



SEMP BioQuickies: *The VHF Viruses*

	Question	Answer
1.	Are the hemorrhagic fever viruses (VHF) contagious between humans?	a. Yes! b. The VHF viruses include, but are not limited to, Ebola, Marburg, Lassa fever, New World arenaviruses, Rift Valley fever, Yellow fever, Omsk hemorrhagic fever, and Kyansanur Forest disease
2.	How are the VHF viruses transmitted between humans?	The viruses are transmitted through touching the infected person's body, body fluids (saliva, sputum from lungs, sweat, urine, vomit, blood, and semen), or personal items.
3.	What are the hallmarks of the VHF viruses?	Fever and bleeding
	A. Fever first:	a. Fever (higher than 101 degrees Fahrenheit scale for at least 72 hours, but not more than two weeks). b. Infected persons are too sick to leave bed. They have poor appetite and severe head, stomach and general body aches. c. The infected person who develops fever was exposed to the VHF virus between 2 and 21 days earlier. The VHF virus is "incubating" during this time. d. The person IS contagious to other humans while the VHF virus is incubating in the body. e. The fever and flu-like symptoms last less than 7 days.
	B. Bleeding is second:	a. During the second week of illness, the VHF viruses damage the human body's blood clotting system so that tiny blood vessels start to leak blood into surrounding body tissues. Infected persons may first notice tiny dark skin spots, about the size of a pencil tip. As the leaking continues, large bruises may develop that can sometimes cover an entire side of an arm or leg. Bleeding occurs everywhere in the body, but is particularly noticeable in the gums, the lining of the nose, eyes, and vagina. Bloody urine, vomit and stool confirm that internal organs are bleeding as well. b. Bleeding internal organs (heart, brain, kidney, liver) may begin to soften as the disease progresses, and finally fail to work at all, causing low blood pressure, seizures, coma, and death. c. Infected persons either get better or die within two weeks of developing the fever.



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4.	What else could the illness be?	<p>a. It could be many, many different diseases, including influenza, hepatitis, Rocky Mountain Spotted Fever, autoimmune diseases, leukemia, and so many others that they all cannot be listed here. For a complete list of diseases that mimic VHF, see the Henderson et al reference, page 202 (go to Question 16).</p> <p>b. One of the main reasons doctors sometimes have difficulty diagnosing VHF viruses in the early part of infected persons' illness is because the VHF viruses mimic so many other disease processes.</p>
5.	When is an infected person <u>most</u> contagious to other humans?	<p>a. During the second week of illness.</p> <p>b. The infected person can infect other humans anytime between the infected person's first contact with the VHF virus, up to seven weeks after the infected person recovers.</p> <p>c. Cadavers can infect handlers and must be handled properly (see also Question 15).</p>
6.	How can a non-infected person keep from catching a VHF virus from an infected person?	<p>a. <u>Stay away</u> from someone infected with VHF virus unless you are a caretaker.</p> <p>b. <u>Hand washing</u>: Wash your hands <i>before and after</i> touching the infected person's body, body fluids (for example, pustules, vomit, urine, blood, saliva), and personal items (for example, blankets, eyeglasses, fork). Plain soap works fine.</p> <p>c. <u>Gloves</u>: Always wear disposable vinyl or latex gloves when entering the infected person's care space. Sterile gloves are not necessary. Change gloves often and always when leaving the infected person's care space. Always wash your hands after removing gloves. Dispose of gloves in special container in infected person's care space.</p> <p>d. <u>Gown</u>: Always wear a paper (disposable) hospital gown in the infected person's care space. Dispose of the gown in special container in victim's care space. Cloth gowns require special handling and laundering (see also Question 14d).</p> <p>e. <u>Mask/Eye Protection/Facemask</u>: Always wear a high-quality mask or face shield to cover your eyes, nose and mouth when in an infected person's care space. N95 (or higher) properly fitted HEPA-filtered respirator facemask works well. Dispose of the mask in the special container in the infected person's care space.</p> <p>f. <u>Shoe covers</u>: Always wear disposable shoe covers when in the infected person's care space. Dispose of shoe covers in a special container in the care space.</p> <p>g. <u>Lockdown procedures</u>: Hospital emergency departments, clinics, doctors' offices, paramedic ambulances, and other facilities may need to implement "lockdown" procedures to prevent the spread of illness.</p>



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7.	Where should infected patients receive care?	<p>a. <u>Limit movement of infected person!</u></p> <p>b. In a small outbreak of VHF, infected persons should be admitted to the hospital to rooms that are under negative pressure and equipped with high-efficiency particulate air filtration.</p> <p>c. In a large outbreak of VHF, infected persons should be transported to a special isolation hospital for VHF patients.</p> <p>d. In general, persons infected with the most deadly VHF viruses (Ebola, for example) are too sick to be cared for at home.</p>
8.	Who should be told of a suspected, probable or confirmed case of VHF?	<p>a. Obtain names, addresses, and telephone numbers of all household and face-to-face “contacts” with the infected person. <i>A contact is any person who has been in the same house as, or in face-to-face contact with, the infected person anytime between three weeks before the onset of fever to seven weeks after recovery. All persons involved in the post-mortem care of a victim are contacts.</i></p> <p>b. Immediately notify the following of a suspected case of VHF:</p> <ul style="list-style-type: none">i. State and local public health department: IDPH: 217-782-4977; DuPage County Public Health: 630-682-7400ii. Illinois Region VIII POD Hospital (Loyola): 708-216-8705iii. Illinois Emergency Management Agency: 800-782-7860
9.	Who besides the infected person should be isolated because of possible infection with VHF?	<p>All people living in the same house as the infected person and all other face-to-face “contacts” should be immediately isolated and put under medical surveillance (temperature checked once each day, preferably in the evening). <i>A contact is any person who has been in the same house as, or in face-to-face contact with, the infected person anytime between three weeks before the onset of fever to seven weeks after recovery. All persons involved in the post-mortem care of a victim are contacts.</i></p>
10.	What laboratory studies need to be performed?	<p>a. <u>Limit laboratory testing</u> because: (1) contact with an infected person’s body fluids can cause infection and (2) infected persons bleed easily from puncture sites in the skin.</p> <p>b. Confirm or exclude diagnosis of VHF by using the Public Health Laboratory Response Network.</p> <p>c. Specimen collection</p> <ul style="list-style-type: none">i. Must be performed by qualified health workerii. Transport specimen in special packaging to Public Health Laboratory Response Network high-containment (BL-4) facility with appropriately trained laboratorians and equipment.iii. Virus can be quickly identified via antigen-capture enzyme-linked immunosorbent assay (ELISA), IgM antibody detection by antibody-capture ELISA, RT-PCR, and viral isolation techniques. <p>d. Antibodies to VHF viruses tend not to occur until the onset of recovery, which typically occurs in the second week of illness.</p>



	Question	Answer
11.	What can be done to help infected persons get better?	a. Isolation b. Pain relief, but avoid intramuscular shots, aspirin, and medications in the same class as Advil. c. Hydration, electrolyte balance d. Infected persons may require kidney dialysis, medicine to stop or prevent seizures, or help breathing by inserting a tube in the throat. e. No anticoagulant therapies should be used on the infected person. f. No steroids should be given to the infected person. g. Intravenous or oral ribavirin may be used pending identification of the agent. Ribavirin is effective in Lassa fever and selected New World arenaviruses.
12.	Is VHF vaccination available?	Mostly no. There is a vaccination for Yellow fever, but none for Ebola, Lassa fever and Marburg viruses.
13.	How many people die from VHF viruses?	It depends on the virus. For example, 50-90 percent of infected persons die from the Ebola virus (Zaire strain), 23-70 percent of infected persons die from the Marburg virus, 15-20 percent of infected persons die from Lassa fever, and 0.5-10 percent of infected persons die from Omsk hemorrhagic fever virus.
14.	What is important to know about housekeeping for an infected person?	a. <u>Disposable equipment</u> : Use whenever possible. b. <u>Non-disposable equipment</u> : Sterilize all instruments and equipment that enter normally sterile tissues or through which blood flows. c. <u>Germicidal cleaning agents</u> (for example, household bleach, ammonia): Should be readily available in infected person's care site for cleaning spills of contaminated material and disinfecting non-critical equipment. d. <u>Soiled linens</u> : Should be placed in clearly labeled leak-proof bags at the site of use and transported directly to the decontamination area. At decontamination area, soiled linens can be autoclaved, laundered in hot water to which household bleach has been added, or incinerated. e. <u>Body fluids</u> : Should be either autoclaved, processed in a chemical toilet, or treated with several ounces of household bleach for greater than or equal to five minutes (for example, in a bedpan or commode) before flushing or disposal in a drain connected to a sanitary sewer. Care should be taken to avoid splashing when disposing of these materials. f. <u>Solid Medical Waste</u> (contaminated needles, syringes, and tubing): Should either be incinerated or decontaminated by autoclaving or immersion in a suitable chemical germicide (an Environmental Protection Agency (EPA)-registered hospital disinfectant or a 1:100 dilution of household bleach), then handled according to existing local and state regulations for waste management. g. <u>Environmental surfaces</u> (beds, bedrails, beside equipment, and other frequently touched surfaces and equipment): Disinfect with EPA-registered germicidal cleaning agents or a 1:100 dilution of household bleach.



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15. How should the cadavers of infected persons be handled?	a. Cadavers require careful handling because they can cause infection in handlers. b. Rapid burial or cremation should be carried out. c. Pathologists and mortuary personnel require notification of VHF infection in a cadaver, and should use all infection precautions listed in Question 6.
16. Where can I get more quality information on the VHF viruses?	1. CDC Viral Hemorrhagic Fever sites at: http://www.bt.cdc.gov/agent/vhf/index.asp and http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/vhf.htm 2. World Health Organization Manual (210 pages): "Infection Control for Viral Haemorrhagic Fevers in the African Health Care Setting" at: http://www.cdc.gov/ncidod/dvrd/spb/mnpages/vhfmanual.htm 3. Henderson DA, Inglesby TV, O'Toole T: <u>Bioterrorism: Guidelines for Medical and Public Health Management</u> . AMA Press 2002, pp 191-220. 4. "Management of Patients with Suspected Viral Hemorrhagic Fever": <u>MMWR</u> 44(25); 475-479 at: http://www.cdc.gov/mmwr/preview/mmwrhtml/00038026.htm . 5. "Management of Patients with Suspected Viral Hemorrhagic Fever": <u>MMWR</u> 37(S-3); 1-16 at: http://www.cdc.gov/mmwr/preview/mmwrhtml/00037085.htm .



Two Zairian nurses wear protective clothing while changing the bedding in an Ebola VHF isolation ward, Kikwit, Zaire, 1995.



Local Red Cross team disinfects body bag of deceased Ebola VHF patient. (1995)



<http://www.nationalgeographic.com/adventure/0105/fourth.html>