

# Implementation Guide

HL7 Specifications for  
Laboratory  
Observation Reporting  
(ORU Messages)

October 12, 2011

Version 1.3

# HHIC LABORATORY INFORMATION AHRQ PROJECT

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## INTRODUCTION

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This document serves as a functional specification and technical requirements for integrating key lab results with Hawaii Health Information Corporation's (HHIC) inpatient database via Health Level 7 (HL7). We request a library of 32 laboratory tests and their respective LOINC codes be transmitted from each of our prospective ELR (Electronic Laboratory Reporting) providers.

HHIC uses these results of the key lab tests to enhance the content of their existing statewide, all-payer hospital discharge database by adding key hospitalization-related laboratory results. The enhanced data set will be used to improve the predictive methodology use to measure key patient outcomes, such as inpatient mortality.<sup>1</sup>

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<sup>1</sup>This effort is supported by CER funding received from The Agency for Healthcare Research and Quality (AHRQ). Todd Seto, MD, from The Queen's Medical Center is the Primary Investigator and will direct the comparative effectiveness research component of the research. Jill Miyamura, PhD, HHIC, is Co-Principal Investigator. HHIC's role is to demonstrate the feasibility of enhancing inpatient all-payer data with clinical (laboratory) data to support the purpose of comparative effectiveness research. More information on the grant, its aims and methodology can be found at <http://www.hcup-us.ahrq.gov/datainnovations.jsp>.<sup>1</sup>

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## GENERAL SPECIFICATIONS

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The instructions and specification contained in the *Implementation Guide- HL7 Specifications for Laboratory Observation Reporting (ORU Messages)* are applicable to participating HHIC institutions submitting data to HHIC, effective with discharges of January, 2008.

Hospitalization-related (**Inpatient**) laboratory results should be obtained from laboratory hospital’s clinical laboratory system/laboratory information system. Observed test results (e.g., finger stick) and other test results from glucometers, chemsticks, etc. should not be submitted. Submit test results specific to that laboratory test only. As an example, for the test of hemoglobin, do not submit a hemoglobin value that was reported as part of an arterial blood gas test result.

### Units of Measure

Each laboratory test has a unique test code that represents both the laboratory test and the unit of measure. For example, the laboratory test lists Glucose with mg/dL as the unit of measurement. The laboratory test codes were designed to accept the submission of the units of measure used specified in the LOINC system. Please consult with the clinical laboratory system/laboratory information system personnel at your facility if you have questions regarding the laboratory units of measures outlined on page 10, Table 1.

### Corrected Values

When two results are available for the same date and time the laboratory specimen was collected and one is labeled “corrected,”submit the final corrected test result.

### Data Submission Schedule

Lab will be submitted to HHIC as follows:

Data Due at HHIC	File
July 1, 2011	50 test messages per hospital
September 1, 2011	1 <sup>st</sup> Quarter 2008
October - December, 2011	2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> Quarter 2008 data (HHIC will provide a detailed schedule by October, 2011)
2012 schedule	To be established by November, 2011

### Data File Description

The file will be submitted in batch on a quarterly basis (at the beginning—and will move to a more frequent schedule as defined at a later time).

Each submission should include a summary document with the following information: hospital name/ID, time frame of messages submitted, number of messages sent in the batch.

Separate batch files should be submitted for each hospital.

### **Transmission Options**

Data will be transmitted to HHIC in one of the following ways:

1. Secure File Transfer Protocol (SFTP)
2. VPN

HHIC will collaborate with each provider to determine the best method.

## LAB DATA SET

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The lab data set includes the specified laboratory data of all inpatient admissions for the specified time period. Generally, data elements specified in the Implementation Manual follow HL7 standards.

The ORU message segments that HHIC requires follows: MSH, PID, PV1, OBR, OBX, NTE. The required message segments, associated fields, and key demographic data are listed on the following pages.

## List of All Data Elements

The demographic fields to be sent in specific segments are listed in the table below. The specific ORU required segments (and fields) follow.

NAME	Message location	HL7 DT	Length
*Account number	<u>PID-18</u>	CX	250
*Admission Date	PV1-44	TS	26
*Discharge Date	PV1 -45	TS	26
*Date of birth	<u>PID-7</u>	TS	26
*Facility Name	<u>MSH-4</u>	HD	227
Gender	<u>PID-8</u>	IS	1
Hospital ID	TBD	HD	6
Hospital Test (order)	<u>OBR-4</u>	CE	250
Hospital Test (result - LOINC)	<u>OBX-3</u>	CE	250
Medical Record Number	<u>PID-3</u>	CX	250
Ordering Physician (Last, First, MI)	<u>OBR-16</u>	XCN	250
*Patient Name (Last, First, MI)	<u>PID-5</u>	XPN	250
Physician NPI	<u>OBR-16</u>	XCN	250
*Social Security Number	<u>PID-19</u>	ST	19

\*for linking lab file to HHIC patient files

### MSH Segment

Seq	NAME	HHIC Use	Type	R/O	LEN
1	Field Separator	" "	ST	R	1
2	Encoding Characters	^~\&	ST	R	4
3	Sending Application	LIS e.g. "SENDER_GenericLABSYSTEM-LIS"	HD	R	227
4	Sending Facility	The sender of the message information, hospital name. hospital name^ CLIA code^CLIA YourHospital-Honolulu^45D3456781^CLIA	HD	R	227
5	Receiving Application	CLH, DLS or Hospital name	HD	R	227
6	Receiving Facility	The brief provider organization name assigned when the provider first registers with the lab	HD	R	227
7	Date/Time Of Message	20110602161633 YYYYMMDDHHMM[SS]	TS	R	26
9	Message Type	ORU^R01	MSG	R	7
10	Message Control Id	The sending system must assign an identifier for the message that is unique within the namespace of the sending facility	ST	R	50
11	Processing ID	P	PT	R	3
12	Version ID	2.3	VID	R	60

### PID Segment

Seq	NAME	HHIC Use	Type	R/O	LEN
3	Patient ID	Medical Record Number	ST	R	250
5	Patient Name	Last^First^Middle	XPN	R	250
7	Date/Time Of Birth	YYYYMMDD	TS	RE	26
8	Sex	F, M, or U	IS	R	1
18	Patient Account Number	Patient Account Number	ST	R	250
19	SSN - Patient	Sent if available	ST	RE	16

### PV1 Segment

SEQ	NAME	HHIC Use	TYPE	R/O	LEN
2	Patient Class	E (Emergency Department visits), I (Inpatient Admission), O (Outpatient)	IS	R	1
44	Admission Date/Time	Date and time of the patient presentation.	TS	RE	26
45	Discharge Date/Time	Date and time of the patient discharge.	TS	RE	26

### Common Order (ORC) Segment

Used to transmit fields that are common to all orders. The ORC is NOT a required segment for HHIC.

### OBR Segment

Seq	NAME	HHIC Use	Type	R/O	LEN
3	Filler Order Number	LIS order number = internal access number	EI	R	50
4	Universal Service Identifier	Ordered test code ^^^[lab order code]^[description]	CE	R	250
7	Observation Date/Time	YYYYMMDDHHMMSS	TS	R	26
16	Ordering Provider	1434567516^LASTNAME^PHYSICIANFIRST [PhysicianIDNPI]^[PhysicianLast]^[PhysicianFirst]	XCN	R	250
22	Results Rpt/Status Chng - Date/Time	“activity end date/time”	TS	R	26
25	Result status	Only “F”	ID	R	1



**OBX Segment**(See next page for “Summary of Required Lab Tests and LOINC”)

Seq	NAME	HHIC Use	TYPE	R/O	LEN
3	Observation Identifier	Local RESULT code^LOINC 4544-3^Hematocrit^LN^HCT^Hematocrit^LAB Result code^test description  LOINC Code^LOINC description^LN^local code^local description^L	CE	R	250
4	Observation sub-ID	0	ST	R	20
5	Observation value	Result Example 1 - Hepatitis A IgM test was positive OBX 1 CE 5182-1^Hepatitis A Virus IgM Serum Antibody EIA^LN  G-A200^Positive^SNM   Example 2 - antimicrobial susceptibility testing OBX 1 SN 7059-9^Vancomycin Susceptibility, Gradient Strip^LN  <^1	*	C	9999
6	Units	Unit of measure	CE	RE	250
7	Reference ranges	Upper and lower limit	ST	RE	60
8	Abnormal flags	Result value - S, I, or R, and should be provided in addition to the numeric value in OBX-5 When findings other than susceptibility results are sent, the abnormal flag should be valued (e.g., "H", "N", or "A")	IS	RE	5
11	Observation Result Status	F= completed. Correct and final results	ID	R	1

**NTE Segment**

Seq	NAME	HHIC Use	TYPE	R/O	LEN
1	Set ID	NTE	SI	O	4
2	Source of Comment	Used when source of comment must be identified	ID	X	8
3	Comment	Comment	FT	RE	65536
4	Comment Type		CE	O	250

**Table 1. Summary of REQUIRED Laboratory Tests and LOINC**

	Lab Test	Lab Test Name	LOINC	Units	LOINC SHORTNAME
Chemistry	Albumin	Albumin	1751-7	g/dL	Albumin SerPI-mCnc
	Alkaline phosphatase	Alkaline phosphatase	6768-6	U/L;units/L	ALP SerPI-cCnc
	Blood urea nitrogen (BUN)	Urea nitrogen	3094-0	mg/dL	BUN SerPI-mCnc
	Bilirubin (total)	Bilirubin	1975-2	mg/dL	Bilirub SerPI-mCnc
	Calcium	Calcium	17861-6	mg/dL	Calcium SerPI-mCnc
	Chloride	Chloride	2075-0	mmol/L	Chloride SerPI-sCnc
	Creatine kinase-MB	Creatine kinase.MB	13969-1	ng/mL; ug/L	CK MB SerPI-mCnc
	Creatinine	Creatinine	2160-0	mg/dL	Creat SerPI-mCnc
	Glucose	Glucose	2345-7	mg/dL	Glucose SerPI-mCnc
	Gamma glutamyl transferase	Gamma glutamyl transferase	2324-2	U/L;units/L	GGT SerPI-cCnc
	Potassium	Potassium	2823-3	mmol/L	Potassium SerPI-sCnc
	Phosphate	Phosphate	2777-1	mg/dL	Phosphate SerPI-mCnc
	BNP	Natriuretic peptide.B	30934-4	pg/mL	BNP SerPI-mCnc
	Sodium	Sodium	2951-2	mmol/L	Sodium SerPI-sCnc
	Troponin I	Troponin I.cardiac	10839-9	ug/L;ng/mL	Troponin I SerPI-mCnc
	SGOT	Aspartate aminotransferase	1920-8	U/L;units/L	AST SerPI-cCnc
SGPT	Alanine aminotransferase	1742-6	U/L;units/L	ALT SerPI-cCnc	
Blood Gas	pO2	Oxygen	2703-7	mm Hg	pO2 BldA
	pCO2	Carbon dioxide	2019-8	mm Hg	pCO2 BldA
	pH(arterial)	pH	2744-1		pH BldA
	Base excess	Base excess	1925-7	mmol/L	Base excess BldA-sCnc
	Bicarbonate	Bicarbonate	1960-4	mmol/L	HCO3 BldA-sCnc
Hematology	Hemoglobin	Hemoglobin	718-7	g/dL	Hgb Bld-mCnc
	Hematocrit	Hematocrit	4544-3	L/L;%	Hct Fr Bld Auto
	Partial thromboplastin time (PTT)	Coagulation surface induced	14979-9	Sec	aPTT Time PPP
	Prothrombin time (PT)	Coagulation tissue factor induced	5902-2	Sec	PT Time PPP
	INR	Coagulation tissue factor induced.INR	34714-6	INR(POC)	INR PPP
	Platelet count	Platelets	777-3	10^9/L	Platelet # Bld Auto
	White blood count (WBC)	Leukocytes	6690-2	10*3/uL	WBC # Bld Auto
Microbiology	Blood culture		600-7		
	Urine culture		630-4		
	Sputum culture		6460-0		

## APPENDIX A: THE HEALTH LEVEL SEVEN (HL7) STANDARD

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The ANSI HL7 standard is widely used for data exchange in the health care industry, and is quite lengthy, covering a variety of situations in patient care and health care finance. This document covers the subset of HL7 that will be used for LIS (laboratory information system) records received by **HHIC** from outside systems.

The basic unit transmitted in an HL7 implementation is the **message**. Messages are made up of several **segments**, each of which is one line of text, beginning with a three-letter code identifying the segment type. Segments are in turn made up of several **fields** separated by a delimiter character, “|”. Below is an example LAB accession in HL7 2.3 format.

In this example, a message consisting of seven segments (MSH, PID, PV1, ORC, OBR, and OBX [0 thru 1]) is being sent to HHIC from a LAB database.

```
MSH|^~\&|YourHL7System|YourHIFACILITY |X| HHIC Database
|20110329082006||ORU^R01|201103290820062979|T|2.3
PID||55555^182P478_367903|15161516;1^^^1|55555^LAB^1|TEST^EMR^SAMPLE||1965101
5|F|||||IB873749|45879|123456789|H
PV1||O|XOP^^^LAB|||16626|16626^TEST^PHYSICIAN|||||OP|182P478_367903560475_10
1_1|||||20110329000000
ORC|RE||E2908978T8191219L1143|||||16626^TEST^PHYSICIAN^LABT02|LAB
OBR|1|20110329082006|201103290820062979|ABC^Automated Bld
Cnt||20110329045100|||||20110329081100||16626^TEST^PHYSICIAN^LABT02|||T8191|2
19L1143^0|||H|F|^R
OBX|0|NM|6690-2^Leukocytes^LN^WBC^WBC^LAB|0|11.8|10(9)/L|3.8-
11.2|H|||F||20110329081700|12D0664165^LAB-HMCW\91-2135 Fort Weaver Road, #
300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
OBX|1|NM|^LN^RBC^RBC^LAB|0|3.01|10(12)/L|3.9-
5.2|L|||F||20110329081700|12D0664165^LAB-HMCW\91-2135 Fort Weaver Road, #
300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
```

In the above example, the Message Header segment (**MSH**) carries the owner of the information being sent (**YourHIFACILITY**) and receiver (**HHIC Database**) and identifies the message as being of type **ORU**, Unsolicited Observation Result.

The Patient Identification segment (**PID**) carries the client’s name (EMR TEST), birth date (19651015, in YYYYMMDD format), and other identifying fields.

**PV1** carries the Patient Visit information, **ORC** carries Common Order information from the referring physician, **OBR** carries the observation request (e.g. perform biopsy), and several **OBX** segments carry the **LAB** laboratory observations, including clinical indications, gross description, and the diagnosis provided by the **LAB physician** or pathologist.

**LAB** will provide HL7 messages to communicate with **HHIC**. These files will be transmitted to the interface engine hosted at **HHIC**. Each HL7 file will contain one HL7 message that includes data for oneLAB accession.

HL7 does not require the use of a particular coding system to identify either the observation or the result. In the past, users tended to use their own unique code systems for identifying tests and other clinical observations because standard codes were not available. Such local code systems suffice for transmitting information within single institutions, but present high barriers to aggregating data from many sources for research or for public health record

systems. Standard code systems such as LOINC® now exist for many of these purposes, and we strongly encourage their use in reporting. Standard codes (LOINC) can be sent as the only code in the OBX-3 field, or they can be sent along with the local code (your local lab code) as the second code system represented in that field (See OBX segment).

## APPENDIX B: MESSAGE SEGMENTS: FIELD SPECIFICATIONS AND USAGE

### HL7 Segment Structure

Each segment consists of several fields, separated by the field separator character, “|”. The table below defines how each segment (described on pages 7-17) is structured.

Field/ Column	Description
SEQ	The ordinal position of the field in the segment. Since HHIC does not use all possible fields in the HL7 standard, these are not always consecutive.
NAME	HL7 element name for the field.
HHIC Use	Short explanation of the use of this field.
TYPE	HL7 data type of the field. See Appendix K for definition of HL7 data types.
R/O	Refers to if a field is required or optional. R means required for HL7 message for LAB. RE means indicated, required, but message will not be rejected if not present. C means conditional (Conditional on the trigger event or on some other field(s)). (See Appendix L)
LEN	Maximum length of the field

**HL7 data types:** Each field in the HL7 message has an HL7 data type. Appendix K of this document lists and defines the HL7 data types needed by HHIC. The elemental data types Numeric (NM) and String (ST) consist of one value, while some data types, such as Patient Name are composites.

**Delimiter characters:** Field values of composite data types consist of several components separated by the **component separator**, “^”. When components are further divided into sub-components, these are separated by the **sub-component separator**, “&”. Some fields are defined to permit repetitions separated by the **repetition character**, “~”. When these special characters need to be included within text data, their special interpretations are prevented by preceding them with the **escape character**, “\”.

## APPENDIX C: MSH SEGMENT

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

SEQ	NAME	HHIC Use	Type	R/O	LEN
1	Field Separator	“ ”	ST	R	1
2	Encoding Characters	^~\&	ST	R	4
3	Sending Application	LIS e.g. “SENDER_GenericLABSYSTEM-LIS”	HD	R	227
4	Sending Facility	The sender of the message information, hospital name. hospital name^ CLIA code^CLIA YourHospital-Honolulu^45D3456781^CLIA	HD	R	227
5	Receiving Application	CLH, DLS or Hospital name	HD	R	227
6	Receiving Facility	The brief provider organization name assigned when the provider first registers with the lab	HD	R	227
7	Date/Time Of Message	20110602161633 YYYYMMDDHHMM[SS]	TS	R	26
9	Message Type	ORU^R01	MSG	R	7
10	Message Control Id	The sending system must assign an identifier for the message that is unique within the namespace of the sending facility	ST	R	50
11	Processing ID	P	PT	R	3
12	Version ID	2.3	VID	R	60

### Notes:

- MSH-1 Determines the field separator in effect for this message. Requires the HL7 recommended field separator of “|”.
- MSH-2 Determines the component separator, repetition separator, escape character, and sub-component separator in effect for the rest of this message. **HHIC** requires the HL7 recommended values of ^~\&.

Definition: Four characters in the following order:

- Component separator ‘^’ ASCII (94)
- Repetition Separator ‘~’ ASCII (126)
- Escape character ‘\’ ASCII (92)

### Subcomponent separator '&' ASCII (38)

- MSH-3 Name of the sending application. When sending, LAB will use their LAB Information System identifier.
- MSH-4 Identifies the sender (the owner of the message information). When sending, LAB will use "Hospital Name."
- MSH-5 Name of the RECEIVING application. Regional or hospital lab that is processing the order.
- MSH-6 Identifies the message receiver. This field identifies the organization responsible for the operations of the receiving application.
- MSH-7 Date and time the message was created. This includes the time zone. See the TS data type.YYYY[MM[DD[HHMM[SS[.S[S[S[S]]]]]]]]][+/-ZZZZ] is the HL7 format for the Time Stamp. Z is the time zone offset. Send values only as far as needed. When a system has only a partial date, e.g., month and year, but not day, the missing values may be interpreted as zeros. The time zone is assumed to be that of the sender.
- Example: 20110526132010-0800 - May 26<sup>th</sup>, 2011, 13:20:10, Pacific Time.
- MSH-9 Two components give the HL7 message type/HL7 triggering event. For outbound results (to HHIC) this field should be "ORU^R01", where ORU is the message ID for Observation Result / Unsolicited and R01 is an Unsolicited Transmission.
- MSH-10 The message control ID is a string (which may be a number) uniquely identifying the message among all those ever sent by the sending system. LAB will use "xxauniquevalue." CCYYMMDDnnnnnnnn may be used, (or DDD - Julian date instead of MMDD) and nnnnnnn is the sequence number for that day. Calendar Date: CCYYMMDD with CC = century, YY = last 2 digits of year, and valid ranges of month = 01 through 12 and day = 01 through 31.
- MSH-11 The processing ID to be used by LAB is P for production. T = Training / testing.
- MSH-12 -- "2.3" to indicate HL7 Version 2.3.

**NOTE:** We have used 2.3 as the default version. 2.3 or higher may be sent, up to 2.5.1.

## APPENDIX D: PID SEGMENT

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

SEQ	NAME	HHIC Use	TYPE	R/O	LEN
3	Patient ID	Medical Record Number	CX	R	250
5	Patient Name	Last^First^Middle	XPN	R	250
7	Date/Time Of Birth	YYYYMMDD	TS	RE	26
8	Sex	F, M, or U	IS	R	1
18	Patient Account Number	Patient Account Number	CX	R	250
19	SSN - Patient	Sent if available	ST	RE	16

### Notes:

**PID-3** The unique medical record number of the patient’s chart within the system. Patient’s unique identifier(s) from the facility.

**PID-5** Example:

Doe^Mary^A [PatientLastName]^[PatientFirstName]  
^[PatientMiddleName]. Last name and first name are required.

**PID-7** Give the year, month, and day of birth (YYYYMMDD). **LAB may ignore any time component in the birth date.** Time stamp (TS) data type must be in the format: YYYY[MM[DD[HHMM[SS[.S[S[S[S]]]]]]]] [ ]. The user values the field only as far as needed. When a system has only a partial date, e.g., month and year, but not day, the missing values may be interpreted as zeros. The time zone is assumed to be that of the sender.

**PID-8** Use F, M, or U (F = Female, M = Male, U = Unknown)

**PID-18** This field is required and must contain an account number. Definition: This field contains the patient account number assigned by accounting to which all charges, payments, etc., are recorded. The entire number including the check digit will be considered the patient account number.

**PID-19** Sent only if stored in lab system.



## APPENDIX E: PV1 SEGMENT

The PV1 (Patient Visit Segment Definition) segment is used by Registration/Patient Administration applications to communicate information on a visit-specific basis.

SEQ	NAME	HHIC Use	TYPE	R/O	LEN
2	Patient Class	E (Emergency Department visits), I (Inpatient Admission), O (Outpatient)	IS	R	1
44	Admission Date/Time	Date and time of the patient presentation.	TS	RE	26
45	Discharge Date/Time	Date and time of the patient discharge.	TS	RE	26

**Notes:**

- PV1-2 Patient Class does not have a consistent industry-wide definition and is subject to site-specific variations. Patient Class = E (Emergency Department visits) or I (Inpatient Admission), or O (Outpatient). Literal values: “E”, “I” or “O”.
- PV1-44 YYYYYMDDHHMM[SS[.S[S[S[S]]]]] [+/-ZZZZ]. Date and time patient arrived for services.
- PV1-45 YYYYYMDDHHMM[SS[.S[S[S[S]]]]] [+/-ZZZZ] - Date and time patient was discharged from facility, as known/recorded/available.

## APPENDIX F: COMMON ORDER (ORC) SEGMENT

Used to transmit fields that are common to all orders. The ORC is NOT a required segment by HHIC.

## APPENDIX G: OBR SEGMENT

The Observation Request Segment carries general information about the sample, test, or result. For laboratory-based reporting, the OBR defines the attributes of the original request for laboratory testing. Essentially, the OBR describes a battery or panel of tests that is being requested or reported. The OBR is similar to a generic lab slip that is filled out when a physician requests a lab test. The individual test names and results for the panel of tests performed are reported in OBX segments, which are described below. As defined by the ORU syntax, there can be many OBXs per OBR, and there can be many OBRs per PID.

Example:

```
OBR|1|20110329082006|201103290820062979|ABC^Automated Bld
Cnt|||20110329045100| || || ||20110329081100| |16626^TEST^PHYSICIAN^LABT02| || ||T81
91|219L1143^0| ||H|F| | ^^^^R
```

SEQ	NAME	HHIC Use	TYPE	R/O	LEN
3	Filler Order Number	LIS order number = internal access number	EI	R	50
4	Universal Service Identifier	Ordered test code ^^^[lab order code]^[description]	CE	R	250
7	Observation Date/Time	YYYYMMDDHHMMSS	TS	R	26
16	Ordering Provider	1434567516^LASTNAME^PHYSICIANFIRST [PhysicianID- NPI]^[PhysicianLastName]^[PhysicianFirstName]	XCN	R	250
22	Results Rpt/Status Chng - Date/Time	“activity end date/time”	TS	R	26
2	Result status	Only “F”	ID	R	1

### Notes:

OBR-3 This is the **LAB (LIS)** internal order number.

Example: PL2010-123456 - [LABAccessionNumber].

### Definition:

It is assigned by the order filler (receiving) application. This string must uniquely identify the order (as specified in the order detail segment) from other orders in a particular filling application (e.g., clinical laboratory). This uniqueness must persist over time.

- OBR-4 This is an element containing the **LAB** case sample procedure type ID and description.
- Components: <identifier (ST)> ^ <text (ST)> ^ <name of coding system (ST)> ^ <alternate identifier (ST)> ^ <alternate text (ST)> ^ <name of alternate coding system (ST)>
- The LOINC is more desirable in the OBX segment, field 3. Panels will have one OBR followed by multiple OBX segments (one for each test in the panel).
- OBR-7 This is the **LAB** collected date, including time and time zone. This field is the clinically relevant date/time of the observation. In the case of observations taken directly from a subject, it is the actual date and time the observation was obtained.
- OBR-16 This is a complex element containing three components related to the ordering physician. **When the provider is assigned a National Provider ID (NPI) the NPI is transmitted as the ID:** 1) NPI or Hospital Physician ID (NPI strongly preferred), 2) last name of referring physician, and 3) first name of referring physician.
- Example: 5551001234^Smith^Bob
- OBR-22 This field is used to indicate the date and time that the results are composed into a report and released to the individual OBX), or that a status, is entered or changed.
- OBR-25 This is the test status and will be “F” for finalized.

#### HL7 Table - Result status (For reference)

Value	Description
O	Order received; specimen not yet received
I	No results available; specimen received, procedure incomplete
S	No results available; procedure scheduled, but not done
A	Some, but not all, results available
P	Preliminary: A verified early result is available, final results not yet obtained
C	Correction to results
R	Results stored; not yet verified
F	Final results; results stored and verified. Can only be changed with a corrected result.
X	No results available; Order canceled.
Y	No order on record for this test. (Used only on queries)
Z	No record of this patient. (Used only on queries)

## APPENDIX H: OBX SEGMENT

The Observation/Result segment is used to transmit the observations of the **LAB**. OBX segments have great flexibility to report information. When properly coded, OBX segments report a large amount of information in a small amount of space. OBX segments within the ORU message are widely used to report laboratory and other clinical information.

There can be many OBX segments identified like OBX|1|, OBX|2|, OBX|3|, OBX|4|, OBX|5|, and OBX|6|, etc.

### Example:

```
OBX|0|NM|6690-2^Leukocytes^LN^WBC^WBC^LAB|0|11.8|10(9)/L|3.8-
11.2|H|||F|||20110329081700|12D0664165^LAB-HMCW\91-2135 Fort Weaver Road, # 300\Ewa
Beach\HI\96706-1929\Glen Doctor, MD
OBX|1|NM|^LN^RBC^RBC^LAB|0|3.01|10(12)/L|3.9-5.2|L|||F|||20110329081700|12D0664165^LAB-
HMCW\91-2135 Fort Weaver Road, # 300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
OBX|2|NM|718-7^Hemoglobin^LN^HGB^Hemoglobin^LAB|0|9.2|g/dL|11.6-
15.1|L|||F|||20110329081700|12D0664165^LAB-HMCW\91-2135 Fort Weaver Road, # 300\Ewa
Beach\HI\96706-1929\Glen Doctor, MD
OBX|3|NM|4544-3^Hematocrit^LN^HCT^Hematocrit^LAB|0|27.2|%|34.1-
44.2|L|||F|||20110329081700|12D0664165^LAB-HMCW\91-2135 Fort Weaver Road, # 300\Ewa
Beach\HI\96706-1929\Glen Doctor, MD
OBX|4|NM|^LN^MCV^MCV^LAB|0|90.3|fL|80-100|||F|||20110329081700|12D0664165^LAB-
HMCW\91-2135 Fort Weaver Road, # 300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
OBX|5|NM|^LN^MCH^MCH^LAB|0|30.4|pg|27-33|||F|||20110329081700|12D0664165^LAB-
HMCW\91-2135 Fort Weaver Road, # 300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
OBX|6|NM|^LN^MCHC^MCHC^LAB|0|33.7|g/dL|32-36|||F|||20110329081700|12D0664165^LAB-
HMCW\91-2135 Fort Weaver Road, # 300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
OBX|7|NM|^LN^RDW^RDW^LAB|0|14.4|%|11-15|||F|||20110329081700|12D0664165^LAB-HMCW\91-
2135 Fort Weaver Road, # 300\Ewa Beach\HI\96706-1929\Glen Doctor, MD
OBX|8|NM|777-3^Platelets^LN^PLTC^Platelet Count^LAB|0|119|10(9)/L|150-
450|L|||F|||20110329081700|12D0664165^LAB-HMCW\91-2135 Fort Weaver Road, # 300\Ewa
Beach\HI\96706-1929\Glen Doctor, MD
```

OBX Segment (continued)

SEQ	NAME	OBX - HHIC Use	TYPE	R/O	LEN
3	Observation Identifier	Local RESULT code^LOINC 4544-3^Hematocrit^LN^HCT^Hematocrit^LAB Result code^test description  LOINC Code^LOINC description^LN^local code^local description^L	CE	R	250
4	Observation sub-ID	0	ST	R	20
5	Observation value	Result Example 1 - Hepatitis A IgM test was positive OBX 1 CE 5182-1^Hepatitis A Virus IgM Serum Antibody EIA^LN  G-A200^Positive^SNM   Example 2 - antimicrobial susceptibility testing OBX 1 SN 7059-9^Vancomycin Susceptibility, Gradient Strip^LN  <^1	*	C	9999
6	Units	Unit of measure	CE	RE	250
7	Reference ranges	Upper and lower limit	ST	RE	60
8	Abnormal flags	Result value - S, I, or R, and should be provided in addition to the numeric value in OBX-5 When findings other than susceptibility results are sent, the abnormal flag should be valued (e.g., "H", "N", or "A")	IS	RE	5
11	Observation Result Status	F= completed. Correct and final results	ID	R	1

OBX Segment (continued)

**Notes:**

OBX-3 <identifier (ST)> ^ <text (ST)> ^ <name of coding system (IS)> ^ <alternate identifier (ST)> ^ <alternate text (ST)> ^ <name of alternate coding system (IS)>

- 3.1 LOINC Code
- 3.2 Text LOINCdescription
- 3.3 Name of Coding System ‘LN’
- 3.4 Alternate Identifier Local code here
- 3.5 Text Local description here
- 3.6 Alternate Coding System “L”

It is strongly recommended that OBX-3 be populated with as specific a LOINC®code as possible to prevent any misinterpretation of reported results.

OBX-4 Used for processing but not mapped

OBX-5 Result value. Example for blood culture

For antimicrobial susceptibility testing, the OBX segment would appear as:

OBX|1|SN|7059-9^Vancomycin Susceptibility, Gradient Strip^LN||<^1|...

where OBX-3 uses a LOINC® code and OBX-5 has a numeric value. The value type listed inOBX-2 determines the structure of the reported result here (i.e., SN). The SN data type has the following structure:

<comparator> ^ <num1(NM)> ^ <separator or suffix> ^ <num2 (NM)>

Some examples of the SN representation are:

- |>^100| Greater than 100
- |^100^-^200| equal to range of 100 through 200
- |^1^:^228| ratio of 1 to 128 (e.g., the results of a serological test)
- |^2^+| categorical response (e.g., an interpretation of occult blood positivity)

For results of a culture that yielded Neisseria meningitides, OBX-2 would be listed as a coded element(CE) and OBX-5 would appear as:

L-22202^Neisseria meningitidis^SNM|

It is strongly recommended that the data types CE and SN be used whenever possible to minimizeambiguity in reporting. In those cases where laboratories have a local code which represents a cannedcomment, the local code can be

placed in OBX5 as a CE data type, and the canned comment can be placed in an NTE directly following the OBX segment.

Example:

```
OBX|1|CE|600-7^Microorganism identified, Blood Culture^LN||^^^SALMPRES^^L|...
NTE|1|L|Numerous colonies of Salmonella were present on culture. A sub-
NTE|2|L|culture was inoculated and sent for further species identification.
```

- OBX-6 Units, for example: |µg/mL^microgram/milliliter^ISO+|
- OBX-7 Reference range. If numeric, the values of this field may report several values in one of the following three formats:
1. lower limit-upper limit when both lower and upper limits are defined, e.g., for potassium "3.5 - 4.5"
  2. > lower limit if no upper limit, e.g., ">10"
  3. < upper limit if no lower limit, e.g., "<15"
- OBX-8 Abnormal flags should be used for reporting microbiology sensitivity data. Abnormal flags for antimicrobial sensitivity reporting should conform to the recommendations of National Committee of Clinical Laboratory Standards (NCCLS, <http://www.nccls.org>). For most reported findings, the allowable values are S, I, or R, and should be provided in addition to the numeric value in OBX-5. For ELR, when findings other than susceptibility results are sent, the abnormal flag should be valued (e.g., "H", "N", or "A") to distinguish between tests that are interpreted as normal and those that are interpreted as abnormal.
- OBX-11 Value Type refers to the content.

## APPENDIX I: NTE Segment

The optional Notes and Comments (NTE) segment is allowed to repeat and may be inserted after any of the OBX segments. The note segment applies to the information in the segment that immediately precedes it, i.e., the observation reported in the preceding OBX segment. The NTE segment can carry any text relevant to the event or the observation and can give its source. The NTE segment is not further defined by HL7.

SEQ	NAME	HHIC Use	TYPE	R/O	LEN
1	Set ID	NTE	SI	O	4
2	Source of Comment	Used when source of comment must be identified	ID	X	8
3	Comment	Comment	FT	RE	65536
4	Comment Type		CE	O	250

**Notes:**

- NTE-1      This field may be used where multiple NTE segments are included in a message. Their numbering must be described in the application message definition
- NTE-2      Used when source of comment must be identified
- NTE-3      Contains the comment contained in the segment
- NTE-3      Contains a value to identify the type of comment text being sent in the specific comment record.



## APPENDIX J: REFERENCES

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See Version 2.3 of the Health Level 7 standard for a full description of all messages, segments, and fields. Information regarding HL7 is at [www.hl7.org](http://www.hl7.org). See ELINCs standards at <http://www.elincs.chcf.org>

IMPACT SIIS 2.0 - Implementation Guide for HL7 Messages & Segments

<http://www.impactportal.info/FileSystem/hl7/4-HL7Guide-ImpactSIIS%20through%202.5%202011.pdf>

## APPENDIX K:SELECTED HL7 Data Types and Segment Sequencing

Data Type	Data Type Name	Data Type	Data Type Name
CE	Coded element	CQ	Composite Quantity with Units
CWE	Coded with Exceptions	CX	Extended Composite Id with Check digit
DT	Date	DTM	Date/Time
EI	Entity Identifier	ERL	Error Location
FC	Financial Class	FN	Family Name
HD	Hierarchic Designator	ID	Coded Values for HL7 Tables
IS	Coded value for User-Defined Tables	LA2	Location with address variation 2
MSG	Message Type	NM	Numeric
PT	Processing Type	SAD	Street Address
SI	Sequence ID	ST	String
SN	Structured Numeric	VID	Version Identifier
TS	Time Stamp	XCN	Extended Composite ID Number and Name for Persons
XAD	Extended Address	XTN	Extended telephone number
XPN	Extended Person Name		

### Segment Sequence and Nesting

The sequence of segments in a message instance is indicated by the sequence of segments in the message-structure specification. Braces, { . . . } surrounding a group of segments indicate one or more repetitions of the enclosed group may occur. Brackets, [ . . . ] surrounding a group of segments indicates that the enclosed group is optional. If a group of segments is optional and may repeat it is enclosed in brackets and braces, [ { . . . } ].

MSH

PID

PV1

ORC

OBR

OBX

OBR

OBX

OBX

NTE

## APPENDIX L: Optionality of Segments: Designation and Meaning

Usage refers to the optionality of individual segments and groups of segments. The following designations and their meanings are used in message structures:

Value	Description	Comment
R	Required	A conforming sending application shall populate all “R” elements with a non-empty value. HHIC shall process (save / print / archive/etc.) or ignore the information conveyed by required elements. HHIC shall not raise an error due to the presence of a required element, but may raise an error due to the absence of a required element.
RE	Required but may be empty	The element may be missing from the message, but shall be sent by the sending application if there is relevant data to report. A conforming sending application shall be <b>capable</b> of providing all “RE” elements. If the conforming sending application knows the required values for the element, then it shall send that element. If the conforming sending application does not know the required values, then that element will be omitted.  HHIC will be expected to process (save/print/archive/etc.) or ignore data contained in the element, but shall be able to successfully process the message if the element is omitted (no error message should be generated because the element is missing).
X	Not supported	For conformant sending applications, the element shall not be sent. HHIC shall ignore the element if it is sent. However, HHIC will not generate an application error if it receives the element.
C	Conditional - Specific to Message Profile	Used only in a <i>shared</i> message-structure specification, i.e., a specification that is shared by multiple Message Profiles. A shared message-structure is defined when the message structures of multiple message types are very similar. The specific usage of these segments is specified in each section where used.

## APPENDIX M: Sample ORU Messages

### Example 1:

```
MSH|^~\&|LIS|M|||20090518161040||ORU^R01|91380000032|P|2.3|
PID|||15161516^^^^M||TEST^EMR SAMPLE^||19651015|M|||||||46456|
PV1||O|XOP|||14516^TEST^PHYSICIAN||LAB|||||^|||||||||||||||||
ORC|RE|||||||||^
OBR|||E2905964|^^^ADIF^CBC|||200905041213|||||200905041223|^|14516^TEST^PHYSICIAN
|||M3
017|||H|F|CBC^ADIF|^^^^^R|^~^~^~^|||^|^|^|^|200905041213|
OBX|1|NM|WBC^WBC|1|10.7|10(9)/L|3.5-10.0|H|||C|||200905050732|C^LAB IT|
OBX|1|TX|WBC^WBC|2|*CORRECTED 05/05 AT 0732: ORIGINAL:
5.1|||||C|||200905050732|C^LAB
IT|
OBX|2|NM|RBC^RBC|1|2.96|10(12)/L|4.4-6.0|L|||F|||200905041231|C^LAB IT|
OBX|3|NM|HGB^Hemoglobin|1|10.3|g/dL|14-17|L|||F|||200905041231|C^LAB IT|
OBX|4|NM|HCT^Hematocrit|1|31.4|%|41-51|L|||F|||200905041231|C^LAB IT|
OBX|5|NM|MCH^MCH|1|106.0|fL|80-100|H|||F|||200905041231|C^LAB IT|
OBX|6|NM|MCHC^MCHC|1|34.8|pg|27-33|H|||F|||200905041231|C^LAB IT|
OBX|7|NM|MCHC^MCHC|1|32.9|g/dL|32-36|||F|||200905041231|C^LAB IT|
OBX|8|NM|RDW^RDW|1|20.4|%|11-15|H|||F|||200905041231|C^LAB IT|
OBX|9|NM|PLTC^Platelet Count|1|58|10(9)/L|150-450|L|||F|||200905041231|C^LAB IT|
OBX|10|NM|MPV^MPV|1|12.5|fL|6.9-10.9|H|||F|||200905041231|C^LAB IT|
OBX|11|TX|DFTYP^Diff Method|1|Auto|||||F|||200905041231|C^LAB IT|
OBX|12|NM|ANEUT^Neutrophils|1|69|%|40-70|||F|||200905041231|C^LAB IT|
OBX|13|NM|ALYM^Lymphs|1|17|%|20-45|L|||F|||200905041231|C^LAB IT|
OBX|14|NM|AMONO^Monocytes|1|11|%|4-10|H|||F|||200905041231|C^LAB IT|
OBX|15|NM|AEOS^Eosinophils|1|3|%|0-6|||F|||200905041231|C^LAB IT|
OBX|16|NM|ABASO^Basophils|1|0|%|0-2|||F|||200905041231|C^LAB IT|
OBX|17|NM|ANEUTA^Neutrophils, Absolute|1|3.52|10(9)/L|1.4-7.0|||F|||200905041231|C^LAB
IT|
OBX|18|NM|ALYMA^Lymphs, Absolute|1|0.86|10(9)/L|0.7-4.5|||F|||200905041231|C^LAB IT|
OBX|19|NM|AMONOA^Monocytes, Absolute|1|0.55|10(9)/L|0.1-1.0|||F|||200905041231|C^LAB
IT|
OBX|20|NM|AEOSA^Eosinophils, Absolute|1|0.13|10(9)/L|0-0.6|||F|||200905041231|C^LAB IT|
OBX|21|NM|ABASOA^Basophils, Absolute|1|0.02|10(9)/L|0-0.2|||F|||200905041231|C^LAB IT|
```

**Example 2:**

```
MSH|^~\&|LIS|M|||20090518161040||ORU^R01|91380000033|P|2.3|
PID|||15161516^^^^M||TEST^EMR SAMPLE^|19651015|M|||||||46456|
PV1||O|XOP|||14516^TEST^PHYSICIAN||LAB|||||^|||||||
ORC|RE|||||||
OBR||E2905966|^^^HA1C^HemoglobinA1C||200905041213|||||200905041223|^|14516^TEST
^PHYSICIAN|||M3017|||RL|F|HA1C^HA1C|^^^^R|^~^~^~^|^^|^|^|^|200905041213|
OBX|1|NM|HA1C^Hemoglobin A1C|1|2.8%|4.0-6.0|L||F||200905041232|C^LAB IT|
OBX|1|TX|HA1C^Hemoglobin A1C|2|Note: Values <7% meet the treatment goal for patients with
diabetes||||||200905041232|C^LAB IT|
OBX|1|TX|HA1C^Hemoglobin A1C|3| mellitus.||||||200905041232|C^LAB IT|
MSH|^~\&|LIS|M|||20090518161041||ORU^R01|91380000034|P|2.3|
PID|||15161516^^^^M||TEST^EMR SAMPLE^|19651015|M|||||||46456|
PV1||O|XOP|||14516^TEST^PHYSICIAN||LAB|||||^|||||||
ORC|RE|||||||
OBR||E2905965|^^^UMIC^Urinalysis||200905041213|||||200905041223|^|14516^TEST^PHY
SICIA
N|||M3017|||HU|F|UA^UMIC|^^^^R|^~^~^~^|^^|^|^|^|200905041213|
OBX|1|TX|UCOL^Color|1|Yellow|||||F||200905041241|C^LAB IT|
OBX|2|TX|UAPP^Appearance|1|Clear|||||F||200905041241|C^LAB IT|
OBX|3|NM|USGB^Specific Gravity|1|1.030|1.005-1.030|||C||200905050733|C^LAB IT|
OBX|3|TX|USGB^Specific Gravity|2|*CORRECTED 05/05 AT 0733: ORIGINAL:
1.015|||||C||200905050733|C^LAB IT|
OBX|4|TX|UESTB^Leukocyte Esterase|1|Negative||NEG|||F||200905041241|C^LAB IT|
OBX|5|TX|UNITB^Nitrite|1|Positive||NEG|A|||C||200905050733|C^LAB IT|
OBX|5|TX|UNITB^Nitrite|2|*CORRECTED 05/05 AT 0733: ORIGINAL:
Negative|||||C||200905050733|C^LAB IT|
OBX|6|NM|UPHB^PH|1|7.0||5.0-7.5|||F||200905041241|C^LAB IT|
OBX|7|TX|UPRTB^Protein|1|Negative|mg/dL|NEG|||F||200905041241|C^LAB IT|
OBX|8|TX|UGLB^Glucose|1|Negative|mg/dL|NEG|||F||200905041241|C^LAB IT|
OBX|9|TX|UKETB^Ketones|1|Negative|mg/dL|NEG|||F||200905041241|C^LAB IT|
OBX|10|NM|UROB^Urobilinogen|1|0.2|EU/dL|0.2-1.0|||F||200905041241|C^LAB IT|
OBX|11|TX|UBILB^Bilirubin|1|Positive||NEG|A|||C||200905050733|C^LAB IT|
OBX|11|TX|UBILB^Bilirubin|2|*CORRECTED 05/05 AT 0733: ORIGINAL:
Negative|||||C||200905050733|C^LAB IT|
OBX|12|TX|UBLDB^Blood|1|Negative||NEG|||F||200905041241|C^LAB IT|
OBX|13|TX|UWBC^WBC|1|0-1|/hpf|0-5|||F||200905041241|C^LAB IT|
OBX|14|TX|URBC^RBC|1|0-2|/hpf|0-2|||F||200905041241|C^LAB IT|
OBX|15|TX|UBAC^Bacteria|1|None|/hpf|NONE|||F||200905041241|C^LAB IT|
OBX|16|TX|UMUC^Mucus|1|None|/lpf|||F||200905041241|C^LAB IT|
OBX|17|TX|USQEP^Squamous Ep|1|Occ|/lpf|||F||200905041241|C^LAB IT|
OBX|18|TX|UCOM^Comments|1|CLEAN CATCH|||||F||200905041241|C^LAB IT|
```

### Example 3:

```
MSH|^~\&|LIS|M|||20090518161041||ORU^R01|91380000035|P|2.3|
PID|||15161516^^^^M||TEST^EMR SAMPLE^||19651015|M|||||||46456|
PV1||O|XOP|||14516^TEST^PHYSICIAN||LAB|||||^|||||||||||||||||
ORC|RE|||||||||^|
OBR|||E2905967|^^^ZZ01^Wound Cult,
Aero|||200905041213|||||200905041223|^Leg|14516^TEST^PHYSICIAN||||M3018||||MC|F|WN
DAE^Z
Z01|^^^^R|^~^~^~^|^^|^|^|^|200905041213|
OBX|1|TX|SDES^Specimen Description|1|Leg|||||F|||200905041228|C^LAB IT|
OBX|2|TX|SREQ^Special Requests|1|None|||||F|||200905041228|C^LAB IT|
OBX|3|TX|CULT^Culture|1|Many (4+) Proteus mirabilis|||||F|||200905050758|C^LAB IT|
OBX|3|TX|CULT^Culture|2|Mod (3+) **Corrected Micro Report** Rhodotorula glutinis (
Previously|||||200905050758|C^LAB IT|
OBX|3|TX|CULT^Culture|3| reported as: Rhodotorula rubra|||||200905050758|C^LAB IT|
OBX|3|TX|CULT^Culture|4|Mod (3+) Pseudomonas aeruginosa|||||200905050758|C^LAB IT|
OBX|3|ST|CULT^Culture|5|. . . . . COMMENT . . . . .
.||||||200905050758|C^LAB IT|
OBX|3|ST|CULT^Culture|6|Called to: Dr office and XOP/Ruth @ 05/05/2009 07:58AM By:
SG2515|||||200905050758|C^LAB IT|
OBX|3|ST|CULT^Culture|7|Read back done and verified as correct.|||||200905050758|C^LAB IT|
OBX|4|TX|RPT^Report Status|1|Final 05/05/2009|||||F|||200905050758|C^LAB IT|
OBX|5|TX|ORG^Organism|1|Many (4+) Proteus mirabilis|||||F|||200905041245|C^LAB IT|
OBX|6|TX|MTYP^Method|1|Kirby Bauer|||||F|||200905041245|C^LAB IT|
OBX|7|TX|AUG^Amox/k Clav'ate|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|8|TX|AMPI^Ampicillin|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|9|TX|CFZ^Cefazolin|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|10|TX|CTN^Cefotetan|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|11|TX|CAX^Ceftriaxone|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|12|TX|CIP^Ciprofloxacin|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|13|TX|GM^Gentamicin|1|Intermediate||I^||F|||200905041245|C^LAB IT|
OBX|14|TX|TE^Tetracycline|1|Resistant||R^||F|||200905041245|C^LAB IT|
OBX|15|TX|TS^Trimeth/sulfa|1|Susceptible||SS^||F|||200905041245|C^LAB IT|
OBX|16|TX|ORG^Organism|1|Mod (3+) Pseudomonas aeruginosa|||||F|||200905050758|C^LAB
IT|
OBX|17|TX|MTYP^Method|1|MIC (ug/mL)|||F|||200905050758|C^LAB IT|
OBX|18|TX|AK^Amikacin|1|2 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|19|TX|AZT^Aztreonam|1|14 Intermediate||I^||F|||200905050758|C^LAB IT|
OBX|20|TX|CAZ^Ceftazidime|1|1 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|21|TX|CAX^Ceftriaxone|1|1 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|22|TX|CIP^Ciprofloxacin|1|<1 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|23|TX|GM^Gentamicin|1|10 Resistant||R^||F|||200905050758|C^LAB IT|
OBX|24|TX|IMP^Imipenem|1|2 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|25|TX|TZP^Piperacillin/Tazo|1|1 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|26|TX|TIM^Ticar/k Clav'ate|1|2 Susceptible||SS^||F|||200905050758|C^LAB IT|
OBX|27|TX|TO^Tobramycin|1|6 Intermediate||I^||F|||200905050758|C^LAB IT|
```

## APPENDIX N: HHIC Use Only - Edits Applied After Receipt

---

### Proposed Edits Applied During or After Receipt of the Data File

#### Duplicate Laboratory Record

Two or more laboratory records were submitted representing the same laboratory test collected at the same date and time.

Resolution: Remove duplicate laboratory records so only one valid laboratory record exists for a single laboratory test collected at a specified date and time.

#### Failure to Link Laboratory Record with Discharge Record

The laboratory record did not link to a unique inpatient discharge record. The fields used to perform this link are the Medical/Health Record Number, Admission Date, and Account Number.

Resolution: Verify and correct the Medical/Health Record Number, Admission Date, and Account Number.

#### Admission Lab Algorithm

For the purpose of improving the severity of illness model, the admission lab results will be incorporated into existing risk models, e.g. 3M's APR-DRGs or other appropriate models. While lab results throughout the inpatient stay may be found to have an important predictive component, the results of selected admission labs (the 32 identified for this study) are known to improve the predictive power of existing risk models such as 3M's APRDRGs. Thus, the admission lab results of the 32 lab tests identified for this study will be identified for this purpose. HHIC will use the following algorithm.<sup>2</sup>

The first lab value on the day of admission will be used as the "admission lab" because it is most likely to reflect the patient's status prior to any major interventions. If a value is not available, particularly if the patient was admitted late in the day (e.g., after 6 PM), then next day values will be used if no major procedure is documented on the day of admission. If no value is available using this algorithm, a value within seven days prior to admission that is closest to the day of admission can be used. Otherwise, the value will be considered missing.

#### Future Validations/Definitions/Edits

Further validations and edits will be applied over the course of working with data files. They will be published as they are incorporated.

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<sup>2</sup> The proposed algorithm is subject to change following as we work with providers and work with data in more detail.

**NOTES:**

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