Impact of Electronic Health Records Implementation on the Early Detection Hearing and Intervention Programs

Discretionary Advisory Committee on Heritable Disorders in Newborns and Children
May 29, 2014

John Eichwald, M.A., Chief
Child Development and Disability (CDD) Branch
Division of Human Development and Disability (DHDD)
National Center on Birth Defects and Developmental Disabilities (NCBDDD)
Centers for Disease Control and Prevention (CDC)
Timeline

2007 - 2008
AHIC
Newborn Screening Use Case / NLM Coding and Terminology Guide

2008 - 2010
HITSP
Interoperability Specification (IS 92)

HITECH Act

2009 - 2014
IHE/HIMSS
EHDI IHE Technical Framework
IHE Testing at Connectathons
HIMSS Interoperability Showcases
PHDSC CDA Pilot Projects

2011 - 2014
HL7
PH Function Profile/EHDI DSTU

2012 - 2014
CMS/ONC
MU2 CQM / S&I PHRI
### Interoperability Specification

**IS 92 - Newborn Screening Interoperability Specification**

The Newborn Screening Interoperability Specification describes the information flows, issues, and system capabilities supporting newborn screening reporting and information exchanges among clinical care settings and public health.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Title / Version</th>
<th>Referenced by</th>
<th>Status</th>
<th>Document Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 92</td>
<td>Newborn Screening Interoperability Specification</td>
<td>IS 92 V:1.0</td>
<td>Released (Panel Approved)</td>
<td>DOWNLOAD</td>
</tr>
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</table>
Integrating the Healthcare Enterprise (IHE) Quality, Research and Public Health (QRPH)
Integrating the Healthcare Enterprise

IHE Quality, Research and Public Health (QRPH)
Technical Framework Supplement

Early Hearing Detection and Intervention: Screening, Short-Term Care, and Clinical Surveillance for Hearing Loss (EHDI)

Draft for Public Comment
COMMUNICATION (101)

Right Information
Right Person
Right Time
Right Format
Health Information Standards
“Semantic Interoperability”

ICD/CPT
LOINC
SNOMED-CT
RxNorm
DICOM Images
Value Sets
Conditions View

The Conditions View presents the conditions you selected on a previous screen, and for each condition, the related Enzyme Commission code (when applicable), the Secretary's Advisory Committee on Heritable Disorders in Newborns and Children (SACHDNC) Category, and International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9-CM and ICD-10-CM) codes.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Abbr</th>
<th>SACHDNC Category</th>
<th>SNOMED CT Code</th>
<th>ICD-9-CM Code</th>
<th>ICD-10-CM Code</th>
<th>Affected Protein</th>
<th>EC#</th>
<th>UniProt Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing Loss</td>
<td>HEAR</td>
<td>Core</td>
<td>15188001</td>
<td>389.9</td>
<td>H91.90</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Critical Congenital Heart Disease</td>
<td>CCHD</td>
<td>Core</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Critical congenital heart disease</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

MS/MS (Tandem Mass Spectrometry) Measured Conditions

Amino Acid Disorders

<table>
<thead>
<tr>
<th>Condition</th>
<th>Abbr</th>
<th>Category</th>
<th>SNOMED CT Code</th>
<th>ICD-9-CM Code</th>
<th>ICD-10-CM Code</th>
<th>Affected Protein</th>
<th>EC#</th>
<th>UniProt Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argininemia</td>
<td>ARG</td>
<td>Secondary</td>
<td>23501004</td>
<td>270.6</td>
<td>E72.21</td>
<td>Arginase</td>
<td>3.5.3.1</td>
<td>P05089</td>
</tr>
<tr>
<td>Argininosuccinic aciduria</td>
<td>ASA</td>
<td>Core</td>
<td>41013004</td>
<td>270.6</td>
<td>E72.22</td>
<td>Argininosuccinate lyase</td>
<td>4.3.2.1</td>
<td>P04424</td>
</tr>
<tr>
<td>Carbamoyl-phosphate synthase deficiency</td>
<td>CPS</td>
<td>Other</td>
<td>62522004</td>
<td>270.6</td>
<td>E72.29</td>
<td>Carbamoyl-phosphate synthase (ammonia)</td>
<td>6.3.4.16</td>
<td>P31327</td>
</tr>
<tr>
<td>Citrullinemia type I</td>
<td>CIT-I</td>
<td>Core</td>
<td>398680004</td>
<td>270.6</td>
<td>E72.23</td>
<td>Argininosuccinate synthase</td>
<td>6.3.4.5</td>
<td>P00966</td>
</tr>
<tr>
<td>Citrullinemia type II</td>
<td>CIT-II</td>
<td>Secondary</td>
<td>30528005</td>
<td>270.6</td>
<td>E72.23</td>
<td>Calcium-binding mitochondrial carrier protein Aralar2</td>
<td>None</td>
<td>Q9UJS0</td>
</tr>
<tr>
<td>Dihydrolipoamide dehydrogenase deficiency</td>
<td>E3</td>
<td>Core</td>
<td>29914000</td>
<td>270.3</td>
<td>E71.0</td>
<td>Dihydrolipoyl dehydrogenase</td>
<td>1.8.1.4</td>
<td>P09622</td>
</tr>
<tr>
<td>Disorders of biotinidase</td>
<td>BIOPT-BS</td>
<td>Secondary</td>
<td>237914002</td>
<td>270.1</td>
<td>E70.1</td>
<td>6-pyruvoyl-tetrahydropterin</td>
<td>4.2.3.12</td>
<td>Q03393</td>
</tr>
</tbody>
</table>
### Matched Value Sets

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code System</th>
<th>Steward</th>
<th>OID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing Examination</td>
<td>Extension</td>
<td>SNOMEDCT</td>
<td>NCBODD</td>
<td>2.16.840.114222.4.1.214079.1.2</td>
</tr>
<tr>
<td>Livebirth</td>
<td>Extension</td>
<td>SNOMEDCT</td>
<td>NCBODD</td>
<td>2.16.840.114222.4.1.214079.1.1</td>
</tr>
<tr>
<td>Medical Reasons</td>
<td>Extension</td>
<td>SNOMEDCT</td>
<td>NCBODD</td>
<td>2.16.840.114222.4.1.214079.1.7</td>
</tr>
<tr>
<td>Newborn Hearing Screen Left</td>
<td>Extension</td>
<td>LOINC</td>
<td>NCBODD</td>
<td>2.16.840.114222.4.1.214079.1.3</td>
</tr>
<tr>
<td>Newborn Hearing Screen Right</td>
<td>Extension</td>
<td>LOINC</td>
<td>NCBODD</td>
<td>2.16.840.114222.4.1.214079.1.4</td>
</tr>
<tr>
<td>Pass Or Refer</td>
<td>Extension</td>
<td>SNOMEDCT</td>
<td>NCBODD</td>
<td>2.16.840.114222.4.1.214079.1.6</td>
</tr>
</tbody>
</table>
### View Information

**View Name**: JH EHD: Screening, Short-Term Care, and Clinical Surveillance for Hearing Loss

**View Description**: Value sets associated with JH Early Hearing Detection and Interventions Screening, Short-Term Care, and Clinical Surveillance for Hearing Loss (JH EHD)

**View Status**: Published

**View Status Date**: 12/16/2010

**View Version**: 2

**View Version Status**: Published

**View Version Date**: 02/15/2012

**View Version Description**: Updated JIC-H-EHD Newborn Hearing Loss Diagnosis value set - added permanent concept.

**View Notes**: The Early Hearing Detection and Intervention Content Profile (JH EHD Content Profile) is aimed

### Version History

- Version 2 (Current)

### 13 Value Sets found

<table>
<thead>
<tr>
<th>Value Set Code</th>
<th>Value Set Name</th>
<th>Version #</th>
<th>Value Set OID</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHVS_HearingLossRiskFactors_JCH_EHDI</td>
<td>JCH-EHDI Hearing Loss Risk Factors</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.11</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_HearingLossRiskFactorsProcedures_JCH_EHDI</td>
<td>JCH-EHDI Hearing Loss Risk Factors - Procedures</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.12</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_HearingScreenLeft_JCH_EHDI</td>
<td>JCH-EHDI Hearing Screen Left</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.8</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_HearingScreenRight_JCH_EHDI</td>
<td>JCH-EHDI Hearing Screen Right</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.9</td>
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</tr>
<tr>
<td>PHVS_NewbornHearingLossDiagnose_JCH_EHDI</td>
<td>JCH-EHDI Newborn Hearing Loss Diagnosis</td>
<td>2</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.14</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_NewbornHearingLossReferrals_JCH_EHDI</td>
<td>JCH-EHDI Newborn Hearing Loss Referrals</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.16</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_NewbornHearingProcedure_JCH_EHDI</td>
<td>JCH-EHDI Newborn Hearing Procedure</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.17</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_NICUServiceDeliveryLocation_JCH_EHDI</td>
<td>JCH-EHDI NICU Service Delivery Location</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.13</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_OutpatientEncounter_JCH_EHDI</td>
<td>JCH-EHDI Outpatient Encounter</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.2</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_ProcedureDenied_JCH_EHDI</td>
<td>JCH-EHDI Procedure Denied</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.20</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_ReasonForNoFollowUpPatientReason_JCH_EHDI</td>
<td>JCH-EHDI Reason for no Follow-up - Patient Reason</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.7</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_ReasonForNoHearingLossDiagnose_JCH_EHDI</td>
<td>JCH-EHDI Reason for no Hearing Loss Diagnosis</td>
<td>1</td>
<td>1.3.6.1.4.1.19376.1.7.3.1.1.15.2.15</td>
<td>Details</td>
</tr>
<tr>
<td>PHVS_JointCommissionMedicalReason_JCH_EHDI</td>
<td>Joint Commission Medical Reason</td>
<td>1</td>
<td>1.3.6.1.4.1.33395.1.3.0.75</td>
<td>Details</td>
</tr>
</tbody>
</table>
Health Information Messaging
“Technical Interoperability”

CONTENT
CREATOR

MESSAGING

HL7 V2.x/CDA
DSTU
Hearing Loss Panel (HL7 v2.5.1)

OBR|17|128993 ^ ST ELSEWHERE HOSPITAL^ 9999999999 ^NPI|999555^ TNSPHLAB^77D7777777^CLIA |54111-0^Newborn hearing loss panel^LN |||201010141853|||^VH|||201010151121||1111111111^Smiles^Minnie^Dr^N PI&&2.16.840.1.113883.4.6&ISO^L ^^^NPI^^^^^MD|||201010160918|||F

OBX|1|TX|57700-7^Hearing loss newborn screening comment/discussion ^LN||Any baby with clinical features suggestive of hearing loss requires clinical and diagnostic follow-up regardless of whether the NMS result is normal or abnormal.|||N|||F

OBX|2|CE|54109-4^Newborn hearing screen - right^LN||LA10392 1^Pass^LN|||N|||F

OBX|3|CE|54108-6^Newborn hearing screen - left^LN||LA10392 1^Pass^LN|||N|||F

OBX|4|CE|54106-0^Newborn hearing screen method^LN||LA10388-9^Auditory brain stem response^LN|||N|||F

HRSA/NLM Guidance for Sending Electronic Newborn Screening Results with HL7 Messaging 10/28/2011
This implementation guide focuses on the secure transmission of newborn hearing screening results from screening equipment to a public health program by specifying the interface through an Electronic Health Record (EHR) or a device manager system.
EHDI DSTU

intended to facilitate the exchange of:

• sending and receiving
  - screening results of each ear
  - reason screen not done
  - patient demographics
  - hearing loss risk indicators (risk factors)
  - date, time and duration of test(s)
  - screener ID
  - device details

• reporting errors about the messaging process
• acknowledging receipt of information
## Table 5-4 Patient Identification Segment (PID)

<table>
<thead>
<tr>
<th>Cardinality</th>
<th>Optional</th>
<th>Value Set</th>
<th>HL7 Element Name</th>
<th>Comments/Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1..*]</td>
<td>R</td>
<td></td>
<td>Patient Identifier List</td>
<td>This field is used by the healthcare facility to uniquely identify a patient. This may include medical record number, billing number, birth certificate ID, national unique ID. NHSN Cardinality: NHSN currently supports up to 4 patient identifiers.</td>
</tr>
<tr>
<td>[1..*]</td>
<td>R</td>
<td>HL70200</td>
<td>Patient Name</td>
<td>This field contains the patient’s name or aliases. When the name</td>
</tr>
<tr>
<td>[0..1]</td>
<td>RE</td>
<td></td>
<td>Mother’s Maiden Name</td>
<td>This field contains the family name under which the mother was born.</td>
</tr>
<tr>
<td>[0..1]</td>
<td>R</td>
<td></td>
<td>Date/Time of Birth</td>
<td>Patient’s date and time of birth. The time zone component is required. Format: YYYYMMDDHHMM[SS.SSSSSSSSSSSSSSSS]</td>
</tr>
<tr>
<td>[0..*]</td>
<td>RE</td>
<td>HL70005</td>
<td>Race</td>
<td>This field refers to the patient’s race.</td>
</tr>
<tr>
<td>[0..1]</td>
<td>RE</td>
<td>HL70189</td>
<td>Ethnic Group</td>
<td>This field further defines patient ancestry. The user MAY use table</td>
</tr>
</tbody>
</table>

PID|1||MRN123||Jones^BabyGirl|James|201201300005-0600|F||2106-3^White^HL70005~1002-5^American Indian or Alaska Native^HL70005|201 Street^^Arlington^TX^99999^USA||^PRN^PH^011^555^555-5555||eng^English^ISO6392||98766||1234555|N^Not Hispanic or Latino^HL70189|HospitalABC|N|1|
CCHD HL7 Implementation Guide

Draft Standard for Trial Use (DSTU):

“Implementation Guide for the Messaging of Newborn Screening using pulse oximetry devices for Critical Congenital Heart Defects (CCHD)”

Version 2.6 HL7 Approval – June 2012

This guide implementation focuses on standardizing on how CCHD newborn screening information is transmitted from a point of care device to an interested consumer such as public health
The initial PHFP balloted in 2011 identified functional requirements and conformance criteria for public health-clinical information collection, management and exchanges that included three public health domains: Early Hearing, Vital Records and Chronic Disease (Cancer Surveillance).

Release 2.0 added Public Health Laboratory, Health Statistics, Occupational Disease, Injury & Fatality, Birth Defects, Deep Vein Thrombosis/Pulmonary Embolism and Adverse Events.
Public Health Functional Profile

- Care Provision #2.6
- Conformance Criteria #9

The system SHOULD provide the ability to capture and store newborn hearing screening results from devices and transmit those results to other systems (e.g., to public health programs)
HL7 Clinical Document Architecture (CDA)
Six Core Characteristics

- **Persistence** – A clinical document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements.

- **Stewardship** – A clinical document is maintained by an organization entrusted with its care.

- **Potential for authentication** - A clinical document is an assemblage of information that is intended to be legally authenticated.

- **Context** - A clinical document establishes the default context for its contents.

- **Wholeness** - Authentication of a clinical document applies to the whole and does not apply to portions of the document without the full context of the document.

- **Human readability** – A clinical document is human readable.
XML + XSLT = Human Readability

XML Code:
```xml
<?xml version="1.0" encoding="UTF-8"?>
<xml version="1.0" encoding="UTF-8"?>
<!-- Edited by John Eichwald -->
<NHS>
  <ehdi>
    <Ear>Left</Ear>
    <Result>Did Not Pass</Result>
    <Date>01/02/2014</Date>
    <Screener>Izza Screener</Screener>
  </ehdi>
  <ehdi>
    <Ear>Right</Ear>
    <Result_PASS>Pass</Result_PASS>
    <Date>01/03/2014</Date>
    <Screener>Ima Audiologist</Screener>
  </ehdi>
</NHS>
```

XSLT Code:
```xml
<?xml version="1.0" encoding="ISO-8859-1"?>
<!-- Edited by John Eichwald -->
<xsl:stylesheet version="1.0"
xmns:xsl="http://www.w3.org/1999/XSL/Transform">
  <xsl:template match="/">
    <html>
      <body>
        <h2>Newborn Hearing Screening Results</h2>
        <table border="1">
          <tr bgcolor="#9acd32">
            <th style="text-align:left">Date</th>
            <th style="text-align:left">Result</th>
            <th style="text-align:left">Screener</th>
          </tr>
          <xsl:for-each select="NHS/ehdi">
            <tr>
              <td><xsl:value-of select="Date"/></td>
              <td><xsl:value-of select="Result"/></td>
              <td><xsl:value-of select="Screener"/></td>
            </tr>
          </xsl:for-each>
        </table>
      </body>
    </html>
  </xsl:stylesheet>
```

Result:

Newborn Hearing Screening Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Ear</th>
<th>Result</th>
<th>Screener</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/02/2014</td>
<td>Left</td>
<td>Did Not Pass</td>
<td>Izza Screener</td>
</tr>
<tr>
<td>01/02/2014</td>
<td>Right</td>
<td>Pass</td>
<td>Izza Screener</td>
</tr>
<tr>
<td>01/03/2014</td>
<td>Left</td>
<td>Pass</td>
<td>Ima Audiologist</td>
</tr>
<tr>
<td>01/03/2014</td>
<td>Right</td>
<td>Pass</td>
<td>Ima Audiologist</td>
</tr>
</tbody>
</table>
EHDI CDA Pilot Project Architecture (2013)
Oregon

Care Provider
Electronic Health Record System

Epic 2012 (OHSU) TEST HARNESS

Form Filler
1. Request Form
2. Pre-population data
3. Prepopulated NHS Form
4. Populated NHS Form

Continuity of Care Document (CCD) (pre-population data)

Health Information Exchange Infrastructure
OZ Systems

Form Manager
Form Receiver
Content Creator

Newborn Hearing Screening CDA Document

State Public Health
Oregon EHDI Information System (locally developed, based on Filemaker)

EHDI Gateway (Orion Rhapsody)

5. NHS report data

Content Consumer

PHDSC
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header</td>
<td>Patient information and demographics</td>
</tr>
<tr>
<td>Allergies, Adverse Reactions, and Alerts</td>
<td>Includes status and severity of each.</td>
</tr>
<tr>
<td>Encounters</td>
<td>Surgeries, ED visits, etc.</td>
</tr>
<tr>
<td>Immunizations</td>
<td>Immunizations and vaccines</td>
</tr>
<tr>
<td>Medications</td>
<td>As prescribed by the provider</td>
</tr>
<tr>
<td>Care Plan</td>
<td>Planned activities and encounters</td>
</tr>
<tr>
<td>Discharge Medications</td>
<td>Part of hospital discharge summary</td>
</tr>
<tr>
<td>Reason for Referral</td>
<td>Written reason for referral</td>
</tr>
<tr>
<td>Problem List</td>
<td>Concerns, complaints, and observations</td>
</tr>
<tr>
<td>Procedures</td>
<td>History of procedures</td>
</tr>
<tr>
<td>Functional and Cognitive Status</td>
<td>List of impairments</td>
</tr>
<tr>
<td>Results</td>
<td>Includes laboratory tests</td>
</tr>
<tr>
<td>Social History</td>
<td>Observations like smoking, drinking, etc.</td>
</tr>
<tr>
<td>Vital Signs</td>
<td>Includes height, weight, blood pressure, etc.</td>
</tr>
<tr>
<td>Discharge Instructions</td>
<td>Written discharge instructions</td>
</tr>
</tbody>
</table>
Health Information Processing

“Process Interoperability”

specifies the process to implement and comply with both content and messaging standards
Integrating the Healthcare Enterprise (IHE)
Quality, Research & Public Health (QRPH)
EHDI Profiles & Technical Frameworks

• **Quality Measure Execution for Early Hearing (QME-EH)**
  - QME-EH specifies a Quality Reporting Document Architecture (QRDA) Category I document for the “hearing screening prior to hospital discharge” clinical quality measure

• **Early Hearing Care Plan (EHCP) / Hearing Plan of Care (HPoC)**
  - Defines content of an early hearing care plan which can be made available to authorized care providers as jurisdictionally directed by a Public Health Agency. The EHCP covers detection, documentation and intervention for hearing loss.

• **Early Hearing Detection and Intervention-Workflow Document (EHDI-WD)** *(NEW)*
  - Utilizes workflow tasks to construct the EHDI workflow for performing the newborn hearing screening, making referrals (if needed), while collecting the information into a Early Hearing Care Plan which provides guidance on newborn hearing care practices.
National Quality Forum (NQF) Measures

Centers for Disease Control and Prevention (CDC)
• NQF #1354: Hearing screening prior to hospital discharge
• NQF#1360: Audiological evaluation no later than 3 months of age
• NQF#1361: Intervention no later than 6 months of age

Health Resources and Services Administration (HRSA)
• NQF #1351: Proportion of infants covered by Newborn Bloodspot Screening

National Committee for Quality Assurance (NCQA)
• NQF #1402: Newborn hearing screening

Initial Endorsements: 2011
CMS Stage 2 EHR Incentive Program

EHR incentive payments requires hospitals to report on 16 of 29 inpatient Clinical Quality Measures that cover at least 3 domains

NQF1354/CMS31: “Hearing screening prior to hospital discharge”: Clinical Process/Effectiveness domain

Retooled EHDI CQM as an “eMeasure” for EHR

- Lantana Consulting Group
- MITRE Corporation
- Oklahoma Foundation for Medical Quality
Hearing Screening Prior To Hospital Discharge - EHDI_1a
CMS31v3

**At A Glance**

<table>
<thead>
<tr>
<th>Downloads/Resources</th>
<th>Population Criteria</th>
<th>Data Criteria</th>
<th>Supplemental Data Elements</th>
<th>Reporting Stratification</th>
<th>Metadata</th>
<th>References</th>
</tr>
</thead>
</table>

**Version:**

- CMS31v1, December 2012 EH
- CMS31v2, April 2013 EH
- CMS31v3, April 2014 EH

This measure assesses the proportion of births that have been screened for hearing loss before hospital discharge.

<table>
<thead>
<tr>
<th>ID</th>
<th>31</th>
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<tbody>
<tr>
<td>NQF</td>
<td>1354</td>
</tr>
<tr>
<td>Version</td>
<td>3</td>
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<tr>
<td>Release Package</td>
<td>April 2014 EH</td>
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<tr>
<td>GUID</td>
<td>0924fbae-3fd4d0a-aab7-9f354e699fde</td>
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<tr>
<td>Eligibility</td>
<td>Eligible Hospitals</td>
</tr>
<tr>
<td>Domain</td>
<td>Clinical Processes/Effectiveness</td>
</tr>
<tr>
<td>Improvement Notation</td>
<td>An increase in the rate.</td>
</tr>
<tr>
<td>Measurement Period</td>
<td>January 1, 20xx through December 31, 20xx</td>
</tr>
<tr>
<td>Transmission Format</td>
<td>None</td>
</tr>
<tr>
<td>Scoring</td>
<td>Proportion</td>
</tr>
<tr>
<td>Type</td>
<td>Process</td>
</tr>
<tr>
<td>Measure Set</td>
<td>Early Hearing Detection and Intervention (EHDI)</td>
</tr>
<tr>
<td>Measure Steward</td>
<td>CDC National Center on Birth Defects and Developmental Disabilities</td>
</tr>
</tbody>
</table>

**Initial Patient Population:**

All live births discharged during the measurement time period born at a facility

**Numerator:**

All live births during the measurement time period born at a facility and screened for hearing loss prior to discharge, or not being screened due to medical reasons or medical exclusions.

**Exclusions:** Not applicable

**Denominator:**

All live births discharged during the measurement time period born at a facility.

**Exceptions:** None, **Exclusions:** Patient deceased prior to discharge and has not received hearing screening.
2014 ONC Certified Health IT Product List

EHR systems and modules that have been tested and certified as fulfilling Clinical Quality Measures (CQM) domain requirements

- Acmeware, Inc.
- Allscripts
- Cerner Corporation
- CitiusTech, Inc.
- Dynamic Health IT, Inc.
- Epic Systems Corporation
- FDB (First Databank, Inc.)
- HCA Information Technology & Services, Inc.
- Health Care Systems, Inc.
- Healthcare Management Systems, Inc.
- Iatric Systems, Inc
- IHM Services Company
- Massachusetts eHealth Collaborative (MAeHC)
- McKesson
- MEDHOST, Inc.
- Medisolv Inc
- Midas+ Solutions
- Northwestern University
- NTT DATA, Inc.
- QuadraMed Corporation
- Rural Wisconsin Health Cooperative
- Siemens Medical Solutions USA Inc

http://oncchpl.force.com/ehrcert?q=chpl
2014 EHDI IHE QRPH Technical Framework

Public Comment period: June 6 – July 6
http://www.ihe.net/QRPH_Public_Comments
**Hearing Plan of Care (HPoC)**

**Table of Contents**
- HEARING PLAN OF CARE
- RISK INDICATORS FOR NEWBORN
  - RISK INDICATORS FOR HEARING LOSS
  - OTHER RISK INDICATORS
- PROCEDURES AND INTERVENTIONS
- DIAGNOSTIC TESTS AND/OR LABORATORY DATA
- ACTIVE PROBLEMS
HEARING PLAN OF CARE

- Provide parents with information about hearing, speech, and language milestones
- Provide ongoing developmental screening (and referral when indicated) per the AAP “Bright Futures Guidelines, 3rd Ed.”
- Refer promptly for audiology evaluation when there is any parental concern regarding hearing, speech, or language development
- Refer for audiology evaluation (at least once before age 30 months) infants who have any risk indicators for later-onset hearing loss
- Provide vision screening (and referral when indicated) as recommended in the AAP “Bright Futures Guidelines, 3rd Ed.”
- Identify and aggressively treat middle ear disease

RISK INDICATORS FOR NEWBORN

These are all the risks for this newborn.

RISK INDICATORS FOR HEARING LOSS

No Risk Indicators for Hearing Loss.

OTHER RISK INDICATORS

No other risk indicators.

PROCEDURES AND INTERVENTIONS

This is the list of the baby’s procedures that had been performed before being discharged. No information provided about procedures.

DIAGNOSTIC TESTS AND/OR LABORATORY DATA

<table>
<thead>
<tr>
<th>Context Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Test:</td>
</tr>
<tr>
<td>Date of Screening Outcome:</td>
</tr>
<tr>
<td>Ordered by:</td>
</tr>
<tr>
<td>Outcome Authored by:</td>
</tr>
<tr>
<td>LEFT EAR Outcome:</td>
</tr>
<tr>
<td>RIGHT EAR Outcome:</td>
</tr>
</tbody>
</table>

History of Testing:

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Ear</th>
<th>Test Type</th>
<th>Result/Interpretation</th>
<th>Reason (if not tested or no result available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/02/2013 1:00pm</td>
<td>Left Ear</td>
<td>Automated auditory brainstem response</td>
<td>F / FAIL</td>
<td></td>
</tr>
<tr>
<td>04/02/2013 1:15pm</td>
<td>Left Ear</td>
<td>Automated auditory brainstem response</td>
<td>F / PASS</td>
<td></td>
</tr>
<tr>
<td>04/02/2013 1:00pm</td>
<td>Right Ear</td>
<td>N/A</td>
<td>Medically not indicated</td>
<td>The ear could not be tested for medical reasons.</td>
</tr>
</tbody>
</table>

ACTIVE PROBLEMS

This is the list of the baby’s active concerns at the point of discharge. These problems are taken into consideration in creating the Hearing Plan of Care.
Newborn Admission Notification Information (NANI)

CONTENT CREATOR

MESSAGING

CONTENT CONSUMER

ACTOR

ACTOR

ACTOR
EHDI NANI

- Automates transfer of basic patient admission information on a newborn from a Birthing Hospital EHR to Public Health (PH)
- Describes the content to be communicated by a hospital EHR to PH
- Facilitates effective communication among hospitals, PH, and PCPs
- Provides a timely and accurate denominator of hospital births that supports quality measure reporting

NANI is being implemented for EHDI but could be used for other public health programs such as: Immunization Programs, Newborn Bloodspot Screening, Critical Congenital Heart Disease, or Communicable Disease Reporting

Demonstrated at the 2013 & 2014 HIMSS Interoperability Showcases
Jurisdictionally-defined Actor Grouping in NANI Profile
Healthcare Information and Management Systems Society and PHI Conference Interoperability Showcases

HIMSS 2011 (Orlando)

PHI 2011 (Atlanta)

HIMSS 2012 (Las Vegas)

HIMSS 2013 (New Orleans)

HIMSS 2014 (Orlando)

PHI 2014 (Atlanta)
COMMUNICATION (101)

Bi-directional Exchange

MESSAGE CREATOR & CONSUMER

MESSAGE CONSUMER & CREATOR
Bi-directional Exchange

Content Creator & Consumer & Creator

Share Content

Content Creator & Consumer & Creator
Health Information Exchange
Patient 2: 35 week neonate vignettes
#1 - Birth with vital records update
#2 – Newborn hospital care and discharge to pediatric unit
#3 – Hearing screening and PH supported pediatric care
Patient 2 vendors included:

- Alere Accountable Care Solutions
- Alert
- Amcom
- Cerner
- Covidien
- Epic
- Genesis Healthcare
- Hyland Software
- IOD Inc
- Isirona (now NANTHealth)
- Minnesota Dept of Health
- NextGen
- OZ Systems
- Philips
- Siemens
- Smiths Medical
PHI 2014 - IHE Interoperability Showcase:
Vital Records and Care Coordination for Newborn Hearing Screening
Improving the timeliness and quality of vital records and newborn hearing data for more efficient and effective birth registration and care giving for early childhood development.

1. Birthing Facility
   - Mother delivers a child. Labor and delivery events are documented in the Birthing Facility EMR
   - EMR creates a Labor and Delivery Summary (LDS) in Clinical Document Architecture (CDA) with the mother & child birth information
   - EMR retrieves the Vital Registration Form from the Form Manager application
   - EMR system populates the Vital Registration (VR) Form with EMR data
   - Staff verifies data and completes additional fields on the VR Form
   - The newborn hearing screening is performed, results sent to Public Health Early Hearing Detection and Intervention information system (EHDI-IS).

2. Public Health
   - State/Jurisdiction Vital Registration for Birth Certificate
     - EMR sends Vital Registration Form to Electronic Birth Registration System to generate birth certificate
   - Newborn Hearing Screening and Early Hearing Care Plan:
     - EHDI-IS receives newborn information from the Vital Registration Form
     - The EHDI-IS system receives hearing screening results, generates an Early Hearing Care Plan and publish this Care Plan into the Health Information Exchanges (HIE)
   - EHDI Quality Measures:
     - EHDI-IS generates EHDI Quality Measure: number of children for whom hearing test was performed by Birthing Facility within the jurisdiction

3. Pediatric Care Provider
   - Pediatric Care Provider retrieves the Early Hearing Care Plan
     - PCP queries the HIE for documents related to the patient
     - PCP retrieves the Early Hearing Care Plan provided by State EHDI Program
     - PCP sends repeat screen & visit summary to the HIE with a referral to the audiologist

4. Audiologist /Infrastructure Physician Portal
   - The Audiologist retrieves the patient summaries, Early Hearing Care Plan, and available images using the HIE Provider Portal. Continuity of Care Documents and Public Health generated care plans are available through the HIE Services: Document Registry, Document Repository, and Secure Transport Infrastructure.
PHI 2014 - IHE Interoperability Showcase

Vital Records & Care Coordination for Newborn Hearing Screening

- CareEvolution
- Epic
- Genesis Healthcare
- NextGen
- OZ Systems
- Utah Department of Health
Standards and Interoperability (S&I) Framework

ONC S&I Initiatives:

• Public Health Reporting Initiative (PHRI)
  – standardized public health EHR reporting

• Structured Data Capture (SDC)
  – standardize patient-level Common Data Elements (CDE) within an EHR

ONC S&I Cross-Initiative Workgroups:

• Clinical Quality Framework (QDF)
  – harmonize Clinical Decision Support (CDS) and electronic Clinical Quality Measurement (eCQM)

• Public Health Tiger Team (PHTT)
  – combine Structured Data Capture (SDC) Data Access Framework (DAF) and Health eDecisions (HeD)
Privacy and Security

Guided by various Federal and state/local laws including: Health Insurance Portability and Accountability Act (HIPAA)

- The HIPAA Privacy Rule covers protected health information (PHI) in any medium (electronic, written, or oral) and patients rights with respect to that information.

- The HIPAA Security Rule specifies a series of additional administrative, physical, and technical safeguards to assure the confidentiality, integrity, and availability of electronic protected health information.
## Eligible Professional

**Meaningful Use Core Measures**

**Measure 9 of 17**

**Stage 2**

**Date updated: December, 2013**

<table>
<thead>
<tr>
<th>Protect Electronic Health Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
</tr>
<tr>
<td>Protect electronic health information created or maintained by the certified EHR technology (CEHRT) through the implementation of appropriate technical capabilities.</td>
</tr>
<tr>
<td><strong>Measure</strong></td>
</tr>
<tr>
<td>Conduct or review a security risk analysis in accordance with the requirements under 45 CFR 164.308(a) (1), including addressing the encryption/security of data stored in CEHRT in accordance with requirements under 45 CFR 164.312 (a)(2)(iv) and 45 CFR 164.306(d)(3), and implement security updates as necessary and correct identified security deficiencies as part of the provider’s risk management process for EPs.</td>
</tr>
<tr>
<td><strong>Exclusion</strong></td>
</tr>
<tr>
<td>No exclusion.</td>
</tr>
</tbody>
</table>

### Table of Contents

- Attestation Requirements
- Additional Information
- Certification and Standards Criteria
Access control: user identity and tracking controls for all authorized users

Authentication: verify person/entity is authorized to access

Encryption: information exchanged following encryption standards

Integrity: upon receipt, verify information has not been altered

Automatic log-off: session termination after inactivity period

Audit log*: record electronic actions and generate audit log

*record date, time, patient identification, and user identification whenever information is created, modified, accessed, disclosed or deleted
IHE IT Infrastructure (ITI) Profiles

The Audit Trail and Node Authentication (ATNA) Integration Profile establishes security measures which, together with the Security Policy and Procedures, provide patient information confidentiality, data integrity and user accountability.

Basic Patient Privacy Consents (BPPC) provides a mechanism to record the patient privacy consent(s) and a method for Content Consumers to use to enforce the privacy consent appropriate to the use.
Engagement Opportunities

• Health IT Policy Committee
  www.healthit.gov/facas/health-it-policy-committee

• Health IT Standards Committee
  www.healthit.gov/facas/health-it-standards-committee

Standards and Interoperability (S&I) Framework

• Community-Led Initiatives/Cross-Initiative Workgroups
  http://wiki.siframework.org

Health Level Seven (HL7) International

• Public Health and Emergency Response (PHER)
  www.hl7.org/special/committees/pher

Integrating the Healthcare Enterprise (IHE)

• Quality, Research and Public Health (QRPH)
  www.ihe.net/Quality_Research_and_Public_Health
Thank You!

jeichwald@cdc.gov

The opinions and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

National Center on Birth Defects and Developmental Disabilities
Division of Human Development and Disability
Child Development and Disability Branch