

# Using Data to Improve Services for Infants with Hearing Loss: Linking Newborn Hearing Screening Records with Early Intervention Records

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## Background

Data matching has been widely used by public health researchers to conduct routine assessments, evaluations and improve the completeness of data by adding information obtained from other registries.

This project was part of the New York Early Hearing Detection and Intervention (NYEHDI) quality improvement effort and highlights important issues in provider compliance with documentation of screening, follow-up services and referrals to the statewide Early Intervention Program (EIP). The data match identified providers in need of technical assistance.

## Objectives

- Match records of infants with permanent hearing loss from the **New York Early Hearing Detection and Intervention Information System (NYEHDI-IS)** to records of infants with permanent hearing loss receiving early intervention services from the **New York State Early Intervention Program (NYSEIP)**
- Identify audiologists not reporting to **NYEHDI-IS**
- Identify gaps in services or documentation
- Target technical assistance to improve the state system of identification of hearing loss and access to early intervention services

## Methods

### Data Systems

- NYEHDI-IS**
- New York Early Intervention System (**NYSEIS**)

### Preparing Data for Matching

- Created using SAS 9.4 software

### NYEHDI-IS dataset

- Infants born between 2014-2016 who had a permanent hearing loss diagnosis documented
- In 2016 the criteria were changed to exclude infants with transient-conductive or late onset hearing loss

### NYSEIS dataset

- Infants born between 2014-2016 with an ICD-9 or ICD-10 code for permanent hearing loss.

### Matching Process

- The Link King data linking software
- Matched on first and last name, date of birth, gender
- Manually reviewed non-matches



## Results

**Table 1.** New York Early Intervention and Early Hearing Detection and Intervention **NYEHDI-IS** to **NYSEIS** data match results, 2014-2016.

	Year 2014	2015	2016
<b>NYEHDI sample size</b>	214	216	145
<b>Direct matched pairs from Link King</b>	84	94	66
<b>Results needing further review</b>	130	122	79
• <b>No hearing loss diagnosis documented in NYEIS</b>	93	93	45
• <b>Infant moved out of state or country</b>	0	0	2
• <b>Parent refused referral to Early Intervention</b>	8	9	6
• <b>Changes in infant DOB or name</b>	5	9	4
• <b>Record not found in Early Intervention</b>	13	6	21
▪ Not referred to Early Intervention	6	2	13
▪ Provider did not complete referral process	7	4	8
<b>True matched records missed</b>	11	5	1

**Table 2.** New York Early Intervention and Early Hearing Detection and Intervention **NYSEIS** to **NYEHDI-IS** data match results, 2014-2016

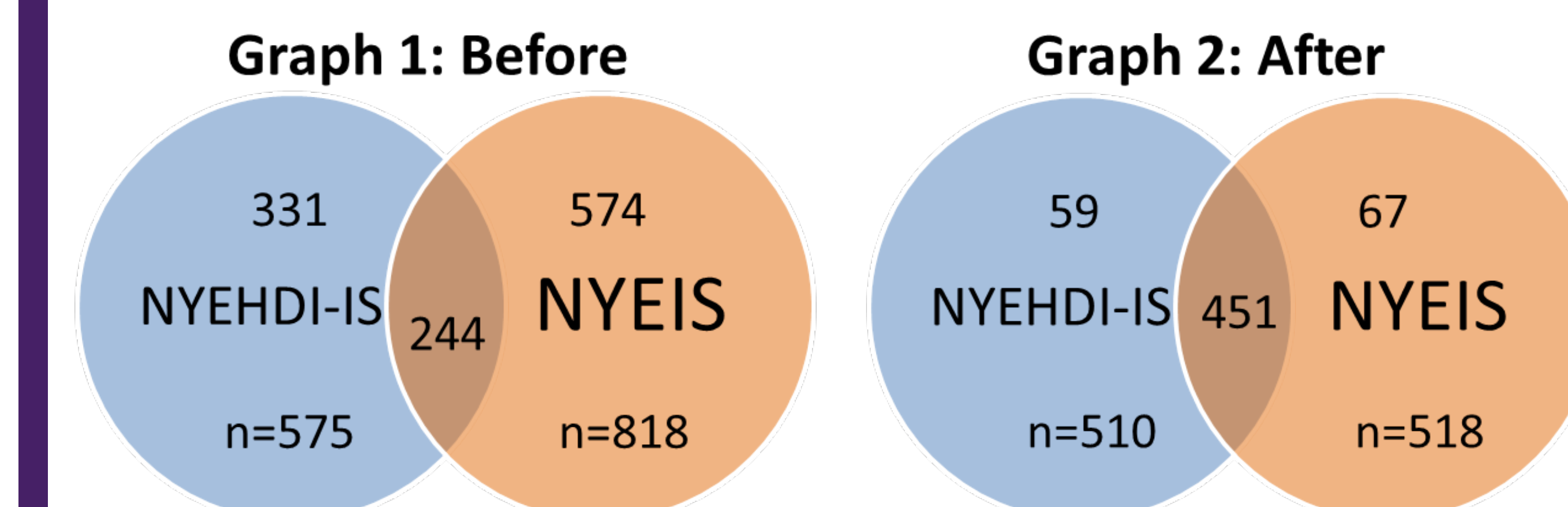
	Year 2014	2015	2016
<b>NYSEIS sample size</b>	397	261	160
<b>Direct matched pairs from Link King</b>	84	94	66
<b>Results needing further review</b>	313	167	94
• <b>No permanent hearing loss diagnosis</b>	270	150	84
▪ Late onset*	155	31	24
▪ Lost to follow-up†	87	35	49
▪ No results recorded‡	27	72	4
▪ Transient conductive	1	12	7
• <b>Infant born out of state or country</b>	30	11	4
• <b>Parent refusal of screening, follow-up or diagnostic testing</b>	3	0	0
• <b>Changes in infant DOB or name</b>	6	2	3
• <b>Other</b>	4	0	1
<b>True matched records missed</b>	0	4	2

## Discussion

- The infant referral process is not automated in NYS so the provider must contact the municipal Early Intervention Official based on the infant's county of residence (New York State Department of Health, 2017). Providers were identified as not referring infants to NYSEIP or not completing the referral process.
- Audiologists were identified that had diagnosed infants with hearing loss but did not document diagnostic evaluations in **NYEHDI-IS**.
- The time spent providing education and training to these providers ranged from 10 to 30 minutes depending on their knowledge of NYSEIP and **NYEHDI-IS**.

## Results

**Graph 1.** Pie Charts of **NYEHDI-IS** and **NYSEIS** matched data sets **before** the data match study reveal the **NYSEIS** data set used to match included extraneous records.



**Graph 2.** Pie Charts **after** the data match study reflect a higher number of matched records due to updating of incomplete or inaccurate information in one or both systems. Selection criteria for the match were amended to exclude infants with transient conductive hearing loss.

## Conclusions

- Despite Public Health Law requiring providers to report results of diagnostic evaluations for infants with hearing loss in **NYEHDI-IS**, results revealed 72 providers did not report 274 diagnostic results (infants lost to follow-up and no results recorded). Targeted technical assistance was provided, ensuring infants diagnosed in the future will be documented in a timely manner.
- Results also revealed an additional 19 providers were not appropriately referring infants to the NYSEIP. Targeted technical assistance was provided, ensuring infants diagnosed in the future will be referred in a timely manner.
- Manual review process can be time consuming
- Identifying, contacting, and educating providers is an on-going process
- Data match is not a one-time analysis

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