resembles the structure used by LOINC in the newborn hearing loss panel. The overarching OBR SHALL have three (3) supporting OBXs and have MAY be supported by additional OBX segments that carry information on hearing comments/discussion or hearing loss indicators.</p> <p>The “Newborn hearing screen panel of ear – right” and the “Newborn hearing screen panel of ear – left” OBRs, will be supported by OBX segments for the newborn hearing screening right ear, with the method in OBX-17, and may be supported by an OBX for the duration, and if appropriate, the reason the screen was not performed. The OBX segments should contain the result of the hearing screening, the technique, the equipment and the date and time of the screen.</p>
}}	--- OBSERVATION end				
}	--- ORDER_OBSERVATION end				
}	--- PATIENT_RESULT end				

OBX NOTE: For the hearing screening panel OBR, the OBX Cardinality is [0..\*], for the right ear and left ear OBRs, the OBX cardinality is [1..\*].

### 2.1. Message Transmission

The ORU^R01 message SHALL contain a single Observation Request (OBR) for the newborn hearing screening panel. The Observation Request (OBR) for the newborn hearing loss panel right ear shall be supported by at least 1 OBX. The Observation Request (OBR) newborn hearing loss panel left shall be supported by at least 1 OBX. There MAY be multiple OBX segments associated with OBRs for newborn hearing loss panel right ear and newborn hearing loss panel left ear. Batch messaging is **NOT** supported.

## 2.2. ACK^R01^ACK

Guaranteed delivery is required. An ACK message will always be returned to the sender of this message as specified in this guide.

Table 2 - ACK^R01^ACK Abstract Message Syntax

Segment	Name	Usage	Cardinality	Comments/Descriptions
MSH	Message Header	R	[1..1]	
MSA	Message Acknowledgment	R	[1..1]	
{{SFT}}	Software Segment	O	[0..*]	
{{ERR}}	Error	CE	[0..*]	This segment is sent if there is an error identified in the message. If MSA-1 (Message Acknowledgment) is not valued as AA.

## 2.3. Messaging Infrastructure

### 2.3.1. Message Header - MSH Segment

The message header (MSH) segment contains information describing how to parse and process the message. This includes identification of message delimiters, sender, receiver, message type, timestamp, etc.

Table 3 - MSH Segment and Field Descriptions

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
1	1	ST	[1..1]	R		Field Separator	Literal value: ' ' [ASCII (124)].
2	5	ST	[1..1]	R		Encoding Characters	Constrained to the literal values '^~\&', always appearing in the same order.
3		HD	[1..1]	R		Sending Application	The use of an OID for this field is recommended.
4		HD	[1..1]	R		Sending Facility	The use of an OID for this field is <b>Required</b> . If your facility does not already have an OID, additional information is available at <a href="https://www.michiganhealthit.org/">https://www.michiganhealthit.org/</a> Facilities are encouraged, but are not required, to use the same OID that is used for other public health reporting to MDCH.
5		HD	[1..1]	R		Receiving Application	Literal value of 'EHDI^2.16.840.1.114222.4.3.2.2.3.161.1.3434^ISO' is required.
6		HD	[1..1]	R		Receiving Facility	Literal value of 'MDCH^2.16.840.1.114222.4.3.2.2.3.161.1^ISO' is required.
7		TS	[1..1]	R		Date/Time Of Message	Field containing the date/time the message was created by the sending system. Format: YYYYMMDDHHMMSS[S[S[S[S]]]]+/- ZZZZ. Note that the time zone offset is required, and the minimum granularity is to the second, although more precise time stamps are allowed. The time zone will be defaulted throughout the message if it is specified in this element.

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
9		MSG	[1..1]	R		Message Type	For the result message Literal Value: 'ORU^R01^ORU_R01'. For the acknowledgement message Literal Value: 'ACK^R01^ACK'.
10	199	ST	[1..1]	R		Message Control ID	A number or other identifier that <b>uniquely</b> identifies the message instance from the sending application. Example formats for message control IDs include GUID, timestamp plus sequence number, OID plus sequence number or sequence number. In the Message Acknowledgement Segment, this system sends the Message Control ID back to the sending system.
11		PT	[1..1]	R		Processing ID	Field that may be used to indicate the intent for processing the message, such as "T" (training or testing) or "P" (production). See Section 4.2 "On-boarding Instructions" for details on this field during the on-boarding process.
12		VID	[1..1]	R		Version ID	HL7 version number used to interpret format and content of the message. For this message, the version ID will always be Literal Value: 2.5.1
15	2	ID	[0..0]	X	HL7 0155	Accept Acknowledgment Type	Due to the public health nature of this message and a need to retransmit if the message was not received, MDCH will acknowledge all messages and ignore this value.
16	2	ID	[0..0]	X	HL70155	Application Acknowledgment Type	Due to the public health nature of this message and a need to retransmit if the message was not received, MDCH will acknowledge all messages and ignore this value. Note: some HIEs in Michigan require the use of this field. Check with the HIE you are connected to for more details.
17	3	ID	[0..1]	RE	ISO 3166-1	Country Code	
19		CE	[0..1]	O	ISO639	Principal Language Of Message	

Example MSH Segment:

```
MSH|^~\&|EHDIScreeningDevice^1234^OID|SendingFacility^1234^OID|EHDI^2.16.840.1.114222.4.3.2.2.3.161.1.3
```

434^ISO|MDCH^2.16.840.1.114222.4.3.2.2.3.161.1^ISO|20120701132554-  
0400||ORU^R01^ORU\_R01|20120701132554000005|T|2.5.1| ||AL|AL|USA||en^English^ISO639-1

### 2.3.2. Patient Identification Segment - PID

This segment is used to communicate patient identification information. This segment contains patient identifying information that is usually permanent and is unlikely to change.

Table 4 - Patient Identification Segment (PID)

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
1	4	SI	[1..1]	R		Set ID – Patient ID	Literal Value: '1'.
3		CX	[1..1]	R		Patient Identifier List	This field is used by the healthcare facility to uniquely identify the infant. Send only the infant's primary identifier (i.e., medical record number). It is <b>required</b> that the infant's medical record number remains the same throughout the newborn screening process, including the metabolic blood spot test.
5		XPN	[1..1]	R	HL70200	Patient Name	Send only one name; this should be the infant's primary legal name. NOTE: See Section 3.1.2 "Infant without a First or Middle Name" for guidance on cases where the infant does not have a first or middle name at the time of screening.
6		XPN	[0..1]	RE		Mother's Maiden Name	
7		TS	[1..1]	R		Date/Time of Birth	Time of birth <b>shall</b> be accurate at least to the minute. If exact birth time is not known, an estimate is acceptable.
8	20	IS	[1..1]	R	HL70001	Administrative Sex	
10		CE	[0..*]	RE	HL70005	Race	
11		XAD	[0..*]	C(R/X)		Patient Address	This should be the address of the infant's parent or primary care giver after discharged. Condition Predicate: This field is required in most cases; the only case that this field may be empty is if the primary guardian who is taking care of the infant does not have a permanent address (i.e., homeless).

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
13		XTN	[0..*]	C(R/X)		Phone Number – Home	This should be the phone number of the infant’s parent or primary care giver after discharged. Condition Predicate: This field is required in most cases; the only case that this field may be empty is if the primary guardian who is taking care of the infant does not have a phone number.
15		CE	[0..*]	O		Primary Language	Value should be from PHVS_Language_ISO_639-2_Alpha3
21		CX	[0..1]	C (R/RE)		Mother’s Identifier	This field is conditional required if the birth is part of a multiple birth. It will be used to identify multiple births for the same mother. This helps to link newborns from multiple births. In the case of single births, it is RE and should be provided if known. NOTE: see Section 3.1.6 “Confidential Mother’s Identity” for guidance on cases where birth mother’s identity may need to be kept confidential.
22		CE	[0..1]	RE	HL70189	Ethnic Group	
23	250	ST	[1..1]	R		Birth Place	Location of infant’s birth, i.e. hospital name. The newborn screening hospital code should be sent if known; otherwise send the full name of the birth place. NOTE: this may be different from the screening facility. In the cases where the infant was born outside a hospital, include the hospital at which the infant was first treated.
24	1	ID	[1..1]	R	HL70136	Multiple Birth Indicator	This field indicates if the infant was part of a multiple birth. See Section 3.1.3 “Multiple Births” for additional information on this field. This field <b>shall</b> be populated in all cases.
25	2	NM	[0..1]	C (R/RE)		Birth Order	Condition Predicate: if PID-24=Y. This field is conditional required if the birth is part of a multiple birth. A number that indicates the infant’s birth order when they were part of a multiple birth. See Section 3.1.3 “Multiple Births” for additional information on this field.
33		TS	[0..1]	O		Last Update Date/Time	
34		HD	[0..1]	C (R/X)		Last Update Facility	Condition Predicate: If PID-33, “Last Update Date/Time”, is valued, this field SHALL be populated. If PID-33 is empty, this field will not be populated.

**Example PID Segment:**

PID|1||MRN123||Jones^BabyGirl|James|201201300005-0600|F||2106-3^White^HL70005~1002-5^American Indian or



Alaska Native^HL70005|201 Street^^Arlington^TX^99999^USA||^PRN^PH^^011^555^555-  
5555||eng^English^ISO6392|||||1234555|N^Not Hispanic or Latino^HL70189|HospitalABC|N|

### 2.3.3. Patient Visit Segment - PV1

The PV1 segment is used to communicate information on a visit-specific basis. For EHD, this is important to indicate if the screening was done as an inpatient, or birth screen, or as an outpatient, follow-up screen.

Table 5 - Patient Visit Segment (PV1)

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
2	1	IS	[1..1]	R	HL7 0004	Patient Class	In this message, this field <b>SHALL</b> be used to categorize the patient as an Inpatient or Outpatient.
3	80	PL	[0..1]	C(R/RE)	HL7 0302 See Table 23	Assigned Patient Location	Conditionally required if screening is taking place in an inpatient setting (PV1-2 is equal to I). All other cases the optionality is RE. If a patient is in the Neonatal Intensive Care Unit (NICU) or Special Care Nursery (SCN) this may impact when their hearing screening is performed or how the result is interpreted. See Table 23 - HL7 Table 0302 - Assigned Patient Location for values.
7	60	XCN	[0..1]	RE		Attending Doctor	This field contains the attending physician information. It is recommended to use a NPI to identify the Attending Doctor.

#### Example PV1 Segment:

```
PV1||I|427695007||||1001001^Smith^Theodore^^^Dr^^^^^^^NPI
```

### 2.3.4. NK1 Segment – Next of Kin Segment

The NK1 segment is used to communicate information on the patient’s Next of Kin, or associated parties, most commonly the parent or guardian in newborn screening. For EHDI, this is important if follow-up care or risk monitoring is necessary as a result of the screening.

Table 6 - Next of Kin Segment

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
1	4	SI	[1..1]	R		Set ID – NK1	
2	250	XPN	[1..1]	R	HL0200	Name	
3	250	CE	[0..1]	RE	HL70063	Relationship	This field contains the actual personal relationship that the next of kin/associated party has to the patient. This table has been constrained in this Guide; see Table 21 - User-defined Table 0063 – Relationship for details.
4	250	XAD	[0..*]	C(R/X)		Address	Condition Predicate: This field is required in most cases; the only case that this field may be empty is if the person the NK1 segment is referring to does not have a permanent address (i.e., homeless).
5	250	XTN	[0..*]	C(R/X)		Phone Number	Condition Predicate: This field is required in most cases; the only case that this field may be empty is if the person the NK1 segment is referring to does not have a phone number.
15	1	IS	[0..1]	RE	HL70001	Administrative Sex	
16	26	TS	[0..1]	O		Date/Time of Birth	
19	250	CE	[0..0]	X	ISO 3166	Citizenship	
20	250	CE	[0..1]	RE	ISO 639	Primary Language	

#### Sample NK1 Segment:

NK1|1|Jones^Mary^James|MTH^Mother^HL70063|201 Street^^Arlington^TX^99999^USA|^PRN^PH^^1^555^555-5555

## 2.4. OBR Segments – Observation Request Segments

In the reporting of hearing screening data there are three required observation request (OBR) segments that are used to capture information about the hearing screening panel performed. The first OBR will report the newborn hearing loss panel. This SHALL be followed by an OBR for the newborn hearing screen panel of the right ear and an OBR for the newborn hearing screen panel of the left ear.

Table 7 - OBR Segments

LOINC	Segment Name	Optionality	Section	Comments
54111-0	Newborn hearing screening panel	R	2.4.1	Has supporting OBXs that apply to entire test/panel.
73744-5	Newborn hearing screen panel of ear - right	R	2.4.2	
73741-1	Newborn hearing screen panel of ear - left	R	2.4.2	

### 2.4.1. OBR for the Newborn Hearing Screening Panel

In the reporting of hearing screening data, one OBR is used to report the newborn hearing screening panel. This contains observations relevant to the hearing screening and it MAY be followed by supporting OBX segments that include details on any comments or discussion and/or the hearing loss risk indicators (risk factors). This OBR serves as the report header for the newborn hearing screening panel.

### 2.4.2. OBRs for Newborn Hearing Screen Panel of Ear – Right and Left

There are two additional OBRs that support the Newborn Hearing Screening Panel; newborn hearing screen panel of ear - right and newborn hearing screen panel of ear - left. These OBRs SHALL be reported for each ear and MAY contain information about the ordering provider and the collector. The OBR for newborn hearing screen panel – right ear and the OBR for newborn hearing screen panel- left ear SHALL be supported by at least one OBX segment that indicates the result of the hearing screen. If a screen is not performed, this result MUST be recorded in the OBX segment. Other data elements relevant to hearing screening recorded in the OBX segment include details on the hearing screening technique, equipment, and screener.

**Note:** the three OBRs have similar structure. The information in OBR-4 identifies whether it is the OBR for the Newborn Hearing Screening panel, the Newborn Hearing Screen panel of Ear – Right, or the Newborn Hearing Screen panel of Ear – left.

Table 8- Observation Request Segments (OBR) for the EHDI ORU^R01 message

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
1	4	SI	[1..1]	R		Set ID – OBR	
2		EI	[1..1]	R		Placer Order Number	The Placer Order number is required. <b>In the case of newborn screening reporting the submitter is both the placer and filler.</b>
3		EI	[1..1]	R		Filler Order Number	The Filler Order number is required. In the case of newborn screening reporting the submitter is both the placer and filler.

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
4		CE	[1..1]	R	54111-0, 73744-5 and 73741-1	Universal Service Identifier	There shall be three OBRs in this message. One OBR is for the newborn hearing screen panel. This will contain the identifier code for the newborn hearing screen panel as a LOINC code, 54111-0. There SHALL two other OBRs: One for the newborn hearing screen panel of the right ear and the other for the newborn hearing screen panel of the left ear. These will be identified by their respective LOINC codes 73744-5 and 73741-1.
7		TS	[1..1]	R		Observation Date/Time	
10		XCN	[0..*]	RE		Collector Identifier	
16		XCN	[0..*]	RE		Ordering Provider	
17		XTN	[0..2]	RE		Order Callback Phone Number	
22		TS	[1..1]	R		Results Rpt/Status Chng - Date/Time	
25	1	ID	[1..1]	R	Table 0123 Result Status Value Set	Result Status	Only final results should be sent. F should indicate the Final results. Incomplete results should only be sent in the special case defined in Section 3.1.8 "Delayed Screening". I should be used to indicate incomplete results. See Section 3.1.7 "Multiple Results" for sending corrected results.
28		XCN	[0..0]	X		Result Copies To	This field is not relevant for this reporting.

**Example OBR of Newborn Hearing Screening Panel:**

```
OBR|1|123456^HOSPITAL^9999999999^NPI|123456^HOSPITAL^9999999999^NPI|54111-0^Newborn hearing loss panel^LN|||201201311234-0600|||^Screeener^Annie^S|||||^Smith^John^S^^Dr.^|PRN^PH^^011^555^5551234^333|||||201201311234-0600|||F
```

**Example OBR for Newborn Hearing Screen Panel of Ear - Right:**

```
OBR|2|123456^HOSPITAL^9999999999^NPI|123456^HOSPITAL^9999999999^NPI|73744-5^Newborn hearing screen  
panel of ear - right^LN|||201201311234-  
0600|||^Screeener^Annie^S|||||^Smith^John^S^^Dr.|^PRN^PH^^011^555^5551234^333|||||201201311234-  
0600|||F|||
```

**Example of OBR for Newborn Hearing Screen Panel of Ear - Left:**

```
OBR|3|123456^HOSPITAL^9999999999^NPI|123456^HOSPITAL^9999999999^NPI|73741-1^Newborn hearing screen  
panel of ear - left^LN|||201201311234-  
0600|||^Screeener^Annie^S|||||^Smith^John^S^^Dr.|^PRN^PH^^011^555^5551234^333|||||201201311234-  
0600|||F|||
```

## 2.5. OBX Segments – Observation Result Segments

The Observation Result Segment (OBX) contains information regarding a single observation related to a single OBR. The OBR for the newborn hearing screen panel, will be supported by optional OBX segments for newborn hearing screen comments or discussion and/or OBX segments for hearing loss risk indicator(s).

The OBR segments for Newborn Hearing Screen Panel of Ear – right and Newborn Hearing Screen Panel of Ear - left will be supported by OBX segments that include the specific type of observation, the result for the observation, when the observation was made, etc. The newborn hearing screening OBX segments include information on hearing screening technique, equipment, results, reasons, screener and the duration of the screen. For these two OBRs, one OBX is always required. There may be additional OBX segments containing other observations such as percent myogenic, or waveform data that are not specified in this IG. The OBX Universal Service ID values will be drawn from the concept value set that is newborn hearing screening panel.

OBX Segment details are described in Table 10 - Observation/Result Segment (OBX). Specific identifiers for each varying OBX segment are described in Table 11 - OBX Identifiers.

### 2.5.1. Michigan’s OBX Optionality

An EHD observation is made up of several OBX segments. The table below outlines the optionality of the possible OBX segments and indicates if the OBX is: Required (R), Required if Known (RE), Conditionally Required (C), Conditionally Required if Known (CE), Optional (O) or Not Supported (X).

Table 9 - Michigan’s OBX Optionality

LOINC	Segment Name	Optionality	Comments
57700-7	Hearing loss newborn screening comment/discussion	O	Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0). Shall not be used to indicate results, only used to send supporting information in addition to the OBXs for Newborn Hearing Screen of Ear – right (54109-4) and left (54108-6).
58232-0	Hearing loss risk indicators	C	Conditionally required if any risk indicators are present. Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0)
<del>54106-0</del>	<del>Newborn hearing screen method</del>	<del>X</del>	<del>A separate OBX is not required for newborn hearing screen method. Instead send screen method in the OBR for Newborn Hearing Screen Panel of Ear – right (73744-5) and left (73741-1) and in the OBX for Newborn Hearing Screen of Ear – right (54109-4) and left (54108-6).</del>
54108-6	Newborn hearing screen of ear - left	R	Required in all messages, if screening was not able to be performed, use was Not Performed (LA7304-4 or 262008008) and complete a Reason Not Performed OBX (73739-5).
73740-3	Duration of screening of ear - left	RE	Send duration in seconds.
73739-5	Newborn hearing screen reason not	C	Conditionally required if OBX for “Newborn Hearing Screen of Ear – left” result

LOINC	Segment Name	Optionality	Comments
	performed of ear - left		was "Not Performed" (LA7304-4 or 262008008).
54109-4	Newborn hearing screen of ear - right	R	Required in all messages, if screening was not able to be performed, use was Not Performed (LA7304-4 or 262008008) and complete a Reason Not Performed OBX (73742-9).
73743-7	Duration of screening of ear - right	RE	Send duration in seconds.
73742-9	Newborn hearing screen reason not performed of ear - right	C	Conditionally required if OBX for "Newborn Hearing Screen of Ear – right" result was "Not Performed" (LA7304-4 or 262008008).
62324-9	Post Discharge provider name	R	If not known, use a point of contact at the screening facility. Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0)
62328-0	Post Discharge provider telephone number	R	If not known, use a point of contact at the screening facility. Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0)
62328-0	Post Discharge provider telephone (FAX) number	R	If not known, use a point of contact at the screening facility. Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0)
57722-1	Birth Plurality	C	Conditionally required if multiple birth. Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0)
57716-3	Blood Spot Fiber Paper Card ID	RE	In the case of opt out of the Blood Spot test, send the literal value of "9999999" (seven 9s) for OBX-5. Should be sent in support of Newborn Hearing Screening Panel OBR (54111-0)

Table 10 - Observation/Result Segment (OBX)

Seq	Len	D T	Cardinalit y	Optionalit y	Value Set	HL7 Element Name	Comments/Descriptions
1	4	SI	[1..1]	R		Set ID – OBX	
2	3	ID	[1..1]	R	HL70125	Value Type	
3		CE	[1..1]	R	Var	Observation Identifier	
4	20	ST	[0..1]	CE		Observation Sub-ID	
5		Varies	[1..1]	R		Observation Value	For coded observation values use the Coded Value set in Table 11 - OBX Identifiers.



Seq	Len	D T	Cardinalit y	Optionalit y	Value Set	HL7 Element Name	Comments/Descriptions
6		CE	[0..1]	RE	Unified Code for Units of Measure (UCUM)	Units	UCUM® is an HL7-approved code system and shall be used for units of measure. The literal value of “1^No Units^UCUM” should be used if the measure is unitless.
7	60	ST	[0..1]	RE		Reference Ranges	
8	20	IS	[0..*]	RE	HL70078	Abnormal Flags	
11	1	ID	[1..1]	R	HL70085	Observation Result Status	Only final results should be sent.
14		TS	[1..1]	R		Date/Time of the Observation	The date/time of observation is intended to carry the clinically relevant time of the observation. For observations carried out directly on a patient for instance, such as a hearing screening, the time the observation was performed also happens to be the clinically relevant time of the observation. The date/time the testing was performed should be reported in OBX-19 Format: YYYYMMDDHHMM[SS[.S[S[S[S]]]])+/-ZZZZ except when reporting an unknown date of ‘0000’. Time zone offset is required.
17		CE	[0..*]	RE	LA10387-1 LA10388-9 LA10389-7 LA10390-5 LA10391-3 LA12406-7	Observation Method	In hearing screening, this would be the physiological technique. For this OBX field, it should be drawn from the LOINC Value Set 54106-0, EHD Newborn Hearing Screening Method. The possible values are AABR, ABR, OAE, DPOAE, TOAE, and methodology unknown. See Table 31 - Newborn Hearing Screening Observation Method Value Set OBX 17 for details.
18		EI	[0..*]	RE	Local	Equipment Instance Identifier	This field contains the equipment instance responsible for the production of the observation. In hearing screening the relevant fields to report on a piece of equipment are: Brand, model, version, instance data, serial number, local name.
19		TS	[0..1]	RE		Date/Time of the Analysis	Time at which the hearing screening was performed.

Seq	Len	D T	Cardinalit y	Optionalit y	Value Set	HL7 Element Name	Comments/Descriptions
23		XON	[1..1]	R		Performing Organization Name	This field contains the name of the organization responsible for performing the hearing screening. For hearing screening, this field specifies the hospital/clinic/provider where the hearing screening was conducted. The newborn screening hospital code <sup>1</sup> shall be sent in the “XON: Organization Identifier” (10th sub-element); the full name of the screening facility/hospital in “XON: Organization Name” (1st sub-element) should be sent. “XON: Assigning Authority” (6th sub-element) shall be MDCH. <b>This field is required, and messages will be rejected if it is missing.</b>
24		XAD	[0..1]	RE		Performing Organization Address	
25		XCN	[0..1]	RE		Performing Organization Medical Director	

**2.5.2. OBX Segments Supporting the Newborn Hearing Screening Panel OBR (54111-0)**

In this IG, there is an OBR for the newborn hearing screen panel (54111-0). This panel SHALL be supported by several OBX segments. The OBX segments related to the panel OBR are:

- Hearing loss newborn screening comment/discussion
- Hearing loss risk indicators
- Post Discharge provider name
- Post Discharge provider telephone number
- Post Discharge provider telephone (FAX) number
- Birth Plurality
- Blood Spot Fiber Paper Card ID

<sup>1</sup> Contact the MDCH Newborn Screening Staff if you need your newborn screening hospital code. See section 1.8 for contact information

### 2.5.2.1. Observation Result Segment (OBX) for Hearing Loss Comments or Discussion

Hearing Screening devices may store comments or discussion on the newborn hearing screen conducted. That information should be included in an OBX segment supporting the Newborn Hearing Loss Panel OBR. This OBX can be used to communicate information on any comments or discussion that may be related to the hearing screening. For example, if the room was noisy or the baby may have atresia, these comments may be included in the device and included in the message transmission to public health.

#### Example OBX Segment:

```
OBX|1|TX|57700-7^Hearing loss newborn screening comment/discussion^LN|1|baby  
sleeping||||F|||20120131123400-0500|||Maico-EroScan|201201311234-0600|||Hospital^^^^MDCH^^^^|123  
Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

### 2.5.2.2. Observation Result Segment (OBX) for Risk Factors of Hearing Loss

Hearing screening devices may store information on risk factors or indicators of hearing loss. Details on the risk factors should be included in an OBX segment(s) supporting the Newborn Hearing Loss Panel OBR. The OBX segments can be used to communicate information on any risk factors for hearing loss the patient may have. For example, “the baby was in the NICU for more than 5 days”, is a risk factor that may be of interest to public health. There may be one or many OBX segments for risk factors. SNOMED-CT codes are the preferred codes for these OBX segments. See Table 28 - Evidence of Hearing Loss Risk Indicators

#### Example Hearing Loss Risk Indicator Segments:

```
OBX|2|CE|58232-0^Hearing loss risk indicators^LN|1|266700009^Assisted breathing  
(procedure)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|201201311234-  
0600|||Hospital^^^^MDCH^^^^|123 Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI  
  
OBX|3|CE|58232-0^Hearing loss risk indicators^LN|2|439750006^Family history of hearing  
loss (situation)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|201201311234-  
0600|||Hospital^^^^MDCH^^^^|123 Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

### 2.5.2.3. OBX Segments: Post Discharge Provider Information

These three OBXs include the name, phone number and FAX number for the provider who is going to be responsible for the care of the infant after the infant is discharged from the screening facility. All three OBXs are required; if the post discharge provider is not known, use a point of contact at the screening facility who can address any follow-up items. Submitting multiple post discharge providers is supported. OBXs for the same post discharge providers shall have the same Observation Sub-ID (OBX-4). Note, for Post Discharge Provider Name (62324-9) the providers last name is required and first name is RE.

**Examples of OBX segments for: Post Discharge Provider Information**

```
OBX|3|XPN|62324-9^Post Discharge Provider  
Name^LN||Smith^John^^^Dr||N||F|||20140201061905|||||Hospital^^^^MDCH^^^^|123 Street^Suite  
A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

```
OBX|4|XTN|62328-0^Post Discharge Provider Telephone  
Number^LN||^WPN^PH^^^734^6777777^1|||||F|||20140201062100|||||Hospital^^^^MDCH^^^^|123  
Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

```
OBX|5|XTN|62328-0^Post Discharge Provider FAX  
Number^LN||^WPN^FX^^^734^6777777|||||F|||20140201062300|||||Hospital^^^^MDCH^^^^|123  
Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

**2.5.2.4. OBX Segment: Birth Plurality**

This OBX includes the total number of fetuses delivered live or dead at any time in the pregnancy of which the infant is a part. It is used in conjunction with PID-24 and PID-25 to uniquely identify infants that are part of a multiple birth. It is conditionally required if the infant was part of a multiple birth.

**Examples of OBX segments for: Birth Plurality**

```
OBX|6|CE|57722-1^Birth Plurality^LN||LA6113-0^2^LN|1^No Units^UCUM||||F|||20140201063500||||  
|20140201073500||||Hospital^^^^MDCH^^^^|123 Street^Suite  
A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

**2.5.2.5. OBX Segment: Blood Spot Fiber Paper Card ID**

This OBX includes the blood spot paper fiber card “Kit ID” that is on the card used for newborn metabolic blood spot testing. It is required if know and in the case of opt out of the Blood Spot test, send the literal value of “9999999” (seven 9s) for OBX-5.

**Example 1:**

```
OBX|1|CX|57716-3^Blood Spot Fiber Paper Card ID^LN||9745677|1^No  
Units^UCUM||||F|||2014042011253||||2014042011353||||Lansing General Hospital^^^^MDCH^^^^160000|176  
Murray Ave^^Lansing^MI^48906^USA^P|Jairam^Rajan|
```

**Example 2:**

```
OBX|2|CX|57716-3^Blood Spot Fiber Paper Card ID^LN||9999999|1^No  
Units^UCUM||||F|2014042011253||||2014042011353||||Lansing General Hospital^^^^MDCH^^^^160000|176  
Murray Ave^^Lansing^MI^48906^USA^P|Jairam^Rajan|
```

### 2.5.3. OBX Segments Supporting the Newborn Hearing Screen Panel of Ear - Right OBR and the Newborn Hearing Screen Panel of Ear - Left OBR

In this IG, there is an OBR for the newborn hearing screen panel of the right ear and the newborn hearing screen panel of the left ear. Each panel MAY be supported by three OBX segments. The OBX segments addressed in this IG are:

- Newborn hearing screen of ear - right and Newborn hearing screen of ear - left
- Duration of screening right ear and Duration of screening left ear
- Reason not done right ear and Reason not done left ear

#### 2.5.3.1. OBX Segments: Newborn Hearing Screen Right and Newborn Hearing Screen Left

When a screening has been performed or attempted or not performed, then a result should be communicated in the OBX segment. There should be OBX segment or the result for the newborn hearing screen – right and newborn hearing screen – left, and the method used in the screen should be contained in OBX-17.

##### Examples of OBX segments for Newborn hearing screen of ear – right and Newborn hearing screen of ear - left:

```
OBX|1|CE|54109-4^Newborn hearing screen of ear-right^LN|1|164059009^Pass^SCT|||N|||F|||201201311235-0600|||LA10389-7^OAE^LN|Maico-EroScan|201201311235-0600|||Hospital^^^^MDCH^^^^|123 Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

```
OBX|2|CE|54108-6^Newborn hearing screen of ear - left^LN|1|183924009^Refer^SCT|||A|||F|||201201311235-0600|||LA10389-7^OAE^LN|Maico-EroScan|201201311235-0600|||Hospital^^^^MDCH^^^^|123 Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

#### 2.5.3.2. OBX Segments: Duration of screening of ear – right & left

If a screening has been performed or attempted, then the duration of the test MAY be communicated in the OBX segment. Some devices capture duration measurements and this OBX is intended to support the communication of that data element. There can be a Duration OBX for each screening performed.

##### Examples of OBX segments for Duration of screening right ear and Duration of screening left ear:

```
OBX|1|NM|73740-3^Duration of screening left ear^LN|1|2|min^minute||N|||F|||201201311235-0600|||LA10389-7^OAE^LN|Maico-EroScan|201201311235-0600|||Hospital^^^^MDCH^^^^|123 Street^Suite A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI
```

```
OBX|2|NM|73743-7^Duration of screening right ear^LN|1|2|min^minute||N|||F|||201201311235-0600|||LA10389-7^OAE^LN|Maico-EroScan|201201311235-0600|||Hospital^^^^MDCH^^^^|123 Street^Suite
```

A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI

**2.5.3.3. OBX Segments: Reason Screen Not Performed right ear & Reason Screen Not Performed left ear**

If a hearing screening was not performed, that information needs to be shared with public health or the EHR. Reasons can include parental refusal, the screening was attempted but unsuccessful, it was not performed, or it was not performed because of a medical exclusion. The Reason the screen was not done OBX Segment is Required when OBX-5 of the Newborn Hearing Screen Right OBX and/or Newborn Hearing Screen Left OBX is Not Performed; 262008008 SNOMED-CT

**Examples of OBX segments for Reason screen not done right ear and Reason screen not done left ear:**

OBX|1|CE|73742-9^Newborn hearing screen reason not performed - right^LN|1|103709008^Attempted but unsuccessful - technical fail^SCT|||N||F|||201201311235-0600|||LA10389-7^OAE^LN|Maico-EroScan|201201311235-0600|||Hospital^^^^MDCH^^^^|123 Street^Suite  
A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI

OBX|2|CE|73739-5^Newborn hearing screen reason not performed -left^LN|1|103709008^Attempted but unsuccessful - technical fail^SCT|||A||F|||201201311235-0600||| LA10389-7^OAE^LN|Maico-EroScan|201201311235-0600|||Hospital^^^^MDCH^^^^|123 Street^Suite  
A^Dallas^TX^71211|1001001^Smith^Theodore^^^Dr^^^^^^NPI

Table 11 - OBX Identifiers

Hearing Screening Supporting OBX Segments	OBX 2 - Value Type	OBX 3 Observation Identifier	OBX 5 - Observation Value	Code Description	OBX 6 Units	Related OBR
Hearing Loss Comments and Discussion	TX	57700-7	This is text of any comments or discussion	This records any comments or discussion related to the hearing screening	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0

Hearing Screening Supporting OBX Segments	OBX 2 - Value Type	OBX 3 Observation Identifier	OBX 5 - Observation Value	Code Description	OBX 6 Units	Related OBR
Evidence of Hearing Loss Risk Indicators	CE	58232-0	Coded observation. SNOMED CT codes for hearing loss risk factors shall be used when a code exists; otherwise use a LOINC Answer Code See Table 28 - Evidence of Hearing Loss Risk Indicators	Field that documents the specific hearing loss indicator. It is recommended that SNOMED-CT codes be used to report the observation of a risk factor of hearing loss. NOTE: if multiple risk factors are present, send multiple OBXs with one risk factor per OBX.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0
Newborn Hearing Screen of Ear - Right	CE	54109-4	Evidence of Hearing Screening Performed Value Set See Table 29 - Hearing Screening Performed Value Set	The OBX segment with the hearing screening results provides coded result values for pass, refers, and not performed. There should be separate OBX segments for each result for the Right Ear and each result for the Left Ear. SNOMED-CT codes should be used to document the result of the hearing screening. If the OBX-5 value is not performed, an OBX segment for the Reason Screen Not Performed is required.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	73744-5

Hearing Screening Supporting OBX Segments	OBX 2 - Value Type	OBX 3 Observation Identifier	OBX 5 - Observation Value	Code Description	OBX 6 Units	Related OBR
Newborn Hearing Screen of Ear - Left	CE	54108-6	Evidence of Hearing Screening Performed Value Set See Table 29 - Hearing Screening Performed Value Set	The OBX segment with the hearing screening results provides coded result values for pass, refers, and not performed. There should be separate OBX segments for each result for the Right Ear and each result for the Left Ear. SNOMED-CT codes should be used to document the result of the hearing screening. If the OBX-5 value is not performed, an OBX segment for the Reason Screen Not Performed is required.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	73741-1
Duration of Screening Right Ear	NM	73743-7	Unit of time in seconds	The observation value is the length of time recorded for the duration of the screen. It is a numeric value.	UCUM units for seconds "s^second^UCUM"	73744-5
Duration of Screening Left Ear	NM	73740-3	Unit of time in seconds	The observation value is the length of time recorded for the duration of the screen. It is a numeric value.	UCUM units for seconds "s^second^UCUM"	73741-1
Newborn Hearing Screen Reason not Performed - right	CE	73742-9	Screening Result not Performed Value Set See Table 30 - Screening Result not Performed Value Set	The observation value is the reason the screen was not done. This is a Required OBX segment when the screen is not performed. The Screening Result not Performed Value Set Shall be used. Please see Chapter 6 for the SNOMED- CT codes.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	73744-5
Newborn Hearing Screen Reason not Performed - left	CE	73739-5	Screening Result not Performed Value Set See Table 30 - Screening Result not Performed Value Set	The observation value is the reason the screen was not done. This is a Required OBX segment when the screen is not performed. The Screening Result not Performed Value Set Shall be used.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	73741-1



Hearing Screening Supporting OBX Segments	OBX 2 - Value Type	OBX 3 Observation Identifier	OBX 5 - Observation Value	Code Description	OBX 6 Units	Related OBR
Post Discharge provider name	XPN	62324-9	Name of the post discharge provider	The observation value is the name and optional NPI for the provider who is going to be responsible for the care of the infant after the infant is discharged from the screening facility. Note, the provider's last name is required and first name is RE.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0
Post Discharge provider telephone number	XTN	62328-0	Telephone number of the post discharge provider	The observation value is the phone (voice) number for the provider who is going to be responsible for the care of the infant after the infant is discharged from the screening facility.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0
Post Discharge provider telephone (FAX) number	XTN	62328-0	Fax number of the post discharge provider	The observation value is the FAX number for the provider who is going to be responsible for the care of the infant after the infant is discharged from the screening facility.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0
Birth Plurality	CE	57722-1	LOINC Normative Answer List LL829-3 See Table 35 - Birth Plurality	The observation value is the total number of fetuses delivered live or dead at any time in the pregnancy.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0
Blood Spot Fiber Paper Card ID	ST	57716-3	ID number on blood spot fiber card	The observation value is the ID number on blood spot fiber card that is issued by the state. It is located on the bottom right of the card with a bar code.	The literal value of "1^No Units^UCUM" is expected. An empty field is also acceptable.	54111-0

## 2.6. MSA Segment

This segment contains information sent while acknowledging another message.

Table 12 - MSA Segment

Seq	Len	DT	Cardinality	Optionalit	Value Set	HL7 Element Name	Comments/Descriptions
1	2	ID	[1..1]	R	HL70008	Acknowledgment Code	
2	199	ST	[1..1]	R		Message Control ID	

## 2.7. Error Segment - ERR

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

Table 13 - Error Segment (ERR)

Seq	Len	DT	Cardinality	Optionality	Value Set	HL7 Element Name	Comments/Descriptions
2		ERL	[0..*]	RE		Error Location	
3		CE	[1..1]	R	HL70357	HL7 Error Code	See Table 37 - HL7 Table 0357 – Message Error Condition Codes and Appendix C: Error Conditions and Related Codes for details.
4	1	ID	[1..*]	R	HL70516	Severity	See Table 38 - HL7 Table 0516 – Error Severity ERR-4 and Appendix C: Error Conditions and Related Codes for details.
5	705	CWE	[0..*]	RE	Local	Application Error Code	See Appendix C: Error Conditions and Related Codes for details.
7	2048	TX	[0..1]	RE		Diagnostic Information	
8	250	TX	[0..1]	RE		User Message	See Appendix C: Error Conditions and Related Codes for details.
12		XTN	[0..*]	RE		Help Desk Contact Point	

### 3. Special Cases and Error Conditions

#### 3.1. Special Cases

##### 3.1.1. Parental or Guardian Refusal

Parent or legal guardian may opt out of EHDI screening. In these cases, a message **shall** be submitted with the “Newborn hearing screen reason not performed of Ear - right” and “Newborn hearing screen reason not performed of Ear – left” with OBX-5 populated with the relevant item from Table 30 - Screening Result not Performed Value Set . This message must be sent in lieu of the screening message.

Example OBXs:

```
OBX|4|CE|73742-9^Newborn hearing screen reason not performed of Ear -
right^LN||183945002^Procedure refused - religion^SCT|1^No
Units^UCUM||||F|2014042011253|||2014042011353|Lansing General
Hospital^^^^MDCH^^^^160000|176 Murray
Ave^^Lansing^MI^48906^USA^P|Jairam^Rajan|
```

OR

```
OBX|4|CE|73739-5^Newborn hearing screen reason not performed of Ear -
left^LN||183948000^Refused procedure - parent's wish^SCT|1^No
Units^UCUM||||F|2014042011253|||2014042011353|Lansing General
Hospital^^^^MDCH^^^^160000|176 Murray
Ave^^Lansing^MI^48906^USA^P|Jairam^Rajan|
```

##### 3.1.2. Infant without a First or Middle Name

In the special case that an infant has not received a first or middle name at the time of screening, submitters **shall** use the literal value “Baby” for the first name. The use of “Baby Boy” or “Baby Girl” is also acceptable. The middle name is considered “RE” and may be blank. In all cases, the infant’s identifier in PID-3 **shall** remain the same, assuming that any required rescreening happens at the same facility.

##### 3.1.3. Multiple Births

In the special case when the infant that is being reported was part of a multiple birth, several of the PID fields are conditional required. These include PID-21 “Mother’s Identifier”, PID-24 “Multiple Birth Indicator” and PID-25 “Birth Order”. PID-21 is used to link all the babies from a multiple birth to a common mother and should be populated with the mother’s main medical record number or equivalent for the birthing center if known. NOTE: see Section 3.1.6 “Confidential Mother’s Identity” for guidance on cases where birth mother’s identity may need to be kept confidential. PID-24 shall be populated with the literal value of “Y” for all infants in a multiple birth. PID-25 shall be populated with the numerical value for the order of birth. Additionally, an OBX for Birth Plurality is conditionally required. See Section 2.5.2.4 “OBX Segment: Birth Plurality” for additional details.

**Example PID Segment for Multiple Birth:**

```
PID|1||MRN123||Jones^BabyGirl|James|201207121205|F^Female^HL70001||2106-
3^White^HL70005~1002- 5^American Indian or Alaska Native^HL70005~2028-
9^Asian^HL70005|201
Street^Arlington^TX^99999^USA||^PRN^PH^555^555555|eng^English^ISO6392|||987
```

```
66|||1234555|N^Not Hispanic or  
Latino^HL70189^^^2.6|HospitalABC||Y|2|||||201206221534|123^Lansing  
Central Hospital^N|
```

#### Example OBX for Birth Plurality:

```
OBX|10|NM|57722-1^Birth Plurality^LN||LA6114-8^3^LN|1^No Units^UCUM||||F||  
|2009071413552||||20140420112730||||Lansing General  
Hospital^^^^MDCH^^^^160000|176 Murray  
Ave^^Lansing^MI^48906^USA^P|Jairam^Rajan|
```

#### 3.1.4. Death of the Infant – Before Screening

In the special case that an infant dies prior to screening, a message should be sent with a populated MSH, PID, PVI, NK1, three OBRs, and the OBXs for Newborn hearing screen of Ear – right and left. Additionally the “Newborn hearing screen reason not performed of Ear - right” **AND** “Newborn hearing screen reason not performed of Ear – left” OBX is conditionally required and it **shall** have OBX-5 populated with ‘397709008^Patient died^SCT’. This message must be sent in lieu of the screening message.

#### 3.1.5. Death of the Infant – After Screening

In the special case that an infant dies after screening, a message should be sent with a populated MSH, PID, PVI, NK1, three OBRs, and the OBXs for Newborn hearing screen of Ear – right and left. Additionally the “Newborn hearing screen reason not performed of Ear - right” **AND** “Newborn hearing screen reason not performed of Ear – left” OBX is conditionally required and it **shall** have OBX-5 populated with ‘397709008^Patient died^SCT’.

#### 3.1.6. Confidential Mother’s Identity

If the birth mother’s identity must remain confidential, contact information for the baby’s point of contact, either an adoptive or foster mother, must be provided in a corresponding NK1 segment. If contact information on new parents, foster parents, or the adoption agency is not available, staff will be unable to contact the family if necessary. In these cases the PID-21.1 field should be blank or filled in with the literal value of “XXXXXXXXXX” (10 Xs). Since PID-21 is conditional required in the case of multiple births, if a multiple birth also required the birth mother’s identity to be confidential, senders shall send the literal value of “XXXXXXXXXX”. In both cases, a birth mother’s NK1 segment should not be sent. A substitute NK1 is required with information of new parents, foster parents, the adoption agency or some other point of contact for the infant post discharge should be sent. It is up to the screening facility to determine when mother’s identity needs to be kept confidential.

#### 3.1.7. Multiple Results

Multiple results for the same infant may be seen if multiple screenings are conducted. The last result (based on screening date/time) is considered the final result for that infant. If a correction needs to be made, send in an additional result message.

##### 3.1.7.1. Recording Two Screens in a Single Visit

Some facilities may choose to immediately rescreen an infant that fails an initial screening (such as OAE) with a different screening method (such as ABR). If these screenings happen in a single visit (single time period) they may be submitted in a single message. These would be submitting multiple OBXs for “Newborn Hearing Screen of Ear” for one or both ears. These should fall under one (1) OBR for “Newborn Hearing Screen Panel of Ear” for the corresponding ear(s). Alternatively, these multiple screens could be sent in individual messages. Note any

individual messages must conform to this Guide, for example OBRs and OBXs for both ears even if one ear is “not performed”.

### 3.1.8. Delayed Screening

In some cases newborn hearing screenings may need to be delayed several days. It is recommended to send in a result message with the results OBX set to “Not performed” and the appropriate “Reason not performed” included in a separate OBX. This delayed screening message should be sent within 4 or 5 days of birth to inform the EHD team that a screening is being delayed. The use of ‘I’ in OBR-25 is recommended for delayed screening messages.

## 3.2. Error Conditions

This section describes the error conditions that might happen, related message acknowledgments, and expected or required actions of the submitter. EHD’s default is to ACK all messages, even successful messages.

See Appendix C: Error Conditions and Related Codes for a full listing of error codes and related information.

In the cases where a message was not completely successful, the submitter will receive an ACK with an ‘AE’ or ‘AR’ Acknowledgment Code. Table 14 below outlines the various error connections and corresponding Acknowledgment Code (MSA-1) and Error Codes (ERR-3). Any message that receives an Acknowledgment Code of “AR” **SHALL** require error handling. Any message that receives and Acknowledgment Code of “AE” and Severity (ERR-4) of “E” **SHALL** require error handling. Any message that receives and Acknowledgment Code of “AE” and Severity (ERR-4) of “W” or “I” may require error handling. See below for more details.

Table 14 - Example Error Conditions and Related MSA and ERR Codes

Error Condition	MSA-1	ERR-3 <sup>2</sup>
Missing Required Segment	AR or AE	100
Missing Required Field	AR or AE	101
Data Type Error	AR or AE	102
Wrong Message Type	AR	200
Unsupported Event Code	AR	201
Unsupported HL7 Version ID	AR	203
Unknown Key Identifier	AR	204
Application Internal Error	AR or AE	207
EHD Application Unavailable	AR	900
EHD Application Down for Planned Maintenance	AR	901
Unauthorized Submitter	AR	952

See Appendix C: Error Conditions and Related Codes for more details.

### 3.2.1. Successful Messages – AA

Any message that receives an Acknowledgment Code of “AA” is considered a successful message, and no error handling is needed.

<sup>2</sup> This is a combination of the HL7 Table 0357 and additional HIE-related (MiHIN) error codes.

### 3.2.2. Non-Fatal Processing Errors – AE

Any message that receives an Acknowledgment Code of “AE” is considered to have a non-fatal processing error(s) and *may* require error handling. All “AE” messages should be investigated by the original sender.

### 3.2.3. Fatal Processing Errors – AR

Any message that receives an Acknowledgment Code of “AR” is considered to have a fatal processing error (s) and *will* require error handling. All “AR” messages require some level of error handling, but in some cases it can be automated. For example, if a receiving system is down, an automatic re-transmission after 10 minutes is appropriate. See System Unresponsive – Special Case below for more details.

If there are any errors, especially in the MSH, PID and required OBX segments, then the message is rejected, and MDCH will respond with an ACK error message.

Examples of issues that may cause a message to be rejected include:

- Message violates HL7 2.5.1 standard.
- Message is missing required field or segment.
- Value is not valid for the given type (e.g. there is an alphanumeric data value in a date field) or is not a recognized valid value.
- Value is inconsistent with other values given in the same message.

### 3.2.4. System Unresponsive – Special Case

Since these messages will flow through HIEs and include multiple hops, a special error case is needed if the intermediary hops are available but the end destination is not. In this case an ACK with AR and a special unresponsive ERR-3 Error Code and MSA-3 Text Message entries are used. It is recommended that the sending system retransmit the message once every ten (10) minutes until it receives a responsive ACK. The special unresponsive ERR-3 Error Code and MSA-3 Text Message entries are any items listed in Table 37 - HL7 Table 0357 – Message Error Condition Codes. This currently includes 900 “Receiving system unresponsive” and 901 “Receiving system down for maintenance.” In some cases the HIE will already handle this error; contact your HIE for more information.

## 3.3. Health Information Exchanges (HIE) and Related Requirements

### 3.3.1. Message Header Validation

Health Information Exchanges or other intermediaries should evaluate the message header for required fields before submission to the State.

Table 15 - Message Header Validation

MSH Field	Field Name	Requirements
MSH-4	Sending Facility	Must be populated with an OID
MSH-5	Receiving Application	Must be populated with 'EHDI^2.16.840.1.114222.4.3.2.2.3.161.1.3434^ISO'
MSH-6	Receiving Facility	Must be populated with 'MDCH^2.16.840.1.114222.4.3.2.2.3.161.1^ISO'
MSH-11	Processing ID	"T" (training or testing) or "P" (production). See Section 4.2 “On-boarding Instructions” for details on this field during the on boarding

		process.
MSH-12	Version ID	Must be populated with 2 . 5 . 1

### 3.3.2. ACK Messages Handling

Health Information Exchanges or other intermediaries will receive ACK messages from MDCH and shall return these messages back to the provider site that submitted them to MDCH. The return of all ACK messages, including 'AA' messages, is required. In cases where returning the ACK to the original sender site would cause undue harm, this requirement can be waved on a case by case basis.

## 4. Message Transport and On Boarding

### 4.1. Message Transport Options

Messages must be sent through Michigan's Health Information Exchange (HIE) infrastructure or other MDCH approved methods to MDCH's Data Hub. Michigan's HIE infrastructure includes the Michigan Health Information Network (MiHIN) Shared Services and its related Health Information Exchanges (a.k.a., Qualified Organizations). To learn more, visit <http://mihin.org/exchanges/>. For additional information, contact the staff listed in Section 1.8 "MDCH Point of Contact".

### 4.2. On-boarding Instructions

The on-boarding process is designed to ensure that all messages are complete and of good quality prior to allowing a new submitter to enter into production. It is a multi-step process, described below.

#### 4.2.1. Pre-Production Onboarding

Prior to entering into full production, submitters are required to go through a data/message quality phase for Pre-Production Onboarding. During this phase, real messages are sent, just as in production, but MSH-11 "Processing ID" is to be set to the literal value of "T". Messages are reviewed for completeness and quality by EHD staff. Only after correcting any quality issues with the message are submitters allowed to enter full production. During Pre-Production Onboarding, submitters may be required to report EHD items via a different process. All Pre-Production Onboarding must be coordinated with EHD staff. Contact the EHD staff listed in Section 1.8 "MDCH Point of Contact" to start pre-production testing and onboarding.

#### 4.2.2. Production

Once a submitter has completed Pre-Production Onboarding and received the approval to enter into production from EHD staff, they must change MSH-11 "Processing ID" to be set to the literal value of "P". **Submitters are advised to include this requirement in any internal project scope or contract with an external organization conducting the configuration of the EHD interface.**

#### 4.2.3. Testing After Entering into Production

If for any reason a submitter wishes to test messages after entering into production (e.g., during an EHR upgrade) they may use the Initial Test site at any time. If additional testing is required, they may also request an additional round of Pre-Production Onboarding testing. This must be coordinated with EHD staff, and the MSH-11 "Processing ID" must be set to the literal value of "T" for any test message. Production messaging can continue during additional rounds of Pre-Production Onboarding testing as long as the MSH-11 "Processing ID" is set to the literal value of "P" for production messages, and EHD staff have approved.

#### 4.2.4. Required Retesting

Submitters are required to go through Pre-Production Onboarding retesting when switching from one EHR or interface engine product to another. Submitters are encouraged to undergo Pre-Production Onboarding retesting for any major EHR or interface engine version upgrade. All retesting must be coordinated with EHD staff.



## 5. Code Tables

The section shows the various Values Set/Codes used in this implementation guide and provides values for those HL7 tables that are constrained by this IG. HL7 tables in this guide are as specified in the HL7 Version 2.5.1 Standard.

### 5.1. PID Tables

Table 16 - HL7 Table 0200 - Name Type

Value	Description
A	Alias Name
B	Name at Birth
C	Adopted Name
L	Legal Name
U	Unspecified

Table 17 - User-defined Table 0001 - Administrative Sex

Value	Description
F	Female
M	Male
O	Other
U	Unknown
A	Ambiguous
N	Not applicable

Table 18 - User-defined Table 0005 – Race

Value	Description
1002-5	American Indian or Alaska Native
2028-9	Asian
2054-5	Black or African American
2076-8	Native Hawaiian or Other Pacific Islander
2106-3	White
2131-1	Other Race

**Table 19 - User-defined Table 0189 - Ethnic Group**

Value	Description
H	Hispanic or Latino
N	Not Hispanic or Latino
U	Unknown

**Table 20 - Multiple Birth Indicator**

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

## 5.2. NK1 Table

**Table 21 - User-defined Table 0063 – Relationship**

Value	Description
WRD	Ward of court
PAR	Parent
MTH	Mother
FTH	Father
CGV	Care giver
GRD	Guardian
GRP	Grandparent
EXF	Extended family
SIB	Sibling
BRO	Brother
SIS	Sister
FND	Friend
OAD	Other adult
EMC	Emergency contact
NON	None
UNK	Unknown
OTH	Other

## 5.3. PV1 Tables

**Table 22 - HL7 Table 0004 - Patient Location**

Value	Description
I	Inpatient
O	Outpatient

Table 23 - HL7 Table 0302 - Assigned Patient Location

Values	Description	Code System
427695007	Newborn Nursery Unit (synonym: Well baby unit)	SNOMED-CT
405269005	Neonatal intensive care unit	SNOMED-CT
309946005	Special care baby unit	SNOMED-CT
309910001	Pediatric intensive care unit	SNOMED-CT
309945009	Pediatric department	SNOMED-CT
420223003	Pediatric medicine department	SNOMED-CT
309991001	Pediatric surgical department	SNOMED-CT
398145002	Unspecified location within hospital premises	SNOMED-CT
91154008	Free-standing birthing center	SNOMED-CT
52668009	Hospital-based birthing center	SNOMED-CT

Table 24 - HL7 Table 0203 – Identifier Type Code PV1-7 for the XCN data type

Values	Description	Comment
AMA	American Medical Association Number	A physician identifier assigned by the AMA.
AN	Account number	An identifier that is unique to an account.
ANON	Anonymous identifier	An identifier for a living subject whose real identity is protected or suppressed
APRN	Advanced Practice Registered Nurse number	An identifier that is unique to an advanced practice registered nurse within the jurisdiction of a certifying board
BCT	Birth Certificate	A number associated with a document identifying the event of a person’s birth.
BR	Birth registry number	An identifier unique within the Assigning Authority that is the official legal record of a person's birth.
DL	Driver’s license number	
DN	Doctor number	
DO	Osteopathic License number	An identifier that is unique to an osteopath within the jurisdiction of a licensing board.
ESN	Staff Enterprise Number	An identifier that is unique to a staff member within an enterprise (as identified by the Assigning Authority).
FI	Facility ID	
LN	License number	
LR	Local Registry ID	
MD	Medical License Number	An identifier that is unique to a medical doctor within the jurisdiction of a licensing board.

Values	Description	Comment
MR	Medical record number	An identifier that is unique to a patient within a set of medical records, not necessarily unique within an application.
MRT	Temporary Medical Record Number	Temporary version of a Medical Record Number
NE	National employer identifier	In the US, the Assigning Authority for this value is typically CMS, but it may be used by all providers and insurance companies in HIPAA related transactions.
NP	Nurse practitioner number	An identifier that is unique to a nurse practitioner within the jurisdiction of a certifying board.
NPI	National provider identifier	In the US, the Assigning Authority for this value is typically CMS, but it may be used by all providers and insurance companies in HIPAA related transactions.
PA	Physician Assistant number	An identifier that is unique to a physician assistant within the jurisdiction of a licensing board
PI	Patient internal identifier	A number that is unique to a patient within an Assigning Authority.
PN	Person number	A number that is unique to a living subject within an Assigning Authority.
PRN	Provider number	A number that is unique to an individual provider, a provider group or an organization within an Assigning Authority. Use case: This allows PRN to represent either an individual (a nurse) or a group/organization (orthopedic surgery team).
SL	State license	
SR	State registry ID	
U	Unspecified identifier	

#### 5.4. OBR Tables

Table 25 - Hearing Screen Value Set

Values	Description	Code System
54111-0	Newborn Hearing Loss Panel	LOINC
73741-1	Newborn Hearing Screen Panel of Ear - Left	LOINC
73744-5	Newborn Hearing Screen Panel of Ear – Right	LOINC

Table 26 - HL7 Table 0123 - Result Status

Value	Description	Comment
I	No results available; specimen received, procedure incomplete	Only should be used in the case of a delayed screening message, see Section 3.1.8 for details.
C	Correction to results	
F	Final results; results stored and verified. Can only be changed with a corrected result.	

### 5.5. OBX Tables

Table 27 - HL7 Table 0125 - Value type for OBX 2

Value	Description
CE	Coded Element
CX	Extended Composite ID with Check Digit
TS	Date/Time
EI	Entity Identifier
ERL	Error Location
FN	Family Name
HD	Hierarchic Designator
ID	Coded Values for HL7 Tables
IS	Coded value for User-Defined Tables
MSG	Message Type
NM	Numeric
PL	Person Location
PT	Processing Type
SAD	Street Address
SI	Sequence ID
ST	String
TX	Text
Var	Variable
VID	Version Identifier
XAD	Extended Address
XCN	Extended Composite ID Number and Name
XON	Extended Composite Name and ID Number for Organizations
XPN	Extended Person Name
XTN	Extended telecommunications number

Table 28 - Evidence of Hearing Loss Risk Indicators

LOINC Description – Value Set: 58232-0	LOINC Value	SNOMED-CT Description Value Sets: 1.3.6.1.4.1.19376.1.7.3.1.1.15.2.12 and 1.3.6.1.4.1.19376.1.7.3.1.1.15.2.11	SNOMED-CT Value
None	LA137-2		

LOINC Description – Value Set: 58232-0	LOINC Value	SNOMED-CT Description Value Sets: 1.3.6.1.4.1.19376.1.7.3.1.1.15.2.12 and 1.3.6.1.4.1.19376.1.7.3.1.1.15.2.11	SNOMED-CT Value
Caregiver concern about hearing	LA12667-4		
Family Hx of Hearing loss	LA12668-2	Family history of hearing loss (situation)	439750006
ICU stay > 5 days	LA12669-0		
ECMO	LA12670-8	Extracorporeal membrane oxygenation (procedure)	233573008
Assisted ventilation	LA12671-6	Assisted breathing (procedure)	266700009
Ototoxic medication use	LA12672-4	History of therapy with ototoxic medication (situation)	441899004
Exchange transfusion for Hyperbilirubinemia	LA12673-2	Neonatal exchange transfusion	180202002
In utero infection(s)	LA12674-0	Intra-amniotic infection of fetus	11618000
Craniofacial anomalies	LA12675-7	Congenital abnormality of skull and face bones	268239009
Physical findings of syndromes that include hearing loss	LA12681-5		
Syndromes associated with hearing loss	LA12676-5		
Neurodegenerative disorders	LA12677-3	Degenerative disease of the central nervous system (disorder)	80690008
Postnatal infections	LA12678-1	Postnatal infection (disorder)	178280004
Head Trauma	LA12679-9	Neonatal extracranial head trauma (disorder)	312972009
Chemotherapy	LA6172-6	History of – chemotherapy (situation)	161653008
		Infections specific to perinatal period (disorder)	206331005
		Fetus or neonate affected by maternal infection (disorder)	206005002
		Conjugated hyperbilirubinemia in infancy (disorder)	276687002
		Neonatal hyperbilirubinemia (disorder)	281610001
		Neonatal conjugated hyperbilirubinemia (disorder)	281612009
		Neonatal unconjugated hyperbilirubinemia (disorder)	281611002

Table 29 - Hearing Screening Performed Value Set

Value	Description	Code System
164059009	Pass	SNOMED-CT
183924009	Refer	SNOMED-CT
262008008	Not Performed	SNOMED-CT

Table 30 - Screening Result not Performed Value Set

Value	Description	Code System
103709008	Attempted, but unsuccessful - technical fail	SNOMED-CT

Value	Description	Code System
410534003	Not performed, medical exclusion - not indicated	SNOMED-CT
183949008	Assessment examination refused (situation)	SNOMED-CT
183945002	Procedure refused - religion (situation)	SNOMED-CT
183948000	Refused procedure - parent's wish (situation)	SNOMED-CT
397709008	Patient died (finding)	SNOMED-CT

Table 31 - Newborn Hearing Screening Observation Method Value Set OBX 17

LOINC Value Set	Description	Code System	Comment
54106-0			
LA10387-1	Automated auditory brainstem response	LOINC	AABR
LA10388-9	Auditory brain stem response	LOINC	ABR
LA10389-7	Otoacoustic emissions	LOINC	OAE
LA10390-5	Distortion product otoacoustic emissions	LOINC	DPOAE
LA10391-3	Transient otoacoustic emissions	LOINC	TOAE
LA12406-7	Methodology unknown	LOINC	

Table 32 - Units of Time

Value	Description	Code System
a	Year	UCUM
mo	Month	UCUM
wk	Week	UCUM
d	Day	UCUM
h	Hour	UCUM
min	Minute	UCUM
s	Second	UCUM

Table 33 - Defined Table 0078 - Abnormal flags OBX 8

Value	Description
N	Normal (applies to non-numeric results)
A	Abnormal (applies to non-numeric results)
Null	No range defined, or normal ranges don't apply

Table 34 - OBX 11 - HL7 Table 0085 - Observation result status codes interpretation OBX 11

Value	Description
C	Record coming over is a correction and thus replaces a final result
F	Final results; Can only be changed with a corrected result.
P	Preliminary results

Table 35 - Birth Plurality

Preferred Code	Preferred Definition	OLD Code	OLD Definition	Code System	Comment
LA6112-2	1	LA12411-7	Singleton	LOINC	
LA6113-0	2	LA12412-5	Twins	LOINC	
LA6114-8	3	LA12413-3	Triples	LOINC	
LA6115-5	4	LA12414-1	Quadruplets	LOINC	
LA10137-0	5	LA12415-8	Quintuplets	LOINC	
LA10138-8	6	LA12416-6	Sextuplets	LOINC	
LA10139-6	7	LA12453-9	Septuplets	LOINC	
LA10140-4	8	LA12913-2	Octuplets or more	LOINC	
LA10141-2	9			LOINC	
LA13942-0	10			LOINC	
LA14557-5	11			LOINC	
LA14558-3	12			LOINC	
LA12914-0	Unknown plurality	LA12914-0	Unknown plurality	LOINC	

## 5.6. MSA Tables

Table 36 - HL7 Table 0008 - Acknowledgment Code MSA-1

Value	Description
AA	Original mode: Application Accept - Enhanced mode: Application acknowledgment: Accept
AE	Original mode: Application Error - Enhanced mode: Application acknowledgment: Error
AR	Original mode: Application Reject - Enhanced mode: Application acknowledgment: Reject
CA	Enhanced mode: Accept acknowledgment: Commit Accept



Value	Description
CE	Enhanced mode: Accept acknowledgment: Commit Error
CR	Enhanced mode: Accept acknowledgment: Commit Reject

## 5.7. ERR Tables

Table 37 - HL7 Table 0357 – Message Error Condition Codes

Value ERR-3^1	Description ERR-3^2 & MSA-3	Comment ERR3^9 & ERR8	Code Set ERR3^3	Typical Severity
0	Message accepted	Success. Optional, as the AA conveys success. Used for systems that must always return a status code.	HL70357	NOT USED
100	Segment sequence error	Error: The message segments were not in the proper order, or required segments are missing.	HL70357	E
101	Required field missing	Error: A required field is missing from a segment	HL70357	E
102	Data type error	Error: The field contained data of the wrong data type, e.g., an NM field contained "FOO".	HL70357	E
103	Table value not found	Error: A field of data type ID or IS was compared against the corresponding table, and no match was found.	HL70357	Varies
200	Unsupported message type	Rejection: The Message Type is not supported.	HL70357	E
201	Unsupported event code	Rejection: The Event Code is not supported.	HL70357	E
202	Unsupported processing id	Rejection: The Processing ID is not supported.	HL70357	E
203	Unsupported version id	Rejection: The Version ID is not supported.	HL70357	Varies
204	Unknown key identifier	Rejection: The ID of the patient, order, etc., was not found. Used for transactions other than additions, i.e., transfer of a non-existent patient.	HL70357	E
205	Duplicate key identifier	Rejection: The ID of the patient, order, etc., already exists. Used in response to addition transactions (Admit, New Order, etc.).	HL70357	Varies
206	Application record locked	Rejection: The transaction could not be performed at the application storage level, i.e., database locked.	HL70357	E
207	Application internal error	Rejection: A catchall for internal errors not explicitly covered by other codes.	HL70357	Varies
<b>900</b>	Receiving system unresponsive	Down: The receiving system is not responsive or is down. Please retransmit the message in 10 minutes.	<b>MIHINERR</b>	E

Value ERR-3^1	Description ERR-3^2 & MSA-3	Comment ERR3^9 & ERR8	Code Set ERR3^3	Typical Severity
901	Receiving system down for maintenance	Down: The receiving system is down for planned maintenance. Please consult mihin.org for known system maintenance windows or retransmit the message in 10 minutes.	MIHINERR	Varies
950	General routing error	Routing: A catchall for all other routing errors.	MIHINERR	Varies
951	Destination is unknown	Routing: The destination or receiving system is unknown.	MIHINERR	E
952	Not authorized	Routing: The sending system is not authorized to send to this destination.	MIHINERR	E

**NOTE: This is a combination of the HL7 Table 0357 and additional HIE-related (MiHIN) error codes.**

Table 38 - HL7 Table 0516 – Error Severity ERR-4

Value	Description	Comment	Usage
W	Warning	Transaction successful, but there may be issues	
I	Information	Transaction was successful but includes information i.e., inform patient	
E	Error	Transaction was unsuccessful	

## Appendix A – Sample Messages

A sample message is included as reference. Please refer to HL7 V 2.5.1 ORU^R01 for details on the fields.

Examples should not be construed as authoritative and the details in this guide should be followed. If the examples do not conform to the guide, the guide should be considered authoritative.

### Sample Message with Risk Factors

```
MSH|^~\&|EHD Screening Device^2.16.840.1.113883.4.3.48^OID|SendingFacility^2.16.840.1.113883.4.3.47^OID|
EHD^2.16.840.1.114222.4.3.2.2.3.161.1.3434^ISO|MDCH^2.16.840.1.114222.4.3.2.2.3.161.1^ISO|20120701132554-
0400||ORU^R01^ORU_R01|2012070113255400-0500|T|2.5.1|||AL|AL|USA||en^English^ISO639-1
```

```
PID|1||MRN123||Jones^BabyGirl|James|201201300005-0500|F||2106-3^White^HL70005~1002-5^American Indian or Alaska
Native^HL70005|201 Street^^Lansing^MI^48917^USA||^PRN^PH^^011^555^555-
5555||eng^English^ISO6392|||98766|||1234555|N^Not Hispanic or
Latino^HL70189|HospitalABC|N|1|PV1||I|427695007|||1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI
```

```
PV1||I|427695007|||1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI
```

```
NK1|1|Jones^Mary^James|MTH^Mother^HL70063|201 Street^^Lansing^MI^48917^USA|^PRN^PH^^011^555^555-5555
```

```
OBR|1|123456^ HOSPITAL^999999999^NPI|123456^HOSPITAL^999999999^NPI|54111-0^Newborn hearing loss
panel^LN|||201201311234-
0600|||^Screener^Annie^S|||^^Smith^John^S^^Dr.|^PRN^PH^^011^555^5551234^333|||20120131123400-
0500|||F|||^Parent^Mama
```

```
OBX|1|TX|57700-7^Hearing loss newborn screening comment/discussion^LN|1|baby sleeping|||F|||20120131123400-
0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South
Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI
```

```
OBX|2|CE|58232-0^Hearing loss risk indicators^LN|1|266700009^Assisted breathing
procedure^SCT|||A|||F|||201201311234-0600|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South
Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI
```

```
OBX|3|CE|58232-0^Hearing loss risk indicators^LN|2|LA12669-0^ICU stay > 5 days^LN|||A|||F|||201201311234-
0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South
Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI
```

```
OBX|4|CE|58232-0^Hearing loss risk indicators^LN|3|LA12667-4^Caregiver concern about
```

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hearing^LN|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|5|CE|58232-0^Hearing loss risk indicators^LN|4|439750006^Family history of hearing Loss (situation)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|6|CE|58232-0^Hearing loss risk indicators^LN|5|233573008^Extracorporeal membrane oxygenation (procedure)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|7|CE|58232-0^Hearing loss risk indicators^LN|6|441899004^History of therapy with ototoxic medication (situation)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|8|CE|58232-0^Hearing loss risk indicators^LN|7|276687002^Conjugated hyperbilirubinemia in infancy (disorder)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|9|CE|58232-0^Hearing loss risk indicators^LN|8|11618000^Intra-amniotic infection of fetus^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|10|CE|58232-0^Hearing loss risk indicators^LN|9|268239009^Congenital abnormality of skull and face bones^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|11|CE|58232-0^Hearing loss risk indicators^LN|10|LA12681-5^Physical findings of syndromes that include hearing loss^LN|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|12|CE|58232-0^Hearing loss risk indicators^LN|11|LA12676-5^Syndromes associated with hearing loss^LN|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|13|CE|58232-0^Hearing loss risk indicators^LN|12|80690008^Degenerative disease of the central nervous system (disorder)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|14|CE|58232-0^Hearing loss risk indicators^LN|13|178280004^Postnatal infection

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(disorder)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|15|CE|58232-0^Hearing loss risk indicators^LN|14|312972009^Neonatal extracranial head trauma (disorder)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|16|CE|58232-0^Hearing loss risk indicators^LN|15|161653008^History of - chemotherapy (situation)^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBR|2|123456^HOSPITAL^999999999^NPI|123456^HOSPITAL^999999999^NPI|73744-5^Newborn hearing screen panel of ear - right^LN|||20120131123400-0500|||^Screener^Annie^S|||^Smith^John^S^^Dr.^|PRN^PH^^011^555^5551234^333|||^20120131123400-0500|||F|||^Parent^Mama

OBX|1|CE|54109-4^Newborn hearing screen of ear right^LN|1|164059009^Pass^SCT|||N|||F|||20120131123500-0500|||LA10389-7^OAE^LN|Maico-EroScan|20120131123500-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|2|NM|73743-7^Duration of screening right ear^LN|1|2|min^minute^UCUM||N|||F|||20120131123500-0500|||LA10389-7^OAE^LN|Maico-EroScan|20120131123500-0500|||Hospital|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBR|3|123456^HOSPITAL^999999999^NPI|123456^HOSPITAL^999999999^NPI|73741-1^Newborn hearing screen panel of ear - left^LN|||20120131123400-0500|||^Screener^Annie^S|||^Smith^John^S^^Dr.^|PRN^PH^^011^555^5551234^333|||^20120131123400-0500|||F|||^Parent^Mama

OBX|1|CE|54108-6^Newborn hearing screen of ear - left^LN|1|183924009^Refer^SCT|||A|||F|||20120131123500-0500|||LA10389-7^OAE^LN|Maico-EroScan|20120131123500-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|2|NM|73740-3^Duration of screening left ear^LN|1|2|min^minute^UCUM||N|||F|||20120131123500-0500|||LA10389-7^OAE^LN|Maico-EroScan|20120131123500-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

Sample Message with Reason Screen Not Done OBX

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MSH|^~\&|EHD Screening Device^2.16.840.1.113883.4.3.48^OID|SendingFacility^2.16.840.1.113883.4.3.47^OID|  
EHD^2.16.840.1.114222.4.3.2.2.3.161.1.3434^ISO|MDCH^2.16.840.1.114222.4.3.2.2.3.161.1^ISO|20120701132554-  
0500||ORU^R01^ORU\_R01|2012070113255400-0500|T|2.5.1||AL|AL|USA||en^English^ISO639-1

PID|1||MRN123||Jones^BabyGirl|James|20120130000500-0600|F||2106-3^White^HL70005~1002-5^American Indian or Alaska  
Native^HL70005|201 Street^^Lansing^MI^48917^USA|^PRN^PH^^011^555^555-  
5555||eng^English^ISO6392|||98766|||1234555|N^Not Hispanic or Latino^HL70189|HospitalABC|N|1

PV1||I|427695007|||1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

NK1|1|Jones^Mary^James|MTH^Mother^HL70063|201 Street^^Lansing^MI^48917^USA|^PRN^PH^^011^555^555-5555

OBR|1|123456^HOSPITAL^999999999^NPI|123456^HOSPITAL^999999999^NPI|54111-0^Newborn hearing loss  
panel^LN|||20120131123400-  
0500|||^Screener^Annie^S|||^^Smith^John^S^^Dr.^PRN^PH^^011^555^5551234^333|||20120131123400-  
0500|||F|||^Parent^Mama

OBX|1|TX|57700-7^Hearing loss newborn screening comment/discussion^LN|1|baby crying|||F||20120131123400-  
0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA  
|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBX|2|CE|58232-0^Hearing loss risk indicators^LN|1|439750006^Family Hx of Hearing  
Loss^SCT|||A|||F|||20120131123400-0500|||Maico-EroScan|20120131123400-0500|||Hospital^^^^MDCH^^^^|123 South  
Street^^Lansing^MI^48917^USA |1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBR|2|123456^HOSPITAL^999999999^NPI|123456^HOSPITAL^999999999^NPI|73744-5^Newborn hearing screen panel of ear -  
right^LN|||20120131123400-  
0500|||^Screener^Annie^S|||^^Smith^John^S^^Dr.^PRN^PH^^011^555^5551234^333|||20120131123400-  
0500|||F|||^Parent^Mama

OBX|1|CE|73742-9^Newborn hearing screen reason not performed - right^LN|1|103709008^Attempted but unsuccessful -  
technical fail^SCT|||N|||F|||20120131123500-0500|||LA10389-7^OAE^LN|Maico-EroScan|20120131123500-  
0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^NPI

OBR|3|123456^HOSPITAL^999999999^NPI|123456^HOSPITAL^999999999^NPI|73741-1^Newborn hearing screen panel of ear -  
left^LN|||20120131123400-  
0500|||^Screener^Annie^S|||^^Smith^John^S^^Dr.^PRN^PH^^011^555^5551234^333|||20120131123400-  
0500|||F|||^Parent^Mama

OBX|1|CE|73739-5^Newborn hearing screen reason not performed -left^LN|1|103709008^Attempted but unsuccessful -

technical fail^SCT|||A|||F|||20120131123500-0500|||LA10389-7^OAE^LN|Maico-EroScan|20120131123500-0500|||Hospital^^^^MDCH^^^^|123 South Street^^Lansing^MI^48917^USA|1001001^Smith^Theodore^^^Dr^^^OPH^^^^NPI





## Appendix B: Background and General HL7 Information

### HL7 Messaging Infrastructure

This section will contain a basic description of the terms and definitions which are used in this document in order to understand the Health Level 7 standard. More detail may be found in the HL7 2.5.1 standard in Chapters 2, 2A and 2B.

#### HL7 Definitions

This section contains the definitions that are used to compose an HL7 message.

**Message:** A message is the entire unit of data transferred between systems in a single transmission. It is made up of segments arranged in a particular order. Refer to Chapter 5 for the full message structure.

This is the message structure utilized in this Implementation Guide.

Table 39 - Message Segments

Segment	Description
MSH ...	Message Header
SFT ...	Software Segment – information about the system that generated the message
PID ...	Patient Information
NK1 ...	Next of Kin Information
PV1 ...	Patient Visit Information
OBR ...	Newborn Screening Panel and Left ear panel and/or Right ear panel
OBX ...	Data for each hearing screen

**Segment:** A segment is a logical grouping of data fields. Segments 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.

**Segment ID:** 3 character code that identifies the segment. Example: MSH for Message Header

**Field:** A field 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

**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:** The unit that is used to construct or restrict the contents of the data field. They are 2 or 3 letter codes. Table 45 - Data Types contains all data types used in this IG. Please refer to the data types chapter in the base 2.5.1 standard for all data type definitions.

**Item number:** Each field is assigned a unique item number. Fields that are used in more than one segment will retain their unique item number across segments.

**Null and empty fields:** The null value is transmitted as two double quote marks (""") between delimiters. A null-valued field differs from an empty field. An empty field should not overwrite previously entered data in the field,

while the null value means that any previous value in this field should be overwritten.

Table 40 - Value in Field

Value in Field	Meaning
""	Nullify the value recorded in the receiving system data base.
""	
<empty field>	Make no changes to the record in the receiving data base. The sending system has no information on this field.

**Code Sets/Systems:** 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. Messages used in this guide shall use the following delimiters:

<CR> = Segment Terminator;

| = Field Separator;

^ = Component Separator;

& = Sub-Component Separator;

~ = Repetition Separator;

\ = Escape Character.

**Message syntax:** Each message is defined in special notation that lists the segment 3-letter identifiers in the order they will appear in the message. Braces, {}, indicate that one or more of the enclosed group of segments may repeat, and brackets, [], indicate that the enclosed group of segments is optional. Note that segments may be nested within the braces and brackets. This will indicate that the nested segments are units within a subgroup of segments. Their usage is relative to the parent segment in the group.

## Basic Message Construction Rules

### Encoding Rules for Sending

Encode each segment in the order specified in the abstract message format. MSH must be the first segment. OBX segments must immediately follow the corresponding OBR.

1. Place the Segment ID first in the segment.
2. Precede each data field with the field separator.
3. Encode the data fields in the order and data type specified in the segment definition table.
4. End each segment with the segment terminator.
5. Components, subcomponents, or repetitions that are not valued at the end of a field need not be represented by component separators.

6. Components, subcomponents, or repetitions that are not valued, but precede components, subcomponents or repetitions that are valued must be represented by appropriate separators.
7. If a field allows repetition (Cardinality maximum > 1), then the length of the field applies to EACH repetition.

**Encoding Rules for Receiving**

1. If a data segment that is expected is not included, treat it as an error.
2. If a data segment is included that is not expected, ignore it; this is not an error.
3. If data fields are found at the end of a data segment that are not expected, ignore them; this is not an error.

**Implications of the Encoding Rules**

The approach for this HL7 version is so that it can act as a base that other implementation guides can use by either:

1. Extending this standard by adding additional supported segments and/or fields
- OR**
2. Constraining this standard by explicitly excluding segments, fields, and/or code values.

In this spirit, segment types other than MSH, PID, PV1, OBR and OBX may be included but are not supported and therefore may be ignored by the receiver implementing this implementation guide.

If a field is an encoded value and the code value for that field is not recognized or cannot be processed by the receiver, then if that field is optional, the receiver should ignore the value. If the field is required but the segment that the field is in is an optional segment, then the receiver should ignore the entire segment. So, if the field is a required field in a required segment and the code is invalid then the entire message should be rejected.

This implementation guide also endeavors to specify coded values as those associated with a specific value set rather than explicitly enumerating the values in use at this time. It is possible that over time the codes for a given value set may add values that the receiver cannot process. That could be because the code is in fact invalid, because the current value set used by the receiver is out of date, or because the code value is one that they receiver is not prepared to process. In any of these cases the encoded field error should be treated as described above. Thus it is worth noting that a message can validly be rejected by a receiver even though the message itself is technically valid. Such a rejection just indicates that this specific exchange cannot be performed.

**Table 41 - Usage Code Interpretations for Fields, Components and Sub-Components**

Usage Code	Interpretation	Comment
R	Required	A conforming sending application shall populate all “R” elements with a non-empty value. Conforming receiving application shall process or ignore the information conveyed by required elements. A conforming receiving application must not raise an error due to the presence of a required element, but SHALL raise an error due to the absence of a required element.

Usage Code	Interpretation	Comment
RE	Required but may be empty	<p>The element may be missing from the message, but must be sent by the sending application if there is relevant data.</p> <p>A conforming sending application must be capable of providing all "RE" elements. If the conforming sending application knows the required values for the element, then it must send that element. If the conforming sending application does not know the required values, then that element will be omitted.</p> <p>Receiving applications will be expected to process or ignore data contained in the element, but must be able to successfully process the message if the element is omitted (no error message should be generated because the element is missing).</p>
C	Conditional	<p>This usage has an associated condition predicate. This predicate is an attribute within the message.</p> <p>If the predicate is satisfied:                      A conformant sending application must always send the element. A conformant receiving application must process or ignore data in the element. It may raise an error if the element is not present. If the predicate is NOT satisfied:                      A conformant sending application must NOT send the element. A conformant receiving application must NOT raise an error if the condition predicate is false and the element is not present, though it may raise an error if the element IS present.</p>
CE	Conditional but may be empty	<p>This usage has an associated condition predicate. This predicate is an attribute within the message. If the predicate is satisfied: If the conforming sending application knows the required values for the element, then the application must send the element.</p> <p>If the conforming sending application does not know the values required for this element, then the element shall be omitted. The conforming sending application must be capable of knowing the element (when the predicate is true) for all 'CE' elements.</p> <p>If the element is present, the conformant receiving application shall process or ignore the values of that element. If the element is not present, the conformant receiving application shall not raise an error due to the presence or absence of the element.</p> <p>If the predicate is not satisfied:                      The conformant sending application shall not populate the element. The conformant receiving application may raise an application error if the element is present.</p>
O	Optional	<p>This element may be present if specified in local profile. Local partners may develop profiles that support use of this element. In the absence of a profile, conformant sending applications will not send the element.</p> <p>Conformant receiving applications will ignore the element if it is sent, unless local profile specifies otherwise. Conformant receiving applications may not raise an error if it receives an unexpected optional element.</p>

Usage Code	Interpretation	Comment
X	Not Supported	The element is not supported. Sending applications should not send this element. Receiving applications should ignore this element if present. A receiving application SHALL raise an error if it receives an unsupported element. Any profile based on this guide should not specify use of an element that is not supported in this guide.

Table 42 - Usage Code Interpretation for Segments

Usage Code	Interpretation	Comment
R	Required	A conforming sending application shall include all “R” segments. A conforming receiving application must process all required segments. It should raise an error due to the absence of a required segment.
RE	Required but may be empty	The segment may be missing from the message, but must be sent by the sending application if there is relevant data. A conforming sending application must be capable of providing all "RE" segments. If the conforming sending application has data for the required segment, then it must send that segment. Receiving applications will be expected to process the data contained in the segment. It must be able to successfully process the message if the segment is omitted (no error message should be generated because the segment is missing).
O	Optional	This segment may be present if specified in a local profile. Local partners may develop profiles that support use of this segment. In the absence of a profile, conforming sending applications will not send the element. Conforming receiving applications will ignore the element if it is sent, unless local profile specifies otherwise.
X	Not Supported	The segment is not supported. Sending applications should not send this element. Receiving applications should ignore this element if present. Any profile based on this guide should not specify use of an element that is not supported in this guide.

### Message Attributes Common to All Messages

The following table describes the various attributes used by this guide to document message structure attributes. These terms will be used in the tables defining message profiles throughout this guide.

Table 43 - Message Attributes

Attribute	Description
-----------	-------------

Attribute	Description
Segment	Three-character code for the segment and the abstract syntax (i.e., the square and curly braces) [ XXX ] Optional { XXX } Repeating XXX Required (not inside any braces) [{ XXX }] Optional and Repeating [ XXX [YYY] ] YYY is nested within the segment block starting with XXX. It is an optional sub-segment to XXX . The whole block is optional. Note: for Segment Groups there will not be a segment code present, but the square and curly braces will still be present.
Name	Name of the Segment or Segment group element.
Usage	Usage of the segment. Indicates if the segment is required, optional, or not supported in a message. See table with Usage Code Interpretation above.
Cardinality	Indicator of the minimum and maximum number of times the element may appear. [0..0] Element never present. [0..1] Element may be omitted and it can have at most, one occurrence. [1..1] Element must have exactly one Occurrence. [0..n] Element may be omitted or may repeat up to n times. [1..n] Element must appear at least once, and may repeat up to n times. [0..*] Element may be omitted or repeat for an unlimited number of times. [1..*] Element must appear at least once, and may repeat unlimited number of times. [m..n] Element must appear at least m and, at most, n times.

### Segment Attributes Common to All Segments

The abbreviated terms and their definitions, as used in the segment table headings are as follows:

Table 44 - Segment Attributes

Abbreviation	Description
Seq	Sequence of the elements (fields) as they are numbered in the segment
Len	Recommended maximum length of the element. Lengths are provided only for primitive data types. Lengths should be considered recommendations, not absolutes. The receiver may truncate fields, components, and sub-components longer than the recommended length. The receiver should not fail to process a message simply because fields, components, or sub-components are too long.
Data Type	Data type used for HL7 element. Data type specifications can be found in Chapter 4.
Usage	Indicates whether the field is supported in this guide. Indicates if the field, component, or subcomponent is required, optional, or conditional in the corresponding segment, field, or component. See Usage Code Interpretation, above. <b>Note:</b> A required field in an optional segment does not mean the segment must be present in the message. It means that if the segment is present, the required fields within that segment must be populated. The same applies to required components of optional fields. If the field is populated, then the required component must be populated. The same applies to required sub-components of optional components. If a component is populated, the required sub-components of that component must also be populated.

Abbreviation	Description
Cardinality	Indicator of the minimum and maximum number of times the element may appear. [0..0] Element never present. [0..1] Element may be omitted and can have at most, one occurrence. [1..1] Element must have exactly one occurrence. [0..n] Element may be omitted or may repeat up to n times. [1..n] Element must appear at least once, and may repeat up to n times. [0..*] Element may be omitted or repeat for an unlimited number of times. [1..*] Element must appear at least once, and may repeat unlimited number of times. [m..n] Element must appear at least m and, at most, n times.
Item #	Unique item identifier in HL7
HL7 Element Name	HL7 descriptor of the element in the segment.
Comment	Lists any constraints imposed and other comments in this guide

### About Data Types

Data types are the foundation of successful interoperability. In each message, a field, component or sub-component has a data type. When systems communicate between each other, agreement on the data type for each component ensures good communication. This implementation guide uses the standard V2.5.1 definitions for the data types. See the HL7 standard for full details on the data types in this implementation guide.

### Data Types Used in ORU^R01

The following is a list of data types used in the ORU^R01 message for EHD.

Table 45 - Data Types

Data type	Data Type Name	Segment Location
CE	Coded with Exceptions	MSH 19, PID 10, PID 15, PID 22, NK1-3, OBR 4, OBR 39, OBX 3, OBX5, OBX 6, OBX 17, OBX20, ERR 3
CX	Extended Composite ID with Check Digit	PID 3, PID 18, PID 21
TS	Date/Time	MSH 7, PID 7, PID 33, OBR 7, OBR 22, OBX 14, OBX 19
EI	Entity Identifier	OBR 2, OBR 3, OBX 18
ERL	Error Location	ERR 2
FN	Family Name	PID 5, PID 6, OBR 10, OBR 16, OBR 28, OBX 25
HD	Hierarchic Designator	MSH 3, MSH 4, MSH 5, MSH 6, PID 34
ID	Coded Values for HL7 Tables	MSH 15, MSH 16, MSH 17, MSA 1, ERR 4, PID 24, OBR 25, OBX 2, OBX 11
IS	Coded value for User-Defined Tables	PID 8, PV1-2, OBX 8
MSG	Message Type	MSH 9
NM	Numeric	PID 25, OBX 2, OBX 5
PL	Person Location	PV1-3
PT	Processing Type	MSH 11
SAD	Street Address	In the XAD data type, which is part of PID 11, NK1-4, OBX 24
SI	Sequence ID	PID 1, NK1-1, OBR 1, OBX 1
ST	String	MSH 1, MSH 2, MSH 10, PID 23, OBX 4, OBX 7, MSA 2,
TX	Text Data	OBX 5, ERR 7, ERR 8
Var	Variable	OBX 5

Data type	Data Type Name	Segment Location
VID	Version Identifier	MSH 12
XAD	Extended Address	PID 11, NK1-4, OBX 24
XCN	Extended Composite ID Number and Name	PV1-7, OBR 10, OBR 16, OBR 28, OBX 25
XON	Extended Composite Name and ID Number for Organizations	OBX 23
XPN	Extended Person Name	PID 5, PID 6, NK1-2
XTN	Extended telecommunications number	PID 13, NK1-5, OBR 17, ERR 12



### Appendix C: Error Conditions and Related Codes

ERR-3	ERR-5	Err-8	Error Condition	Likely Causes	Reference	MSA-1

## Appendix D: Revision History

Version	Date	Author	Comments
0.1	11/17/2014	J. Shaw	Initial Draft
0.2	11/24/2014	J. Shaw	Updates based on EHDI requirements
0.3	1/26/2015	J. Shaw	Updates
0.4	2/23/2015	J. Shaw	Updates from team review. Only major changes were OB-5 to R and [1..1] as well as PID-7 to [1..1]. All other changes were minor typos.

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