Are we there yet?

Electronic Health Information Exchange for Diagnostic Audiology Results

EHDI National Conference
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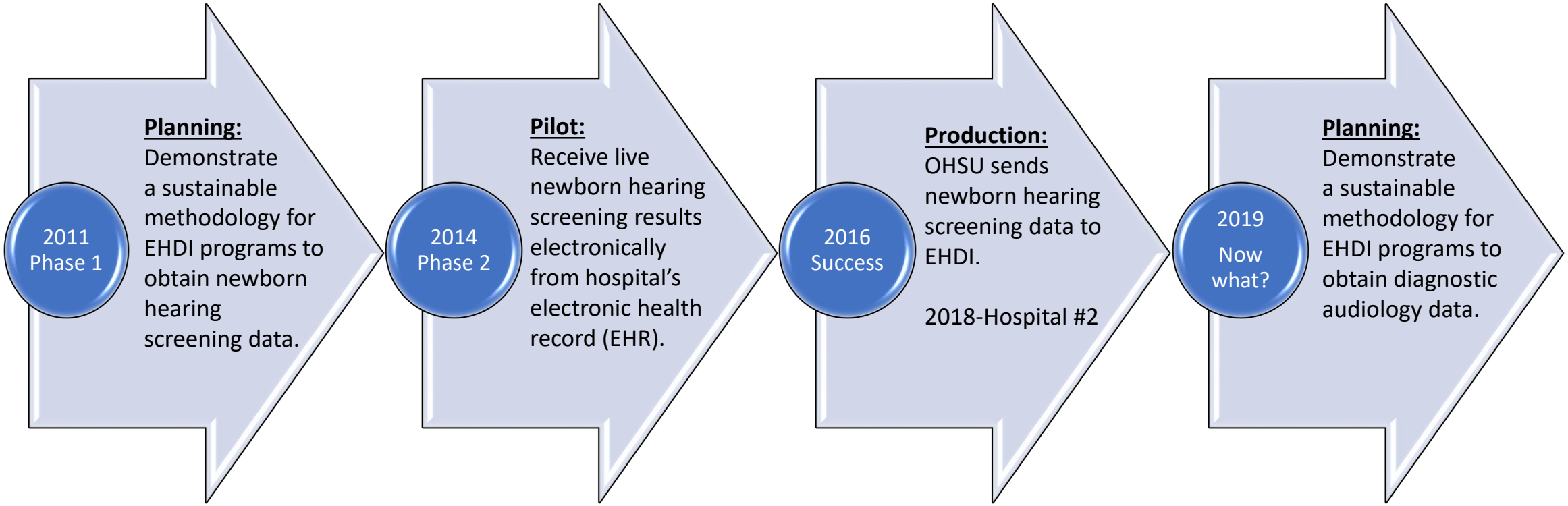
Objectives

Identify	Some key components which underline the feasibility of health information exchange (HIE) for diagnostic audiology data reporting.
Identify	Key steps to assess if your data system (EHR/EHDIIS) is ready for HIE.
Describe	The importance of data standards.
Name	One challenge facing HIE for diagnostic data.

Background

Our goal is to reduce duplicative data entry for EHDI partners and improve the timeliness, completeness and quality of the newborn hearing screening and diagnostic audiology data received.



Planning: A look at EHRs, EHDI, and national standards

Oregon Health and Science University

- Participated in national Audiology workgroup with EHR Vendor
  - Phone calls, emails, etc…
  - Preview of new screens
  - Testing

- Goal of Vendor
  - Create standard reporting in EHR
  - Improve access of results in EHR
  - Determine needs of Auds and ENTs
  - Determine reporting styles (single audiogram/dual audiogram, etc.)
  - Determine usability of newly developed screens

Oregon EHDI

Oregon Audiologists

Vendor Site Visit

- Gather information
  - Workflow and reporting of diagnostic info in EHR and EHDI from multiple locations

- Determine
  - Usability of newly developed screens
  - Ability to capture and extract diagnostic data
    - Audiogram

Currently…in Oregon

Data written in progress notes

Data in problem list

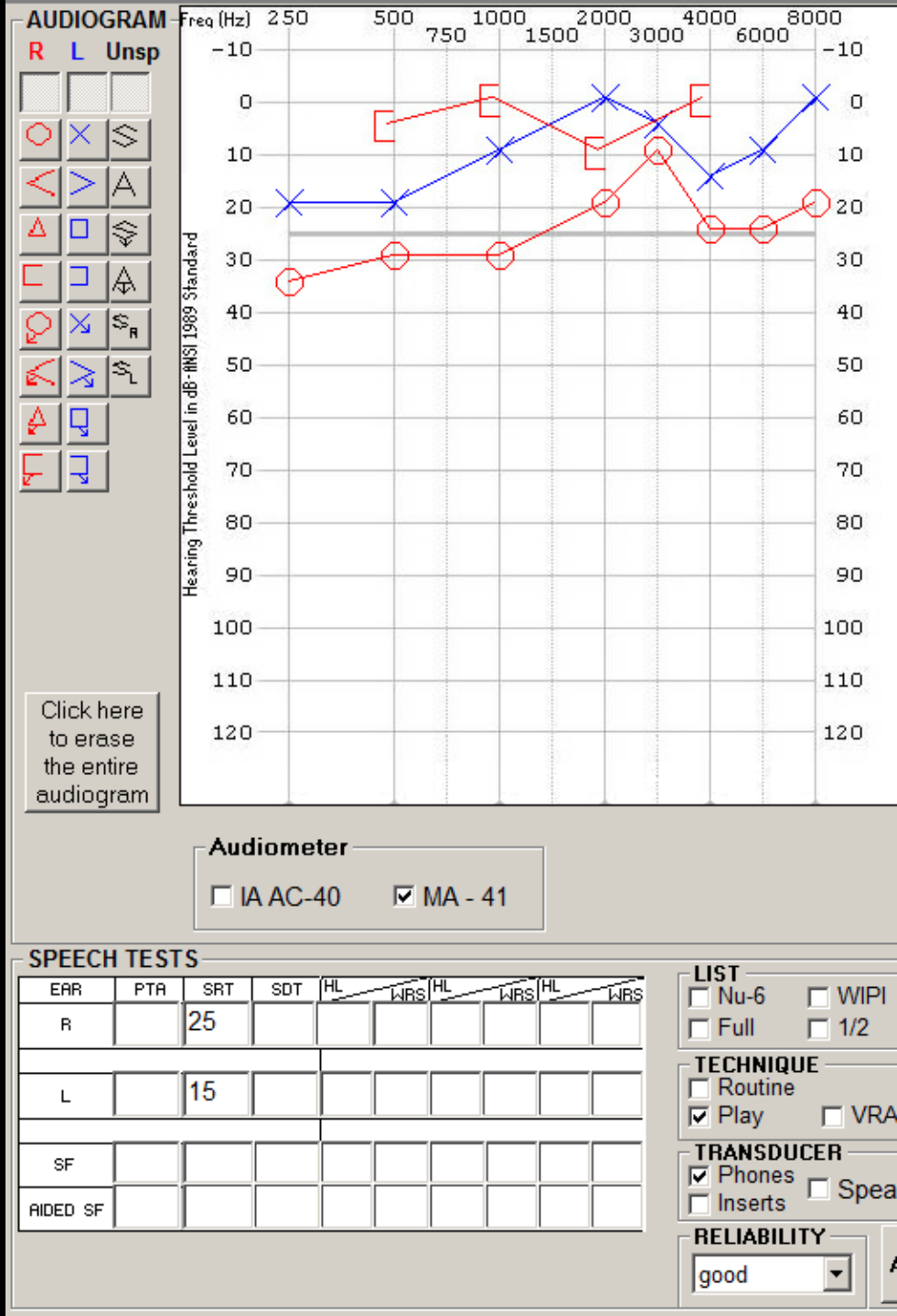
Data in customized flowsheet

No standard documentation

IT support varied

Future possibilities…..

- Each threshold will have “electronic data/code” associated with it
- Electronic data can be “pulled”
- Electronic data can be sent
- Electronic data can be analyzed



Where to begin?

Data standards

- Gather reporting requirements from Center for Disease Control (CDC) Hearing Screening Follow-up Survey (HSFS)
- Mapped diagnostic data elements and value sets between four systems: CDC-HSFS, EHDIIS, National Standards and data in partners' EHRs
- Identified needed data elements and value sets absent from National Standards, which included LOINC, SNOMED-CT, ICD-10, UCUM and PHIN-VADS
- Aligned diagnostic audiology data elements to newborn hearing screening HL7 v2.6 ORU^RO1 message structure

Terminology and Coding Systems

- **SNOMED CT:** Systematized Nomenclature of Medicine -- Clinical Terms
- **LOINC:** Logical Observation Identifiers Names and Codes
- **UCUM**: Unified Code for Units of Measure
- **ICD-10**: The International Classification of Diseases, Tenth Revision

Mapping standards

Risk Factors in LONIC, SNOMED CT and ICD-10

JCIH Risk Factor	LOINC	SNOMED-CT	Label	Specific Diagnosis	ICD-Code/Description	
Congenital Infection	LA12674-0	11618000	Intra-amniotic infection of fetus	Congenital Cytomegalovirus	P35.1	Congenital Cytomegalovirus infection
Head Injury	LA12679-9	312972009	Neonatal extracranial head trauma (disorder)	Basal Skull	P13.0	Fracture of skull due to birth injury
					S02.1	Fracture of base of skull
				Temporal Bone Fracture	S02.19 XA	Other fracture of base of skull, initial encounter for closed fracture.

Type and Degree of loss in SNOMED-CT

44057004	Conductive hearing loss (disorder)
60700002	Sensorineural hearing loss (disorder)
77507001	Mixed conductive AND sensorineural hearing loss (disorder)
443805006	Auditory neuropathy spectrum disorder (disorder)
123123005	Transient (qualifier value)
162339002	Hearing normal
17621005	Normal (qualifier value)
255605001	Minimal (qualifier value)
18647004	Mild (Severity modifier) (qualifier value)
6736007	Moderate (severity modifier) (qualifier value)
371924009	Moderate to severe(qualifier value
24484000	Severe (severity modifier) (qualifier value)

Hz in LOINC

Missing	125 Hz
Missing	250 Hz
LA16857-7	500 Hz
LA16858-5	1000 Hz
LA16859-3	2000 Hz
LA16860-1	3000 Hz
LA16861-9	4000 Hz
LA16862-7	6000 Hz
LA16863-5	8000 Hz

dB or Hz in UCUM

dB (SPL)	Decibel (pressure level)
dB (A)	Decibel (sound scale)
Hz	Hertz

Newborn hearing screening HL7 v2.6

MSH|^~\&| EHR ^^HL7|SENDING FACILITY^^ HL7|Oregon EHDI|OPHD|20180130181005||ORU^R01^ORU_R01||P|2.6|||AL|AL|USA|||…

PID|1||MRN123||SMITH^BABY GIRL^3|JONES|20180123|F||2106
3^White^HL70005|123SCREENING^^PORTLAND^OR^97232||5031234567^PRN^PH|…

PV1||I|427695007||||1001001^PROVIDERLASTNAME^FIRST^^^MD^^^ ^^^^NPI|….

NK1|1|JONES^MARY^|MTH^Mother^HL70063|123 PORTLAND STt^^PORTLAND^OR^97232^USA ||(971)1234567^PRN^PH|…

OBR|1|11635076|11635076|54111-0^Newborn Hearing Loss Panel^LN|||||||||||||||||20190210022200|||I…

OBX|1|CWE|58232-0^Hearing loss risk indicator^LN||180202002^Neonatal exchange transfusion^SCT||||||F|||20180130181000|||||…

OBR|2|11635076|11635076|73741-1^Newborn Hearing screen panel of Ear - Left^LN|||||||||||||||||20190210022400|||F

OBX|1|CWE|54108-6^Newborn hearing screen of Ear - left^LN||164059009^Pass^SCT||||||F|||20190210022400|||LA10389-7^ …

OBR|3|11635076|11635076|73744-5^Newborn Hearing screen panel of Ear - Right^LN|||||||||||||||||20190210022400|||F

OBX|1|CWE|54109-4^Newborn hearing screen of Ear - right^LN||183924009^Refer^SCT||||||F|||20190210022400|||LA10389-7^…

Diagnostic Results

MSH|^~\&| EHR ^^HL7|SENDING FACILITY^^ HL7|Oregon EHDI|OPHD|20180130181005||ORU^R01^ORU_R01||P|2.6|||AL|AL|USA|||…

PID|1||MRN123||SMITH^BABY GIRL^3|JONES|20180123|F||2106 3^White^HL70005|123SCREENING^^PORTLAND^OR^97232||5031234567^PRN^PH|…

PV1||I|427695007||||1001001^PROVIDERLASTNAME^FIRST^^^MD^^^ ^^^^NPI|….

NK1|1|JONES^MARY^|MTH^Mother^HL70063|123 PORTLAND STt^^PORTLAND^OR^97232^USA ||(971)1234567^PRN^PH|…

OBR|1|11635076|11635076|398171003^Hearing examination^SCT|||||||||||||||||20190210022200|||I…

OBX|1|CWE|58232-0^Hearing loss risk indicator^LN||180202002^Neonatal exchange transfusion^SCT||||||F|||20180130181000|||||…

OBR|2|11635076|11635076|73741-1^Newborn Hearing screen panel of Ear - Left^LN|||||||||||||||||20190210022400|||F

OBX|1|CWE|54108-6^Newborn hearing screen of Ear - left^LN||6070002^Sensorineural hearing loss (disorder)^SCT||||||F|||20190210022400|||…

OBX|2|CWE|54108-6^Newborn hearing screen of Ear - left^LN||164059009^Severe (severity modifier) (qualifier value)^SCT||||||F|||20190210022400|||…

OBR|3|11635076|11635076|73744-5^Newborn Hearing screen panel of Ear - Right^LN|||||||||||||||||20190210022400|||F

OBX|1|CWE|54109-4^Newborn hearing screen of Ear - right^LN||6070002^Sensorineural hearing loss (disorder)^SCT||||||F|||20190210022400|||…

OBX|2|CWE|54109-4^Newborn hearing screen of Ear - right^LN||164059009^Severe (severity modifier) (qualifier value)^SCT||||||F|||20190210022400|||…

Diagnostic Results with audiogram

OBR|1|11635076|11635076|398171003^Hearing examination^SCT||||||||||||||||||20190210022200|||I…

OBX|1|CWE|58232-0^Hearing loss risk indicator^LN||180202002^Neonatal exchange transfusion^SCT||||||F|||20180130181000|||||…

OBR|2|11635076|11635076|73741-1^Newborn Hearing screen panel of Ear - Left^LN||||||||||||||||||20190210022400|||F

OBX|1|CWE|54108-6^Newborn hearing screen of Ear - left^LN||6070002^Sensorineural hearing loss (disorder)^SCT||||||F|||20190210022400|||…

OBX|2|CWE|54108-6^Newborn hearing screen of Ear - left^LN||164059009^Severe (severity modifier) (qualifier value)^SCT||||||F|||20190210022400|||…

OBX|3|CWE|LA16857-7^500 hz^LN||70^dB^UCUM||||||F|||20190210022400|||…

OBX|4|CWE|LA16859-3^2000 hz^LN||70^dB^UCUM||||||F|||20190210022400|||…

OBR|3|11635076|11635076|73744-5^Newborn Hearing screen panel of Ear - Right^LN||||||||||||||||||20190210022400|||F

OBX|1|CWE|54109-4^Newborn hearing screen of Ear - right^LN||6070002^Sensorineural hearing loss (disorder)^SCT||||||F|||20190210022400|||…

OBX|2|CWE|54109-4^Newborn hearing screen of Ear - right^LN||164059009^Severe (severity modifier) (qualifier value)^SCT||||||F|||20190210022400|||…

OBX|3|CWE|LA16857-7^500 hz^LN||70^dB^UCUM||||||F|||20190210022400|||…

OBX|4|CWE|LA16859-3^2000 hz^LN||70^dB^UCUM||||||F|||20190210022400|||…

Considerations: National Standards vs Local

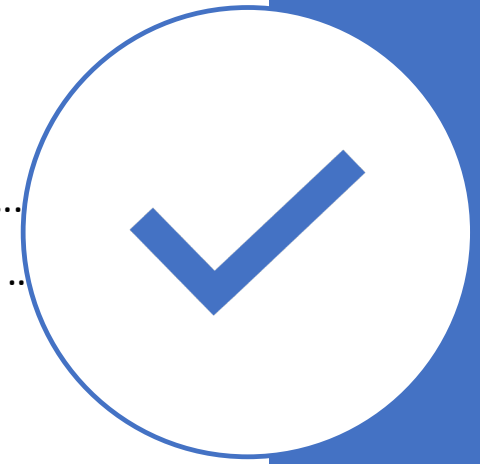
- Hearing examination vs Hearing assessment

  OBR|1|11635076|11635076|398171003^Hearing examination^SCT||||||||||||||||||20190210022200|||I…

- No LOINIC code for diagnostic panel

  OBR|2|11635076|11635076|73741-1^Newborn Hearing screen panel of Ear - Left^LN|….

  OBR|3|11635076|11635076|73744-5^Newborn Hearing screen panel of Ear - Right^LN|..



- NO LOINC code for ear specific testing for left or right ear

  OBX|1|CWE|54108-6^Newborn hearing screen of Ear - left^LN|…

  OBX|1|CWE|54109-4^Newborn hearing screen of Ear - right^LN |…

- LOINC code for Hz (hertz) is incomplete
  - Missing 125 Hz and 250 Hz

Almost there…

GOAL: National standard for diagnostic audiology reporting

Coming soon…

EHR vendor will release software upgrade to include a standardized solution for data capture.

OHSU and EHDI needs to make a decision to move forward with developing a national standard or define local definitions.

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Thank you!