Shedding of Ebola Virus in an Asymptomatic Pregnant Woman

TO THE EDITOR: In West Africa, the worst outbreak of Ebola virus disease (EVD) in history is continuing, with more than 11,100 deaths caused by the Zaire species (*Zaire ebolavirus* [EBOV]).[1] Symptoms include fever, headache, body pain, nausea with vomiting, diarrhea, hemorrhage, and symptoms of septic shock and multiorgan failure. It is thought that transmission occurs only through contact with body fluids from symptomatic patients.[2]

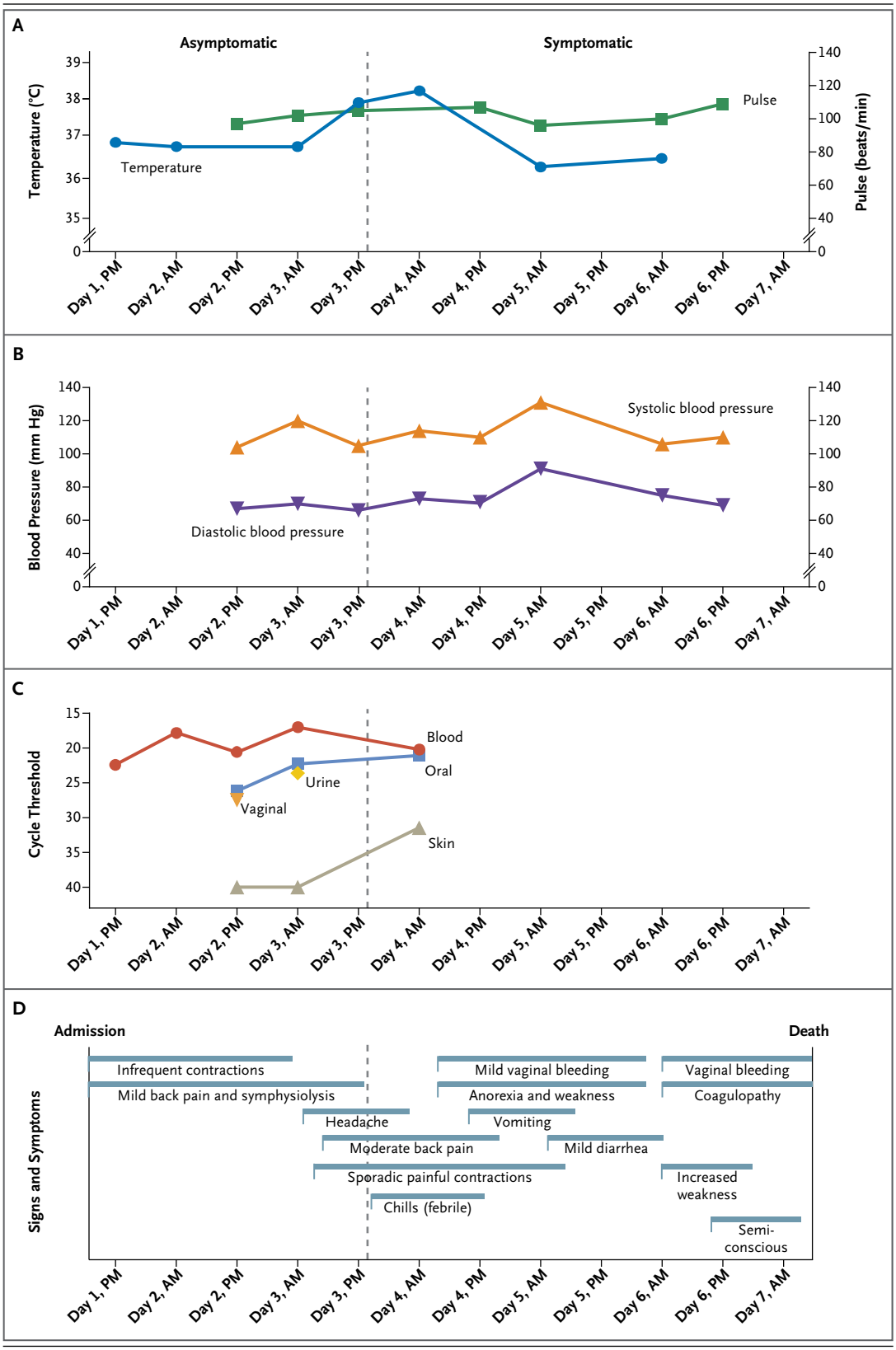
A 31-year-old woman in the late stage of a fifth pregnancy who had no history of coexisting illnesses or use of long-term medications presented to the hospital with suspected premature rupture of membranes. She was referred to the ELWA3 Ebola treatment unit (ETU) in Monrovia, Liberia, as was common practice in Monrovia for patients who potentially presented a hospital-exposure risk, such as during delivery. On admittance to the ETU, she had mild lower abdominal pain and sparse contractions and reported fetal movements (Fig. 1). She was afebrile and reported having had no contact with patients with EVD and did not meet the Ebola virus case definition. She underwent routine EBOV testing for anticipated transfer to the delivery clinic.

On quantitative reverse-transcriptase–polymerase-chain-reaction (qRT-PCR) assay to detect L-gene sequences, her blood tested positive for EBOV, with a high viral load.[3] Given the apparent asymptomatic presentation and since her acute symptoms were consistent with pregnancy-related issues, she was retested for EBOV on day 2, and the results were again positive. Additional EBOV testing was subsequently performed on blood and fluids to assess EBOV shedding to evaluate the potential risks associated with patient contact (Fig. 1), although no virus isolation was performed. All samples except those obtained from skin tested positive before the development of symptoms that were clearly associated with EVD. During the evening of day 3, she became mildly febrile and was considered to be symptomatic for EVD. During the following days, additional EVD-associated signs (vomiting, diarrhea, bleeding, and semiconsciousness) developed, and she died with the baby in utero 7 days after admission.

The viral RNA levels in the various samples suggest that she may have been able to transmit EBOV for several days before the onset of obvious EVD symptoms.[4] The patient's initial nonclassic EVD presentation might be attributed to pregnancy, which could have masked EVD symptoms. Pregnancy promotes an evolutionary immunotolerant state that inhibits rejection of the fetus; this could have blunted pyrogenic responses.[5] EVD is complex and thought to be at least partially immune-mediated. The unique immunologic status of pregnant women might alter disease presentation and progression. This case highlights the challenges that clinicians may face in assessing pregnant women for possible infections, including EVD, and the potential risk for health care staff.

Figure 1 (next page). Chronologic Progression of Vital Signs, Viral Load, and Signs and Symptoms in a Pregnant Woman with Ebola Virus Disease (EVD).

Shown is the assessment of the patient over time, starting on hospital admission and ending at the time of her death on day 7. Panel A shows the patient's temperature (as indicated on the left y axis) and pulse (right y axis), and Panel B, systolic and diastolic blood pressure. The vertical dashed line indicates the time when the patient was considered to be symptomatic for EVD, beginning on the evening of day 3, when she became transiently febrile. Panel C shows the cycle threshold values of the L gene on quantitative reverse-transcriptase–polymerase-chain-reaction (qRT-PCR) assay for EBOV diagnostic tests for *Zaire ebolavirus* (EBOV), which were performed on whole blood, urine, and oral, skin, and vaginal swabs. The cycle threshold measurement is inversely related to the viral RNA load, and all samples with a cycle threshold of less than 40 were considered to be positive for EBOV RNA. The swabs were placed in 1 ml of virus-transport medium before extraction of the RNA and qRT-PCR. For RNA extraction, 140 μl of whole blood was used. Panel D shows the timing of the patient's signs and symptoms during hospitalization. AM indicates from midnight to noon, and PM from noon to midnight.



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2. Dowell SF, Mukunu R, Ksiazek TG, Khan AS, Rollin PE, Peters CJ. Transmission of Ebola hemorrhagic fever: a study of risk factors in family members, Kikwit, Democratic Republic of the Congo, 1995. J Infect Dis 1999;179:Suppl 1:S87-S91.
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CORRECTIONS

Brief Report: Persistence of Ebola Virus in Ocular Fluid during Convalescence (DOI: 10.1056/NEJMoa1500306). In the Case Report, the final paragraph (page 3) should have included, as the third sentence, "Continued clinical deterioration of the patient's left eye prompted the initiation of treatment with topical difluprednate (Alcon Laboratories), a 21-day course of oral favipiravir (MediVector), a periocular injection of triamcinolone, and a 10-week tapering course of oral prednisone." In the Discussion, the last sentence of the final paragraph (page 4) should have ended, ". . . and to identify effective treatment strategies for the clinical management of EVD complications," rather than, "and to develop strategies . . . ." Also, MediVector should have been included in the acknowledgements, as well as the following statement: "Favipiravir was provided by the Department of Defense Joint Project Manager Medical Countermeasure Systems." The article is correct in print and at NEJM.org.

Between-Hospital Variation in Treatment and Outcomes in Extremely Preterm Infants (May 7, 2015;372:1801-11). In the legend for Table 2 (page 1807), the second footnote should have read, "Overall rate is the percentage of infants regardless of hospital of birth," rather than ". . . the percentage of all infants who received active treatment, regardless of hospital of birth." The article is correct at NEJM.org.

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