

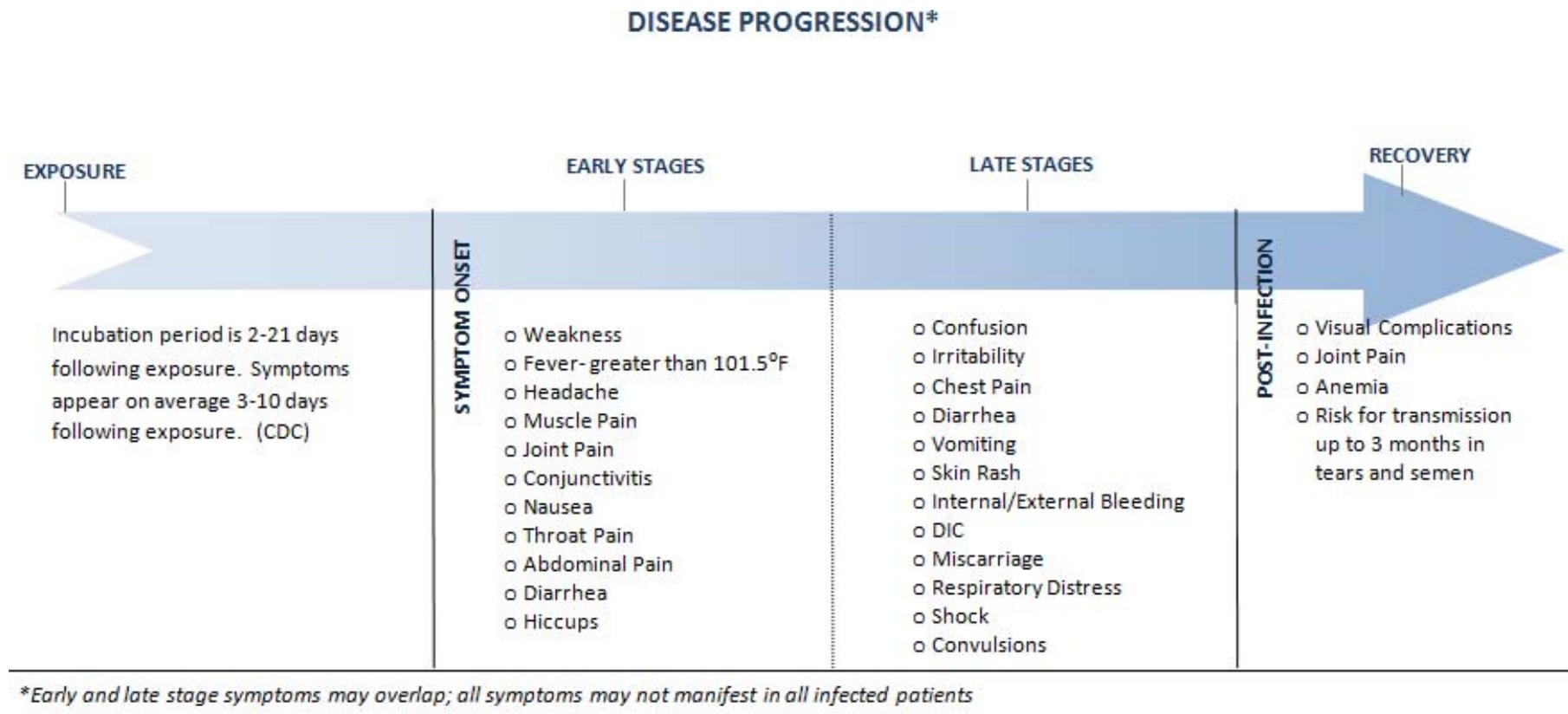
Ebola Facts

October 20, 2014



American Hospital
Association

Clinical Progression of Ebola



Source: Jonathan B. Perlin, MD, PhD and HCA Clinical Excellence Knowledge Center, 2014

Clinical Evidence

| CARE COMPONENT | CLINICAL MANAGEMENT |
|--|---|
| Disease Pathophysiology⁴ | Research suggests the virus first infects dendritic cells , disabling immune system, and then attacks the vascular system , causing hemorrhage, hypotension and shock. The virus also affects the liver (impacting coagulation proteins), the adrenal gland (affecting steroid synthesis for blood pressure stabilization) and the gastrointestinal tract (diarrhea). |
| Hemodynamic Support^{1,2,5-7} <i>Hypotension/shock, hemorrhage/DIC</i> | <p><u>Hypotension/Shock</u>: Aggressive IV fluid resuscitation resembling the approach to the septic shock patient is identified by the CDC as one of three interventions that impact mortality through observation and case series. Base fluid selection (Lactated Ringers or Normal Saline) on patient electrolyte status. One animal study examined supplemental fluid resuscitation of infected, hypotensive rhesus macaques, which resulted in improved renal parameters. Hydrocortisone may be considered to support viral disruption in steroid synthesis.</p> <p><u>Hemorrhage/DIC</u>: Management of hemorrhage is inconsistent in literature. Literature around previous outbreak transfusion strategies includes various blood products, antifibrinolytics, and clotting factors. One recent report suggests the use of melatonin to combat endothelial disruption, disseminated intravascular coagulation (DIC) and multiple organ hemorrhage due to potential benefit, high safety profile, and limited alternative therapies.</p> |
| Respiratory Support^{1,2,8-10} <i>Oxygen therapy, ventilation</i> | <p>Maintain adequate oxygenation (titrate to SpO₂ ≥90%). To protect the airway and/or treat multisystem organ failure, standard mechanical ventilation practices should be followed with the addition of HEPA filtration of airflow gases. Methods of non-invasive ventilation are not ideal due to increased potential for aspiration and infection transmission. Additional measures including placement of ventilated patients in a negative pressure room, use of video/optical laryngoscopy for intubation, use of rapid sequence intubation with neuromuscular blockade, and use of a ventilator-patient monitoring system interface to minimize entry into the patient room should be considered.^{1-2,6-8}</p> |

Source: Jonathan B. Perlin, MD, PhD and HCA Management Services, L.P. 2014

Clinical Evidence

| CARE COMPONENT | CLINICAL MANAGEMENT |
|--|---|
| Infection Support ^{1,2,6,11} <i>Fever, secondary infection, malaise, plasma transfusion, antivirals</i> | <p>Treat fever with acetaminophen (avoid aspirin and NSAIDs due to antiplatelet activity). Identify any additional sources of infection and treat with appropriate empiric antimicrobials. If sepsis develops, administer broad-spectrum IV antibiotics within 1 hour and follow Surviving Sepsis Early Goal Directed Therapy (EGDT). Antiviral and antimalarial agents are not efficacious for Zaire Ebola virus. Consider passive immunotherapy early in disease course by transfusing whole blood or plasma donated from a convalescent patient.</p> |
| Renal/Hepatic Support ^{1,2,4,6,12,13} | <p>Renal: Advanced stage may lead to impaired kidney function, increased creatinine and BUN, and decreased urine output. Renal failure has been reported in fatal cases. Patients may experience persistent oliguria, hematuria and proteinuria despite IV fluid resuscitation. Reports of peritoneal and hemodialysis show no consistent correlation on survivability, and transmission risk to healthcare workers should be considered.</p> <p>Hepatic: Patients demonstrate impaired liver function, hepatomegaly and elevated liver enzymes (ALT/AST), but severity is lower than that seen in hepatitis A/B or yellow fever. One study showed AST was several times higher than ALT in fatal cases.</p> |
| Pain Management ^{2,14-16} | <p>Treat mild pain with acetaminophen and moderate to severe pain with opioids. Avoid diclofenac, ibuprofen and other NSAIDs due to antiplatelet activity; avoid tramadol due to seizure activity. The management of pain resembling the approach to a critically ill patient with potential multi-organ failure should be followed due to high risk of renal and hepatic failure.</p> |
| Neurologic Support ^{1,6} <i>Anxiety, Confusion, Seizures</i> | <p>Monitor the patient for confusion, anxiety and seizures. Treat anxiety and seizures with benzodiazepines. Avoid the use of other medications that may reduce seizure threshold. Late in the disease progression, monitor neurologic status for increased intracranial pressure and intracranial hemorrhage.</p> |

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Clinical Evidence

| CARE COMPONENT | CLINICAL MANAGEMENT |
|---|--|
| Gastrointestinal Support^{1,10} Nutrition, Nausea/Vomiting, Diarrhea | Provide rehydration therapy to prevent volume depletion. Correct abnormal electrolytes. Proton pump inhibitors should be administered for dyspepsia and gastrointestinal bleed prophylaxis. Administer antiemetics for nausea/vomiting. Monitor for dehydration. |
| Survivability^{2,3} | Dependent upon access to basic care and patient immune status. Current West Africa Ebola strain has reported 70% mortality rate (October 14, 2014). |
| Recovery^{2,13} | Recovery (weeks to months) is highly dependent on supportive care and immunologic response of patient. Men can still transmit Ebola virus through semen for up to 3 months so abstinence is encouraged during this time. Once fully recovered, patients are no longer able to transmit the virus. Development of antibodies last at least 10 years but it is unknown if this confers lifelong immunity or if infection with other strains is possible. Acute complications include: generalized weakness, weight loss, headache, sensory distortion, migratory arthralgias, skin sloughing, alopecia, and persistent anemia. Uveitis and orchitis can occur weeks after illness, and virus can persist in aqueous humor and semen. |
| Experimental Therapies^{2,4} | No experimental vaccines or antiviral medications have been fully tested for safety or efficacy. ZMapp (Mapp Biopharmaceutical, Inc.), is an experimental treatment of three monoclonal antibodies that bind to viral protein. All available doses have been distributed at this time. Several experimental vaccines and treatments in animal models show promise. |

Source: Jonathan B. Perlin, MD, PhD and HCA Management Services, L.P. 2014

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See handout for evidence classification.

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