Fact Sheet: Marburg Virus Disease

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What is Marburg Virus Disease?

Marburg virus disease (MVD) is a rare but severe and often fatal viral hemorrhagic fever (VHF) caused by infection with one of two *orthomarburgviruses*, Marburg virus (MARV) or Ravn virus (RAVV). Both viruses are part of the *Filoviridae* family (filovirus) to which *Orthoebolavirus* genus belongs. MVD can affect both humans and other primates, like apes and monkeys. The reservoir host of *Orthomarburgviruses* is the Egyptian fruit bat, *Rousettus aegyptiacus*. Initially, human MVD infection was from the result of prolonged exposure to mines or caves inhabited by Rousettus fruit bat colonies. Once introduced in the human population, it can spread person-to-person via direct contact with blood or body fluids. Symptoms can appear suddenly and may include fever, rash, and severe bleeding. Of those infected with MVD, 20-90% of people will die. Marburg virus was first recognized in 1967, when outbreaks of hemorrhagic fever occurred simultaneously in laboratories in Marburg and Frankfurt, Germany and in Belgrade, Serbia. Since then, outbreaks and sporadic cases have been reported in Angola, Democratic Republic of the Congo, Equatorial Guinea, Kenya, South Africa, Uganda, Guinea, Ghana, Tanzania, and most recently in Rwanda.

Clinical Presentation & Disease Summary

Transmission:

- Person to person through direct contact (through broken skin or mucous membranes) with blood or body fluids of infected person OR person who has died of MVD
- Objects contaminated with body fluids of infected person (e.g. bedsheets, clothing, medical equipment)
- Semen from men who have recovered from MVD
- Unprotected contact with infected bat feces, excretions, or aerosols
- Unprotected Contact with infected non-human primates

Incubation Period:

- 2-21 days after infection
- Average of 8-10 days

Signs and Symptoms:

- Early stage of MVD has an abrupt onset of “dry” symptoms, including:
  - Elevated body temperature or subjective fever (fever is not universally exhibited by all patients)
  - Chills
  - Myalgia
  - Fatigue
  - Headache

- Mid-late stage of MVD is typically 4 to 5 days after symptom onset, where patients can progress to “wet” symptoms that include:
  - Gastrointestinal Symptoms:
    - Severe watery diarrhea
    - Nausea
    - Vomiting
    - Abdominal pain
  - Other Symptoms:
    - Chest pain
    - Shortness of breath
    - Headache
    - Confusion
    - Eye irritation and redness
    - Hiccups
    - Seizures
    - Cerebral edema
    - Orchitis (inflammation of one or both testicles)
  - Bleeding

        - Is not universally present but can manifest later in the course of disease as petechia, ecchymosis or oozing from venipuncture sites, mucosal hemorrhage, or blood in stool or vomitus.
    - Skin lesions
        - Mixture of flat and raised lesions which are red in color usually involving the neck, trunk, and arms, that can peel or flake off. Occurs by days 5 to 7.
- Patients with fatal disease usually develop more severe clinical signs early during infection and die typically between days 6 and 16 of complications.
- Non-fatal cases, may have a fever for several days and improve typically around day 6.

Complications:

- Pregnant women may experience spontaneous miscarriages
- Multiorgan failure
- Septic Shock
- Severe blood loss
- Seizures
- Cerebral edema
- Death
- Those who survive can have a prolonged convalescence
    - MVD is known to persist in immune-privileged sites in some people who have recovered (e.g., testicles, eyes). Persistence of Marburg virus in other immune privileged sites (placenta, central nervous system) is possible.

Early in illness Marburg virus disease may resemble non-specific febrile illness (e.g., influenza, COVID-19) or other tropical diseases (e.g., typhoid fever, malaria) or other viral hemorrhagic fevers (e.g., Lassa fever or Ebola disease). A high index of suspicion is required.

When to Suspect a Patient has Marburg Virus Disease

Suspect Marburg virus disease in any individual who has a sudden onset of one or more symptoms of Marburg virus disease (listed above) **AND** one or more of the following exposure risk factors within 3 weeks of symptom onset:

- Travel to / residence in a country known to have circulating Marburg virus Disease. Outbreak map located here
- Known/suspected exposure to ill or dead person with suspected/confirmed Marburg virus disease, including by:
    - Contact with bodily fluids (e.g., blood, sweat, saliva, urine, vomit, feces, semen) without appropriate PPE
    - Contact with objects contaminated by bodily fluids (e.g., clothing, bedding, equipment) without appropriate PPE
    - Contact with bodily fluids or contaminated objects with appropriate PPE if there is concern for a breach in PPE
- Known/suspected exposure to semen of male recovered from Marburg virus disease
- Work in a laboratory that handles viral hemorrhagic fever specimens
- Handling wild animals or carcasses that may be infected with *orthomarburgviruses* (e.g., bats, primates)

Key Steps for Frontline Clinical Staff

Identify
- Assess the patient for signs and symptoms, travel history, and epidemiological criteria.
- For assistance, contact facility Infection Prevention and Control or on-call hospital epidemiologist

Isolate
- Provide a mask to the patient and initiate prompt isolation. Follow **Infection Prevention Guidance**.

Inform
- Notify dept/facility leadership, Infection Prevention & Control, on-call hospital epidemiologist.
- Notify jurisdictional health department immediately (via the 24-hour Epi-On-Call contact list) and follow jurisdictional protocols for patient assessment.

Infection Prevention and Control

Hand Hygiene

- Perform hand hygiene before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE, including gloves.

- Use soap and water for at least 20 seconds or use alcohol-based hand rubs. If hands are visibly soiled, use soap and water.

Patient Placement

- Place patient in a single patient **Airborne Infection Isolation Room (AIIR)**. If an AIIR is not available, isolate the patient in a private examination room. Keep the door closed, minimize entry and exit, and avoid entry without appropriate PPE.
    - Keep a **log** of all persons who care for or enter the room or care area of the patient.
- Limit movement of the patient outside of the room. When outside the room, **patient should wear a facemask**.

Transmission-Based Precautions & Personal Protective Equipment

- Adhere to **Standard + Airborne + Contact Precautions**. At minimum for those who do not have bleeding, vomiting, or diarrhea use a respirator, 2 pairs of extended cuff gloves (at minimum, outer gloves should have extended cuffs), fluid-resistant gown that extends to at least mid-calf OR fluid-resistant coveralls without integrated hood, face shield, hood, knee high boot covers. Additionally, an impermeable apron is recommended over gown or coveralls anytime the patient is vomiting or has diarrhea.
    - CDC VHF PPE: Clinically Stable Patients Suspected to have VHF
    - CDC VHF PPE: Confirmed Patients and Clinically Unstable Patients Suspected to have VHF
- Follow Donning and Doffing Checklist
    - Example: NYC Health + Hospitals **SP Level 2 VHF PPE Donning and Doffing Checklist**.
- Ensure a trained observer is present and donned in appropriate PPE (respirator, 2 pairs of extended cuff gloves (at minimum, outer gloves should have extended cuffs), fluid-resistant gown that extends to at least mid-calf OR fluid-resistant coveralls without integrated hood, face shield, hood, knee high boot covers).

Environmental Infection Control

- *Orthomarburgviruses* are classified as a **Category A infectious substance**: capable of causing permanent disability or life-threatening/fatal disease in humans if exposure occurs. Notify facility EVS. Keep all waste, supplies, or medical equipment in patient room until Ebola virus is ruled out.
- If MVD infection is **RULED OUT**, clean and disinfect the patient's care area using an EPA registered disinfectant for appropriate contact times. Management of laundry, food service utensils, and medical waste should also be performed in accordance with routine procedures.
- If MVD infection is **RULED IN**, all cleaning, disinfection, and transport of waste must be **managed as Category A waste**. Once the patient vacates a room, all unprotected individuals, including HCP, should not be allowed in that room until sufficient time has elapsed for enough air changes to remove potentially infectious particles and the room has been cleaned and disinfected by designated vendor (if applicable) or staff.

Diagnostic Testing

- **Consultation and approval from jurisdictional health department is required if specimen collection is warranted.** Call jurisdictional health department 24-hour Epi-On-Call contact.
- Further information regarding specimen collection can be found here: https://www.cdc.gov/viral-hemorrhagic-fevers/php/laboratories/specimen-collection.html

Treatment and Immunization

- There is no specific or licensed treatment for MVD.
- Treatment is limited to supportive care which includes:
    - Balancing the patient's fluids and electrolytes
    - Maintaining oxygen status and blood pressure
    - Replacing lost blood and clotting factors
    - Treatment for any complicating infections
- There are candidate monoclonal antibodies and antivirals, along with candidate vaccines that can be evaluated in clinical trials

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References:

- CDC Clinical Overview of Marburg Virus Disease
- WHO Marburg Disease
- CDC Marburg Virus Disease for Healthcare Providers