DHCS
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Department of Health Care Services

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April 18, 2012

To: General Acute Care Hospitals with Licensed Perinatal and/or Intensive Care Newborn Nursery Services

Subject: Newborn Hearing Screening Program Data Management Service, Updated Technical Requirements Specifications Document

We are pleased to provide you with updated information regarding the implementation of the Statewide Data Management Services (DMS) for the Newborn Hearing Screening Program (NHSP). Over the past three years, we have shared with you information regarding how your hospital can begin the implementation phase of this project and have provided information on the various technical requirements needed to implement the service.

The purpose of this letter is to provide you with (1) an updated version (v3.2) of the Technical Requirements Specification (TRS) for Electronic Data Transmission, (2) a timeline for the implementation of the DMS, and (3) contact information for reporting your data submission preference and your hospital's DMS representative if you have not already done so. Given the revisions and additional information contained in this document, we request that all hospitals please review the updated technical specifications with their Information Technology (IT) staff and hospital administration.

Due to concerns regarding workload issues (i.e., staffing) and fiscal concerns, there are a few areas we want to highlight for you:

Minimum required data for all infants:

- Medical Record Number
- Infant Name
- Date of Birth
- Gender
- Birth Hospital
- Date of Screening
- Screen result
- Screen method
- Screener

Additional data for infants who refer, transfer or are missed (currently being submitted on the Infant Reporting Form (IRF)).

- Legal guardian contact information
- Legal guardian primary language
- Secondary contact information
- Secondary contract primary language
- Infant legal name
- Follow-up appointment information
- Primary care provider (where infant will be seen as an outpatient) information
- Acuity (WBN vs. NICU)

This revised version contains significantly more detail regarding configuration for electronic data transmission via Health Level Seven (HL7) and hearing screening device upload.

Currently the DMS is being used by all three Hearing Coordination Centers (HCCs) and 35 Northern California hospitals. Thus far,the DMS implementation has progressed successfully. We plan to continue our rollout to Bay Area/Northern California hospitals this year and we will begin rolling out to hospitals in the Southern and South Eastern California regions in July 2012.

We would like to thank all of the hospitals that have provided us with their choice for data transmission. If your hospital would like to revise your response or has not yet responded with the hospital's data submission preference, please send an e-mail to NHSPInfo@cce.csus.edu indicating your data submission preference and contact information for your hospital NHSP DMS representative.

The attached document is very important and we encourage you to share this information with your IT staff and hospital administration as soon as possible. This information is critical and provides you with current and updated specifications for your hospital. In addition, you will also find a list on the following page of specific changes made to the TRS in this new version. We hope this will help hospitals already engaged in the project to locate these changes more easily.

If you need additional information, please e-mail NHSPinfo@cce.csus.edu or contact the NHSP DMS Information Line at (916) 278-3424. Thank you for your continued support of the early identification of hearing loss in California children.

Sincerely

Adam Quintana, Chief
Hearing and Audiology Services UnitAttachment

Attachment

Summary of Changes in the CA NHSP TRS from v2.82 to v3.2

Below is a list of changes between v2.82 and v3.2 of the TRS.

- All figures have been updated to match the processes described in the document.
- All figure and table numbers have been updated.
- Reference to a temporary table or holding file have been removed.
- Beta Testing with parallel launch, which is not a program requirement, has been removed.
- The names of the data transmission modes have been updated to more accurately reflect the options: manual, device upload, and HL7 (ADT and/or ORU).
- SRV has been removed from the Acronym/Terms Definitions.
- Reference to a public key in Section 9 has been removed.
- Section 10.4.3, the description has been changed. Only NK1 segments identified as representing the mother or legal guardian will be used. All others will be ignored.
- The list of mandatory fields has been reduced. The HL7 segment tables in Sections 10.4 and 10.5 no longer state if the field is optional, the "DHCS OPT" column. The mandatory fields are listed in Section 10.7.
- Section 10.7 added mandatory fields for ORU messages. The additional fields are based on the DHCS letter to pilot hospitals on 7/18/2011 and feedback from the State.
- Section 10.9, emails will not be sent when a mandatory field is missing. They will only be sent to the designated hospital email address to confirm a successful file upload or when an error is generated logging into the SFTP service.
- Section 14, highlighted the fields that are transmitted to the DMS from the Algo 5 xml file.
- Section 15.2, updated wording for Possible Matches and Exception Data to provide further clarification.

The following changes were made to tables in the TRS:

Table Number v2.82	Table Number V3.2	Change
9	7-1	*Hearing Data Fields.* The fields have been updated to ensure all fields match what is transmitted to the DMS
14	10-7	*Patient Identification Mapping.* Changed PID-13 to better follow the HL7 XTN data type. Use of the prior format by hospitals integrated before the approval of this TRS version is allowed.
14	10-7	*Patient Identification Mapping.* Changed PID-14 to better follow the HL7 XTN data type. Use of the prior format by hospitals integrated before the approval of this TRS version is allowed.
19	10-14	*Next of Kin Mapping.* Changed NK1-6 to better follow the HL7 XTN data type. Use of the prior format by hospitals integrated before the approval of this TRS version is allowed.
23	10-18	*PV1 Segment Mapping.* The Non-Nursery Unit may be sent in PV1-3. It is preferred that it be sent in ZCA-1.3 or an OBX segment.
28	10-20	*ZCA Custom Segment Mapping.* Changed ZCA-4 to better follow the HL7 XTN data type. Use of the prior format by hospitals integrated before the approval of this TRS version is allowed.
28	10-20	*ZCA Custom Segment Mapping.* Changed ZCA-7 to better follow the HL7 XTN data type. Use of the prior format by hospitals integrated before the approval of this TRS version is allowed.
37	13-2	*HiTrack File Format Fields.* Added a new column "Data Transmitted to DMS."

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California Department of Health Care Services (DHCS), Newborn Hearing Screening Program (NHSP)

Technical Requirements Specification
Electronic Data Transmission (EDT)
Version 3.2

Project: California iCMS Hearing Project	Version #: 3.2
Document: Technical Requirements Specification Electronic Data Transmission (EDT)	Version Date: March 20th, 2012

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Project: California iCMS Hearing Project	Version #: 3.2
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1 Introduction

Electronic Data Transmission (EDT) is the interface that allows for the remote and automated entry of data into the California iCMS Hearing Data Management Service (DMS). Hospitals can use EDT to transmit demographic data, risk factor data, and hearing screening result data from manual web-form entry screening devices or from your Hospital Information System (HIS). This document focuses on the technical requirements necessary for a hospital to configure EDT in order to transmit data from authorized hospitals to the California Newborn Hearing Screening Program (NHSP) DMS.

1.1 Purpose

This document describes the various processes (also referred to as tasks) and the interfaces to the NHSP DMS. This document is intended primarily for business analysts, developers and the stakeholders of the interface's project.

1.2 Scope

The processes and interfaces defined in this document apply to the interface between the hospitals' Health Information System (HIS) and the California NHSP DMS.

2 Definition of Terms

The following terms shall be used throughout this document.

Figure 1: Acronym/Term Definitions

Acronym	Definition
ADT	Admission, Discharge and Transfer. An HL7 message type is used to broadcast patient demographic data, specifically data related to patient admission and registration.
DHCS	California Department of Health Care Services
DMS	The California iCMS Hearing Screening Data Management Service. This is the system that will capture data on newborn hearing screening from hospitals and allow the state to manage the data according to State program guidelines.
HIS	Hospital Information System. General term for patient data management applications running at the hospital.
HL7	Health Level Seven. An ANSI (American National Standards Institute) standard messaging protocol used for medical and health related data processing systems.
iCMS	The name for the software that the state is employing for this project. It stands for (i)nternet (C)ase (M)anagement (S)ystem.
MRN	Medical Record Number. A method to identify patient and patient information within a health care organization. The number is unique only to specific organization that generated the number. It is not unique across hospital networks.

Acronym	Definition
MSH	Message Header Segment. This segment is a mandatory HL7 segment that includes mandatory information for the data transmission.
NHSP	Newborn Hearing Screening Program. Also referred to as the State Program.
ORC	Common Order Segment. This segment is used to place an order for newborn hearing screening results to the DMS.
ORU	Observational Report, Unsolicited. An HL7 message type used to broadcast a data report.
PID	Patient Identification Segment. This segment is used to retrieve patient demographics sent by the HIS.
RDE	Remote Data Entry. A web application that allows hospitals and clinics to enter demographic data at the bedside and send to the DMS.
Task	A sequence of operations that executes independently of other tasks. Each task runs in its own data and code space and is scheduled to run by the operating system.

3 Development Methodology & Environment

This software was designed as an event-driven, object oriented system. The software was developed under the Windows .NET environment. The software is web-based and will run on standard web browsers. The EDT interface supports three types of data transmissions: demographic data, inpatient hearing screening results, and risk factors. These data types are defined later in the document and the corresponding methods to transmit the data

3.1 Desktop Requirements

The following is a listing of general product functionality that will be incorporated in all application modules.

3.1.1 Browser Support

Web Components will be fully compatible with IE6, IE7, and IE8 and Firefox v3.x, v4.x and v5.x. If the end-user launches the RDE form from a non-supported browser, messaging will appear explaining that the browser (and/or version) is not supported, and will list the recommended browser options.

3.1.2 Windows Support

System must run on Windows 2000, Windows 7, XP, or Vista operating systems.

3.2 Languages, Tool and Standards

The HL7 interface is compatible with version 2.6 of the HL7 standard. Uploads from hearing screening devices require the device to output either HiTrack or Algo5 XML formats.

3.3 Development Tools and Languages

The HL7 interface is written with and tested using the following tools (these are for development purposes only and are not required to reside on the target machine to interface with the deployed software):

- Microsoft Visual Studio
- Borland Delphi
- Interfaceware Iguana
- Interfaceware Chameleon
- Microsoft SQL Server
- C#, Ajax, ASP.Net, Active X, and Javascript

3.4 Environment – Data Transport

For the HL7 interface the following is acceptable to transmit data:

- SSL connection between the HIS and DMS via Security Certificates
- Secure FTP interface between the HIS and DMS

Device uploads are completed through a file upload module in the DMS.

3.5 Hospital Network – Screening Device Uploads

In order to transmit data into the DMS from hearing screening device equipment, a hospital must ensure that the device files are in the appropriate format (HiTrack or Algo5 XML) and are able to be accessed by the workstation that will be uploading to the DMS website.

3.6 Hospital Network – HL7

It is expected that each hospital group that wants to send data to the State program will be responsible for configuring their HIS to send data to the HL7 interface. There are several different approved versions of the HL7 messaging standard; this interface will be configured to process version 2.6 messages or earlier. The messages are required to conform to the message format specified in this document.

The following message types will be processed by the State program HL7 interface:

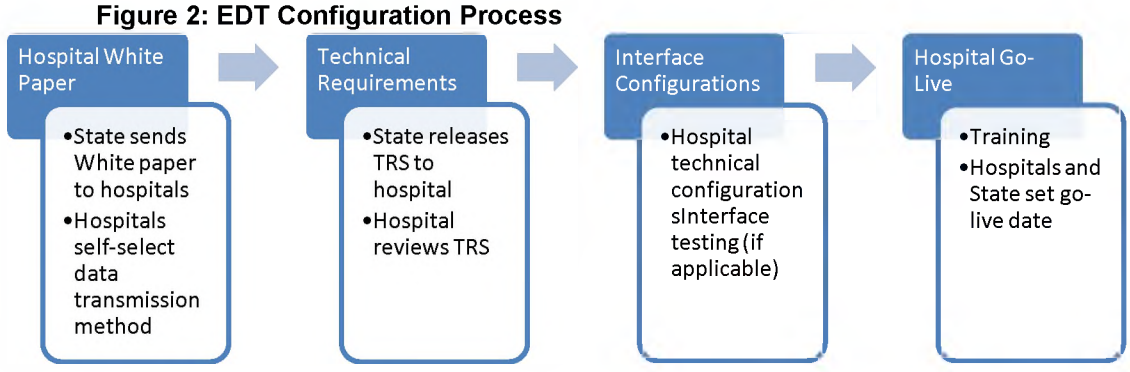
Table 3-1: Message types supported by interface

Message Event	Meaning	Type
ORU^R01	Unsolicited transmission of an Observation Message	Incoming to DMS
ADT^A01	Admit a patient	Incoming to DMS
ADT^A08	Update Patient information	Incoming to DMS

4 EDT Configuration Process

The DMS will accept data electronically from hospitals. Some hard copy reports, specifically IRF, Face Sheets and Monthly Stats, will be required for a period of time, and some ongoing QA reports will be necessary to verify all infants have been entered. The process has several pieces:

Figure 2: EDT Configuration Process



4.1 Frequently Asked Questions Document

Hospitals in the state have received a document that addressed several frequently asked questions regarding the upcoming implementation of the NHSP DMS. Based on individual hospital review, each hospital was asked to report their intention for data transmission.

4.2 Technical Requirements Specifications

This revision of the document replaces all previous versions of the TRS and should be used to assist EDT hospitals in the interface configuration. Neometrics will work with hospital staff to review EDT protocols and set dates for transmission tests.

4.3 HL7 Interface Configuration

Neometrics will work with the hospitals to configure their HL7 interface. Hospitals send test messages (test data only to satisfy HIPAA compliance) which are validated against the specifications. Their HL7 interface is tuned so that messages can be sent when the project goes live.

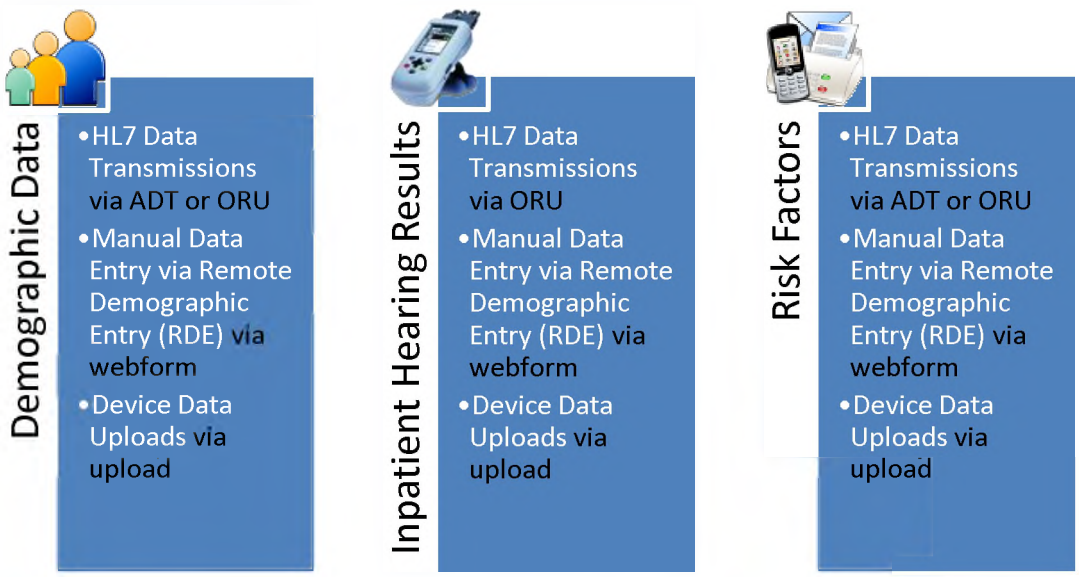
4.4 Hospitals Go-Live

DHCS and Neometrics will work with hospitals to achieve their go live dates. Each hospital will be notified of their specific go live date and all steps which will need to be taken in order to prepare for go live as well as ongoing support procedures once they are live.

5 Data Profiles for the State Program

Three types of data can be electronically submitted to the DMS: demographic, in-patient hearing screen results and risk factors for hearing loss. Submitting hospitals have options when providing data to the state program. These options are displayed in Figure 3:

Figure 3: Data Types by Transmission Methods



The following sections detail the options for each data type (i.e. Demographic Data, Inpatient Hearing Results and Risk Factors) to help submitting hospitals determine the proper data submission methods (i.e. Manual Data Entry, Device Data Upload and HL7)

5.1 Data Transmission Selection Overview

Table 5-1: EDT Selection Overview

Is there a PC with internet access in your nursery?	Can your screening device?		Is the hospital HIS capable of:			Your Transmission mode	Corresponding Section in Document
	Export data?	Capture required demographic fields?	Sending admission data? (ADT)	Loading screening results from the device	Transmitting screening data (ORU)		
Yes	No	No	No	No	No	Manual	Manual Data Entry Process
Yes	Yes	No	No	No	No	Device Upload	Device Upload

Is there a PC with internet access in your nursery?	Can your screening device?		Is the hospital HIS capable of:			Your Transmission mode	Corresponding Section in Document
	Export data?	Capture required demographic fields?	Sending admission data? (ADT)	Loading screening results from the device	Transmitting screening data (ORU)		
Yes	Yes	Yes	No	No	No	Device Upload	Device Upload
Yes	No	No	Yes	No	No	HL7 (ADT)	HL7 (ADT)
Yes	Yes	Yes	Yes	No	No	HL7 (ADT)	HL7 (ADT)
Yes	Yes	Yes	Yes	Yes	Yes	HL7 (ADT and ORU)	HL7 (ADT and ORU)

5.2 Manual Data Entry Process

The manual process is designed for hospitals that do not have HIS or are not yet set up to transmit data electronically. The DMS provides web-based modules that hospitals use to transmit data. Once the data is gathered, hospital staff uses the web-based modules to manually enter the **demographic data for every baby born** – as well as subsequent hearing screening result information into the state system. The flow is shown below:

Figure 4: Manual Data Entry Transmission Process

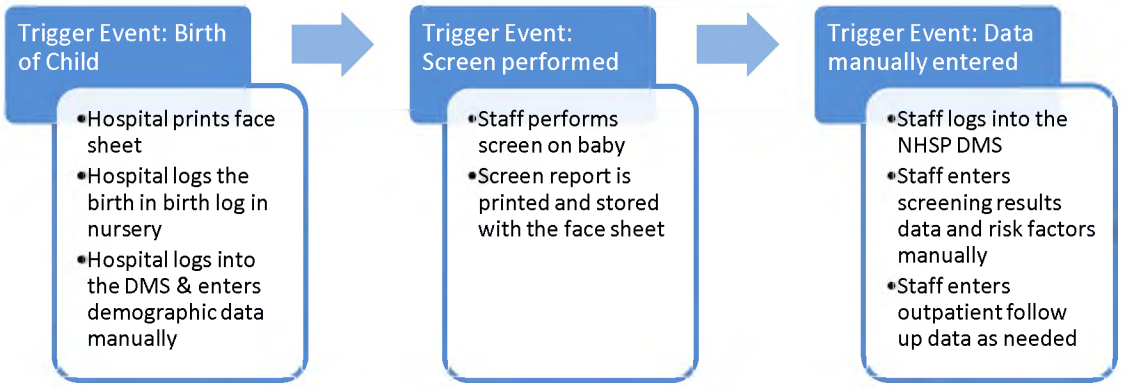
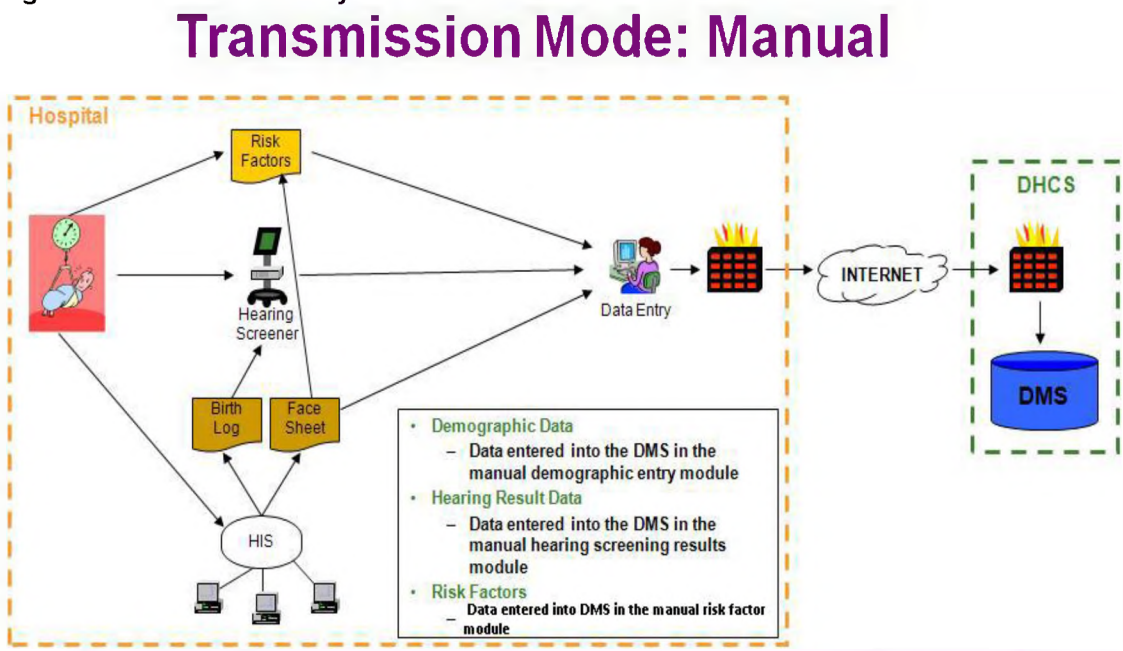


Figure 5: Manual Data Entry Process

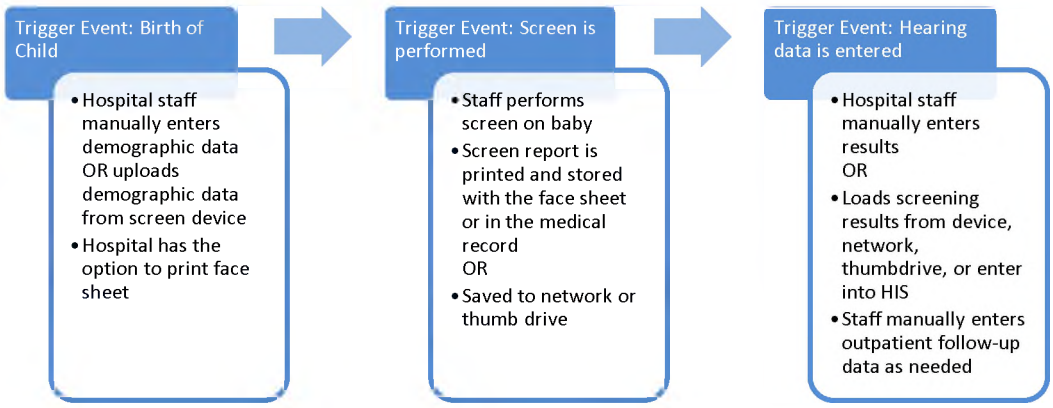


	Can your screening device?		Is the hospital HIS capable of:			
Is there a PC with internet access in your nursery?	Export data?	Capture required demographic fields?	Sending admission data? (ADT)	Loading screening results from the device	Transmitting screening data (ORU)	Your Transmission mode
Yes	No	No	No	No	No	Manual

5.3 Device Upload Transmission Process

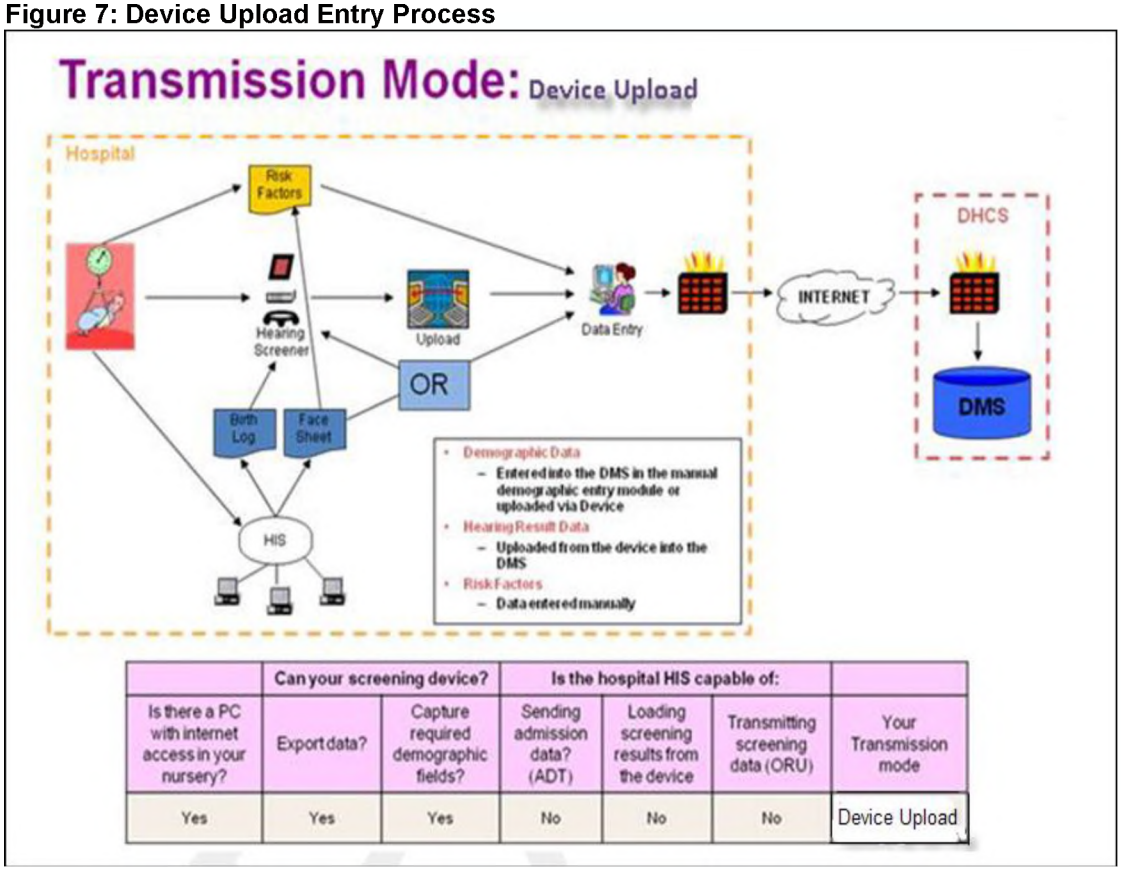
The device upload process is designed for sending infant demographic data or inpatient screening results to the DMS via an EDT interface. After admitting the baby, the hospital transmits the demographics to the state via manual entry in DMS web-based modules or an upload of files exported from hearing screening devices. The inpatient screening results can be manually entered via DMS web-based modules or with an upload of files exported from hearing screening devices. The flow is shown below:

Figure 6: Device Upload Data Entry Process



There is only one transmission options available for Device Upload. see the figure below.

Figure 7: Device Upload Entry Process

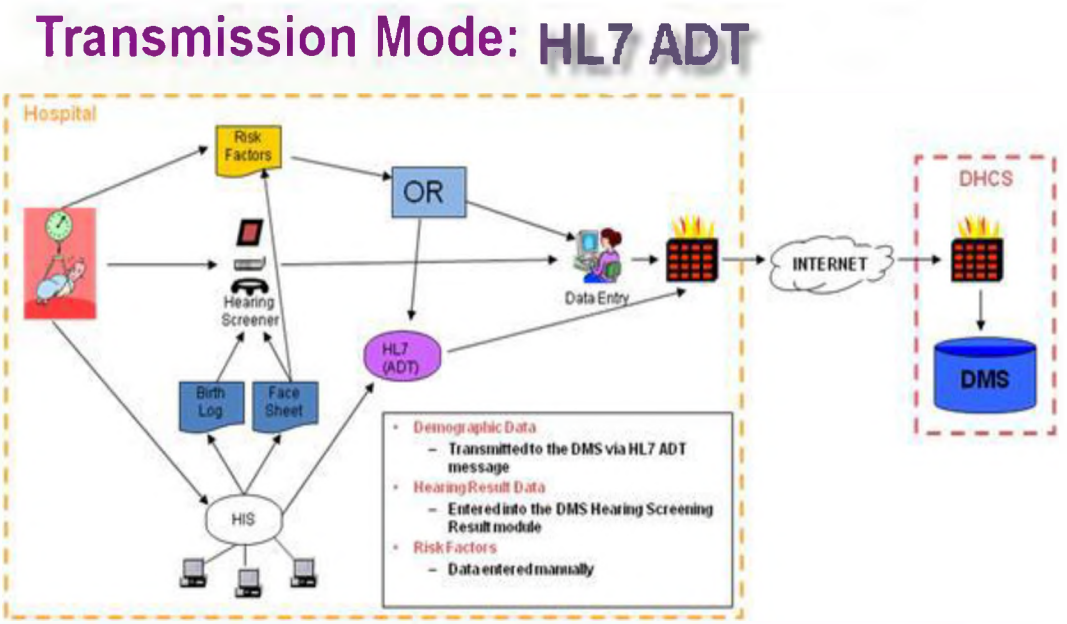


	Can your screening device?		Is the hospital HIS capable of:			
Is there a PC with internet access in your nursery?	Export data?	Capture required demographic fields?	Sending admission data? (ADT)	Loading screening results from the device	Transmitting screening data (ORU)	Your Transmission mode
Yes	Yes	Yes	No	No	No	Device Upload

5.4 HL7 Transmission Process

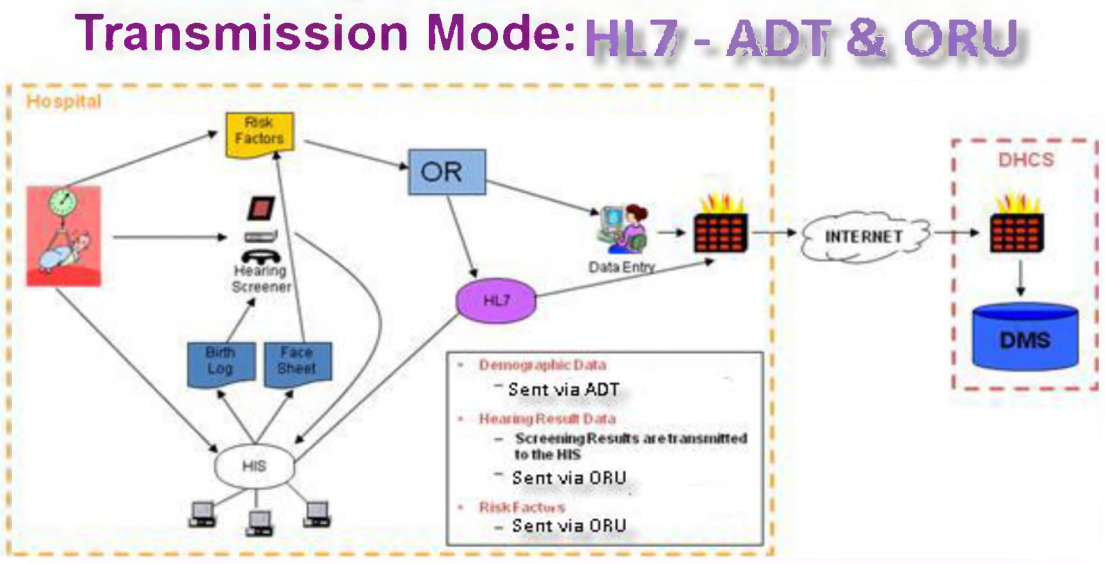
The demographic data are received by the state program in the DMS. Baby is searchable via the search screen in the case management module. Hearing screening result data are transmitted via an updated electronic data transmission (HL7 ORU) or device upload. The flow is shown below:

Figure 8: HL7 Entry Process – HL7 (ADT)



	Can your screening device?		Is the hospital HIS capable of:			
Is there a PC with internet access in your nursery?	Export data?	Capture required demographic fields?	Sending admission data? (ADT)	Loading screening results from the device	Transmitting screening data (ORU)	Your Transmission mode
Yes	No	No	Yes	No	No	HL7 ADT

Figure 9: HL7 Entry Process – HL7 (ADT)



	Can your screening device?		Is the hospital HIS capable of:			
Is there a PC with internet access in your nursery?	Export data?	Capture required demographic fields?	Sending admission data? (ADT)	Loading screening results from the device	Transmitting screening data (ORU)	Your Transmission mode
Yes	Yes	Yes	Yes	Yes	Yes	HL7 - ADT & ORU

6 Demographic Data Entry

The State program system requires demographic data to be submitted. Hospitals have the option of sending data via

- HL7 data transmissions
- Using the Demographic Entry Module on the Website
- Uploading data from a hearing screening device in the approved file format

Demographic data are gathered on the newborn and grouped by type of data. The four groups are:

- Patient Information
- Mother Information
- Legal Guardian Information
- Submitter Information

The chart below lists the minimum demographic fields required for all infants. Additional data elements are needed for infants who are transferred, refer on screening, or are missed. Later sections of the document define the HL7 grammar that may be used to transmit data.

Table 6-1: Patient Information

Available Fields	Field Type	Required	Validation	Values
NHSP Number	Text		Auto-Generated by System	
Medical Record Number	Text	Yes		
Last Name	Text	Yes		
First Name	Text	Yes		
AKALast Name	Text			
AKAFirst Name	Text			
Date of Birth	Date	Yes	Valid Date, not after current date	
Gestational Age in Weeks	Number			
Multiple Birth Order	List Value			Not Multiple Birth (Default) First Multiple Second Multiple Third Multiple Fourth Multiple Fifth Multiple Sixth Multiple Seventh Multiple

Available Fields	Field Type	Required	Validation	Values
				Eighth Multiple
Gender	List Value	Yes		Male Female Unknown
Ethnicity	List Value			Hispanic American Indian Asian Black Pacific Islander White Other Unknown Two or more races Refused to answer
Acuity	List Value	Only for patients that require follow-up		WBN (default) NICU
Unit	List Value	Only for patients that require follow-up		NICU PICU Other
Non-Nursery Unit	Text			
Insurance Type	List Value			(Default to Blank) Medi-Cal Healthy Families HMO Private Not Insured Unknown

Table 6-2: Mother Information

Available Fields	Field Type	Required	Validation	Values
Mother Last Name	Text			
Mother First Name	Text			

Available Fields	Field Type	Required	Validation	Values
Street Address	Text			
Zip code	Number			5 digit number
City	Text			Auto populate based on Zip code
State	List Value		Validate against table	Default to CA Updates based on zip code entered
County of Residence	List Value		Validate against table	Auto populate based on Zip Code
Country of Residence	List Value			U.S. Mexico Other
Home Phone	Text			10 digit number
Cell Phone	Text			10 digit number
Work Phone	Text			10 digit number
Work Extension	Text			
Email	Text			
Primary Language	List Value			English(Default) Spanish Cambodian Chinese Farsi Hmong Korean Laotian Russian Vietnamese Other
Mother is Legal Guardian	List Value			Yes No

Table 6-3: Legal Guardian Information

Available Fields	Field Type	Required	Validation	Values
Legal Guardian Last Name	Text			
Legal Guardian First Name	Text			
Relationship	List Value			Mother, Father, Aunt, Uncle, Grandparent, Sibling, Other,

Available Fields	Field Type	Required	Validation	Values
				Other relative, Adoptive parent, Foster parent, Cousin, Friend, Social worker, Interpreter, Child Protective Services, Residential Healthcare Facility, None or Unknown
Street Address	Text			
Zip code	Number			5 digit number
City	Text			Auto populate based on zip code
State	List Value		Validate against table	Default to CA Updates based on zip code entered
County of Residence	List Value		Validate against table	Auto populate based on zip code
Country of Residence	List Value			U.S. Mexico Other
Home Phone	Text			10 digit number
Cell Phone	Text			10 digit number
Work Phone	Text			10 digit number
Work Extension	Text			
Email	Text			
Primary Language	List Value			English Spanish Cambodian Chinese Farsi Hmong Korean Laotian Russian Vietnamese Other

Table 6-4: Submitter Information

Available Fields	Field Type	Required	Validation	Values
Submitter ID	List Value	Yes	Validate against table	This field will populate for Hospital Users

Table 6-5: Birth Hospital Information

Available Fields	Field Type	Required	Validation	Values
Birth Hospital ID	List Value	Yes	Validate against table	This field will populate for Hospital Users
County of Birth	List Value	Yes		This field will populate based on Birth Hospital selected

7 Hearing Results Entry

7.1 Hearing Results Data Fields

The DMS requires data from the Inpatient Hearing Screen(s) be entered in the system. These data may be entered in one of three ways:

- Manually
- Via upload of screener export file (Details provided in Section 13)
- Via HL7 transmission from HIS (Details provided in Section 10)

The following fields can be transmitted to the DMS:

Table 7-1: Hearing Data Fields

Field Display	Field Type	Required	Validation	Values
Medical Record No	Text	Yes		
Last Name	Text	Yes		
Screen No	Text			Auto generated
Screen Type	List Value	Yes		Inpatient Outpatient
Screening Provider	List Value			
Screener	Text	Yes		
Date of Screening	Date	Yes	Greater than or equal to the date of birth	
Date Screening Results Received	Date	Yes	Greater than date of birth and date of screening	
Result Right Ear	List Value	Yes		Missed Pass Refer

Field Display	Field Type	Required	Validation	Values
				Previously Passed No Show Rescheduled Cancel Refused > 6 months NMI Expired
Result Left Ear	List Value	Yes		Same as above
Screening Method Right	List Value	Yes		ABR OAE N/A
Screening Method Left	List Value	Yes		ABR OAE N/A
IP Malformation Right Ear	List Value			Atresia Microtia Both None
IP Malformation Left Ear	List Value			Atresia Microtia Both None

8 Risk Factor Entry

There are several risk factors for entry into the State program. The DMS supports manual entry and EDT (HL7 ORU) submission of the following risk factors for hearing loss:

- Caregiver concern regarding hearing, speech, language, or developmental delay.
- Family history of permanent childhood hearing loss.
- Neonatal intensive care of more than 5 days or any of the following regardless of length of stay: ECMO, assisted ventilation, exposure to ototoxic medications (gentamicin and tobramycin) or loop diuretics (furosemide/Lasix), and hyperbilirubinemia that requires exchange transfusion.
- In utero infections, such as CMV, herpes, rubella, syphilis, and toxoplasmosis.

- Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies.
- Physical findings, such as white forelock, that is associated with a syndrome known to include a sensorineural or permanent conductive hearing loss.
- Syndromes associated with hearing loss or progressive or late-onset hearing loss, such as neurofibromatosis, osteopetrosis, and Usher syndrome; other frequently identified syndromes including Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson.
- Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome.
- Culture-positive postnatal infections associated with sensorineural hearing loss, including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis.

9 HL7 (ADT or ORU) Message Exchange

9.1 How will the hospitals send their HL7 messages to the State?

For testing, the hospital will connect to the State's test server. This is where Neometrics will be testing and correcting the HL7 messages. Neometrics will work with hospitals on fine-tuning their messages and the data transport.
HL7 will use SFTP, or secure FTP, which is a program that uses SSH to transfer files. It requires a user to have a password.
The steps for HL7 are:

1. The hospital provides its public IP, the one the SFTP client will be connecting from. This will be added to the firewall to allow that IP to access the State's test server.
2. The hospital provides an email address to receive email ACK messages from the SFTP service (see section 10.9). The address should be for a distribution list so the hospital may adjust the recipients as appropriate.
3. Neometrics supplies the hospital with the User ID and Password for the SFTP service.
4. The hospital may connect to the test server at:
   IP: 209.34.67.7
   Port: 2010

On a successful login, the hospital may view the folder and post files. To make it easier to distinguish between incoming files, it is recommended that the filenames be composed of the site identifier, current date, and time.

9.2 How can the hospitals confirm the message is processed?

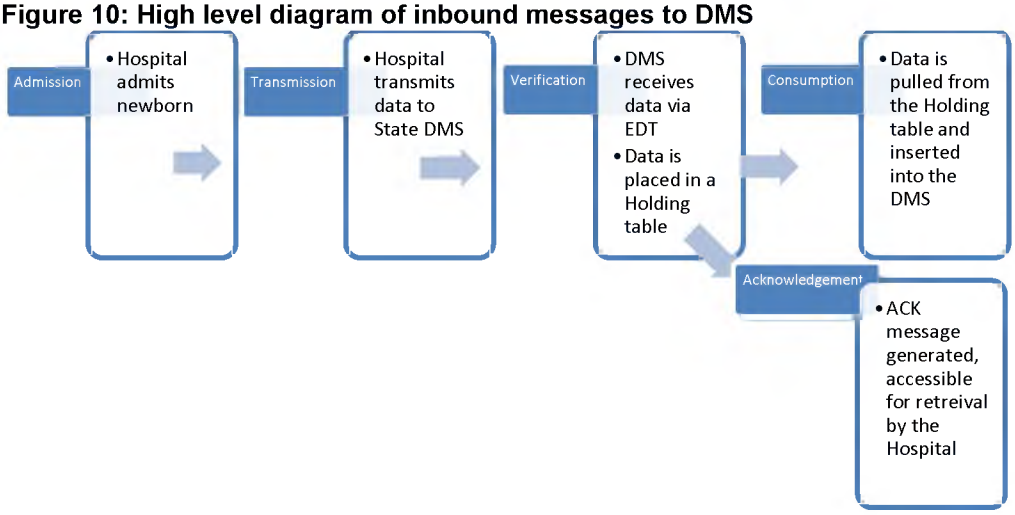
The HL7 Interface will produce an HL7 Acknowledgement ("ACK") message for each message that is processed. This message will confirm that the incoming message was processed..
When logged into the SFTP server, there will be an "ACK" folder where the HL7 acknowledgement messages will be placed. There will be one file for each incoming message that is processed. Files will be deleted 30 days after they are created.

Neometrics may create ACK messages as part of testing; they will have file names that begin with "Test_" and can be ignored.

10 DMS HL7 Interface

A high level diagram of the Interface process is shown in Figure 10. The Interface process extracts data from the HL7 ADT or ORU message.

Figure 10: High level diagram of inbound messages to DMS



10.1 HL7 Message Grammar

The HL7 interface accepts ADT and ORU messages containing the following segments. Any other segments that are present will be ignored.

Table 10-1: ORU Message Grammar [R01]

Segment	Description	Required?	Repeat?
MSH	Message Header	Yes	No
PID	Patient Identification	Yes	No
NK1	Next of Kin	No	Yes
PV1	Patient Visit	No	No
ORC	Order Details	No	No
OBR	Observation Request	Yes	Yes
OBX	Observation Result	Yes	Yes
ZCA	Custom Fields	No	No

Table 10-2: ADT Message Grammar [A01, A08]

Segment	Description	Required?	Repeat?
MSH	Message Header	Yes	No
PID	Patient Identification	Yes	No
NK1	Next of Kin	No	Yes
PV1	Patient Visit	No	No
OBX	Observation Result	No	Yes
ZCA	Custom Fields	No	No

Table 10-3: ACK Message Grammar

Segment	Description	Required?	Repeat?
MSH	Message Header	Yes	No
MSA	Message Acknowledgement	Yes	No

10.2 Explanation of the Use of the OBX Segment in the Newborn Screening HL7 Message

OBX segments are used for data elements that are qualitative or quantitative results of observation, like hearing screening results data, gestational age, or birth weight. It is information that hospitals may choose instead to send via the NK1 and custom California Newborn Hearing Segment, ZCA.

10.2.1 OBX-3: List of Identifiers

OBX Identifiers specify which data elements are being sent in that OBX segment.

Table 10-4: OBX Identifiers

OBX Identifier	Field Length	Valid Values	Description
INSURANCETYPE	1	1. Medi-Cal 2. Healthy Families 3. HMO 4. Private 5. Not Insured 6. Unknown	Type of Insurance
ACUITY	1	1. WBN 2. NICU	Acuity of the Newborn

OBX Identifier	Field Length	Valid Values	Description
GESTAGE	2		Gestational Age in weeks (as an integer)
MOTHEREMAIL	50		Email Address of the Newborn's Mother
MOTHERCELL	10	i.e. 5559991111	Cell Phone for the Newborn's Mother
MOTHERLEGALGUARDFLAG	1	1. YES 2. NO	Legal Guardian Indicator
LGEMAIL	50		Email Address for legal guardian
LGCELL	10	i.e. 5559991111	Cell Phone Number for legal guardian
SCREEN_TYPE	5	00201 (Inpatient) 00202 (Outpatient)	Type of screen performed (Inpatient or Outpatient)
RESULT_RIGHT_EAR	1	0. Missed 1. Pass 2. Refer 3. No Show 4. Rescheduled 5. Cancel 6. Refused 7. > 6 months 8. NMI 9. Expired A. Previously Passed	Result for the right ear
RESULT_LEFT_EAR	1	0. Missed 1. Pass 2. Refer 3. No Show 4. Rescheduled 5. Cancel 6. Refused	Result for the left ear

OBX Identifier	Field Length	Valid Values	Description
		7. > 6 months 8. NMI 9. Expired A. Previously Passed	
METHOD_RIGHT	1	1. ABR 2. OAE 3. N/A	Right ear screening method
METHOD_LEFT	1	1. ABR 2. OAE 3. N/A	Left ear screening method
MALFORM_RIGHT	1	1. Atresia 2. Microtia 3. Both 4. None	Inpatient Right Ear Malformation
MALFORM_LEFT	1	1. Atresia 2. Microtia 3. Both 4. None	Inpatient Left Ear Malformation
BABYUNIT	50		The nursery in the Hospital where baby is currently located
BABYNONNU	50		Non-Nursery Unit for the baby
RISKFACTOR01	1	1. YES 2. NO 3. NOT ENTERED	Caregiver concern regarding hearing, speech, language, or developmental delay.
RISKFACTOR02	1	1. YES 2. NO 3. NOT ENTERED	Family history of permanent childhood hearing loss.
RISKFACTOR03	1	1. YES 2. NO	Neonatal intensive care of more than 5 days or any of the following regardless of length

OBX Identifier	Field Length	Valid Values	Description
		3. NOT ENTERED	of stay: ECMO, assisted ventilation, exposure to ototoxic medications (Gentamicin and tobramycin) or loop diuretics (furosemide/Lasix), and hyperbilirubinemia that requires exchange transfusion.
RISKFACTOR04	1	1. YES 2. NO 3. NOT ENTERED	In utero infections, such as CMV, herpes, rubella, syphilis, and toxoplasmosis.
RISKFACTOR05	1	1. YES 2. NO 3. NOT ENTERED	Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies.
RISKFACTOR06	1	1. YES 2. NO 3. NOT ENTERED	Physical findings, such as white forelock, that are associated with a syndrome known to include a sensorineural or permanent conductive hearing loss.
RISKFACTOR07	1	1. YES 2. NO 3. NOT ENTERED	Syndromes associated with hearing loss or progressive or late-onset hearing loss, such as neurofibromatosis, osteopetrosis and Usher syndrome; other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson.
RISKFACTOR08	1	1. YES 2. NO 3. NOT ENTERED	Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome.
RISKFACTOR09	1	1. YES 2. NO	Culture-positive postnatal infections associated with sensorineural hearing loss, including confirmed bacterial

OBX Identifier	Field Length	Valid Values	Description
		3. NOT ENTERED	and viral (especially herpes viruses and varicella) meningitis.
BIRTHHOSPITALNPI	10		The database is configured to store NPI information only (for contract States only at this time).

10.3 HL7 Message Examples

10.3.1 Sample ADT Message using an OBX segment for Demographic Data

MSH|^~\&|MEDITECH|IP0041|CAHEAR|CAHEAR|20100407115308||ADT^A01|Q5555999910001|P|2.6
PID|1||778899^^^PHK||BABYTWO^GIRL|BABYTWO^MAMA|201003011400|2|NEOTWO^BABY|2|10 WELL ST^^LOS ANGELES^CA^90210^1^^^06039^|06039|212-632-3912|212-333-6666|2|||1200543404^^^K0^FIN_NBR||||1|IP0041||0|||||
NK1|1|BABYTWO^MAMA|2|10 WELL ST^^LOS ANGELES^CA^90210^1^^^06039|^^PH^TEST@NATUS.COM^^212^6323912^~^^CP^^^512^5557894^|212-333-6666|1|
PV1||I|1|||||||||
OBX|1|ST|ACUITY|1|1||||||F
OBX|2|ST|INSURANCETYPE|1|3||||||F
OBX|3|ST|BABYNONNU|1|NNU-NORTH6||||||F
OBX|4|ST|GESTAGE|1|32||||||F
OBX|5|ST|RISKFACTOR01|1|2||||||F
OBX|6|ST|RISKFACTOR02|1|2||||||F
OBX|7|ST|RISKFACTOR03|1|2||||||F
OBX|8|ST|RISKFACTOR04|1|2||||||F
OBX|9|ST|RISKFACTOR05|1|3||||||F
OBX|10|ST|RISKFACTOR06|1|2||||||F
OBX|11|ST|RISKFACTOR07|1|2||||||F
OBX|12|ST|RISKFACTOR08|1|2||||||F
OBX|13|ST|RISKFACTOR09|1|2||||||F

10.3.2 Sample ORU message

MSH|^~\&|MEDITECH|IP0022|CAHEAR|CAHEAR|20100407115308||ORU^R01|Q5555999910001|P|2.6
PID|1||23452345||NATUSBABY^GIRL|MAMA NATUSBABY|201003011400|2|NEOMETRICS^BABY|2|1001 MINERAL WELLS ST^^LOS ANGELES^CA^90210^1^^^06039^|06039|212-632-3912|212-333-6666|2|||1200543404^^^K0^FIN_NBR||||1|||1|||||

OBR|1|||54111-0^Newborn Hearing Loss Panel|||20100419125701|||||||20100418111021||IP0006|||||||||F|||||||||BOB||||||
OBX|1|ST|RESULT_LEFT_EAR|1|3||||||F|
OBX|2|ST|RESULT_RIGHT_EAR|1|3||||||F|
OBX|3|ST|SCREEN_TYPE|1|00201||||||F|
OBX|4|ST|METHOD_RIGHT|1|1||||||F|
OBX|5|ST|METHOD_LEFT|1|1||||||F|
OBX|6|ST|MALFORM_RIGHT|1|4||||||F|
OBX|7|ST|MALFORM_LEFT|1|4||||||F|
OBR|2|||54111-0^Newborn Hearing Loss Panel|||20100418123201|||||||20100416111028||IP0006|||||||||F|||||||||STEVE||||||
OBX|1|ST|RESULT_LEFT_EAR|2|1||||||F|
OBX|2|ST|RESULT_RIGHT_EAR|2|1||||||F|
OBX|3|ST|SCREEN_TYPE|2|00202||||||F|
OBX|4|ST|METHOD_RIGHT|2|2||||||F|
OBX|5|ST|METHOD_LEFT|2|2||||||F|
OBX|6|ST|MALFORM_RIGHT|2|4||||||F|
OBX|7|ST|MALFORM_LEFT|2|4||||||F|
ZCA|1^1^NNU-NORTH6|32|MAMANATUSBABY@AOL.COM|212-777-8888|1|TESTER@AOL.COM|(516)-271-1475|2^2^2^2^2^2^2^2^2^2|IP0022|2|IP0022

10.3.3 Sample ADT message

MSH|^~\&|MEDITECH|IP0006|CAHEAR|CAHEAR|20100407115308||ADT^A01|Q5555999910001|P|2.6
PID|1||480956^^^PHK||NATUSBABY^GIRL|MAMA NATUSBABY|201003011400|2|NEOMETRICS^BABY|2|1001 MINERAL WELLS ST^^LOS ANGELES^CA^90210^1^^^06039^|06039|212-632-3912|212-333-6666|2|||1200543404^^^K0^FIN_NBR||||1|||0|||||
NK1|1|THOMAS^JACK|3|123 AVELYN LANE^^LOS ANGELES^CA^90210^US^^06039|212-555-1234|212-545-3214|1|||||||||||||2||||
PV1||I|||||||||
ZCA|1^1^NNU-NORTH6|32|MAMANATUSBABY@AOL.COM|212-777-8888|1|TESTER@AOL.COM|(516)271-1475|2^2^2^2^2^2^2^2^2^2|IP0006|2|IP0006

10.4 HL7 Message Mapping for Newborn Hearing Screening Message from Hospitals to DHCS

This section contains tables that describe the formatting, meaning, and constraints on values that can be provided in a HL7 message. All fields and components that are not listed will be ignored. Only the first repetition of a field will be used unless otherwise noted.

Each table has the following columns:

- HL7 Segment: This is the name of the segment.

- HL7 Position: The location of the value in the segment. This is the field and (if applicable) component numbers.
- Maximum Length: The maximum length in characters internal to the DMS application. Data that exceeds this limit will be omitted when the message is processed and will have to be entered by another means.
- HL7 Element Name: The name of the location in the HL7 Specification.
- DHCS Element Name: The specific meaning of this location where it differs from the HL7 Specification.
- Example Value: A sample of the values that could be sent in this location.

Notes: Notes about the location.

Additional information about the locations may be given after each segment's table.

10.4.1 MSH – Message Header Mapping

Data from the message header are used to identify the sender of the message and the message type being processed as well as logging a Unique Messaging ID.

Table 10-5 - Message Header Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
MSH	1		Field Separator		"|"	
MSH	2		Encoding Characters		"^ ~ \ &"	
MSH	3		Sending Application		"EPIC"	
MSH	4	10	Sending Facility		"IP0006"	
MSH	5		Receiving Application		"CAHEAR"	
MSH	6		Receiving Facility		"CAHEAR"	
MSH	7		Date/time of Messag		"20110203091446"	YYYY[MM[DD[HH[mm[SS]]]]]

			e			
MSH	8		Security			
MSH	9		Messag e Type			
MSH	9.1		Messag e Code		"ADT"	
MSH	9.2		Trigger Event		"A01"	
MSH	10	255	Messag e Control ID		"123456789A BCD"	
MSH	11		Processin ID		"T"	
MSH	12		Version ID		"2.6"	

Sending Facility – This field has the identity of the sending facility, which matches the Submitter ID. The state program uses this value to associate data in the message to the submitter of the data. This will be a unique value assigned to each hospital. Please contact the HL7 Interface Administrator for the hospital Submitter ID.

Date/Time of Message – This field is used to record the date and time a message is sent.

Message Type – This field is used to determine the type of message that is being sent to the state program. The message types supported by the interface are: ADT^A01, ADT^A08 and ORU^R01.

Message Control ID – This field contains an identifier that uniquely identifies the message for the sending facility.

Processing ID – This field specifies the mode that this data is being applied. Valid values are:

Table 10-6 - Processing ID

Value	Description
P	Production
D	Debugging
T	Training

Version ID – This field contains the HL7 version ID used by the Submitting facility which is used to match vocabulary for the incoming message. The value sent will be 2.x ("x" will vary based on the version used by the Submitter).

10.4.2 PID – Patient Identification Mapping

This segment is used to transmit Patient Demographics in the HL7 message.

Table 10-7 - Patient Identification Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
PID	1		Set ID		“1”	
PID	3		Patient Identifier List			
PID	3.1	17	ID Number	Medical Record Number	"123456789ABCD"	
PID	5		Patient Name			
PID	5.1	35	Family Name		"Smith"	
PID	5.2	20	Given Name		"Baby A"	
PID	6		Mother's Maiden Name			
PID	6.1	35	Family Name	Mother’s Legal (not Maiden) Family Name	"Smith"	
PID	6.2	20	Given Name		"MommyFirst"	
PID	7		Date/Time of Birth		"20110203091446"	YYYY[MM[DD[HH[mm[SS]]]]]
PID	8	1	Administrative Sex	Gender	"1"	See table below.
PID	9		Patient Alias	AKA		
PID	9.1	35	Family Name		"SMITHY"	
PID	9.2	25	Given Name		"ALLEN"	
PID	11		Patient Address	Mother’s Address		
PID	11.1	50	Street Address		"20 MAIN STREET"	These fields will be concatenated. In the DMS they will appear as "20 Main Street
PID	11.2		Other Designation		"APT#19A"	

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
						(Apt#19a)"
PID	11.3	50	City		"LOS ANGELES"	
PID	11.4	2	State or Province		"CA"	The postal abbreviation should be used.
PID	11.5	5	Zip or Postal Code		"90210"	
PID	11.6	1	Country		"1"	
PID	11.9	5	County/Parish Code		"06039"	
PID	12	5	County Code	Birth County	"06039"	This is the county the baby was born in.
PID	13		Phone Number - Home	Mother's Telephone Number		The entire phone number can be provided in component 1 or in components 6 and 7, but both the area code and local number should be provided. All non-digits will be stripped out and do not count toward the maximum length.
PID	13.1	10	Telephone Number		"212-555-1234"	
PID	13.6	3	Area Code		"212"	
PID	13.7	7	Local Number		"555-1234"	
PID	14		Phone Number - Business	Mother's Telephone Number - Business		The entire phone number can be provided in component 1 or in components 6 and 7, but both the area code and local number should be provided. All non-digits will be stripped out and do not count toward the maximum length.
PID	14.1	10	Telephone Number		"212-555-1234"	
PID	14.6	3	Area Code		"212"	
PID	14.7	7	Local Number		"555-1234"	
PID	15		Primary Language	Mother's Primary Language		
PID	15.1	1	Identifier		"2"	

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
PID	22	1	Ethnic Group	Race/Ethnicity	“1”	
PID	23	10	Birth Place	BIRTH HOSPITAL	"IP0006"	Birth Hospital is required and may be sent here, ZCA-11, or in an OBX segment.
PID	25	1	Birth Order		"1"	

Medical Record Number – This field contains the primary identifier used by the sending facility to identify a patient uniquely for a patient’s lifetime.

Family Name - This field contains the legal last name of the newborn.

Given Name – This field contains the legal first name of the newborn.

Mother’s Legal Family Name – This field contains the last name of the newborn’s mother

Mother’s Given Name – This field contains the first name of the newborn’s mother

Date/Time of Birth – This field contains the birth date of the newborn and time of birth (time of birth is optional).

Gender – This field contains the newborn’s gender. Valid values for this field are:

Table 10-8 - Gender

Value	Description
1	Male
2	Female
3	Unknown

AKA Family Name – alternate last name for the newborn

AKA Given Name – alternate first name for the newborn

Street Address – This field contains the street address of the mother

City – This field contains the city of the mother

State – This field contains the state of the mother

Zip code – This field contains the zip code of the mother

Country – This field contains the mother’s country of residence. Valid values are:

Table 10-9: Country of Residence

– Value	Description
1	US

2	Mexico
3	Other

County Code – This is the county in which the mother resides as per her address. FIPS (Federal Information Processing Standard) Codes are used for the County values. Refer to Table 10-10.

Birth County – This is the county in which the child was born. FIPS (Federal Information Processing Standard) Codes are used for the County values. Refer to Table 10-10.

Table 10-10: County (FIPS) Codes

FIPS Value	County
06001	Alameda
06003	Alpine
06005	Amador
06007	Butte
06009	Calaveras
06011	Colusa
06013	Contra Costa
06015	Del Norte
06017	El Dorado
06019	Fresno
06021	Glenn
06023	Humboldt
06025	Imperial
06027	Inyo
06029	Kern
06031	Kings
06033	Lake
06035	Lassen
06037	Los Angeles
06039	Madera
06041	Marin
06043	Mariposa
06045	Mendocino
06047	Merced
06049	Modoc
06051	Mono
06053	Monterey
06055	Napa
06057	Nevada
06059	Orange
06061	Placer
06063	Plumas
06065	Riverside

FIPS Value	County
06067	Sacramento
06069	San Benito
06071	San Bernardino
06073	San Diego
06075	San Francisco
06077	San Joaquin
06079	San Luis Obispo
06081	San Mateo
06083	Santa Barbara
06085	Santa Clara
06087	Santa Cruz
06089	Shasta
06091	Sierra
06093	Siskiyou
06095	Solano
06097	Sonoma
06099	Stanislaus
06101	Sutter
06103	Tehama
06105	Trinity
06107	Tulare
06109	Tuolumne
06111	Ventura
06113	Yolo
06115	Yuba
59599	OUT OF STATE
99999	OUT OF COUNTRY

Mother's Telephone Number – This field contains the home phone number of the mother

Mother's Telephone Number - Business – This field contains the business phone number of the mother.

Primary Language – This field contains the primary language of the mother. Valid values for this field:

Table 10-11: Language

Value	Description
2	English
3	Spanish
4	Cambodian
5	Chinese
6	Farsi

Value	Description
7	Hmong
8	Korean
9	Laotian
A	Russian
B	Vietnamese
Z	Other

Race/Ethnicity – This field contains the race/ethnicity of the newborn. Valid values for this field:

Table 10-12: Race/Ethnicity

Value	Description
1	Hispanic
2	American Indian
3	Asian
4	Black
5	Pacific Islander
6	White
7	Other
8	Unknown
9	Two or more races
A	Refused to answer

Birth Hospital – The code corresponding to the location of the baby's birth; i.e. "IP0006". This is not the hospital or facility name, but the ID number assigned to the hospital/facility by the State. In rare cases, the birth hospital will not be the same as submitting hospital, and the Birth Hospital ID will be different from the Submitter ID. A list of all CA hospitals with their ID numbers will be provided to each hospital.

Birth Order – The field contains the Birth Order information for the newborn. Valid values for this field:

Table 10-13: Birth Order

Value	Description
0	Not a multiple
1	First Multiple
2	Second Multiple
3	Third Multiple

Value	Description
4	Fourth Multiple
5	Fifth Multiple
6	Sixth Multiple
7	Seventh Multiple
8	Eighth Multiple

10.4.3 Next of Kin Mapping

The NK1 segment holds the mother or legal guardian information for newborn. NK1 segments for persons not identified as the mother or legal guardian will be ignored.

Table 10-14: Next of Kin Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
NK1	1		Set ID		"1"	
NK1	2		Name			
NK1	2.1	35	Family Name		"SMITH"	
NK1	2.2	20	Given Name		"JACK"	
NK1	3		Relationship			
NK1	3.1		Identifier		"3"	
NK1	4		Address			
NK1	4.1	50	Street Address		"123 Main Street "	These fields will be concatenated. In the DMS, they will appear as "123 Main Street (Suite#200)"
NK1	4.2		Other Designation		"Suite#200 "	
NK1	4.3	50	City		"LOS ANGELES"	
NK1	4.4	2	State or Province		"CA"	Use the state abbreviation.
NK1	4.5	5	Zip or Postal		"90210"	

			Code			
NK1	4.6	1	Country		"US"	US, Mexico or other
NK1	4.9	50	County Code		"06039"	
NK1	5		Phone Number			Repetitions of this field will be saved.
NK1	5.1	10	Telephone Number		"2126551234"	The phone number can be provided here as the entire number, or in components 6 and 7, but both the area code and local number should be provided. All non-digits will be stripped out and do not count toward the maximum length.
NK1	5.2	10	Telecommunication Use Code		"PRN"	REFER TO TABLE 10-16
NK1	5.3	10	Telecommunication Equipment Code		"PH"	REFER TO TABLE 10-17
NK1	5.4	50	Email Address		MMOUSE@MICKEYMOUSECLUB.COM	
NK1	5.5	1	Country Code		"1"	
NK1	5.6	3	Area/City Code		"212"	
NK1	5.7	7	Local Number		"6551234"	
NK1	6		Business Phone Number			The entire phone number can be provided in component 1 or in components 6 and 7,
NK1	6.1	10	Telephone		"212-555-1234"	

			Number			but both the area code and local number should be provided. All non-digits will be stripped out and do not count toward the maximum length.
NK1	6.6	3	Area Code		"212"	
NK1	6.7	7	Local Number		"555-1234"	
NK1	7		Contact Role			
NK1	7.1	1	Identifier	Legal Guardian Flag	"1"	Send a "1" if the demographic information in this segment was for a legal guardian. Send "0" otherwise.
NK1	20		Primary Languag e			
NK1	20.1	1	Identifier		"2"	

Family Name – This field contains the last name of the mother or legal guardian

Given Name – This field contains the first name of the mother or legal guardian

Relationship – This field is the indicator that identifies the relationship of the mother or legal guardian data being transmitted for the newborn. Valid values for this field:

Table 10-15: Next of Kin Relationship

Value	Description
2	Mother
3	Father
4	Aunt
5	Uncle
6	Grandparent
7	Sibling
8	Other
9	Other Relative
A	Adoptive Parent
B	Foster Parent
C	Cousin
D	Friend
E	Social Worker
F	Interpreter
G	Child Protective Services
H	Residential Healthcare Facility

Value	Description
I	None

Street Address – This field contains the street address of the mother or legal guardian

City – This field contains the city of the mother or legal guardian

State – This field contains the state of the mother or legal guardian

Zip code – This field contains the zip code of the mother or legal guardian.

Country – This field contains the country of residence of the mother or legal guardian. Refer to Table 10-9.

County Code – This field contains the county code of the mother or legal guardian. FIPS (Federal Information Processing Standard) Codes are used for the County values. Refer to Table 10-10.

Telephone Number – This field contains the home phone number, including area code, of the mother or legal guardian.

Telecommunication Use Code – Please see the table below for valid values. The relevant values are in bold.

Table 10-16: Telecommunication Use Code

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

Telecommunication Equipment Code – See the table below for valid values. The relevant values are in bold.

Table 10-17: Telecommunication Equipment Type

Value	Description
BP	Beeper
CP	Cellular Phone
FX	Fax
Internet	Internet address: use only if Telecommunication Use Code is NET
MD	Modem
PH	Telephone
TDD	Telecommunications Device for the Deaf
TTY	Teletypewriter
X.400	X.400 email address: use only if Telecommunication Use Code is NET

Email Address –Mother or legal guardian email address.

Area/City Code – Mother or legal guardian area code only.

Local Number – Mother or legal guardian telephone number without area code. i.e., "6514235"

Business Phone Number –Mother or legal guardian business phone number.

Legal Guardian Contact Role – Send a value of "1" if this is the legal guardian. If not, send "0".

Primary Language – This field contains the primary language for the mother or legal guardian. Refer to Table 10-11.

10.4.4 PV1 – Patient Visit Segment Mapping

While this segment is required in the HL7 standard, it is not required in this specification. It may be used to send the Newborn Unit information. If it is not used, the value should be sent in the ZCA segment.

Table 10-18: PV1 Segment Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
PV1	2	1	Patient Class		"I"	
PV1	3		Assigned Patient Location	Nursery Unit		
PV1	3.1	50	Point of Care	Unit (table 6-1)or Non-Nursery Unit	"1"	

Patient Class – See the User Defined Table from the HL7 standard. For the purpose of the DMS, send "I".

Figure 11: Patient Class

User-defined Table 0004 - Patient Class

Value	Description	Comment
E	Emergency	
I	Inpatient	
O	Outpatient	
P	Preadmit	
R	Recurring patient	
B	Obstetrics	
C	Commercial Account	
N	Not Applicable	
U	Unknown	

Assigned Patient Location – Nursery or other unit for the baby

Table 10-19: Assigned Patient Location

Value	Description
1	NICU
2	PICU
3	Other

10.4.5 ORC – Common Order Segment Mapping

While this segment is required in the HL7 standard, it is not required in this specification. It should be included as part of a well-formed ORU message, but no information will be used from it.

10.4.6 ZCA – Custom Segment – California State Newborn Hearing Screening Program

This document defines a custom 'Z' segment named ZCA. The data contained by the segment may instead be sent in a combination of other segments (NK1, PV1, OBX). The decision of presenting the information is determined by the implementing hospital.

The ZCA Segment is defined as follows:

Table 10-20: ZCA Custom Segment Mapping

HL7 Segment	HL7 Position	Maximum Length	DHCS Element Name	Example Value	Notes
ZCA	1		Acuity		
ZCA	1.1	1	Acuity	"1"	
ZCA	1.2	1	Unit	"1"	
ZCA	1.3	50	Non-Nursery Unit	"NNU-6 NORTH"	
ZCA	2	2	Gestational Age	"32"	
ZCA	3	50	Mother Email	ALEXISALLEN@AOL.COM	
ZCA	4		Mother Cell Phone		The entire phone number can be provided in component 1 or in components 6 and 7, but both the area code and local number must be provided. All non-digits will be stripped out and do not count toward the maximum length which is 10
ZCA	4.1	10	Telephone Number	"212-555-1234"	
ZCA	4.6	3	Area Code	"212"	
ZCA	4.7	7	Local number	"555-1234"	
ZCA	5	1	Mother Legal Guardian Flag	"1"	
ZCA	6	50	Legal Guardian Email	ALEXISALLEN@AOL.COM	
ZCA	7		Legal Guardian Cell Phone		The entire phone number can be provided in component 1 or in components 6 and 7, but both the area code and local number should be provided. All non-digits will be stripped out and do not count toward the maximum length which
ZCA	7.1	10	Telephone Number	"212-555-1234"	
ZCA	7.6	3	Area Code	"212"	
ZCA	7.7	7	Local Number	"555-1234"	

HL7 Segment	HL7 Position	Maximum Length	DHCS Element Name	Example Value	Notes
					is 10.
ZCA	8		Risk Factors		
ZCA	8.1	1	RF 01	"1"	Caregiver concern regarding hearing, speech, language, or developmental delay.
ZCA	8.2	1	RF 02	"1"	Family history of permanent childhood hearing loss.
ZCA	8.3	1	RF 03	"1"	Neonatal intensive care of more than 5 days or any of the following regardless of length of stay: ECMO, assisted ventilation, exposure to ototoxic medications (Gentamicin and tobramycin) or loop diuretics (furosemide/Lasix), and hyperbilirubinemia that requires exchange transfusion.
ZCA	8.4	1	RF 04	"1"	In utero infections, such as CMV, herpes, rubella, syphilis, and toxoplasmosis.
ZCA	8.5	1	RF 05	"1"	Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies.
ZCA	8.6	1	RF 06	"1"	Physical findings, such as white forelock, that are associated with a syndrome known to include a sensorineural or permanent conductive hearing

HL7 Segment	HL7 Position	Maximum Length	DHCS Element Name	Example Value	Notes
					loss.
ZCA	8.7	1	RF 07	"1"	Syndromes associated with hearing loss or progressive or late-onset hearing loss, such as neurofibromatosis, osteopetrosis, and Usher syndrome; other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson.
ZCA	8.8	1	RF 08	"1"	Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome.
ZCA	8.9	1	RF 09	"1"	Culture-positive postnatal infections associated with sensorineural hearing loss, including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis.
ZCA	9	10	Submitter ID	"IP0006"	This should be the same value as the one sent in MSH-4.
ZCA	10	1	Insurance Type	"2"	
ZCA	11	10	Birth Hospital	"IP0006"	This same value can be sent via an OBX or in PID-23

Acuity – This field contains the acuity of the patient. Valid values are listed below:

Table 10-21: Acuity

Value	Description
1	WBN
2	NICU

Unit – Baby's unit in the Hospital

Table 10-22: Unit

Value	Description
1	NICU
2	PICU
3	Other

Non-Nursery Unit – If Other is selected in Unit, please send the exact location in this field.

Gestational Age – This field contains the number in weeks of the gestational period for this patient.

Mother's Email Address – This field contains the email address for the newborn's mother.

Mother's Cell Phone – These fields contain the cell phone number for the newborn's mother

Mother's Legal Guardian Flag – This field contains an indicator that identifies the mother as the legal guardian. Valid Values are listed below:

Table 10-23: Mother's Legal Guardian Flag

Value	Description
0	Mother is not the legal guardian
1	Mother is the legal guardian.

Legal Guardian Email Address - This field contains the email address of the legal guardian.

Legal Guardian Cell Phone Number - These fields contain the cell phone number of the legal guardian.

Risk Factors - For each of the risk factors, the answer should be given from this table:

Table 10-24: Risk Factor

Value	Description
1	Yes
2	No
3	Not Entered

Submitter ID – Submitting Hospital ID number -- a number assigned to each hospital by the State.

Insurance Type – Patient insurance type

Valid values are listed below:

Table 10-25: Insurance Type

Value	Description
1	Medi-Cal
2	Healthy Families
3	HMO
4	Private
5	Not Insured
6	Unknown

Birth Hospital ID– Birth Hospital ID number – a number assigned to each hospital by the State. In rare cases, the birth hospital will not be the same as submitting hospital, and the Birth Hospital ID will be different from the Submitter ID. A list of all CA hospitals with their ID numbers will be provided to each hospital.

10.4.7 OBR – Observation Request Segment to be sent with ORU Result Messages

This segment is used to send data about the observation details pertaining to the screening results that are being sent as part of this message**. This is a required segment when sending results.**

Table 10-26: OBR Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
OBR	1	255	Set ID			
OBR	2	255	Placer Order Number			

OBR	3	255	Filler Order Number			
OBR	4		Universal Service Identifier			
OBR	4.1	255	Identifier		54111-0	
OBR	4.2	255	Text		Newborn Hearing Loss Panel	
OBR	7		Observation Date/Time			
OBR	7.1		Time		"20110203091446"	YYYYMMDDHHmmSS
OBR	14		Specimen Received Date/Time	Date/Time Results Received		
OBR	14.1	14	Time		"20110203091446"	YYYYMMDDHHmmSS
OBR	16		Ordering Provider			
OBR	16.1	50	ID Number	Ordering Hospital ID	"IP0006"	
OBR	25	50	Result Status		“F”	
OBR	34	50	Screener		“JamieS”	

Placer Order Number – Optional order number. Note: Included for future compatibility.

Filler Order Number – This number uniquely identifies the order for the receiving application.

Universal Service Identifier - This field contains the ID generated by the Hospital to identify the requested observation test from the hospital.

Observation Date/Time – This field contains the date and time the hearing screen results are collected (YYYYMMDDHHMMSS).

Specimen Received Date/Time – This field contains the date and time when the hearing screening was performed by the hospital

Ordering Hospital ID…

Results Status - Status for the result. Only final results of each screen should be sent, so this will be 'F'.

Screener - A hospital identifier for the screener/technician that performed the screen. The data should be unique so that the hospital can always identify the screener at a later date.

10.4.8 OBX – Result Segments

Results are sent via repeating OBX segments. The main difference between sending demographics via this segment and sending hearing screen results is the OBX-4 field. For demographics data this field is not necessary, but it is required when sending results to group an OBR segment with its related OBX segments. A matching value in the OBX-4 field and OBR-1 field associate the segments. Below is an example to illustrate this. The number in red below indicates the screening order, for example, "1" would be the initial screen, "2" the repeat screen, and so on.

OBR|**1**|||54111-0^Newborn Hearing Loss Panel|||20100419125701|||||||20100418111021||00001|||||||||||||||||||BOB||||||
OBX|1|CE|RESULT_LEFT_EAR|**1**|3|||||F|
OBX|2|CE|RESULT_RIGHT_EAR|**1**|3|||||F|
OBX|3|CE|SCREEN_TYPE|**1**|00201|||||F|
OBX|4|CE|METHOD_RIGHT|**1**|1|||||F|
OBX|5|CE|METHOD_LEFT|**1**|1|||||F|
OBX|6|CE|MALFORM_RIGHT|**1**|NONE|||||F|
OBX|7|CE|MALFORM_LEFT|**1**|NONE|||||F|

In the above example, that result set is associated with the information contained in the OBR. The result set tells us what the results were for the baby's hearing screen. The OBR gives us (1) observation details on who the screener and the provider were, (2) the date this screening was completed, and (3) the date the results were sent to the State. See the table below for more detail. Refer to the OBX Identifiers list for valid values for OBX-3 and OBX-5 fields.

Table 10-27: OBX Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
OBX	1	10	Set ID -- OBX			

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	DHCS Element Name	Example Value	Notes
OBX	2	50	Value Type			
OBX	3	50	Observation Identifier		VARIES	See list of OBX Identifiers for details.
OBX	4	50	Observation Sub-ID			
OBX	5		Observation Value			See OBX Identifiers in Table 10-4 for specific field lengths and example values.
OBX	11	1	Observation Result Status		"F"	

Set ID -- The sequential number for the OBX segment

Value Type – The data type for the variable. Please see the OBX identifiers table in section 10.2 for valid value types.

Observation Identifier – Please see the OBX identifiers table in section 10.2 for valid values.

Observation Sub-ID – The sequential number used to group OBX segments within an observation.

Observation Value – Please follow the values listed earlier in section 10.2 in this document for the identifier used. There is strict checking on the values and wrong values will cause errors in parsing the message.

Observation Result Status – The status for the result, 'F' is the standard value.

10.5 HL7 Message Mapping for Acknowledgements for Messages Sent by Hospitals

This section contains tables that describe the formatting, meaning, and constraints on values that can be provided in an HL7 ACK message.

10.5.1 MSH – Message Header Mapping

See section 10.4.1 for a description of this segment.

10.5.2 MSA – Message Acknowledgement

This segment identifies the acknowledgement code and message to which it applies.

Table 10-28: MSA Mapping

HL7 Segment	HL7 Position	Maximum Length	HL7 Element Name	Example Value	Notes
MSA	1	2	Acknowledgement Code	"AA"	This will be "AA".
MSA	2	255	Message Control ID	"123456789ABCD"	This is the Message Control ID from the original message.

10.6 Update Patients

For Update Patients, the message type needs to be ADT^A08 message type, Update Patient Information. A check is performed in the DMS system to make sure this patient record exists based on the following fields:

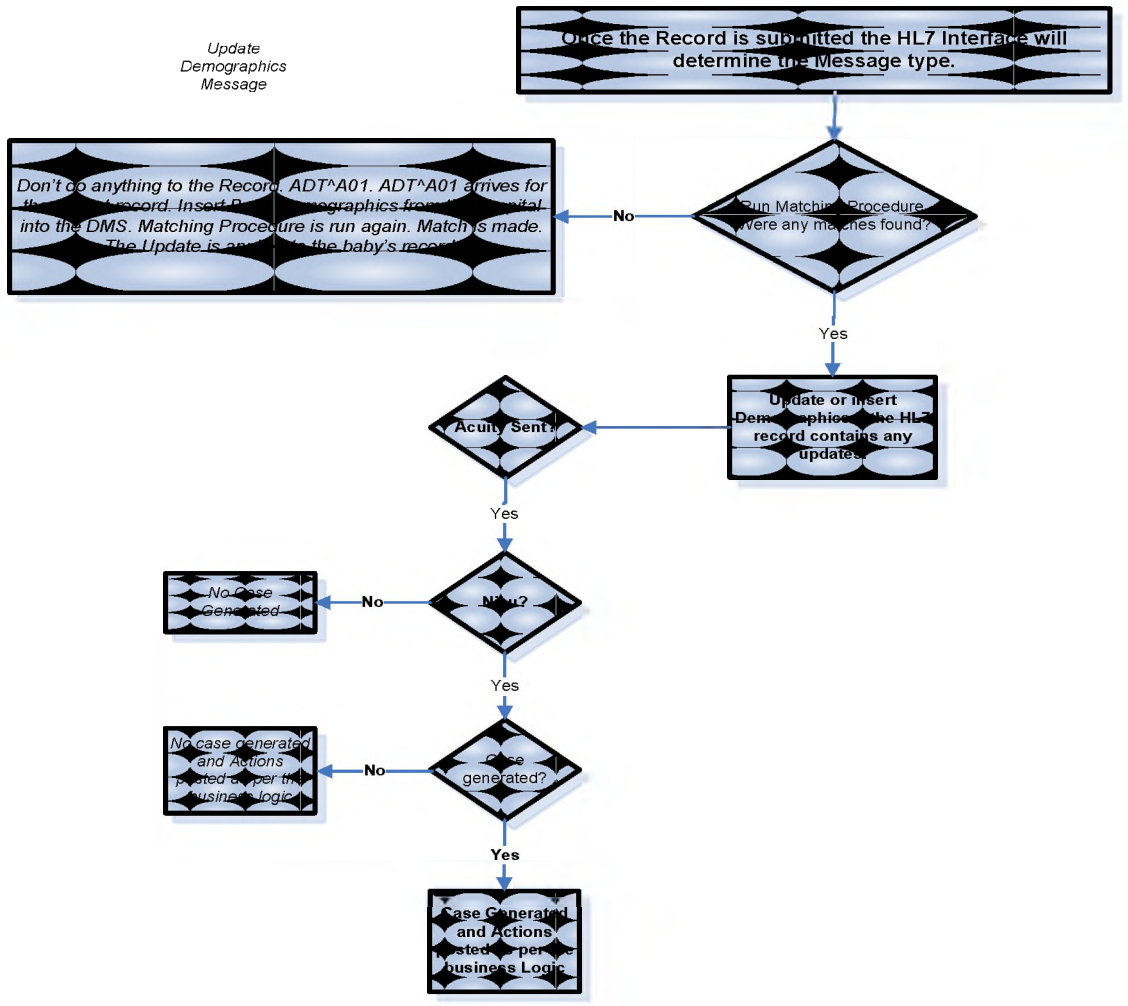
- Baby Last Name
- Baby AKA
- Baby Birth Date
- Baby Gender
- Baby First Name
- Medical Record Number
- Birth Hospital
- Submitter ID # of the Submitting Facility [i.e. IP0006]

If no record is found for this baby, the record will not be passed into the DMS. Instead, the service will wait for the birth hospital to submit a record for this baby via an ADT^A01 record]. Once that record is in the DMS, the check, which will be made periodically, will pick the A08 record as an update and then this Update Patient Record will update the patient record.

Please see Figure 12 below for more details.

Figure 12: Update Newborn Record via HL7 Update Demographic Message

ADT^A08



In order for A08 messages to be processed, they must be matched to initial data in the DMS. Data must have been submitted to the DMS either:

- manually
- through device upload
- through an ADT^A01 message or
- through an ORU HL-7 message

The A08 message will remain in the DMS until the matching procedure returns a match as outlined above. All unmatched A08 messages are visible in a grid on the HL7 page.

10.7 Mandatory Inbound Fields

The following fields are mandatory. If they are not received, the record will be placed in a grid pending and will need to be manually reviewed before passing into the DMS.
For all messages:

- MSH-1: Field Separator
- MSH-2: Encoding Characters
- MSH-4: Sending Facility (DHCS Unique ID# that will be distributed to all Hospitals)
- MSH-7: Date/Time of Message
- MSH-9: Message Type
- MSH-10: Message Control ID
- MSH-11: Processing ID
- MSH-12: Version ID
- PID-3.1: Medical Record Number
- PID-5.1: Patient Family Name
- PID-5.2: Patient Given Name
- PID-7: Patient Birth Date
- PID-8: Gender
- PID-23: Birth Hospital ID (or in the proper OBX segment)

For ORU messages only:

- OBR-3: Filler Order Number
- OBR-4: Universal Service Identifier
- OBR-7: Date of Screening
- OBR-14: Date/Time Results Received
- OBR-16: Ordering Provider (Hospital)
- OBR-34: Screener
- In some combination of ZCA fields or OBX segments:
    - Type of screen performed
    - Result for the right ear
    - Result for the left ear
    - Right ear screening method
    - Left ear screening method
    - Inpatient Right Ear Malformation
    - Inpatient Left Ear Malformation
    - The 9 Risk Factors

10.8 Matching Conditions and Affiliation Rules [Applies to all Message Types]

There are two types of interfaces for matching patient records: The Remote Data Entry web-based module for manual hospitals and automated matching for Device Uploads and HL7 electronic data.

Once a file containing patient data is uploaded to the DMS, it is automatically checked for duplicates and exceptions. Duplicates refer to records that already exist in the DHCS DMS or records that have potential matches in the system. Exceptions are patient records that failed field validation rules, such as data type.

Once matching is performed, the user uploading the file is taken to a page with data in one of four grids.

1. **Ready to Insert**. This display only applies to Device Upload and indicates that no matches were found. Alternatively, a match was found for a record which was missing results data. The data is being passed into the DMS via the current file upload. All new HL7 records will automatically be inserted into the DMS.

2. **Possible Matches**. This display applies to both Device Upload and HL7 and indicates a matching demographic record is present in the DMS (see Note[1] below). Matching records are based on these criteria:
    - *Primary match of Submitter ID and Medical Record Number, and*
    - *Secondary match of Baby Last Name or AKA, Baby DOB, Baby Gender, Baby First Name, and Birth Hospital, and*
    - *Tertiary match of Baby Last Name or AKA, Baby DOB, and Baby Gender*

3. **Exception data**. This display applies to both Device Upload and HL7 and indicates that the transmission is missing required fields (demographic and/or hearing results) or the user does not have access to these records because of rights.
    - ORU
    - ADT

4. **Orphaned Records**. This display applies only to HL7 transmission and includes any ADT^A08 messages that could not be matched to an existing record in the DMS. These messages will reside in the Orphaned Records grid until a match is found in the DMS.

Note [1]: HL7 records are processed as follows:

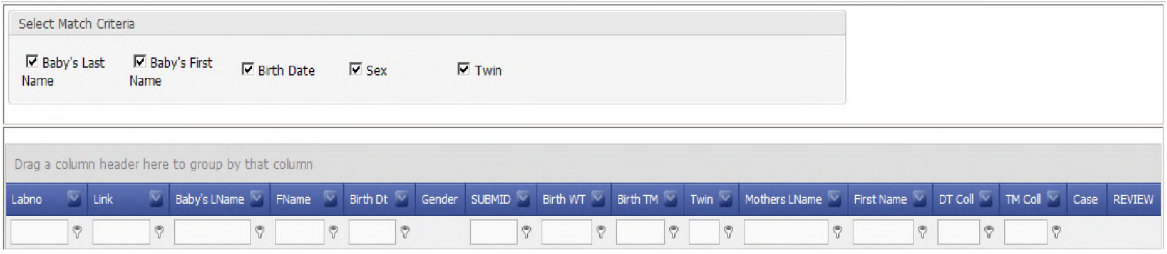
- A01 with demographics only and no previous record in the DMS is automatically posted to the DMS.
- A01/A08 with a match on demographics is found and there are three levels of matching that occur, see the three math levels above.
- A01/A08 message missing required fields that prohibited it from posting to DMS.
- A08 without a match to an existing record in the DMS is automatically posted to the Orphaned Records Grid until a match is received by the DMS.
- ORU without a match to an existing record in the DMS is automatically posted to the DMS ORU (with a match to a record in the DMS) with demographics is automatically posted to the system.
- ORU (with a match to a record in the DMS) with demographics is automatically posted to Possible Matches Grid.

The DMS provides links to screens that will allow users to modify data for HL7 messages. Once the changes are saved the DMS will re-process the record.

NOTE: Making changes to data in the DMS holding file will not make changes in the hospital HIS. It is imperative that the hospital staff review policy for data updates with the hospital IT and data managers when processing exceptions.

This is a step before a case is generated for a baby with abnormal hearing results and it is important that the duplicates be resolved by an informed individual in the hospital nursery or newborn hearing screening program. The matching criteria have been set by the State and the Hearing Coordination Centers (HCCs). These criteria help to ensure that no duplicate cases are generated for the same record.

Figure 13: Matching Module Screening



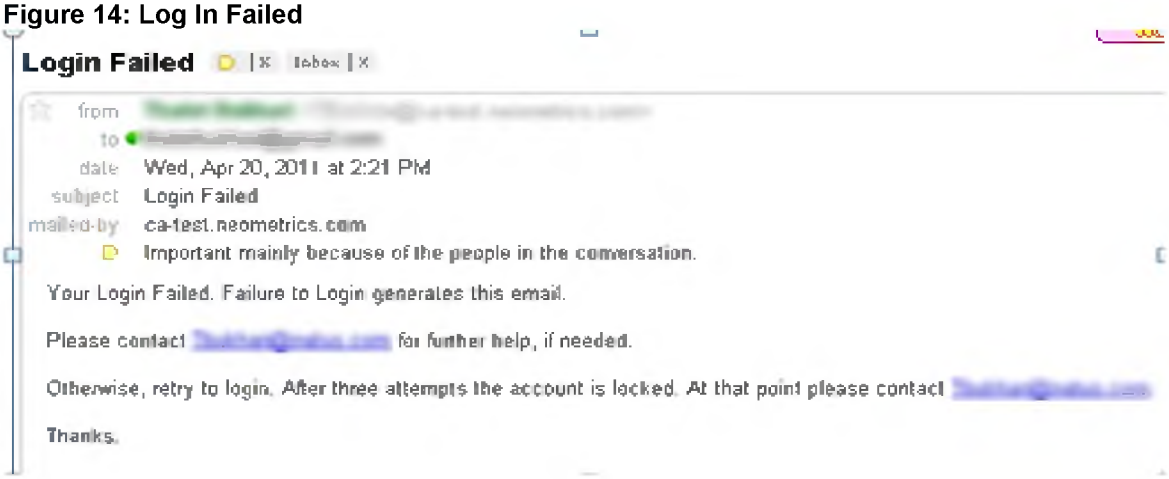
10.9 DHCS HL7 Emails to Hospital Administrators

Email messages will be sent to the designated hospital address to confirm a successful file upload or when an error is generated logging into the SFTP service.

- Login Failed: User failed to login because of an invalid password or public key or both.

  Example: See Figure 14

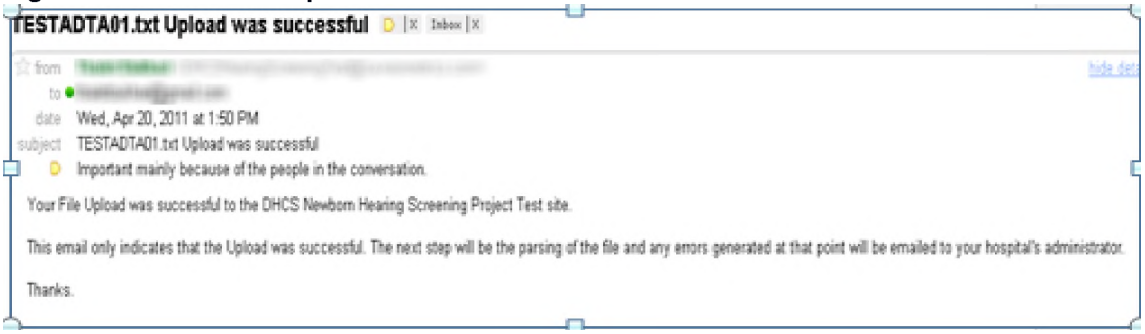
Figure 14: Log In Failed



- Upload Successful: File Upload was successful to the State's SFTP server. This does not imply that the files or batch of files were successfully parsed and entered into the State's Hearing Screening DMS.

Example: See Figure 15

Figure 15: Successful Upload



11 HL7 Concepts and Definitions

Messages – a **message** is the atomic unit of data transferred between systems. It is comprised of a group of segments in a defined sequence. Each message has a **message type** that defines its purpose. For example the ORU Message type is used to transmit portions of a patient's Patient Administrative (ADT) data from one system to another. A three character code contained within each message identifies its type.

The real-world event that initiates an exchange of messages is called a **trigger event**. These codes represent values such as a live birth (A01) or initial screen results are available (R01). There is a one-to-many relationship between message types and trigger event codes. The same trigger event code may not be associated with more than one message type.

Segments – a segment is a logical grouping of data fields. Segments of a message may be required or optional. They may occur only once in a message or they may be allowed to repeat. Each segment is given a name. For example, the ORU message may contain the following segments: Message Header (MSH), and Patient ID (PID). Each segment is identified by a unique three-character code known as the Segment ID.

Fields – a field is a string of characters. HL7 does not discriminate how systems actually store data within an application. When fields are transmitted, they are sent as character strings. Except where noted, HL7 data fields may take on the null value. Sending the null value, which is transmitted as two double quote marks (""), is different from omitting an optional data field. The difference appears when the contents of a message will be used to update a record in a database rather than create a new one. If no value is sent, (i.e., it is omitted) the old value should remain unchanged. If the null value is sent, the old value should be changed to null.

Component – a field may be further subdivided into components to define discrete data within the field.

Position (sequence within the segment) – this is the ordinal position of the data field and component within the segment. This number is used to refer to the data field or component.

12 Screening Device Data File Upload

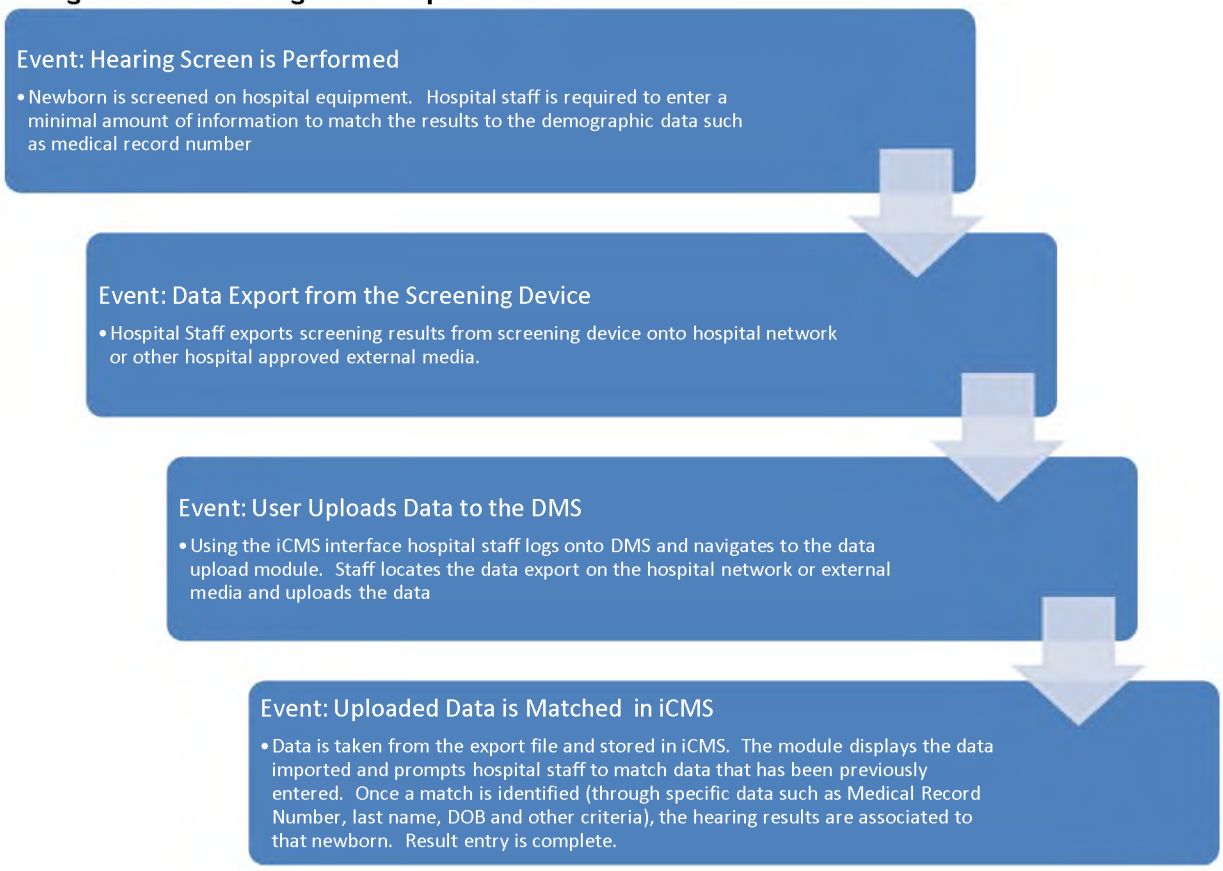
12.1 Hospital Requirements

Most hearing screening devices can export screening results. The DMS interface currently supports the HiTrack or Algo5 XML formats. The Hospital IT staff is required to provide support to hospital staff to ensure that the file is available for import. The following tasks may be required in order for hospitals to upload data export files from hearing screening devices:

- Network support for screening devices – Screening devices may need to be added to the hospital network so that exported files can be uploaded to the DMS
- Support for thumb drives ("sneaker net") – Devices that cannot be networked may use other media to copy data files from the device to the hospital network.
- Browser access to the hospital network or external media – The DMS runs in a web browser. Data upload requires that the upload module have access to the exported data file, either on the hospital network or external media.

Once the exported data file is in a location that can be accessed by the system, the DMS will upload the file securely to the State servers. Once the file is uploaded, hospital staff uses the DMS to associate the device data to the newborn demographics that already exist in the system. A basic flow diagram follows:

Figure 16: Screening Device Upload Flow



13 HiTrack File Format Information

The following section describes the HiTrack File Format. You can visit http://www.hitrack.org for additional details. The following document can be found on that website and has been used to create much of the information presented here:
http://www.hitrack.org/Content/Data_Linking_with_HITRACK.pdf

13.1 HiTrack Flat File Format

DMS supports flat file data exports from newborn hearing screening devices. The flat file export is defined in the following way:

Table 13-1: HiTrack Fields

Field Type	Format Required
Text Fields	Enclosed in quotes
Date Fields	Use the yyyymmdd format. Where: yyyy = four-digit year mm = two-digit month dd = two digit day
Yes/No Fields	Use Y or N
Field Separator	Comma (,), Commas must be used even if a field has no data.
Record separator	Carriage return/linefeed
End of file marker	1A hex or CHR(26)

13.2 HiTrack Flat File Name

Hospital staff should decide on a naming convention for the flat files that are generated. The creation and validity of these files are the responsibility of each hospital IT staff. The DMS does not have requirements regarding the name of the file. Once a file is uploaded to the DMS, it is deleted from the DMS servers.

HiTrack file names will be determined with input from the hospital however there is no standard naming convention utilized.

13.3 HiTrack Flat File Data Structure

The HiTrack flat file format maintains a specific file format that should be known to each hearing screening device. The DMS uses the data imported to match the hearing results to the demographics data (if previously entered). In order for results to merge automatically, some demographic data fields are required to be entered into the screening device and uploaded to the DMS. These fields are:

- Medical Record Number
- Baby's Last Name
- Baby's First Name
- Baby's Gender
- Baby's Date of Birth

These fields pertain to infant demographic information only. There are other fields which are mandatory if results exist in the file. These are indicated with a YES in the required column in the table below. The HiTrack file format is detailed in the table below.

Table 13-2: HiTrack File Format Fields

Field Name	Type	Required	Length	Description	Data Transmitted to DMS
CMID	Character	Yes	15	Child's Medical Record Number	Yes
CLAST	Character	Yes	20	Child's last name	Yes
CFIRST	Character	Yes	15	Child's first name	Yes
CSEX	Character	Yes	1	Child's gender (M male; F=female)	Yes
CDOB	Date	Yes	8	Child's date of birth (yyyymmdd)	Yes
CTOB	*Character*		*5*	*Child's time of birth (must be on 24-hour clock, hh:mm)*	
MULTI_CODE	*Character*		*1*	*Child's multiple birth code (S=single birth; multiple, A, B, C etc.)*	
RACE	*Character*		*2*	*Child's race*	
COHORT	*Character*		*2*	*Not used*	
STAGE	Character	Yes	1	Inpatient or outpatient status (I=Inpatient; O=Outpatient).	
HOSP_CODE	Character	Yes	3	Hospital code. This is defaulted from the user logged into the DMS	
SCRN_SITE	*Character*		*3*	*Screening-site code*	
TYPE	*Character*		*1*	*Nursery type*	
PE_ID	*Character*		*4*	*Pediatrician's ID*	
INS_CODE	*Character*		*2*	*Insurance code*	
BW_LOCAL	*Number*		*7*	*Not used*	
BW_TYPE	*Character*		*1*	*Not Used*	
BW_GRAMS	*Number*		*5*	*Child's birth weight in grams.*	
SCRN_TYPE	Character	Yes	1	Type of screening results	Yes

Field Name	Type	Required	Length	Description	Data Transmitted to DMS
				(O = TEOAE; D=DPOAE; G = Generic OAE; A = A-ABR)	
IRO	Character	Yes	1	Right ear OAE result (see Screening Outcomes in Table 13-3)	Yes
IDRO	Date	Yes	8	Right ear OAE test date (yyyymmdd)	
IRODTA	Character	Yes	12	Screening data test number for right OAE	
INITSCRNRO	Character	Yes	3	Right ear OAE screener ID	
INAUDOAE_R	*Character*		*3*	*Right ear OAE scoring audiologist ID*	
ILO	Character	Yes	1	Left ear OAE result (see Screening Outcomes in Table 13-3)	Yes
IDLO	Date	Yes	8	Left ear OAE test date (yyyymmdd)	Yes
ILODTA	Character	Yes	12	Screening data test number for left OAE	
INITSCRNLO	Character	Yes	3	Left ear OAE screener ID	
INAUDOAE_L	*Character*		*3*	*Left ear OAE scoring audiologist ID*	
IRA	Number	Yes	1	Right ear ABR result (see Screening Outcomes in Table 13-3	Yes
IDRA	Date	Yes	8	Right ear ABR test date (yyyymmdd)	Yes
IRORUA	Character	Yes	12	Screening data test number for right ABR	
INITSCRNRA	Character	Yes	3	Right ear ABR screener ID	
ILA	Character	Yes	1	Left ear ABR result (see Screening Outcomes in Table 13-3	Yes

Field Name	Type	Required	Length	Description	Data Transmitted to DMS
IDLA	Date	Yes	8	Left ear ABR test date (yyyymmdd)	Yes
ILORUA	Character	Yes	3	Screening data test number for left ABR	
INITSCRNLA	Character	Yes	6	Left ear ABR screener ID	

13.4 Standard Field Values

The HiTrack export file has several suggested field values that are included in the HiTrack specification. The following field values represent the values accepted by the DMS. Hospital staff should contact their device manufacturers to ensure that the device output complies with this requirement.

Table 13-3: Screening Outcomes

Value	Description
1	**Pass** – pass criteria met
2	**Refer** – pass criteria not met; referral for further screening or follow-up
N	**Not Required** – no attempt made to re-screen an ear that passed previously.
M	**Missed** – no screening attempt made on either ear before discharge. (Inpatient screening only)
R	**Waived** – parents waived IP screening.
T	**Transferred** – infant transferred to another facility prior to screening.
D	**Deceased** – infant expired.

14 Algo5 XML Format Information

14.1 Algo 5 XML Format

The DMS accepts data in Algo 5 XML format. As with the HiTrack file, the hospital is required to provide support to staff to create this file and place in a location that the DMS can access it. All the fields in table 13-2, where it is indicated "yes" in the column Data Transmitted to DMS need to be available in the XLM file. Note: The OAE test is not available from the Algo5 therefore the OAE results are not available in the sample XML file below. Sample XML File

The following is an example of an XML file. The fields highlighted in yellow below are transmitted to the DMS.

```
Algo5>
  <Culture>en-US</Culture>
- <PatientTestRecord>
- <Patient>
- <DemographicData>
  <Id>defdc9fd-2526-4ee3-8fb2-8b91c52263ac</Id>
  <MedicalRecordNumber>002247</MedicalRecordNumber>
  <FirstName>nbgirl2</FirstName>
  <LastName>test</LastName>
  <MiddleInitial />
  <AlsoKnownAs />
  <Birthdate>12/10/2010 12:00:00 AM</Birthdate>
  <BirthLocation />
  <Gender>2</Gender>
  <Address1 />
  <Address2 />
  <City />
  <State />
  <PostalCode />
  <Country />
  <Nationality />
  <Height />
  <Weight />
  <Telephone />
  <MobilePhone />
  <CurrentPediatrician />
  <MothersFirstName />
  <MothersLastName />
  <CaregiverFirstName />
  <CaregiverLastName />
  <Comment />
  <Other />
  <DischargeDate />
  <ArchiveDate />
  <ExportDate />
```

```
<CreationDate />
<LastModified>1/4/2011 4:36:39 PM</LastModified>
<UserText1 />
<UserText2 />
<UserText3 />
<UserText4 />
<UserText5 />
<UserDate1 />
<UserDate2 />
<UserDate3 />
<UserDate4 />
<UserDate5 />
<MothersBirthdate />
</DemographicData>
<RiskFactors />
</Patient>
- <Test>
- <TestResult>
<Id>b4b54ef7-2708-4798-b678-2f4e7cf737a3</Id>
<PatientId>defdc9fd-2526-4ee3-8fb2-8b91c52263ac</PatientId>
<TestType>1</TestType>
<LE_Result>1</LE_Result>
<RE_Result>3</RE_Result>
<TestDateTime>1/4/2011 4:39:28 PM</TestDateTime>
<Duration>972.3</Duration>
<Pediatrician />
<Medication />
<Physician />
<Examiner>sylvia</Examiner>
<Reason />
<ReferredBy />
<TestFacility />
<Comment />
<Other />
<Conclusion />
<Recommendation />
<Interpretation />
<TestInfo />
<Location>vmc</Location>
<LocationType>0</LocationType>
<ArchiveDate />
<ExportDate />
<UserAccountId>6e0d0911-2707-4f63-95de-12d985c5b006</UserAccountId>
<UserText1 />
<UserText2 />
<UserText3 />
<UserText4 />
```

```
<UserText5 />
<UserDate1 />
<UserDate2 />
<UserDate3 />
<UserDate4 />
<UserDate5 />
</TestResult>
- <Plugin type="ABR">
<ResultId>c89daa71-c306-4e56-9db2-a0ed189167e0</ResultId>
<Method>LeftRightSimultaneous</Method>
<Application>Amplitude35dBSPL</Application>
<Duration>972.299987792969</Duration>
<StartTime>1/4/2011 4:39:28 PM</StartTime>
<MyogenicNoise>0</MyogenicNoise>
<AmbientNoise>0</AmbientNoise>
<ImpedanceVertexCommon>2</ImpedanceVertexCommon>
<ImpedanceNapeCommon>2</ImpedanceNapeCommon>
- <PreAmplifier>
<Id>8857f4af-214a-4015-a27c-d4b5c5e3ddfa</Id>
<SerialNumber>p500217</SerialNumber>
<Version>Ver1.0</Version>
<Type>0</Type>
<CompatibleType>0</CompatibleType>
<ManufacturingDate>6/11/2008 2:08:08 PM</ManufacturingDate>
</PreAmplifier>
- <Probe>
<Id>38da06f3-860d-4575-ae0f-9f6d26a5c44d</Id>
<SerialNumber>A501479</SerialNumber>
<Version>VER1.1</Version>
<Type>0</Type>
<CompatibleType>0</CompatibleType>
<CalibrationDate>12/19/2009 7:44:30 AM</CalibrationDate>
<NextCalibrationDate>8/30/2011 4:03:58 PM</NextCalibrationDate>
<CalibrationData>31449-32796-1790-5661-2266-7167-40-7100000-6100000-35-4160599-3574600-0-0-
0-0-0-0-0-0-0</CalibrationData>
</Probe>
- <SystemInfo>
<Id>15da608b-dfda-426e-8c95-49a4a1acb93f</Id>
<FWVersion>0.0.2.D</FWVersion>
<HWVersion>Ver1.0</HWVersion>
<SWVersion>1.1.12.2</SWVersion>
<HwSerialNumber>D500024</HwSerialNumber>
<HwType>0</HwType>
<CompatibleHwType>0</CompatibleHwType>
<ManufacturingDate>3/28/2008 3:27:13 PM</ManufacturingDate>
</SystemInfo>
- <LeftEarAABRDetails>
```

```
<DetailsId>9545fea3-fee1-4144-9e5a-daad4d3075b7</DetailsId>
<AABRResultId>c89daa71-c306-4e56-9db2-a0ed189167e0</AABRResultId>
<TestedEar>Left</TestedEar>
<Result>Incomplete</Result>
<FullResult>Halted</FullResult>
<Sweeps>7489</Sweeps>
<RejectedSweeps>0</RejectedSweeps>
<LikehoodRatio>38</LikehoodRatio>
<TemplateShift>0</TemplateShift>
<LikehoodRatioNumberHistory>0</LikehoodRatioNumberHistory>
</LeftEarAABRDetails>
- <RightEarAABRDetails>
<DetailsId>2d43c72a-0962-4495-bdd6-3462402f1ecb</DetailsId>
<AABRResultId>c89daa71-c306-4e56-9db2-a0ed189167e0</AABRResultId>
<TestedEar>Right</TestedEar>
<Result>Pass</Result>
<FullResult>Pass</FullResult>
<Sweeps>5013</Sweeps>
<RejectedSweeps>0</RejectedSweeps>
<LikehoodRatio>189</LikehoodRatio>
<TemplateShift>0</TemplateShift>
<LikehoodRatioNumberHistory>0</LikehoodRatioNumberHistory>
</RightEarAABRDetails>
<RawDataId>00000000-0000-0000-0000-000000000000</RawDataId>
<TestResultId>b4b54ef7-2708-4798-b678-2f4e7cf737a3</TestResultId>
<TotalTestTime>0</TotalTestTime>
<ScreeningInterrupts>3</ScreeningInterrupts>
</Plugin>
</Test>
</PatientTestRecord>
</Algo5>
```


15 Data Matching for Uploaded Data

Data that are uploaded must be matched to an existing demographic data record or they will be treated as a new record in the DMS system.

15.1 Successful Data Match

When hearing results can be associated with an existing record, the hearing results are attached to the record based on the data imported. The DMS uses the following information when attempting to match data that have been uploaded to existing data records:

1. Primary match of Submitter ID and Medical Record Number,
2. Secondary match on Baby Last Name or AKA, Baby DOB, Baby Gender, Baby First Name, and Birth Hospital, or
3. Tertiary match on Baby Last Name or AKA, Baby DOB, and Baby Gender.

Any records that cannot be matched to an existing record using the above criteria will be considered unmatched.

15.2 Unmatched Data Process

Data that are unmatched are displayed to the user for manual intervention. Refer to the matching grids section.

15.2.1 Possible matches to existing records in the DMS

The hearing device records MAY exist in the Data Management Service. Select the "Match" link next to each record to view the demographic data of the possible matched record – in order to determine if the new data is a match to an existing patient.

15.2.2 Exception Data

The hearing device records cannot be inserted in the Data Management Service because they are missing required fields of information. Review the following patients; and make note of the patients that need to be re-uploaded. Once the patient data has been noted and re-uploaded to DMS the user should delete the Exception Data from the grid.

Figure 17: Device Upload Screen

16 Table of Captions

16.1 Figures

16.2 List of Tables