Congenital Cytomegalovirus Screening: Targeted vs. Expanded

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ABSTRACT SUMMARY

- Congenital cytomegalovirus (cCMV) is the leading non-genetic cause of deafness in the United States. Because the sensorineural hearing loss associated with cCMV is progressive, early detection and intervention are crucial for improved audiological outcomes.
- Hearing-targeted screening tests those who fail newborn hearing screen (NBHS) but may not detect patients with late-onset hearing loss. Expanded-targeted screening aims to capture a wider range of presentations, but current literature does not define a set of standard screening criteria.
- We present 4 CMV cases in a tertiary academic hospital in Newark, New Jersey. Two were diagnosed after failed NBHS, one failed NBHS with other developmental and neurologic abnormalities, and one passed NBHS but was small for gestational age (SGA). 3 of the 4 cases were preterm births.
- These results support the use of expanded-targeted screening to include criteria such as SGA, prematurity, and failed NBHS; this will allow earlier initiation of treatment, and more favorable audiological and developmental outcomes

INTRODUCTION

- Cytomegalovirus is a double-stranded herpesvirus that can be transmitted to newborns transplacentally, during birth, and through breastfeeding
- According to the CDC, congenital cytomegalovirus occurs in approximately 1 in 200 livebirths and is the most common non-genetic cause of congenital hearing loss
- About 1 in 5 infected infants will experience long-term health issues, including hearing loss, developmental delay, or visual impairment[1-2]
- Newborns can present with features including thrombocytopenia, jaundice, hepatosplenomegaly, small for gestational age, periventricular calcification, microcephaly and prematurity, etc[3-5]
- Early detection and treatment with ganciclovir is critical for improved developmental outcomes since this is a progressive sensorineural hearing loss (SNHL)[6-8]
- The gold standard for diagnosis is urine culture or PCR within the first 21 days of life

OBJECTIVE

- Improve outcomes of newborns with cCMV by early detection and treatment in an academic tertiary medical center in Newark, New Jersey

METHODS

- Urine CMV culture testing was implemented as standard of care for all newborns who failed newborn hearing screen at University Hospital in Newark, New Jersey beginning October 2022
- We transitioned to urine CMV PCR testing in October 2024 for an expedited result time
- CMV testing was also performed for infants who were identified as small for gestational age as part of workup for toxoplasmosis, rubella, and herpes simplex virus (TORCH) infections
- All newborns that failed NBHS were referred for repeat audiology assessment with Auditory Brainstem Response testing in two weeks
- Infected newborns were treated with ganciclovir or valganciclovir for 6 weeks and referred to Infectious disease

RESULTS

- There were 4 positive cases out of 222 newborns tested between October 2022 and April 2025

- **Case #1** was born at term and was identified after failed NBHS
- **Case #2** was a preterm birth and was identified after failed NBHS
- **Case #3** was a preterm birth, SGA, failed NBHS, and had abnormal prenatal neurological ultrasound findings associated with cCMV, including microcephaly and pontocerebellar hypoplasia
- **Case #4** passed NBHS but was identified due to SGA

- 75% of cases failed NBHS, 50% were small for gestational age, 75% were born preterm, 25% had an abnormal brain ultrasound, and 50% had thrombocytopenia (Table 1 & Graph 1)

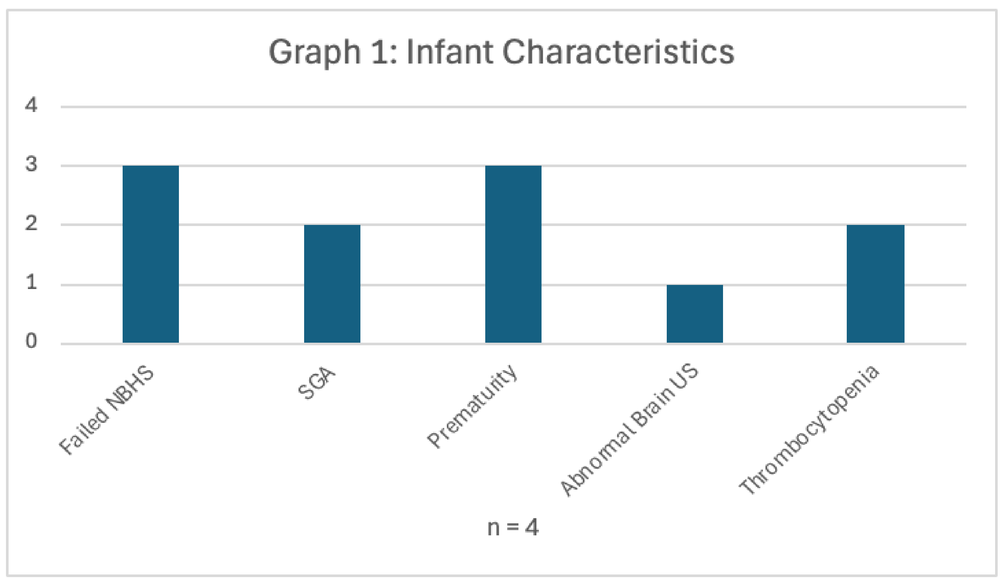

Table 1

Case #	Sex	GA	NBHS	Additional Risk Factors
1	M	37w0d	Failed	None
2	M	34w0d	Failed	Prematurity
3	M	36w2d	Failed	SGA; Prematurity; Abnormal brain ultrasound (microcephaly, pontocerebellar hypoplasia); Thrombocytopenia
4	F	30w5d	Passed	SGA; Thrombocytopenia; Prematurity

GA = Gestational Age

CONCLUSION

- These results support the use of expanded-targeted screening to include infants with SGA, prematurity, and failed NBHS
- Implementing expanded screening ensures earlier detection of cCMV, enabling timely intervention and preventing cases that would otherwise be diagnosed only after hearing loss is identified on the newborn screen

DISCUSSION

- Some states have already implemented universal screening for cCMV but no standard US guidelines by CDC or AAP available for testing
- Multicenter trials are necessary to define evidence-based, cost-effective screening criteria that effectively capture newborns who may develop late-onset sensorineural hearing loss

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