Newborn Screening Program

Office Hours – October 2024

Georgia Newborn Screening Providers / Newborn Screening Program / October 16, 2024

Agenda

1. Office Hours Overview
2. Congenital Cytomegalovirus (cCMV) Overview
3. Question and Answer Session

Congenital Cytomegalovirus (cCMV) Overview

Melanie Morris, Au.D, CCC-A

Learning Objectives

1. Describe Georgia's hearing-targeted cCMV testing and follow-up protocol.
2. List 2-3 roles and responsibilities of the birthing facility, individual conducting the newborn hearing screen, and primary care physician in the cCMV testing protocol.
3. Understand reporting requirements for cCMV results and follow-up procedures.
4. Locate cCMV resources and materials.

Georgia Law

Effective October 10, 2024, under Georgia Code Section 31-5-1, birthing facilities will be required to conduct congenital cytomegalovirus (cCMV) testing on all infants who fail their final newborn hearing screening before discharge and before 21 days of age.

Cytomegalovirus vs. *Congenital* Cytomegalovirus

Cytomegalovirus

- A common virus that is typically harmless to healthy children and adults
- Part of the herpes family – Once infected, CMV stays in your body in an inactive state that can reactivate
- Common in children 1-3 years of age, particularly if they attend daycare
- In the US, 1 in 3 children have been infected by 5 years of age; 50% of adults have been infected by 40 years of age

Congenital Cytomegalovirus

- CMV that is acquired by the fetus in utero
- Infants can be asymptotic or symptomatic
- The "most common infectious disease cause of birth defects in the United States," impacting 1 of every 200 births
- Leading cause of non-genetic, childhood-onset sensorineural hearing loss

Transmission: Spread by *direct and indirect* close contact with bodily fluids (e.g. saliva, urine, mucous, tears, etc.)

National Center for Immunization and Respiratory Diseases, Division of Viral Diseases

Congenital Cytomegalovirus (cCMV)

CMV is common, serious, and preventable.

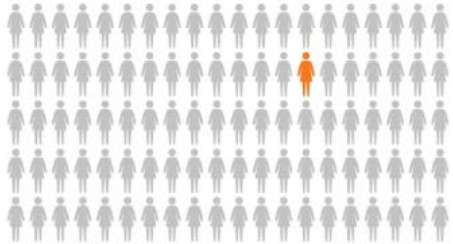
1 out of 3

pregnant women who become infected with CMV will pass the virus to their unborn child

1 Child

is permanently disabled by congenital CMV every hour

1 in 200



children are born with congenital CMV each year

National CMV Foundation

cCMV Symptoms

- 85-90% of infants with cCMV are born with clinically inapparent infections, and only 10-15% have symptomatic disease with *detectable* symptoms at birth.
- The most common symptoms of cCMV include:
  - Hearing loss
  - Microcephaly
  - Petechiae
  - Hepatosplenomegaly
  - Chorioretinitis
  - Intrauterine Growth Restriction (IUGR)
  - Brain abnormality

cCMV and Hearing Loss

- 10–15% of asymptomatic cCMV+ infants will have hearing loss at birth or experience delayed-onset hearing loss.
- In the United States, 15–20% of all cases of bilateral moderate to profound sensorineural hearing loss (SNHL) in children are due to cCMV
- cCMV is the leading environmental cause of hearing loss among children, affecting 4:1000 newborns.

Lanzieri, et al (2018); Philips, et al (2023); Fowler, et al (2018)

cCMV Testing Methods

Specimen	Advantages	Disadvantages
Dried Blood Spot	Newborn Screening (NBS) process already in place	CMV viral load lower in blood (50-85% Sensitivity), less available specimen
Saliva*	CMV viral load higher (88% Sensitivity)	Not part of existing NBS process; Possible contamination with breastmilk; Will require confirmatory urine sample if positive
Urine	CMV viral load higher (79% Sensitivity); does not require additional testing	Not part of existing NBS Program; Challenges with collection

Recommended Methods

*CDC recommended first-tier screening method

Dollard *(2010); Schleiss, et al (2023)*

cCMV screening must occur prior to 21 days of life

Universal Screening
Test all infants for cCMV

Targeted Screening
Test for cCMV after 1-2 failed hearing screenings

Updates on National cCMV Trends

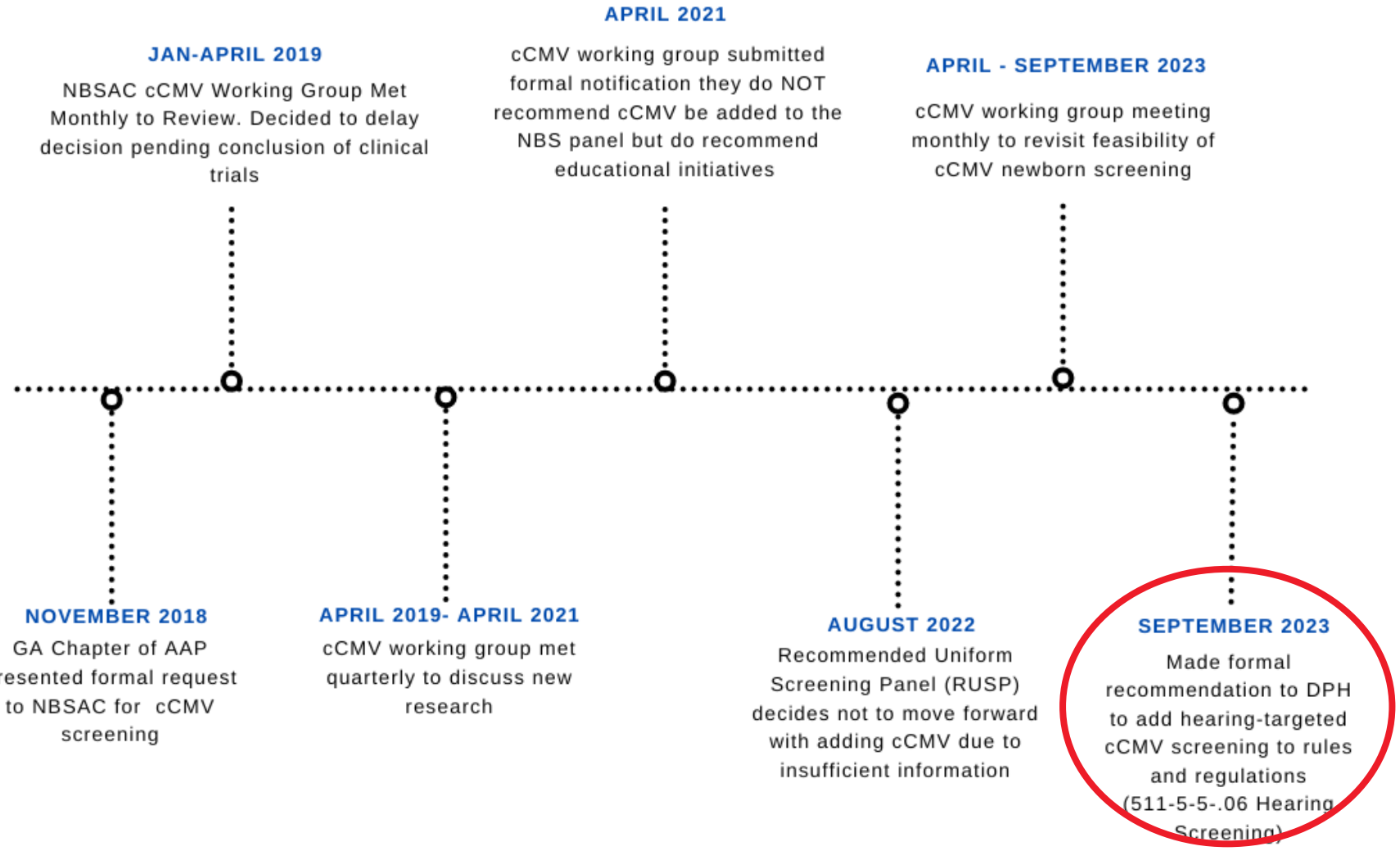
States with **Universal** cCMV Screening (Bloodspot Panel)

- Minnesota (February 2023)
- Connecticut (To begin 2025)
- New York (NICHD Grant, 2023-2024)

States with **Hearing Targeted** cCMV Screening (Point of Care)

- Florida
- Virginia
- Illinois (to be offered*)
- Iowa
- Kentucky
- Maine
- New York
- Pennsylvania
- Utah
- Texas
- Louisiana
- Colorado

Newborn Screening and Genetics Advisory Committee (NBSAC) **cCMV Working Group** Efforts Timeline



Rules and Regulations Adopted Amendments

(d) If the baby does not pass the initial or final inpatient newborn hearing screening test, in cases where a second test is performed, in accordance with the Georgia Newborn Screening Program Policy and Procedure Manual, the hospital or birthing center shall conduct cytomegalovirus testing before hospital discharge or 21 days of age, whichever occurs earlier;
(e) In the event that a baby is transferred to another hospital or birthing center before the newborn hearing screening test has been completed, then it is the responsibility of the second facility to ensure that a newborn hearing screening test and cytomegalovirus test, as indicated in subsection 3(d) of this Rule, is completed.
(4) The results of the hearing test shall be included in the baby's clinical record, reported to the Department, and given to the parents or legal guardians along with any follow-up recommendations, in accordance with the Georgia Newborn Screening Policy and Procedure Manual.
(5) The results of the cCMV test shall be included in the baby's clinical record, and the status of the cCMV test shall be provided to the baby's physician or healthcare provider and the parent or legal guardian, in accordance with the Georgia Newborn Screening Policy and Procedure Manual.

Rules and Regulations Adopted Amendments

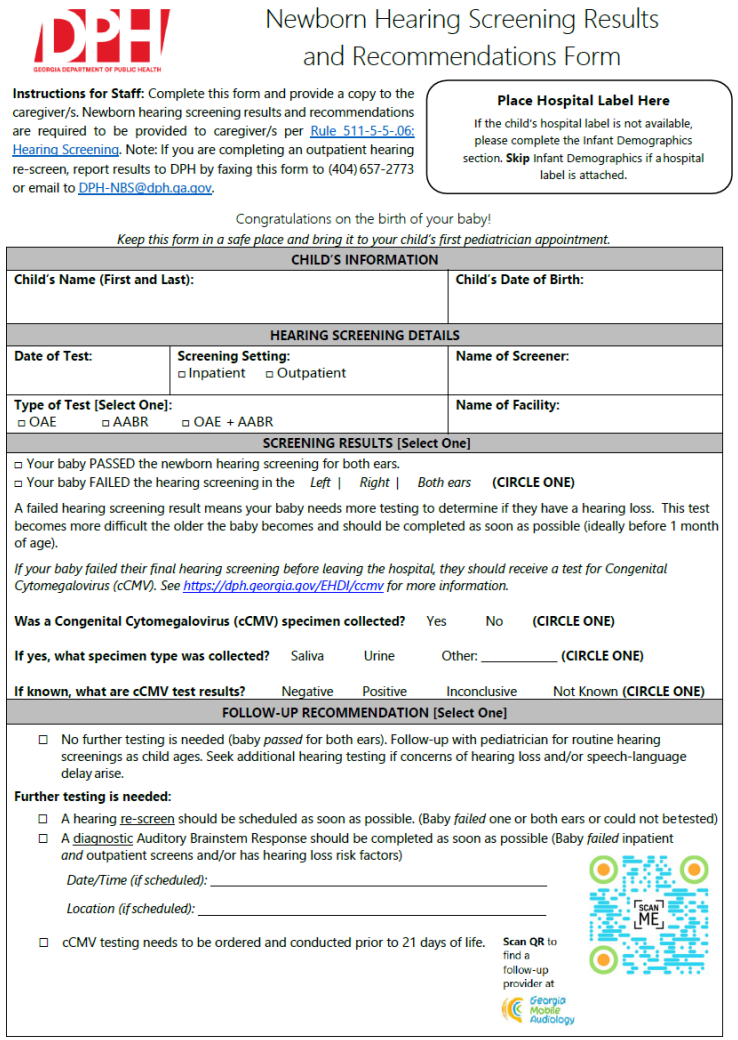
Rule 511-5-5-.08 Abnormal Test Results

(4) In the event of an abnormal test for cytomegalovirus (cCMV), the provider administering the cCMV test shall notify the Department. The appropriate follow-up provider shall notify the baby's physician or healthcare provider, and the parent or legal guardian, in accordance with the Georgia Newborn Screening Policy and Procedure Manual.

- Not universal screening → Hearing-targeted screening
- Not a legislative mandate → GA DPH's Rules and Regulations amendment
- Samples are not sent to GPHL→ Birthing facilities to coordinate lab testing
- Results are not reported on the bloodspot card → Birthing facilities must notify DPH separately

cCMV Testing and Follow-Up

Birthing Facility Responsibilities



DPH
GEORGIA DEPARTMENT OF PUBLIC HEALTH

Newborn Hearing Screening Results and Recommendations Form

Instructions for Staff: Complete this form and provide a copy to the caregiver/s. Newborn hearing screening results and recommendations are required to be provided to caregiver/s per Rule 511-5-5-.06: Hearing Screening. Note: If you are completing an outpatient hearing re-screen, report results to DPH by faxing this form to (404) 657-2773 or email to DPH-NBS@dph.ga.gov.

Place Hospital Label Here
If the child's hospital label is not available, please complete the Infant Demographics section. **Skip** Infant Demographics if a hospital label is attached.

Congratulations on the birth of your baby!
Keep this form in a safe place and bring it to your child's first pediatrician appointment.

CHILD'S INFORMATION

Child's Name (First and Last):	**Child's Date of Birth:**

HEARING SCREENING DETAILS

Date of Test:	**Screening Setting:** ▫ Inpatient ▫ Outpatient	**Name of Screener:**
Type of Test [Select One]: ▫ OAE ▫ AABR ▫ OAE + AABR		**Name of Facility:**

SCREENING RESULTS [Select One]

▫ Your baby PASSED the newborn hearing screening for both ears.
▫ Your baby FAILED the hearing screening in the *Left* | *Right* | *Both ears* **(CIRCLE ONE)**

A failed hearing screening result means your baby needs more testing to determine if they have a hearing loss. This test becomes more difficult the older the baby becomes and should be completed as soon as possible (ideally before 1 month of age).

If your baby failed their final hearing screening before leaving the hospital, they should receive a test for Congenital Cytomegalovirus (cCMV). See https://dph.georgia.gov/EHDI/ccmv for more information.

Was a Congenital Cytomegalovirus (cCMV) specimen collected? Yes No **(CIRCLE ONE)**

If yes, what specimen type was collected? Saliva Urine Other: _____ **(CIRCLE ONE)**

If known, what are cCMV test results? Negative Positive Inconclusive Not Known **(CIRCLE ONE)**

FOLLOW-UP RECOMMENDATION [Select One]

☐ No further testing is needed (baby *passed* for both ears). Follow-up with pediatrician for routine hearing screenings as child ages. Seek additional hearing testing if concerns of hearing loss and/or speech-language delay arise.

Further testing is needed:

☐ A hearing re-screen should be scheduled as soon as possible. (Baby *failed* one or both ears or could not be tested)
☐ A diagnostic Auditory Brainstem Response should be completed as soon as possible (Baby *failed* inpatient *and* outpatient screens and/or has hearing loss risk factors)

Date/Time (if scheduled): _____

Location (if scheduled): _____

☐ cCMV testing needs to be ordered and conducted prior to 21 days of life.

Scan QR to find a follow-up provider at Georgia Mobile Audiology

SCAN ME

- Complete cCMV testing on all infants who fail their final initial hearing screening before 21 days of age and before discharge (whichever comes first).
- Inform parent and primary care physician in writing before discharge of the following:
  - Hearing screening results and recommendations
  - Status of cCMV testing (include results if available)

NOTE: cCMV testing will not affect discharge as only specimen collection is required prior to discharge, but results are NOT required to be obtained prior to discharge.

Birthing Facility Responsibilities

- Once the birthing facility receives the cCMV results:
  - All results must be included in the infant's medical record.
  - All positive cCMV results must be reported to DPH within 7 days of the result (ideally within 3 days)
  - In the event of an inconclusive or contaminated result after discharge, the provider who completed the test must notify DPH to ensure the child's medical home is informed of the need for a repeat specimen collection.

Birthing Facility Internal Guidelines

- Determine the facility's testing protocol (e.g., cCMV testing after the first failed or second failed hearing screening; whether urine or saliva will be collected).
- Designate a physician to oversee the medical aspects of both the newborn hearing screening and cCMV hearing-targeted testing program.
- Train all personnel who will be completing cCMV specimen collection using recommended methods.
- Develop a process for placing the cCMV order following a failed hearing screening. Consider adopting a standing order policy.
- Develop workflow for notifying DPH of positive cCMV cases.

Best Practice: Evaluate newborn hearing screening referral rate to ensure it is ≤4% to prevent over-screening for cCMV. Email DPH-NBS@dph.ga.gov if you need training or assistance.

Hearing Screener Responsibilities

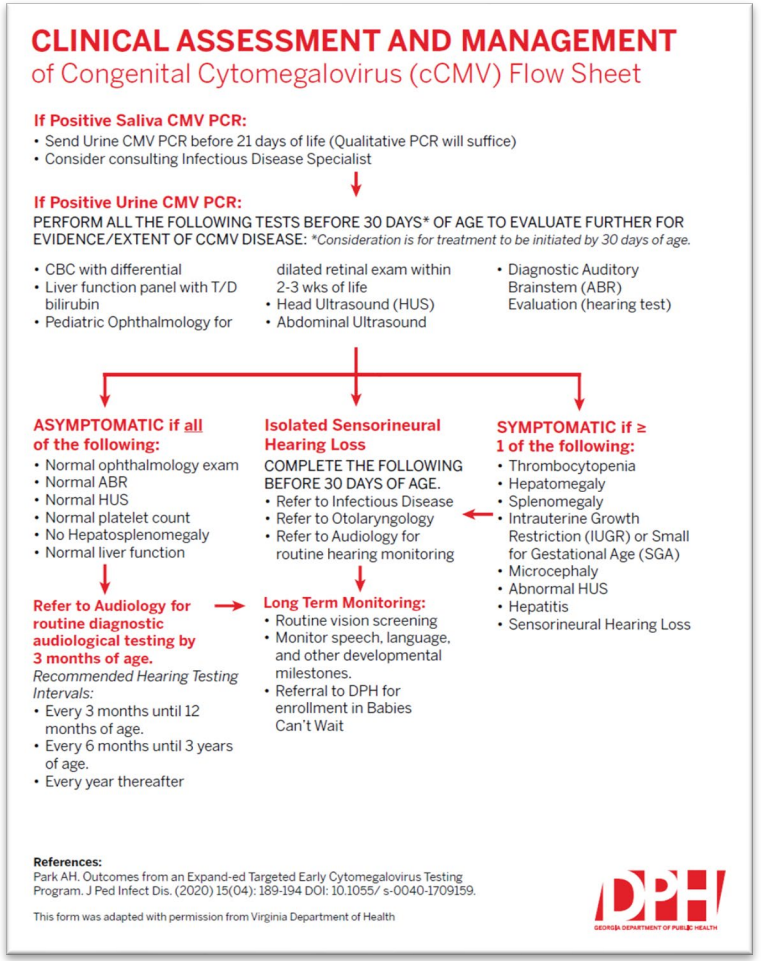
Final Failed Initial Hearing Screening:

- Communicate results to the medical provider responsible for ordering and/or conducting cCMV testing.
- If cCMV results are not known or if cCMV results are negative, a hearing re-screen should be recommended*
- If cCMV results are positive, a diagnostic Auditory Brainstem Response (ABR) should be completed instead of a screening. Refer directly to an audiologist.

*Follow the policies and procedures for newborn hearing screening as outlined in the Newborn Screening Policy and Procedure Manual

DPH Responsibilities

- DPH's designated follow-up program will educate and assist Healthcare Providers (HCP) with next steps and referral coordination for all positive cCMV cases reported before 21 days of life.
- Provide education and policy and procedure information to providers regarding the implementation of hearing-targeted cCMV testing.



CLINICAL ASSESSMENT AND MANAGEMENT
of Congenital Cytomegalovirus (cCMV) Flow Sheet

If Positive Saliva CMV PCR:
- Send Urine CMV PCR before 21 days of life (Qualitative PCR will suffice)
- Consider consulting Infectious Disease Specialist

If Positive Urine CMV PCR:
PERFORM ALL THE FOLLOWING TESTS BEFORE 30 DAYS* OF AGE TO EVALUATE FURTHER FOR EVIDENCE/EXTENT OF CCMV DISEASE: **Consideration is for treatment to be initiated by 30 days of age.*

- CBC with differential
- Liver function panel with T/D bilirubin
- Pediatric Ophthalmology for dilated retinal exam within 2-3 wks of life
- Head Ultrasound (HUS)
- Abdominal Ultrasound
- Diagnostic Auditory Brainstem (ABR) Evaluation (hearing test)

ASYMPTOMATIC if all of the following:
- Normal ophthalmology exam
- Normal ABR
- Normal HUS
- Normal platelet count
- No Hepatosplenomegaly
- Normal liver function

Refer to Audiology for routine diagnostic audiological testing by 3 months of age.
Recommended Hearing Testing Intervals:
- Every 3 months until 12 months of age.
- Every 6 months until 3 years of age.
- Every year thereafter

Isolated Sensorineural Hearing Loss
COMPLETE THE FOLLOWING BEFORE 30 DAYS OF AGE.
- Refer to Infectious Disease
- Refer to Otolaryngology
- Refer to Audiology for routine hearing monitoring

Long Term Monitoring:
- Routine vision screening
- Monitor speech, language, and other developmental milestones.
- Referral to DPH for enrollment in Babies Can't Wait

SYMPTOMATIC if ≥ 1 of the following:
- Thrombocytopenia
- Hepatomegaly
- Splenomegaly
- Intrauterine Growth Restriction (IUGR) or Small for Gestational Age (SGA)
- Microcephaly
- Abnormal HUS
- Hepatitis
- Sensorineural Hearing Loss

References:
Park AH. Outcomes from an Expand-ed Targeted Early Cytomegalovirus Testing Program. J Ped Infect Dis. (2020) 15(04): 189-194 DOI: 10.1055/ s-0040-1709159.

This form was adapted with permission from Virginia Department of Health

Medical Home Responsibilities

- Review hearing and cCMV testing status to ensure infants who failed inpatient hearing screening receive cCMV testing by 21 days of life and receive timely hearing screening follow-up.
- If the infant did not receive a newborn hearing screening for some reason (e.g., home birth, missed, etc.), the HCP should refer for an outpatient hearing screening before 21 days of age and obtain cCMV testing if the child fails that screening.
- Refer for confirmatory cCMV testing by 21 days of life if the saliva specimen is positive.

Medical Home Responsibilities

Positive Urine cCMV Results:

- Follow recommendations per cCMV follow-up program
- Make necessary referrals for follow-up testing

cCMV Specimen Collection Procedures

Saliva Collection

The saliva test can be used as a first-tier screen. Positive results from a saliva test require confirmatory urine PCR.

1. Must wait 1-2 hours after breastfeeding due to risk of contamination
2. Insert a sterile swab into the infant's mouth between the gums and cheek and swirl for 10 seconds or until the swab is saturated
3. Follow test kit storage and transit guidelines

Urine Collection

1. Sterile urine bag collection is the recommended method.
   NOTE: Urine collection DOES NOT REQUIRE catheterization.
2. Clean the genital area with water. Pat dry with a clean towel or gauze.
3. Place the urine bag on the infant.
4. Work with a birth parent to monitor the urine bag occasionally to ensure that it stays in place to avoid contamination, as it may take some time for a specimen to be collected.
5. Gently remove the urine bag and pour the sample into a sterile urine cup.
6. Follow test kit storage and transit guidelines.

cCMV Reporting

Positive Results

The provider who completed the test must notify DPH within 7 days of receipt (best practice is within 72 hours of result).

NOTE: This can be delegated to other staff within the facility.

Best Practice: The provider who completed the test should also notify the patient's provider on record of the positive result so they can facilitate time-sensitive next steps.

Inconclusive, Contaminated, etc.

The provider who completed the test must notify DPH to ensure the child's medical home is informed of the need for a repeat specimen collection.

NOTE: This can be delegated to other staff within the facility.

cCMV Reporting Requirements

- Report all positive and inconclusive laboratory results for infants ≤21 days of age
- Includes all specimen types (e.g. saliva or urine)
- Includes both first-tier (i.e. saliva) specimen results and confirmation (i.e. urine) specimen results
- Must report within 7 days of result

Reporting Methods

SendSS

- Reports submitted in the notifiable condition module within SendSS
- Same process as all other notifiable conditions

Electronic Lab Reporting

- Reports of cCMV results for neonates (≤21 days of age) will be submitted to DPH directly from external laboratories
- Laboratory must set up reporting function to DPH

If facility doesn't have access to SendSS or Electronic Lab Reporting, fax completed cCMV Laboratory Case Report to (404) 657-2773 or email to DPH-NBS@dph.ga.gov

Why Report to DPH Within 7 Days?

- DPH provides infants with positive cCMV results timely follow-up services
  - Informs medical provider on record of positive results, next steps, and necessary referrals
  - Provides the patient's family with information on cCMV and necessary next steps

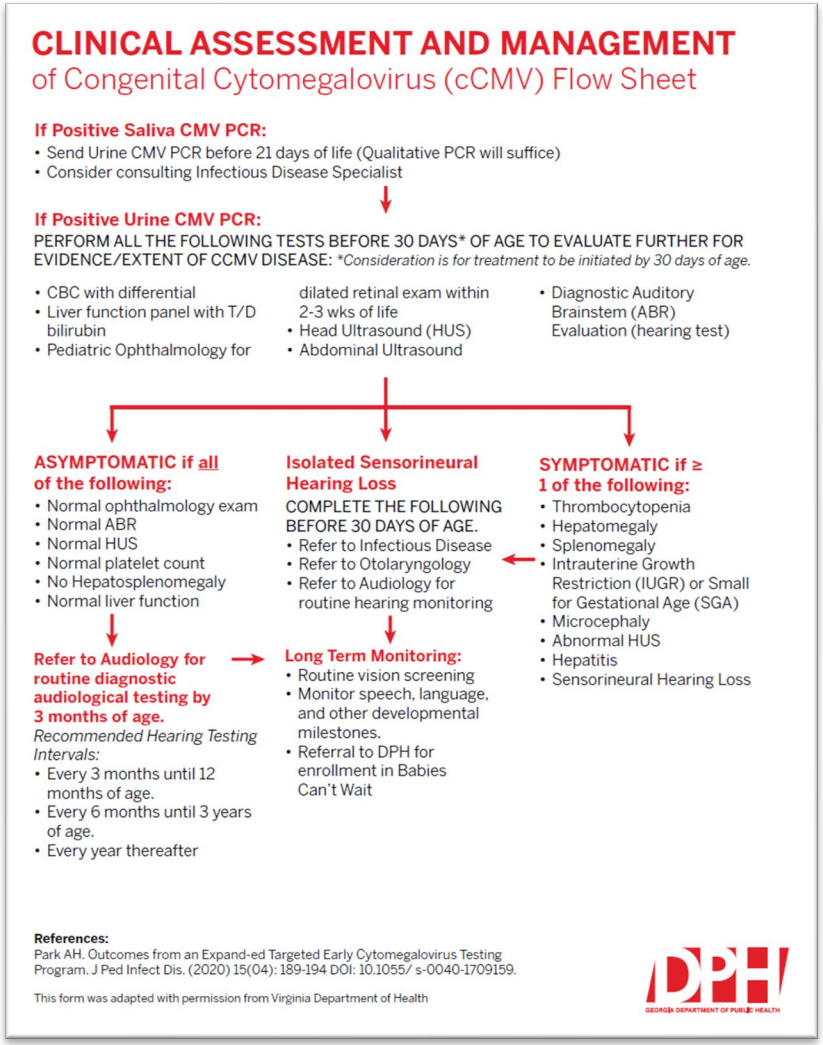
- Notifiable condition requirement
- Required per GA Rule 511-5-5-.08

Follow-up testing is urgent!

cCMV Follow-Up

cCMV Follow-Up Protocol

DPH's designated follow-up program will educate the healthcare provider on record, provide the next steps, and assist with referral coordination for all positive cases of cCMV reported to DPH before 21 days of life.



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Negative Saliva or Urine Result

- No further cCMV testing is needed. cCMV has been ruled out.
- Refer for hearing re-screening or diagnostic ABR testing right away (if the infant also failed an outpatient hearing screening) as the infant still requires hearing follow-up testing.

Inconclusive, Contaminated, or Missed Result

- Ensure the infant receives urine PCR prior to 21 days of life.
- Refer for hearing re-screening or diagnostic ABR testing immediately (if the infant also failed an outpatient hearing screening) as the infant still requires hearing follow-up testing.

Positive First-Tier Saliva Result

- Inform DPH of positive results within 7 days
- Possible congenital CMV; confirm with urine PCR to avoid false positives from breast milk contamination. Ensure baby receives urine cCMV PCR before 21 days of life.
- Refer to a pediatric audiologists for diagnostic ABR, as cCMV-positive infants need ABR evaluation, not a hearing screen.

Positive Confirmatory Urine Result

- No further cCMV testing is needed. cCMV has been confirmed.
- Complete the following before 30 days of age to evaluate further for evidence/extent of cCMV disease:
  - Refer to Pediatric Infectious Disease Physician
  - Refer to Pediatric Ophthalmology for dilated retinal exam
  - Refer to Pediatric Audiology for diagnostic Auditory Brainstem (ABR) Evaluation (hearing test)
  - Refer to Pediatric Otolaryngologist
- Complete the following tests:
  - Complete Blood Count (CBC) with differential
  - Liver function panel with T/D bilirubin
  - Head Ultrasound (HUS)

Positive Urine Result, Long-Term Monitoring:

- Refer to Early Intervention (Babies Can't Wait). cCMV diagnosis automatically qualifies for enrollment.
- Monitor speech, language, and other developmental milestones.
- Follow-up with Pediatric Audiologist for repeated hearing testing at least every 6 months until age 3, then annually until age 10.
- Routine vision testing.

Special Populations

Neonatal Intensive Care Unit Transfers

- The transferring hospital must provide hearing and cCMV testing status to the receiving facility upon transfer.
- The second facility must ensure newborn hearing screening and cCMV testing are completed if the infant is transferred before completion.
- For newborns unable to complete hearing screening by 21 days, cCMV testing is at the medical practitioner's discretion. Consult Pediatric Infectious Disease if the patient fails the final hearing screening after 21 days or if other risk factors are present.

Multiple Births

If one twin tests positive for cCMV, the other is at higher risk and should also be screened, even if they pass the hearing screening.

Missed Hearing Screenings

If an infant missed the newborn hearing screening (e.g., home birth, etc.), the HCP should refer for an outpatient hearing screening before 21 days and follow outlined procedures based on results.

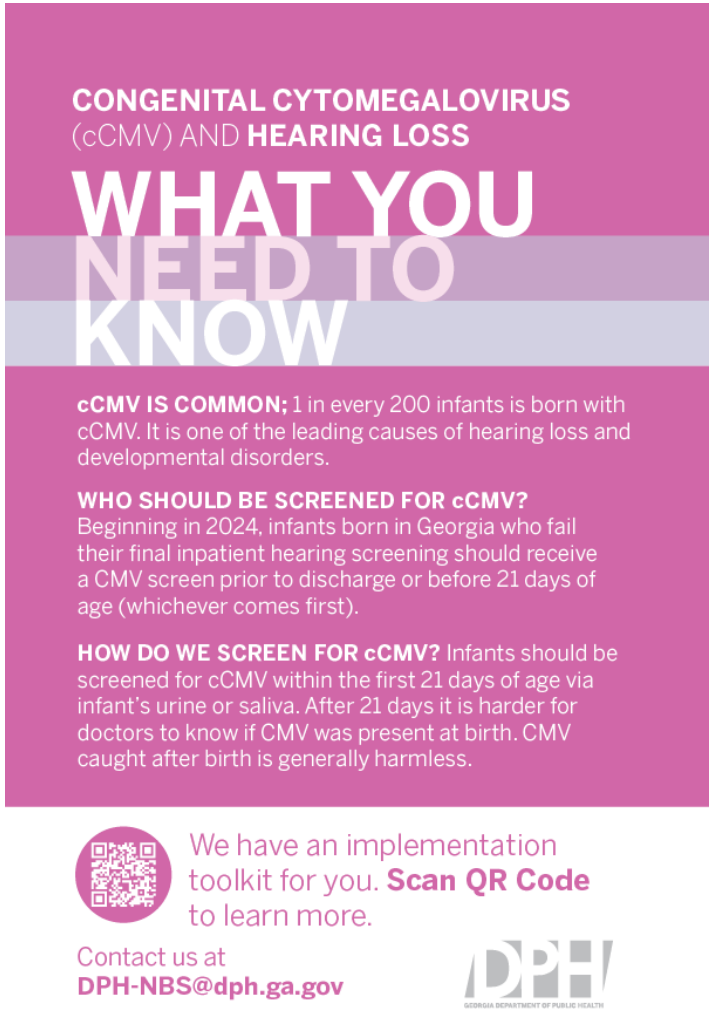
Parent Refusal

- Parents/Guardians can refuse the cCMV test.
- They must complete a refusal form at the time of screening (e.g., at the birthing facility)

Helpful Resources

Online Resources

- cCMV Policy and Procedure Manual
- Protocol Flow Sheets
- cCMV Refusal Form
- Audiological Monitoring Protocol
- cCMV Laboratory Case Report Form
- Newborn Hearing Screening Results and Recommendations Form



https://dph.georgia.gov/EHDI/ccmv

Thank you, cCMV Task Force Members

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Questions

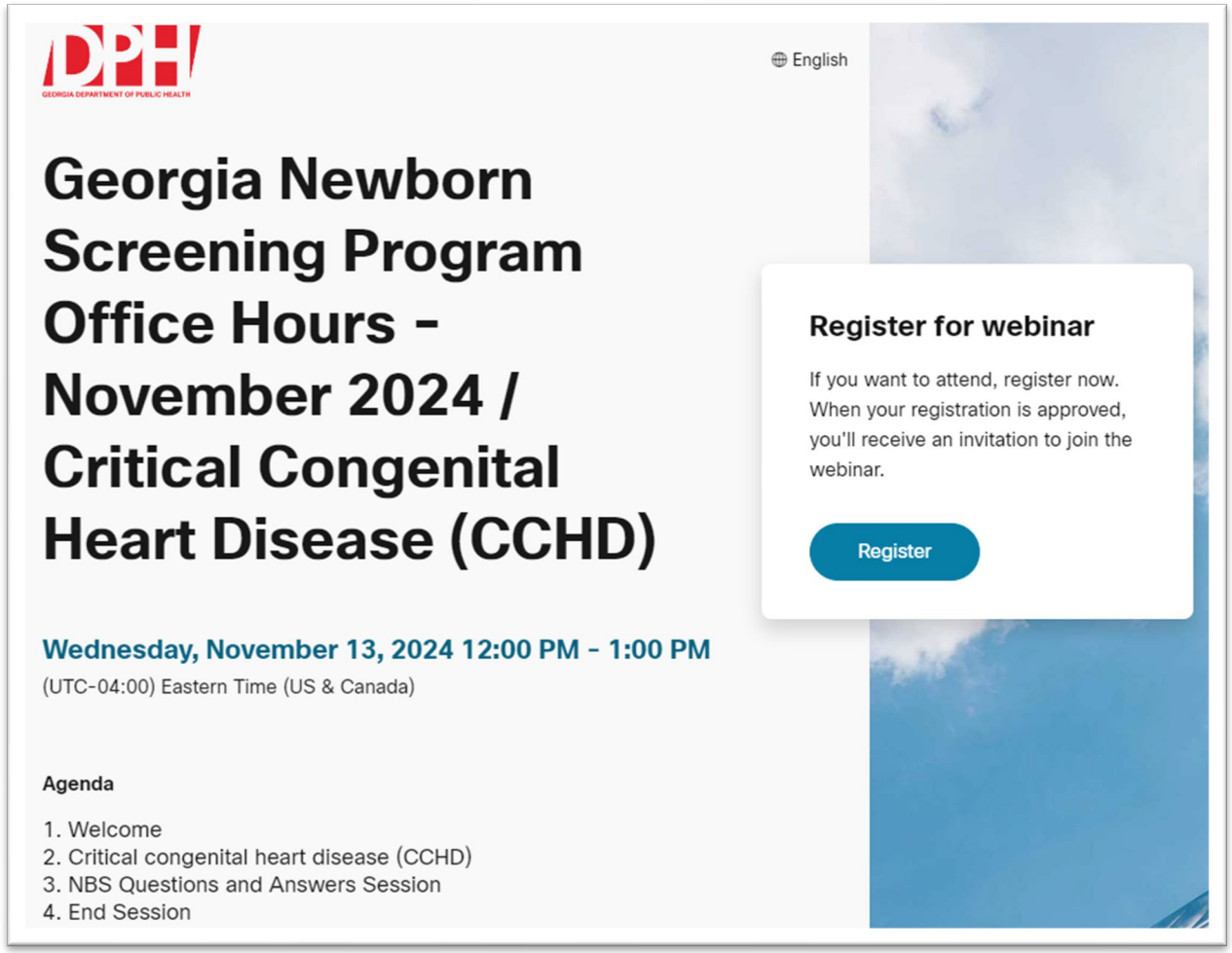
For additional information, please contact:

Georgia Newborn Screening Program
Email: DPH-NBS@dph.ga.gov
Fax Number: (404) 657-2773
Webpage: www.dph.ga.gov/NBS

Georgia Public Health Laboratory
Newborn Screening Unit
Phone: (404) 327-7950
Fax Number: (404) 327-7919
Webpage: www.dph.ga.gov/lab

Thank you for screening Georgia’s newborns!

Save the Date – November Office Hours



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