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Ebola: Protecting Healthcare Workers

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Introduction:
Ebola is a hemorrhagic disease that has been seen throughout the world, but because of international travel it is spreading. Gilsdorf, Morgan and Leitmeyer (2012) researched air travel and reported that “in 2010, 3.5 billion passengers arrived and departed from 1,100 airports worldwide...and travel to and from Africa almost doubled between 1995 and 2005” (p.1475). In the last few months there have been cases of Ebola reported in Spain and the United States linked to travel.

These are recent developments because as of July 2014 the Center for Disease Control and Prevention (CDC) reported “to date there are no cases reported in the United States.” (CDC, 2014). Turner (2014) reports that “the incubation period can be as long as 21 days” (p.2). This gives exposed people a chance to travel to the world and expose others to the potential lethal virus. The people that flies in planes may have a risk, but the people that are at greatest risk are healthcare workers that care for Ebola patients.

Pathophysiological Processes:
When researching Ebola it was revealed that infected individuals have been known to fly to other countries while infected, but the risk to follow travelers is not very high. Gilsdorf, Morgan and Leitmeyer (2012) reviewed a few cases of people traveling internationally with Ebola “…the reviewed studies show a low risk of transmission in the early phase of symptomatic patients, even if high risk exposure occurred.” (p.1475). It seems that high risk exposure is “direct physical contact.” (p.1472). They go on to say, “In the outbreak in 2000 in Uganda the most important risk factor was direct and repeated contact with a sick person’s body fluids.” (Gilsdorf, Morgan, & Leitmeyer, 2012, p.1472). This would indicate that the person providing care at time of greatest risk and current events have proved this to be true. The infected person in Spain and the United States are both healthcare providers. Even though the infected person traveled a great distance and came in contact with many people along the way, it was a nurse with personal protective devices (PPE) in both cases that was infected.

Signs and Symptoms:
Ebola virus disease is, “characterized by a sudden onset of fever, intense weakness, headache, and severe thirst” reports WHO. (WHO, 2014). The CDC says the fever is, “greater than 101.5 Fahrenheit.” Additional symptoms are “vomiting, diarrhea and unexplained hemorrhage.” (CDC, 2014). Laboratory findings “include low white blood cell and platelet counts and shockable (hypotensive) heart rates.” (WHO, 2014).

Underlying Pathophysiology:
Ebola virus usually infects humans through openings in the skin or mucous membranes. Antigen-presenting cells such as macrophages and dendritic cells (DCs) located at the site of infection, are primary targets of Ebola replication…The cells become functionally deranged and are unable to express co-stimulatory molecules or stimulate lymphocytes, namely naïve T cells. Unresponsiveness of DCs to Ebola infection most likely contributes to the massive lymphocyte apoptosis routinely observed in clinical cases of infection in humans. Ebola infection of macrophages and monocytes elicits the release of massive amounts of pro-inflammatory cytokines and chemokines. This “cytokine storm” recruits additional antigen-presenting cells (APCs) to the site of infection, increasing the number of host to support virus replication. It also contributes to the pathogenesis at the late stage of disease by increasing endothelial permeability and vascular leakage which, in turn, foster rapid dissemination of infected APCs throughout the systemic circulation to release Ebola in the secondary lymphoid organs, lungs, liver and other areas of the body where virus replication occurs. (Gilsdorf & Coyle, 2013, p.565).

More information on lymphocytes:
Limited data from patients and more extensive data from laboratory animals indicate that massive lymphocyte apoptosis occurs during Ebola hemorrhagic fever and may contribute to the high death rate. Thus, the loss of the immune system’s ability to protect itself by releasing Ebola in the secondary lymphoid organs, lungs, liver and other areas of the body may contribute to the high death rate. Thus, the loss of the immune system’s ability to protect itself by releasing lymphocytes, namely naïve T cells. Unresponsiveness of DCs to Ebola infection most likely contributes to the massive lymphocyte apoptosis routinely observed in clinical cases of infection in humans. Ebola infection of macrophages and monocytes elicits the release of massive amounts of pro-inflammatory cytokines and chemokines. This “cytokine storm” recruits additional antigen-presenting cells (APCs) to the site of infection, increasing the number of host to support virus replication. It also contributes to the pathogenesis at the late stage of disease by increasing endothelial permeability and vascular leakage which, in turn, foster rapid dissemination of infected APCs throughout the systemic circulation to release Ebola in the secondary lymphoid organs, lungs, liver and other areas of the body where virus replication occurs. (Gilsdorf & Coyle, 2013, p.565).

Implication for Nursing Care:
Ebola will change nursing care now and in the future. A patient with a temperature will have to be questioned about recent travel and contacts. Park says, “First asking the patient about where they have been in the past month to triage those who are at highest risk of having Ebola, and also having a nonverbal test for those they might actually be infected.” (Park, 2014, p.2) Although, it is reported that these patients can be taken care of in any hospital, this may be a return of isolation rooms or wards.

The CDC put out recommendations for hospitals caring for Ebola patients. “Ebola is a deadly, but treatable, disease. Patient rooms with an entry log, all personnel entering must wear gloves, fluid resistant gowns, eye protection and a face mask (N95). If the patient is vomiting or bleeding, gowns and latex gloves are recommended. Sharp objects must be handled with extreme care. If a healthcare worker is exposed to a patient without PPE they need to be monitored twice daily after the exposure. (CDC, 2014).

In the case of death, “Handling of the remains should be kept at a minimum.” (CDC, 2014). The PPE listed above is used as death occurs. The CDC reports that at the “site of death the body should be wrapped in a plastic shroud. Intravenous lines and endotracheal tubes are left in place. The body is double bagged in a leak proof plastic bag. This is an unfortunate part of hospital personal were Ebola is here.

Significance of Pathophysiology:
The pathophysiology of Ebola may be the answer for a vaccine or serum to stop the virus. Chui and Coyle (2013) report that many vaccine paths have been followed, trying to find a perfect result. They first used “Ebola proteins” but these were found to “override pre-existing immunity...[they] are not desirable, since high doses of adenovirus particles can participate severe, toxic inflammatory responses in humans.” (p. 568).

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Conclusion:
A few months ago, Ebola was an African virus that Americans did not need to worry about, how quickly things change. America had an Ebola patient due to traveling to Texas hospital. A nurse infected, is fighting for her life after contact with this man. Many people are being isolated that were on the plane, in the airport or homes were to work. These are all like innocent everyday activities.

References


