

Factors Related to Fetal Death in Pregnant Women with Cholera, Haiti, 2011–2014

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Reginald Tucker] Cholera infections during pregnancy are associated with high rates of fetal death, especially when women are severely dehydrated. In Haiti in 2011, pregnant women with clinical signs of cholera who sought treatment from Médecins Sans Frontières, or MSF, in Port-au-Prince, were sent to a general cholera treatment center, or CTC. In April 2012, MSF established a CTC to improve fetal outcomes in pregnant women by facilitating intensive follow-up for dehydration and rapid access to obstetric and neonatal services. In June 2013, a more aggressive rehydration protocol was implemented. To assess the effects of cholera infection, establishment of a specialized CTC, and the new rehydration protocol, the authors conducted a retrospective cohort analysis of pregnant women with suspected cholera admitted to MSF's CTC during September 1, 2011 through December 31, 2014.

This study was approved by the National Bioethical Committee of the Ministry of Public Health and Population of Haiti. A cholera case patient was defined as someone who passed about 3 liquid stools with or without vomiting or dehydration in the previous 24 hours or within 6 hours of seeking treatment. Women of childbearing age were asked whether they were pregnant. Urine dipstick tests were conducted in cases of uncertainty or early stages of pregnancy. Gestational age was determined by the date of the woman's last menstruation, uterine height, or ultrasound. Fetal status was assessed at admission and hourly by using fetal stethoscope or ultrasonic fetal Doppler. Women who had a miscarriage at home and were not bleeding at admission were not classified as pregnant. Dehydration status was determined according to World Health Organization categories. The authors assigned women into 3 treatment groups, or TGs, according to whether they were treated in the general or specialized CTC and whether they were given the original or new protocol.

During September 1, 2011 through December 31, 2014, a total of 936 pregnant women were admitted. Thirty-six were excluded from analysis: 33 lacked fetal outcome data and 3 died. Of the remaining 900, mean age was 26.7 years; 168 were in their first trimester, 303 second trimester, and 416 third trimester. Trimester was unknown for 13. A total of 444 sought treatment within 24 hours of symptom development.

Fetal death occurred in 141 of the 900 analyzed pregnancies, more often in women less than 20 years of age, in their third trimester, seeking treatment more than 24 hours after symptom onset, with severe dehydration or who vomited. A total of 64 fetal deaths occurred before admission.

Women who experienced preadmission or postadmission fetal death did not differ by age or clinical presentation. However, preadmission fetal death was more likely in women who arrived more than 24 hours after symptom onset or were severely dehydrated. In unadjusted analysis, postadmission fetal death was associated with moderate dehydration and vomiting. Of 836 women with viable fetus at admission, 120 were in TG1, 399 in TG2, and 317 in TG3.

There was no modification effect of TG in postadmission fetal death. Weak evidence of a difference in effect of severe dehydration and postadmission fetal death between TGs was potentially due to a lower rate among severely dehydrated women in TG2. However, there was insufficient power to detect these differences, and the final model did not require adjustment.

Although the proportion of postadmission fetal deaths within a TG decreased with each protocol change, the proportion in TG3 was not different from TG1 or TG2.

Fetal death occurred in 141 of 900 pregnancies. Risk factors were third trimester, younger maternal age, severe dehydration, and vomiting.

Severe dehydration at admission increased risk of fetal death. Fetal death may occur due to fetal hypoxia and acidosis resulting from excessive maternal dehydration. The proportion of fetal deaths was higher than that previously recorded in Haiti but close to that of the 2006 Senegal cholera outbreak. Earlier studies in India, Nigeria, and Pakistan found higher proportions.

Women less than 20 years of age were twice as likely as older women to experience fetal death. Although the relationship between fetal death and maternal age during cholera has not been documented, younger age is associated with increased risk for other adverse pregnancy outcomes. The risk for fetal death was highest in the third trimester, even after controlling for maternal age, dehydration level, and vomiting. The relationship between fetal death and trimester of pregnancy is unclear.

Determination of dehydration status of pregnant women is difficult in later stages of pregnancy. Misclassification of dehydration status could affect fetal outcome due to placement of patients under the wrong treatment protocol. In addition, increased placental blood flow with gestational age may increase the effect of dehydration. Even after the authors controlled for dehydration level, they determined that fetal death was twice as likely in women experiencing vomiting, potentially due to electrolyte changes in amniotic fluid.

Lack of effect of a specialized CTC on fetal death could result from a detection bias in the establishment of the specialized CTC that led to an increased likelihood of detection of fetal deaths. In addition, 45 percent of fetal deaths occurred before women sought treatment. Fetal death may occur early in a pregnant woman's illness with cholera, and more than half the women sought treatment more than 24 hours after symptom onset, likely contributing to poor fetal outcomes. Likewise, the effect of the new treatment protocol may have been limited by fetal death occurring before the women sought treatment or by women assigned the incorrect protocol due to difficulty in determining dehydration status.

Limitations include lack of laboratory-confirmed diagnoses. Data were collected for programmatic rather than research purposes and lack electrolyte levels, amniotic fluid composition, maternal blood group, and fetal cause of death. Some first-trimester pregnancies may have been missed. Pregnancies in women who completed miscarriage at home were not counted, potentially underestimating overall risk of fetal death. Because there was no follow-up of women after discharge, some early-term fetal deaths might have been missed. In addition, the long-term effect of treatment on fetal well-being could not be determined. TG outcomes also may have been affected by differences in factors, such as women's access to health services over time.

Although the implementation of a specialized CTC did not decrease fetal deaths, specialized CTCs play a vital role in preserving patient dignity and providing patient-centered care. Determining the mechanism of fetal death in cholera infection would enable development of evidence-based treatment protocols. Because many fetal deaths occurred before women sought treatment, the importance of cholera prevention and the risk of poor fetal outcomes should be emphasized.

I've been reading Factors Related to Fetal Death in Pregnant Women with Cholera, Haiti, 2011 through 2014, online in the January 2016 issue of Emerging Infectious Diseases at cdc.gov/eid.

I'm Reginald Tucker for *Emerging Infectious Diseases*.

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