least likely to report doctors' office visits for urgent care (25.8% and 17.1%, respectively). These two racial/ethnic populations exhibited the most positive asthma-control profile, with moderate-to-low percentages of respondents reporting each of the negative indicators (i.e., ED visits, urgent care visits, symptoms, attacks, sleep disturbance, and activity limitation). Both racial/ethnic populations also reported a moderate-to-low frequency of routine doctors' visits for asthma care and medication use. Non-Hispanic black, AI/AN, multiracial, and Hispanic respondents all had less positive asthma profiles, with high percentages reporting three to five of the six negative indicators.

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**CDC Editorial Note:** Asthma is a chronic respiratory illness often associated with familial, allergenic, socioeconomic, psychological, and environmental factors.[3] Although recent reports suggest asthma-related mortality has been declining since 1996, a disparity remains between rates for non-Hispanic whites and those for non-Hispanic blacks and other racial/ethnic populations.[4] Non-Hispanic blacks experience higher rates than non-Hispanic whites for ED visits, hospitalizations, and deaths; these trends are not explained entirely by higher asthma prevalence among non-Hispanic blacks.[4] Other racial/ethnic populations experience higher asthma mortality and hospitalization rates than non-Hispanic whites while also reporting lower asthma prevalence and fewer outpatient and ED visits. The asthma-control characteristics described in this report can contribute to increased mortality and higher hospitalization rates.

In 2002, the BRFSS adult lifetime asthma prevalence estimate and the adult current asthma prevalence estimate for the 50 states and DC were higher than in 2001 and 2000. Consistent with previous BRFSS findings, the data in this report indicate variability across states and territories in the lifetime and current asthma estimates. In addition, racial/ethnic populations with the highest current asthma prevalence in 2001 (non-Hispanics of multiple races, non-Hispanic AI/ANs, and non-Hispanic blacks) reported higher adult current asthma prevalence in 2002. Non-Hispanic whites also reported higher adult current asthma prevalence in 2002 than in 2001. Although non-Hispanic Asians reported the lowest current asthma prevalence in 2001, current asthma prevalence decreased in 2002 in contrast to the increases reported by other racial/ethnic populations. Non-Hispanic NH/PIs also reported a decrease in current asthma prevalence in 2002, compared with 2001. Higher current asthma prevalence cannot be explained by the distribution of BRFSS respondents by race/ethnicity because the change in any racial/ethnic population in the BRFSS data was <1% from 2001 to 2002. Possible reasons for variability include demographic, socioeconomic (e.g., income and education level), and environmental factors (e.g., outdoor air pollution and climate), physician diagnostic procedures, or data-collection practices.[3]

The findings in this report are subject to at least four limitations. First, the median response rate for the survey was 58.3%. However, BRFSS asthma prevalence is similar to estimates from other surveys with higher response rates, such as the National Health Interview Survey.[5] Second, BRFSS does not measure asthma prevalence among institutionalized adults, military personnel, persons aged <18 years, and residents without telephones. Third, the validity of self-reported asthma or asthma-control characteristics in BRFSS is unknown.[6] Actual adherence to prescribed medication or asthma treatment plans in respondents with current asthma is unknown. Finally, the asthma-control questions were asked in 19 of the 54 BRFSS reporting areas and might not accurately reflect the asthma-control characteristics of other reporting areas or accurately represent their racial/ethnic distribution.

States and territories using the BRFSS Adult Asthma History module can direct asthma management within their jurisdictions and address disparities in asthma risk and control characteristics among racial/ethnic populations. Use of comprehensive state-specific asthma surveillance data to identify populations with poorly controlled asthma is instrumental in developing, implementing, and evaluating asthma-control programs and interventions.

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This report is based on data contributed by state BRFSS coordinators.

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6 available

*California, Delaware, District of Columbia, Idaho, Iowa, Louisiana, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Rhode Island, Texas, Utah, Wisconsin, and the U.S. Virgin Islands.

# Interim Guidelines for the Evaluation of Infants Born to Mothers Infected With West Nile Virus During Pregnancy

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WEST NILE VIRUS (WNV) IS A SINGLE-stranded RNA flavivirus with antigenic similarities to Japanese encephalitis and St. Louis encephalitis viruses. It is transmitted to humans primarily through the bites of infected mosquitoes. Flavivirus infection during pregnancy has been associated rarely with both spontaneous abortion and neonatal illness but has not been known to cause birth defects in humans.[1-4] During 2002, a total of 4,156 cases of WNV illness in humans, including 2,946 cases of neuroinvasive disease, were reported to CDC by state health departments. In 2002, a woman who had WNV encephalitis during the 27th week of her pregnancy delivered a full-term infant with chorioretinitis, cystic destruction of cerebral tissue, and

laboratory evidence of congenitally acquired WNV infection.[5,6] Although this case demonstrated intrauterine WNV infection in an infant with congenital abnormalities, it did not prove a causal relation between WNV infection and these abnormalities. During 2002, CDC investigated three other instances of maternal WNV infection. In all three cases, the infants were born at full term with normal appearance and negative laboratory tests for WNV infection; cranial imaging studies and ophthalmologic examinations were not performed. During 2003, CDC received reports of approximately 9,100 cases of WNV illness, including approximately 2,600 cases of neuroinvasive disease.* CDC is gathering data on pregnancy outcomes for approximately 70 women with WNV illness during pregnancy (CDC, unpublished data, 2003).

To develop guidelines for evaluating infants born to mothers who acquire WNV infection during pregnancy, on December 2, 2003, CDC convened a meeting of specialists in the evaluation of congenital infections. This report summarizes the interim guidelines established during that meeting.

## Screening for WNV During Pregnancy

No specific treatment for WNV infection exists, and the consequences of WNV infection during pregnancy have not been well defined. For these reasons, screening of asymptomatic pregnant women for WNV infection is not recommended.

## Diagnosis of WNV Infection During Pregnancy

Pregnant women who have meningitis, encephalitis, acute flaccid paralysis, or unexplained fever in an area of ongoing WNV transmission should have serum (and cerebrospinal fluid [CSF], if clinically indicated) tested for antibody to WNV. If serologic or other laboratory tests indicate recent infection with WNV, these infections should be reported to the local or state health department, and the women should be followed to determine the outcomes of their pregnancies.

**BOX 1. Recommended clinical evaluation of infants born to mothers infected with West Nile virus (WNV) during pregnancy**

- Thorough physical examination, including careful measurement of the head circumference, length, weight, and assessment of gestational age.
- Evaluation for neurologic abnormalities, dysmorphic features, splenomegaly, hepatomegaly, and rash or other skin lesions. Any rash, skin lesions, or dysmorphic features should be photographed. If an abnormality is noted, consultation with an appropriate specialist is recommended.
- Testing of infant serum for IgM and IgG antibody to WNV. The initial sample should be collected either from the umbilical cord or directly from the infant within 2 days of birth. If maternal WNV illness occurred ≤8 days before delivery and the initial infant serum sample is negative for WNV IgM antibody, a second infant serum sample should be obtained ≥2 weeks after the first sample. Free testing of samples by CDC can be arranged by contacting state public health laboratories.
- Evaluation of hearing by evoked otoacoustic emissions testing or auditory brainstem response testing, either before discharge from the hospital or within 1 month after birth. Infants with abnormal initial hearing screens should be referred to an audiologist for further evaluation.
- Initial examination of the placenta by a pathologist is encouraged. Regardless of whether this is completed, the entire placenta, a sample of umbilical cord tissue, and a sample of serum from the umbilical cord should be retained for further evaluation if congenital WNV infection is identified or strongly suspected. A section of the placenta and umbilical cord should be frozen, and the remainder of the placenta should be preserved in formalin; a sample of umbilical cord blood should be centrifuged, and the serum should be refrigerated or frozen.

## Evaluation of the Fetus in Pregnant Women with WNV Infection

If WNV illness is diagnosed during pregnancy, a detailed ultrasound examination of the fetus to evaluate for structural abnormalities should be considered no sooner than 2-4 weeks after onset of WNV illness in the mother, unless earlier examination is otherwise indicated. Amniotic fluid, chorionic villi, or fetal serum can be tested for evidence of WNV infection. However, the sensitivity, specificity, and predictive value of tests that might be used to evaluate fetal WNV infection are not known, and the clinical consequences of fetal infection have not been determined. In case of miscarriage or induced abortion, testing of all products of conception (e.g., the placenta and umbilical cord) for evidence of WNV infection is advised to document the effects of WNV infection on pregnancy outcome.

**BOX 2. Recommended clinical evaluation of infants with clinical or laboratory evidence of possible congenital West Nile virus (WNV) infection***

- Computerized tomography (CT) scan of the head and brain. If CT is abnormal, a pediatric neurologist should be consulted.
- Pediatric ophthalmologic evaluation, including examination of the retina.
- Complete blood count, platelet count, and liver function tests, including alanine aminotransferase and aspartate aminotransferase. Examination of cerebrospinal fluid (CSF) should be considered and, if performed, should include testing of CSF for IgM antibody to WNV.
- Evaluation by a dysmorphologist or clinical geneticist.
- Further evaluation of any congenital abnormalities to determine alternative causes, including genetic, infectious, or other teratogenic causes.
- Additional hearing screen at age 6 months.
- Careful evaluation of head circumference, physical characteristics, and developmental milestones throughout the first year of life.
- Additional examination of infant serum for IgG and IgM antibody to WNV at age 6 months.
- Histopathologic examination of the placenta and umbilical cord, testing of frozen placental tissue and cord tissue for WNV nucleic acid, and testing of cord serum for IgM and IgG antibody to WNV.

*The following laboratory results indicate possible congenital WNV infection: 1) positive IgM to WNV in infant serum or cerebrospinal fluid; 2) stable or increasing IgG to WNV in infant serum samples obtained at delivery and at age 6 months; or 3) detectable WNV, WNV nucleic acid, or WNV antigen in any infant clinical sample.

## Evaluation of Infants Born to Mothers Infected With WNV During Pregnancy

When an infant is born to a mother who was known or suspected to have WNV infection during pregnancy, clinical evaluation is recommended (see sidebar 1). Further evaluation should be considered if any clinical abnormality is identified or if laboratory testing indicates that an infant might have congenital WNV infection (see sidebar 2).

## Prevention of WNV Infection During Pregnancy

Pregnant women who live in areas with WNV-infected mosquitoes should apply insect repellent to skin and clothes when exposed to mosquitoes and wear clothing that will help protect against mosquito bites. In addition, whenever possible, pregnant women should avoid being outdoors during peak mosquito-feeding times (i.e., usually dawn and dusk).

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**CDC Editorial Note:** Neither the proportion of WNV infections during pregnancy that result in congenital infection nor the spectrum of clinical abnormalities associated with congenital WNV infection is known. However, one case reported in 2002 suggests that intrauterine transmission of WNV in certain instances might affect the newborn adversely. To evaluate the possible effects of WNV infection during pregnancy, CDC is gathering clinical and laboratory data on outcomes of pregnancies of women who were known or suspected to be infected with WNV during pregnancy. Guidance on diagnosis of WNV can be obtained from local or state health departments and from CDC, telephone 970-221-6400. Guidance also is available at http://www.cdc.gov/ncidod/dvbid/westnile/resources/fact_sheet_clinician.htm. Clinicians are encouraged to report cases of WNV infections in pregnant women to their state or local health departments or CDC.

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