Evaluating the Impact of Universal cCMV Screening on Newborn Hearing Screening and Follow-up

Amanda Pavan | Senior Epidemiologist, Newborn Screening Program

Sara Lammert | Senior Epidemiologist, Longitudinal Follow-up Program

Learning Objectives

1

Describe the approach to universal screening for CMV and audiology monitoring for infants and children with cCMV implemented in Minnesota

2

Understand disparities in completion of follow-up appointments

3

Summarize future considerations for fine tuning guidelines and follow-up practices

What is cytomegalovirus (CMV)?

- CMV is a member of the herpes virus family
- Congenital CMV (cCMV) occurs when CMV is passed from a pregnant person to the fetus
- cCMV presents in various ways:
  - Most infants are asymptomatic at birth and unlikely to develop long-term sequelae
  - Up to 20% will have permanent hearing loss, either at birth or later in childhood

Universal cCMV Screening in Minnesota

- Universal screening began February 6, 2023
- Screen for CMV through newborn dried blood spot
- If CMV detected, confirmatory testing recommended within first 21 days of life
  - Urine PCR recommended
- If PCR positive, recommend several follow up tests/examinations

Minnesota's Audiology Monitoring Guidelines

- **Initial Diagnostic Audiology Assessment**
  - By 1 month of age or within 1 month of cCMV confirmed PCR test
- **Second Diagnostic Audiology Assessment**
  - By 4-5 months of age
- **Monitoring Audiology Visits up to age 2 years**
  - Every 3 months
- **Monitoring Audiology Visits age 2-6 years**
  - Every 6 months
- **Monitoring Audiology Visits age 6-10 years**
  - Every 12 months

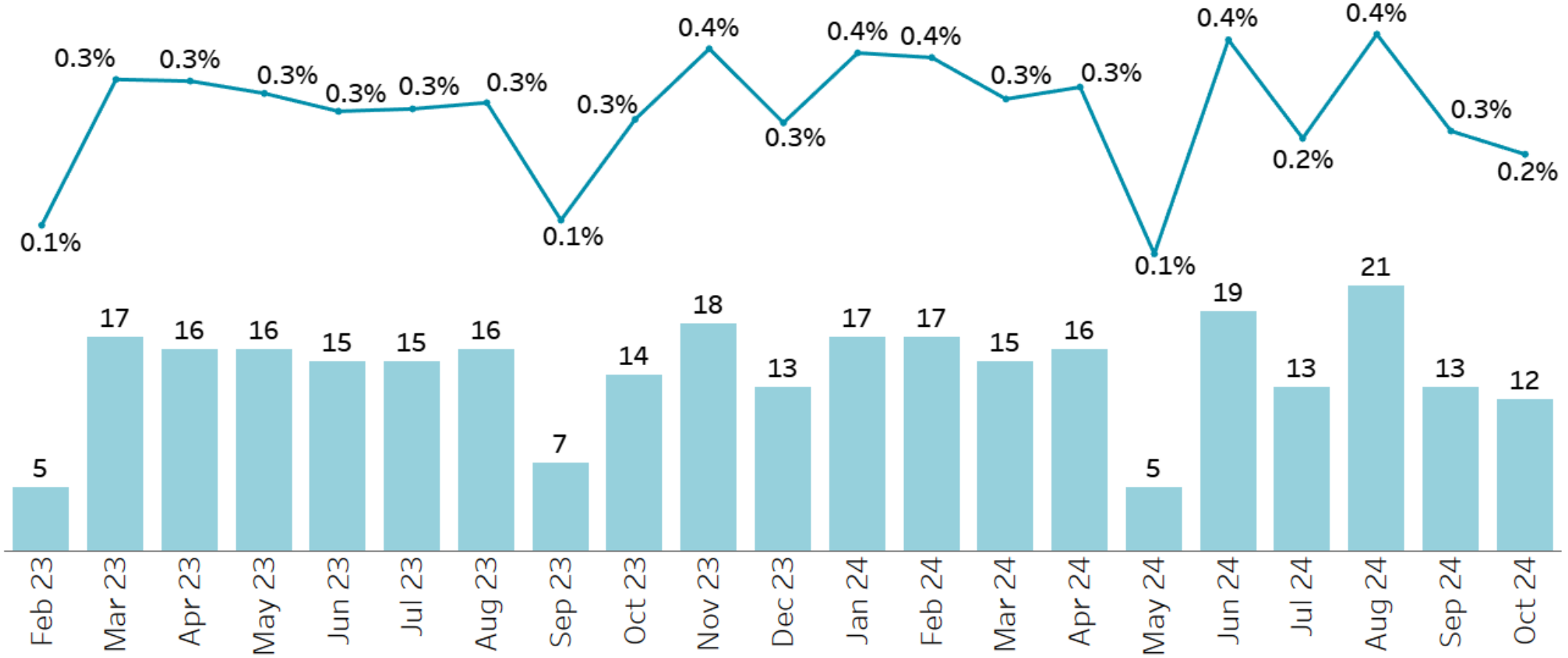
https://www.health.state.mn.us/docs/people/childrenyouth/improveehdi/audiogdlnccmv.pdf

Newborn Screening Results

infants born 2/6/23 – 10/31/24

105,201 infants screened

300 cases identified (0.3% of births)



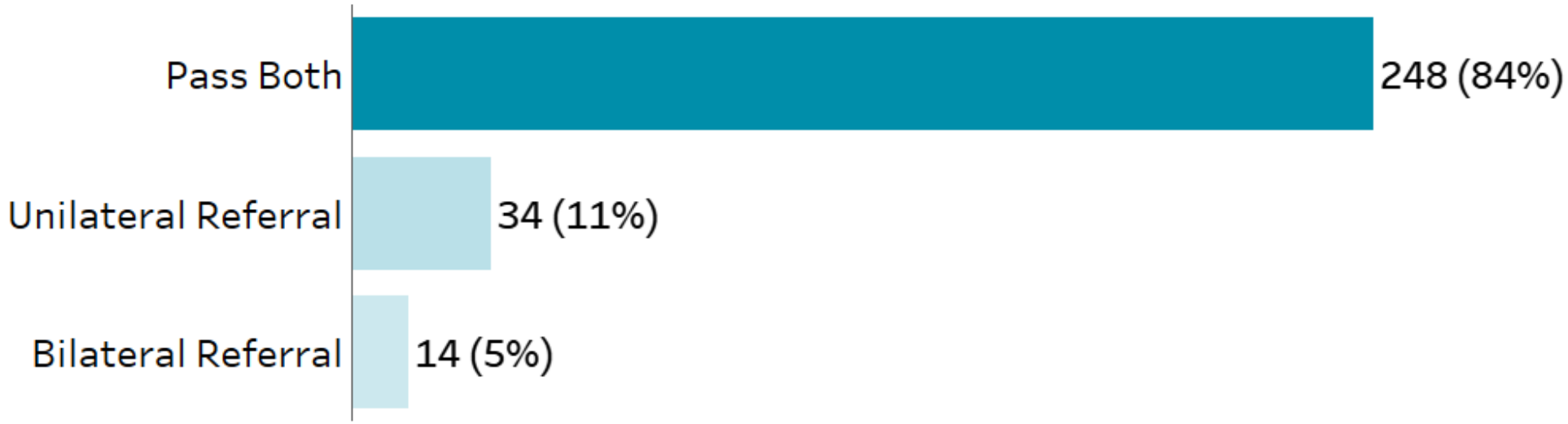
Prevalence of cCMV in Minnesota

infants born 2/6/23 – 10/31/24

- **1:355 infants** (**2.8 per 1,000** or **0.3% of births**)
  - Lower than the 1:200 (0.64% average) reported in the literature
  - Lower than Minnesota screening study, which estimated 1:220 (0.45%)
  - Higher than Ontario, Canada's newborn screening program (1:800 infant, 0.13%)

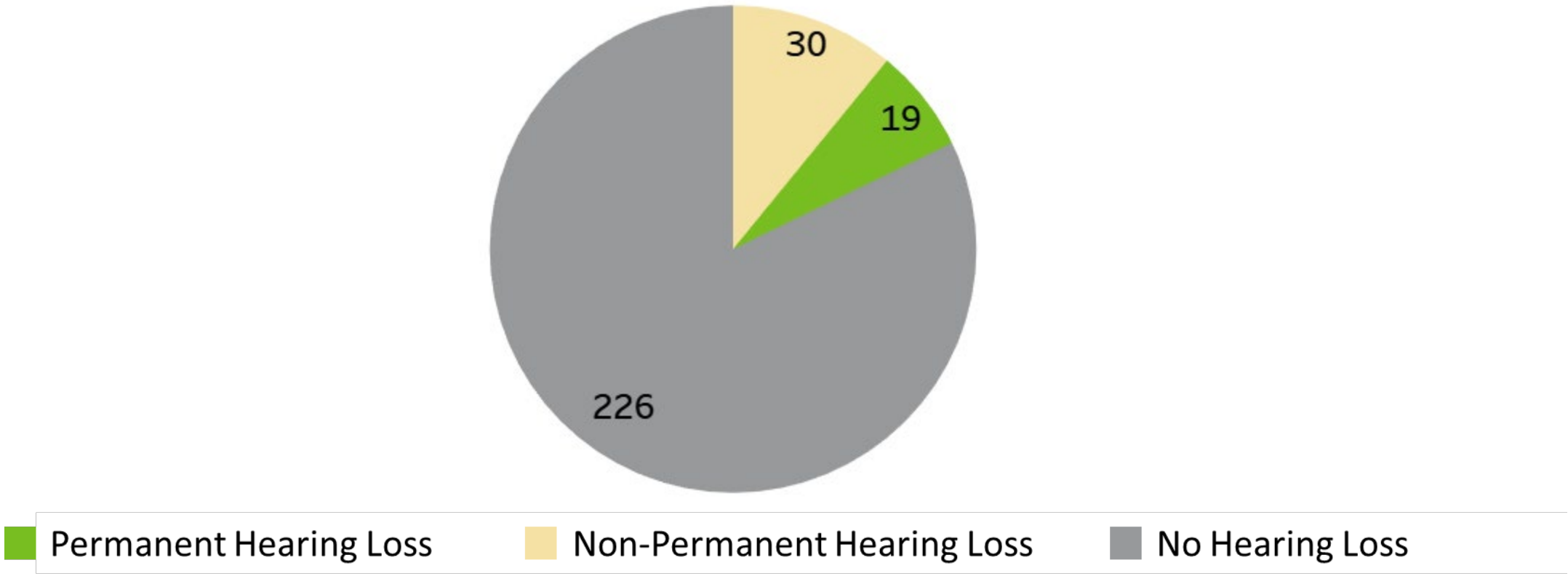
Newborn Hearing Screen Results
Infants born 2/6/23 – 10/31/24

16% of cCMV cases had a refer result on their newborn hearing screen



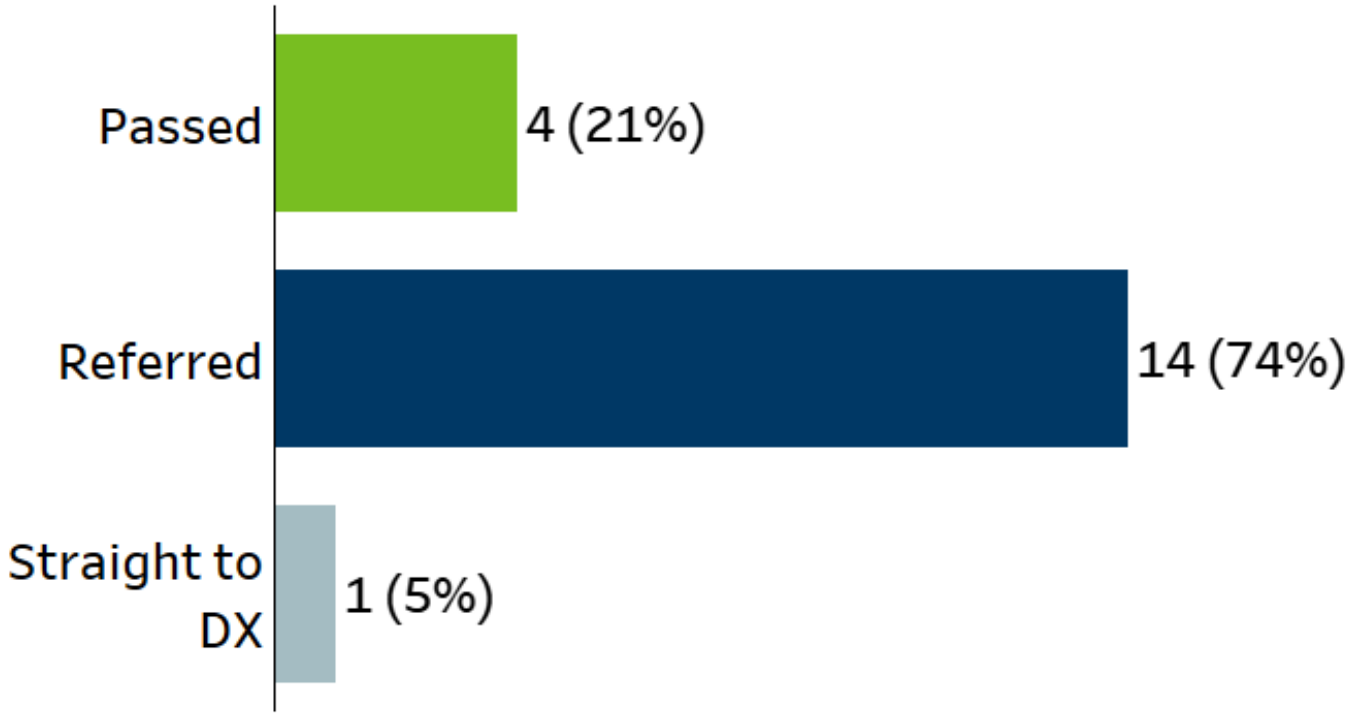
Diagnostic Audiology Assessment Results

7% were diagnosed with permanent hearing loss at their most recent diagnostic audiology assessment



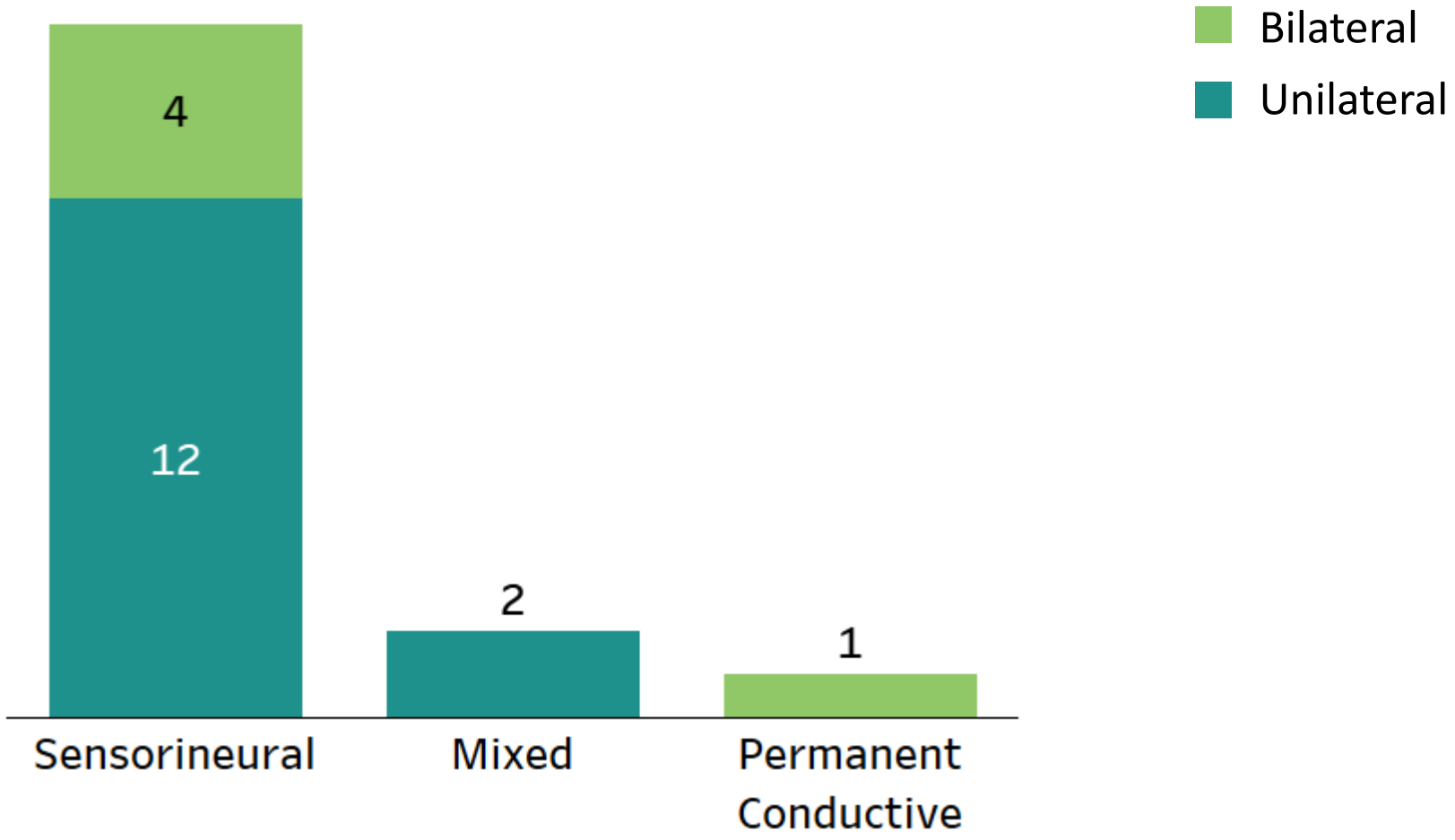
Diagnostic Audiology Assessment Results

4 infants with permanent hearing loss PASSED their newborn hearing screen



Diagnostic Audiology Assessment Results

Type and Laterality of Permanent Hearing Loss



Diagnostic Audiology Assessment Results

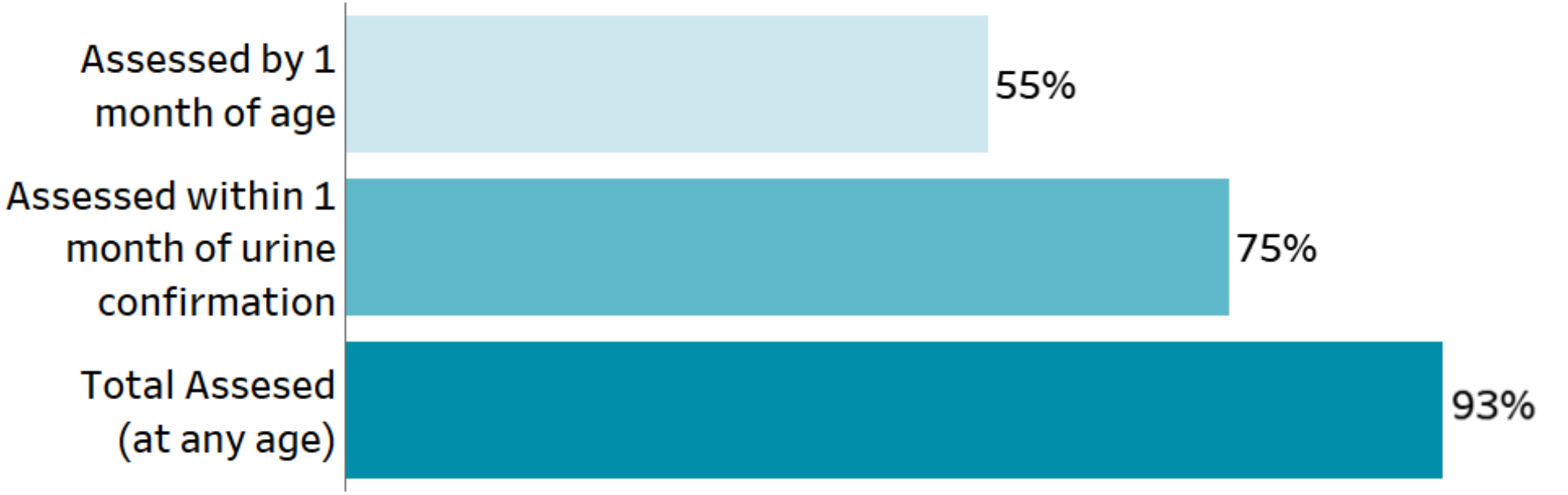
39 infants received a revised diagnosis between their first and most recent diagnostic audiology assessments

First DX Assessment	Most Recent DX Assessment	Count
No Hearing Loss	Permanent hearing loss	1
	Non-Permanent hearing loss	24
Non-permanent hearing loss	Permanent hearing loss	1
	No hearing loss	13

Adherence to recommended audiology follow-up

Timeliness: First diagnostic audiology assessment

75% received their initial diagnostic audiology assessment within 1 month of PCR confirmation*



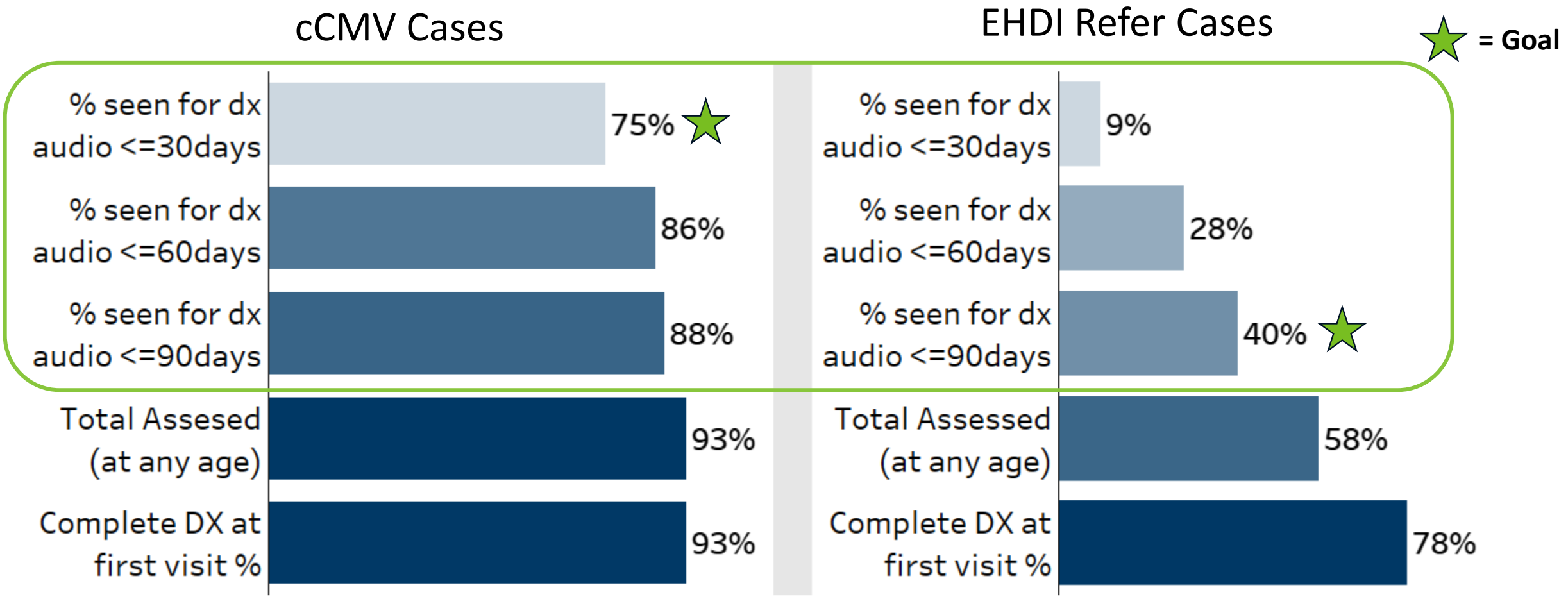
*As reported to MDH by 3/5/25

Timeliness: Second diagnostic audiology assessment

58% received a second diagnostic assessment by 5 months of age*

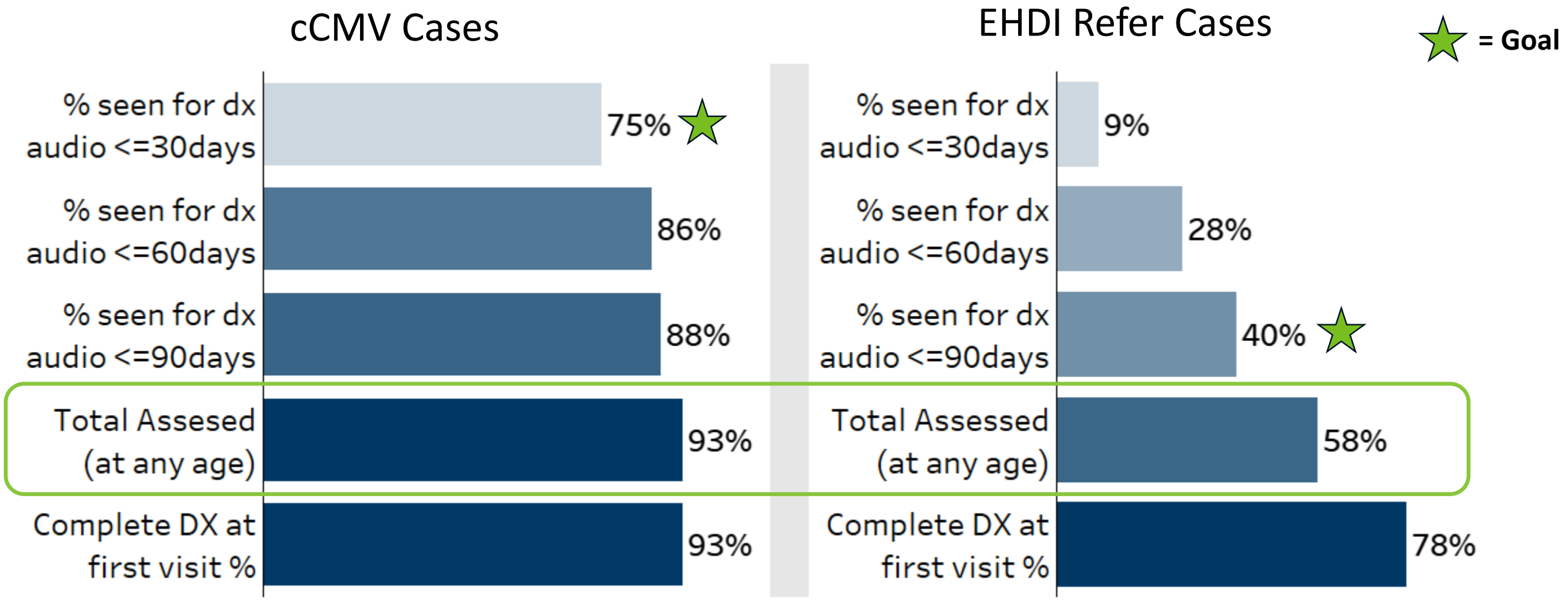
**As reported to MDH by 3/5/25*

Time to Audiology: A Comparison



EHDI refer excludes cCMV cases

Time to Audiology: A Comparison



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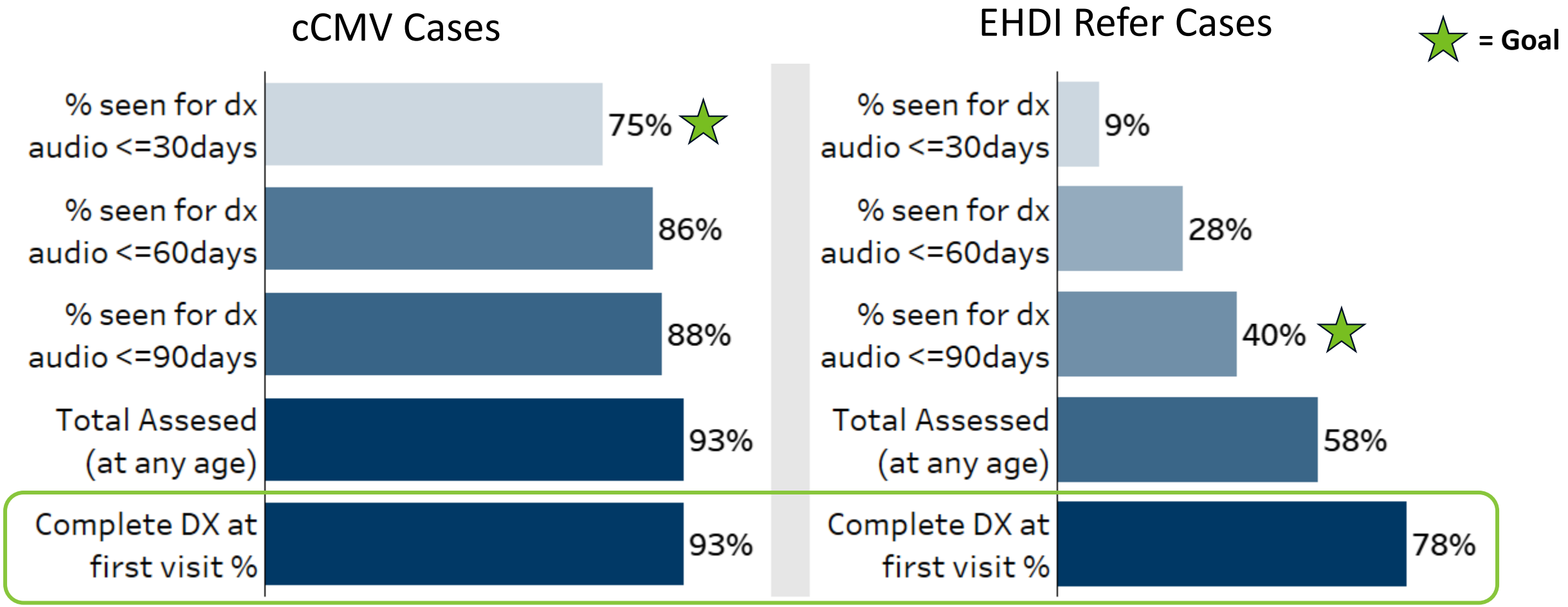
Time to Audiology: A Comparison



EHDI refer excludes cCMV cases

Are there differences in which families **completed all** recommended cCMV follow-up evaluations (*initial audiology, ophthalmology, neuroimaging*) vs those that **did not**?

Methods

- Infants born 2/6/23-2/5/24 with confirmed cCMV and who lived in Minnesota
  - **Incomplete**: ≥1 evaluation (*initial audiology, ophthalmology, or neuroimaging*) not completed (37 infants)
  - **Complete**: all 3 evaluations (*initial audiology, ophthalmology, and neuroimaging*) completed (130 infants)
- **Structural Racism Effects Index (SREI):** area-based index measures social risk factors that may impact the ability to complete follow-up:

– Built environment	– Employment	– Social cohesion
– Criminal justice	– Housing	– Transportation
– Education	– Income & poverty	– Wealth

www.sreindex.com

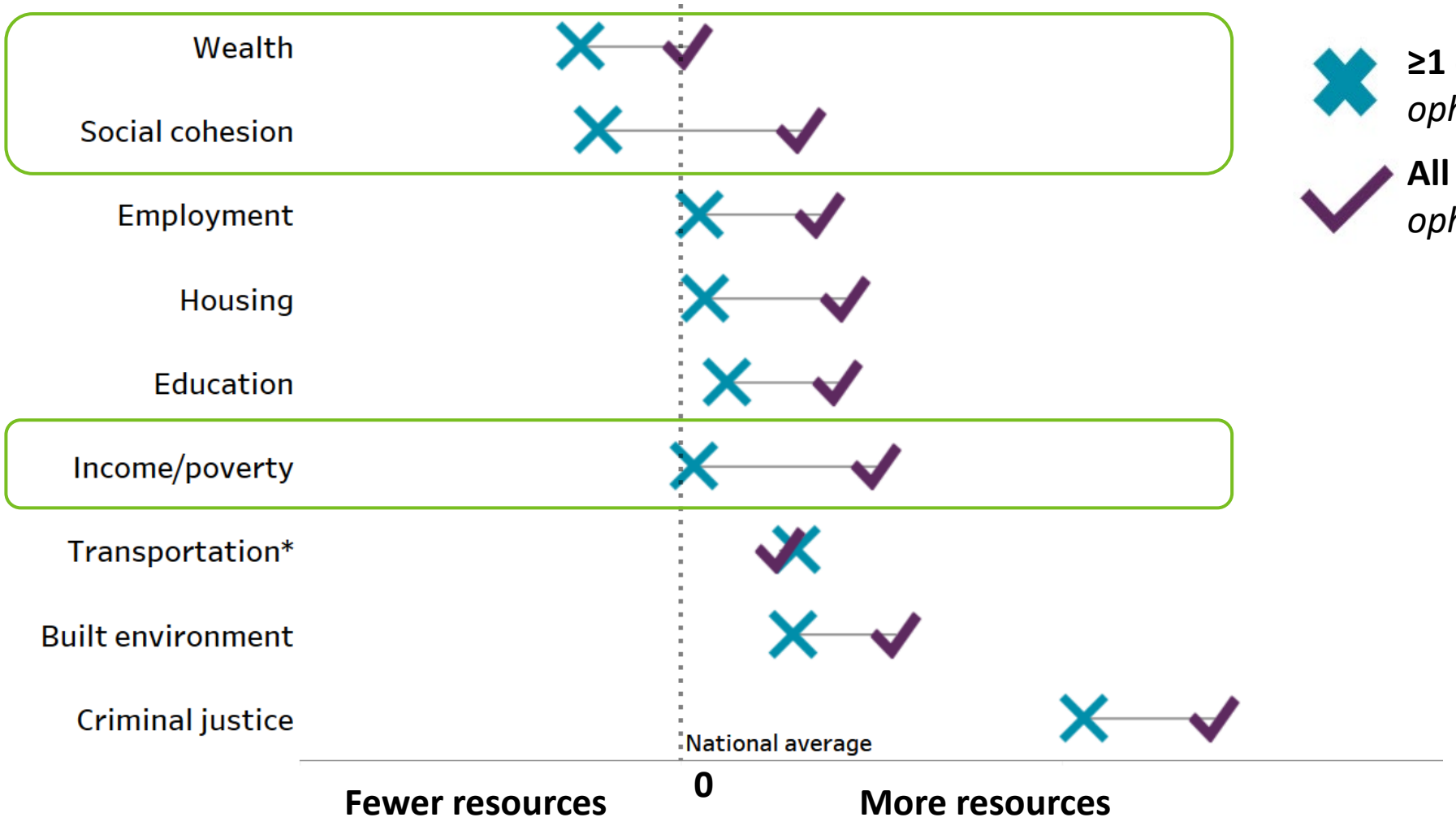
Living in a **neighborhood with fewer resources** is associated with **incomplete health evaluations**

≥1 eval incomplete (*initial audiology, ophthalmology, or neuroimaging*)

All evals complete (*initial audiology, ophthalmology, and neuroimaging*)

** p-value >0.05*

Wealth, social cohesion, and **income/poverty** were most associated with completing all health evaluations for cCMV



≥1 eval incomplete (*initial audiology, ophthalmology, or neuroimaging*)

All evals complete (*initial audiology, ophthalmology, and neuroimaging*)

** p-value >0.05*

Conclusions & Future Directions

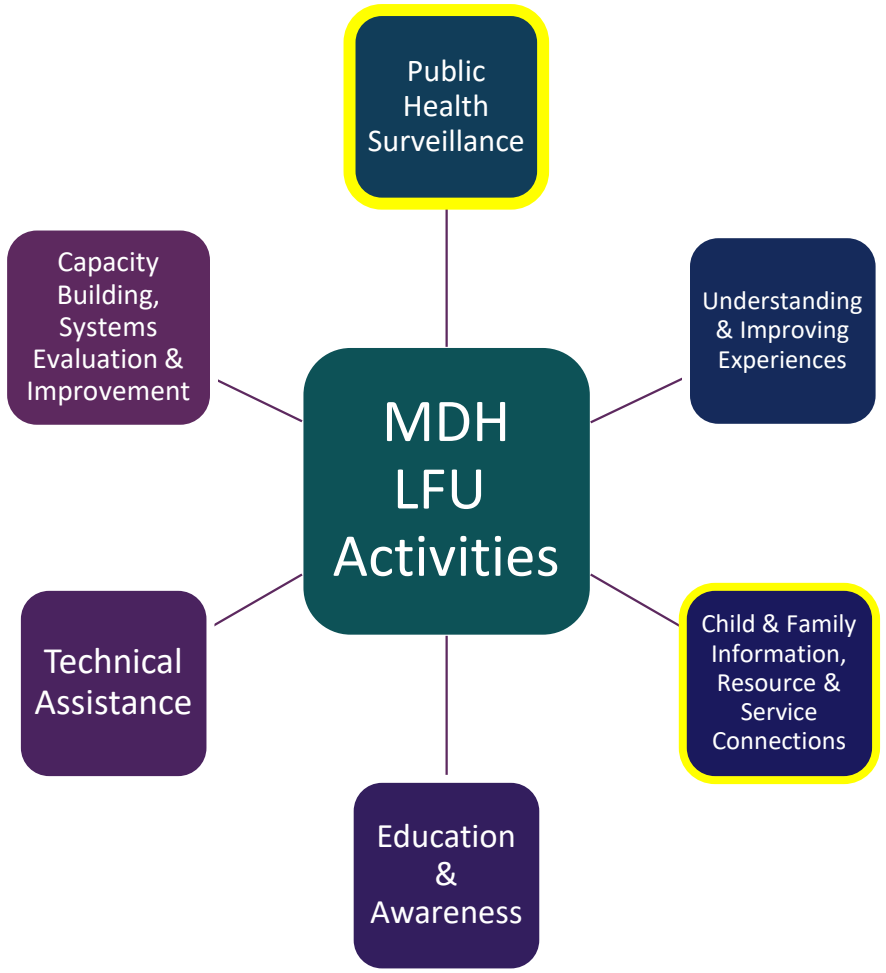
- **Differences** between families that did vs did not complete all recommended cCMV follow-up evaluations (*initial audiology, ophthalmology, neuroimaging*) **exist**
  - Differences associated **neighborhood-level social risk factors**
- **More to come!!**
  - Analyze with 2 years of complete cCMV screening data
    - Collect individualized data
    - Geographic variations
  - Inform decisions on system improvements

Longitudinal Follow-Up Activities

Longitudinal Follow-Up Activities

Systematic evaluation to determine how newborn screening is meeting its goal.

Focus: *after* diagnosis of a person with a condition included in newborn screening.



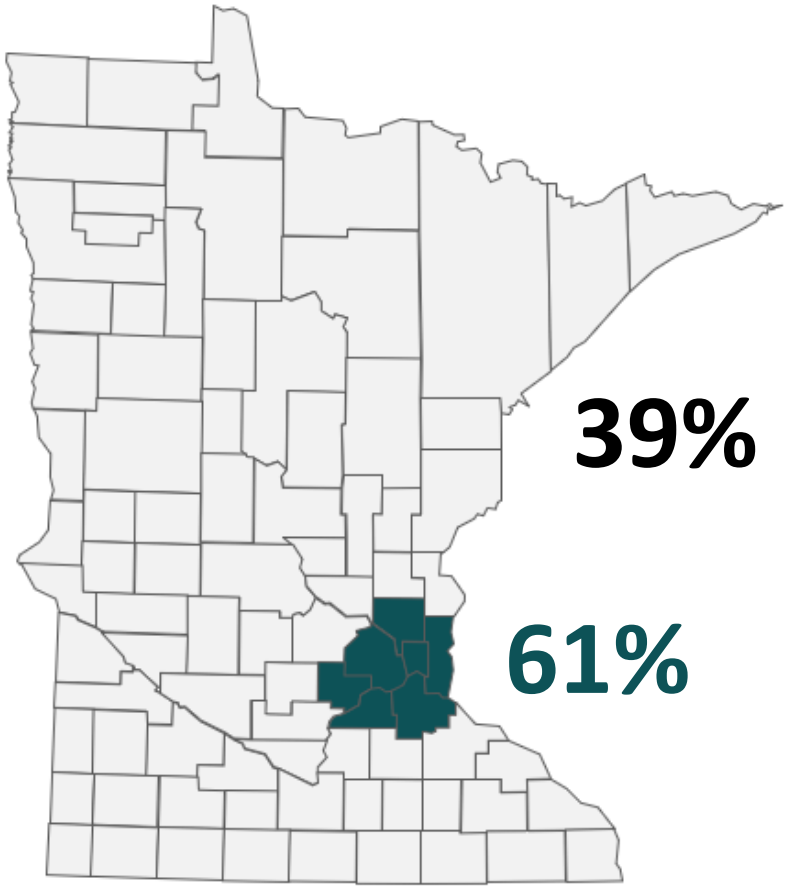
LFU follows 19 children with cCMV and hearing loss

53% Males
47% Females

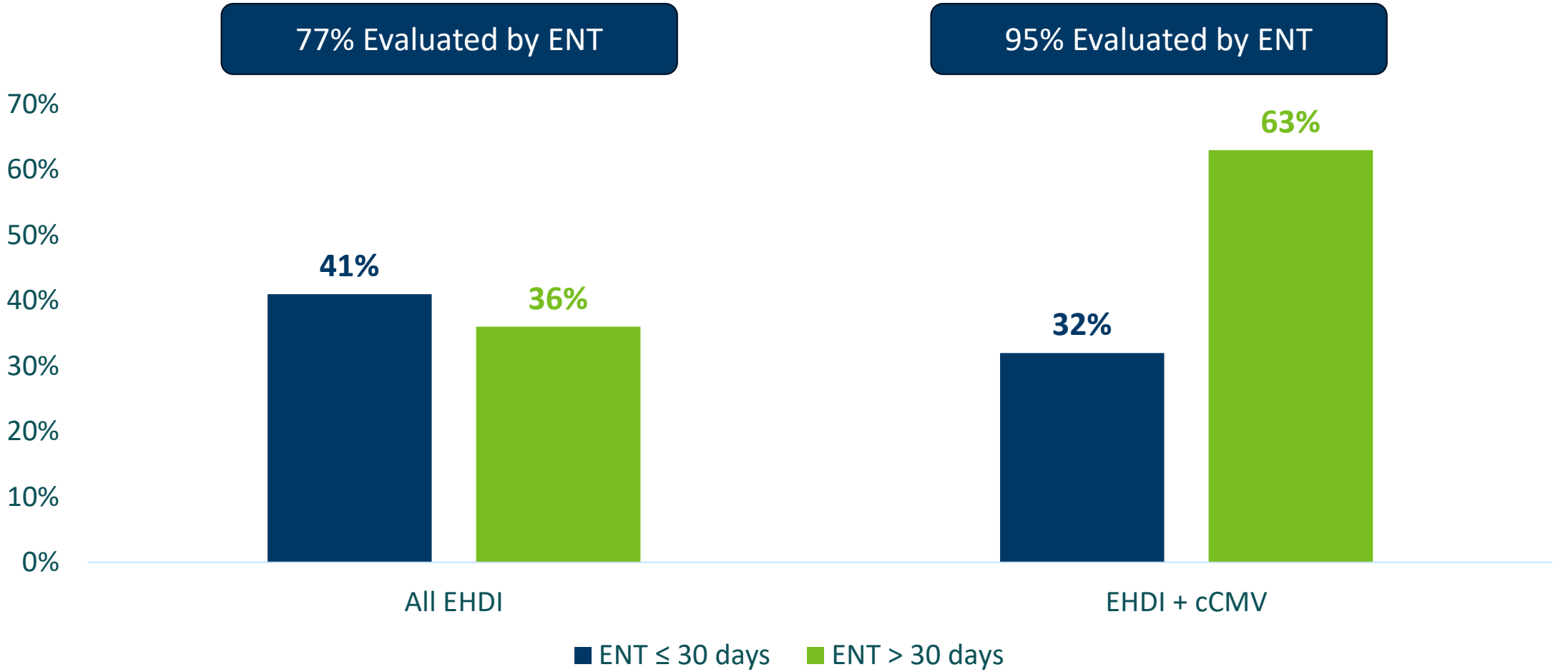
70% born to mothers with other living children

Mothers Race:
79% White
11% Asian
5% Black or African American
5% Missing

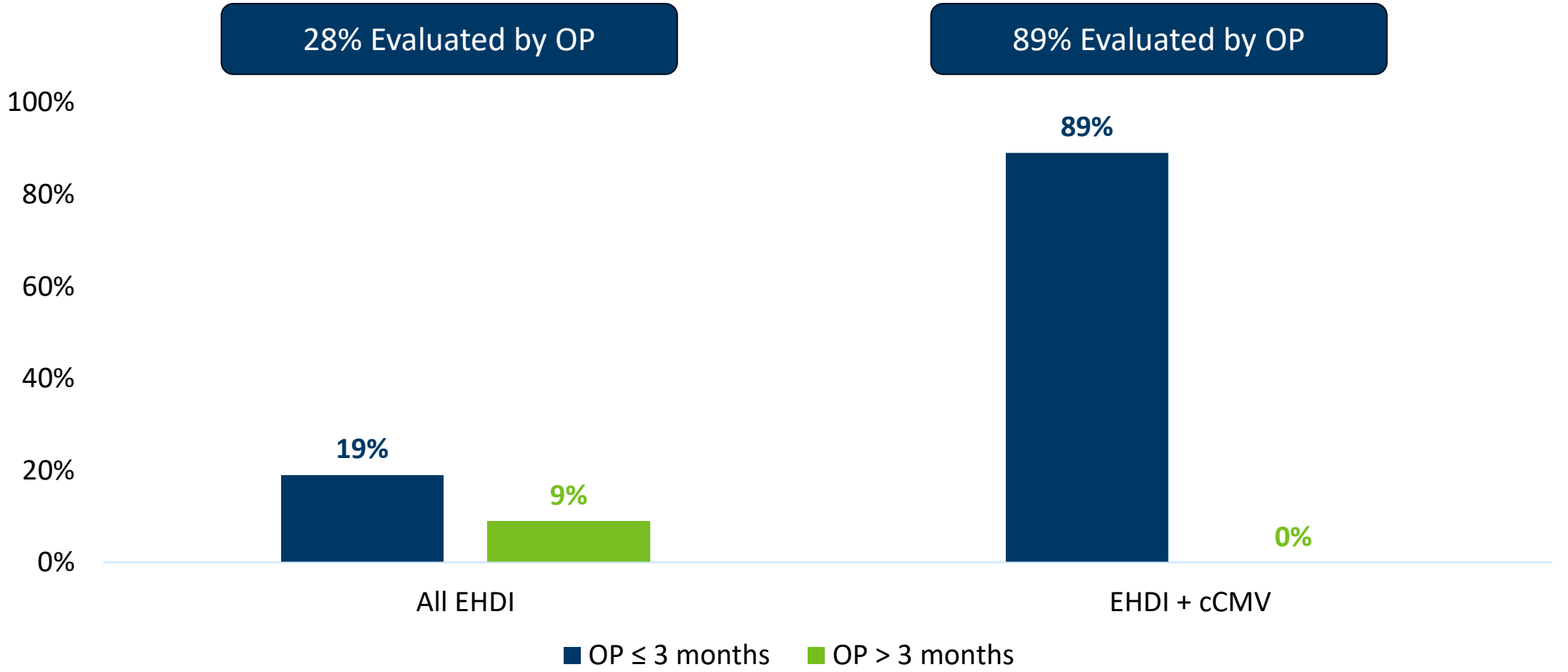
32% MN Public Insurance
53% Private Insurance
15% Missing or Unknown



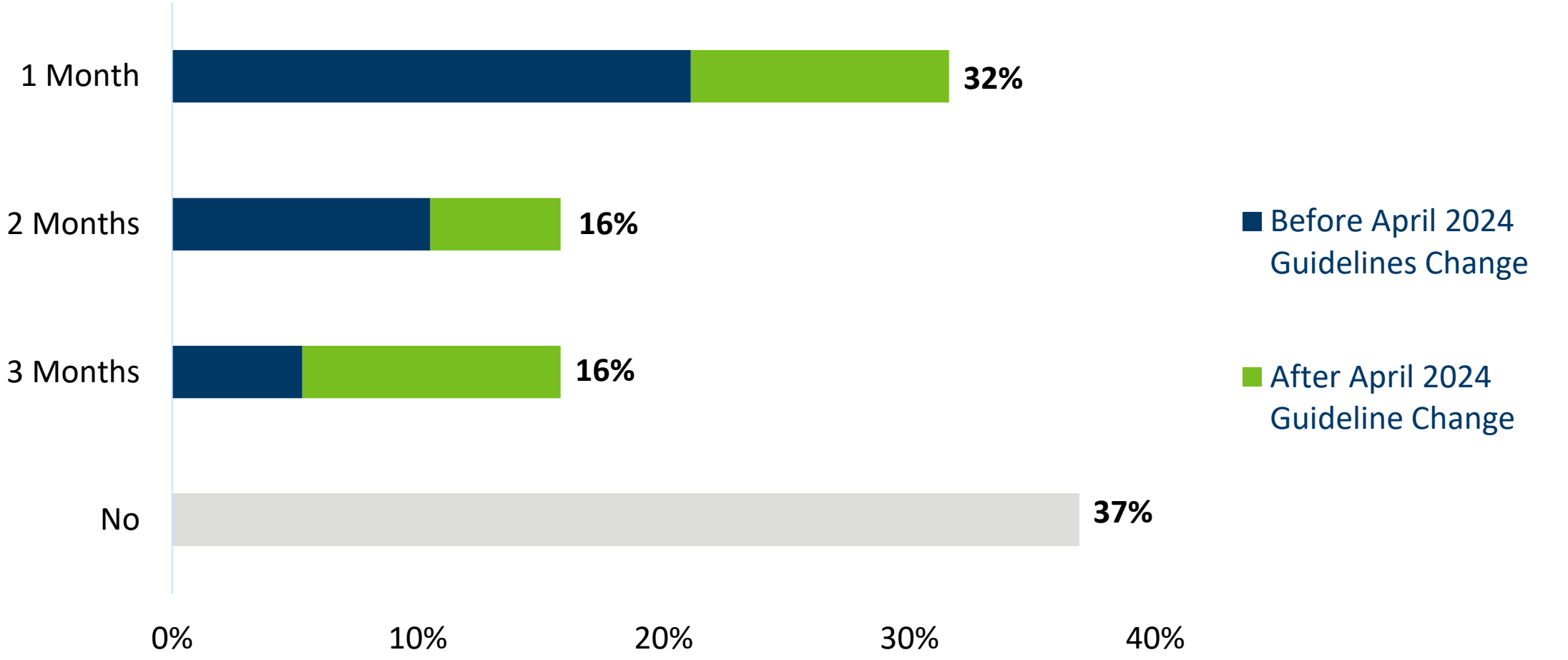
More than 95% of children with cCMV & HL were evaluated by ENT within 30 days of permanent HL diagnosis



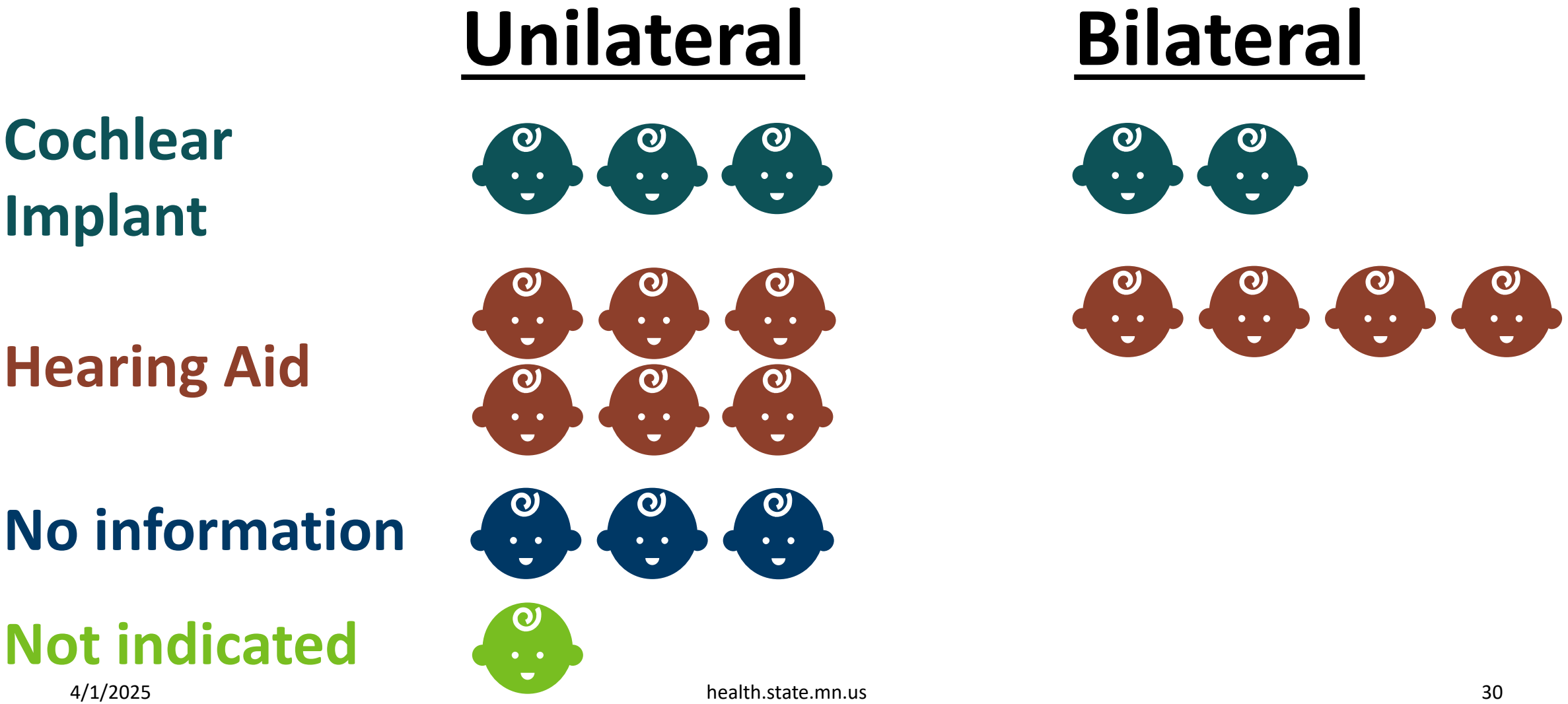
Nearly 90% of children with cCMV & HL were evaluated by ophthalmology by 3 months of permanent HL diagnosis



Approximately two-thirds of children with cCMV & HL received antiviral therapy. One-third started treatment within 1 month of birth



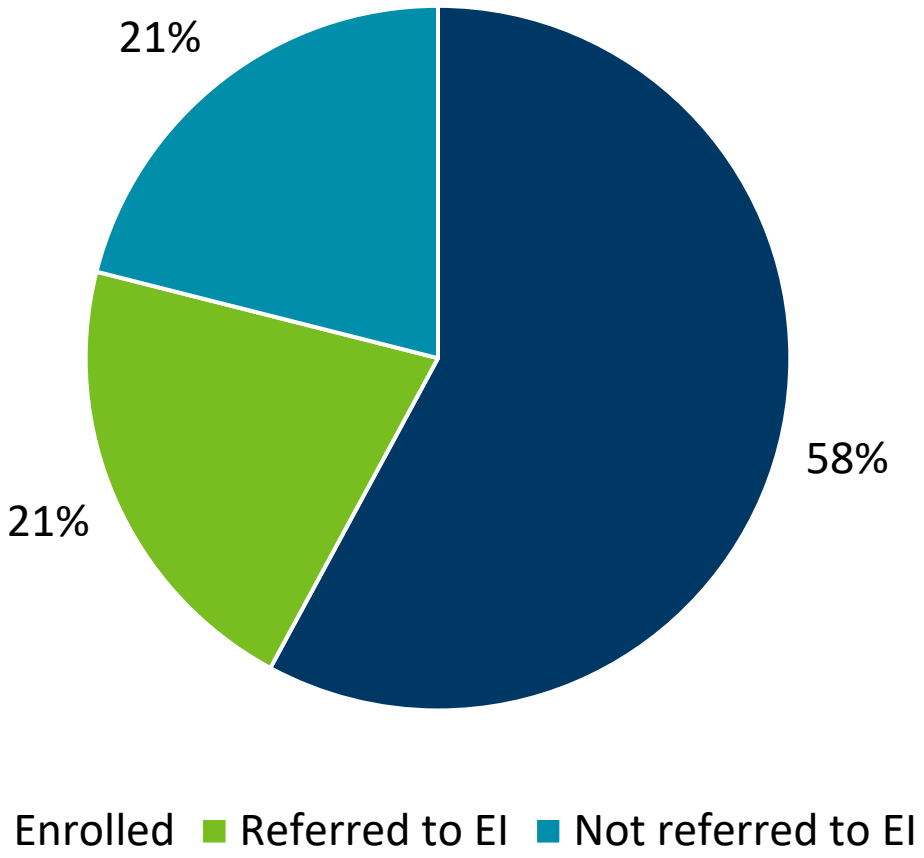
Nearly 80% of children were fit for amplification - All children with bilateral HL were fit with hearing technology



All families were referred to LPH and 95% completed a public health nursing assessment.

- All families were referred to LPH for a nursing assessment & 95% of families completed a nursing assessment
- During the nursing assessment, LPH nurses can assess problems areas including income, communication with community resources, caretaking & parenting, growth & development, and healthcare supervision
  - Indicate signs & symptoms related to each problem area
  - Provide interventions to families
- Nurses are required to complete questions about insurance, language, and referrals to family home visiting and early intervention.

Nearly 80% were enrolled in or referred to Early Intervention



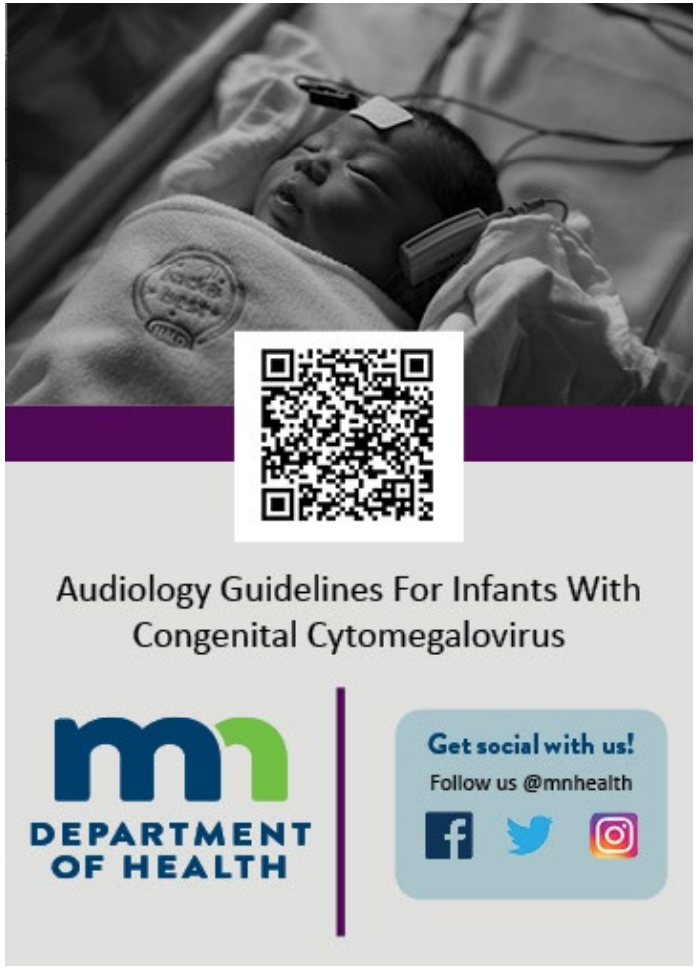
All families were referred to MN Hands & Voices. 95% of families were able to be reached by MN H&V

- Of those contacted by MN H&V, 50% of families were contacted within 1 month of their initial diagnosis

First contact date ≤ 1 month of diagnosis

First contact date > 1 month of diagnosis

Audiology Guidelines for Infants with cCMV



Thank you!

Questions?

amanda.pavan@state.mn.us
sara.lammert@state.mn.us