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Ebola: Protecting Healthcare Workers

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Introduction:

Ebola is a hemorrhagic disease that has been seen throughout Liberia, but because of international travel it is spreading. Gilsdorf, Morgan and Leitmeyer (2012) researched air travel and reported that, "In 2010, 5.04 billion passengers arrived and departed from 1318 airports worldwide... and travel to and from Africa almost doubled between 1995 and 2005." (p.1471). 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.68) This gives exposed people a chance to travel to any place in the world and expose others to this potentially fatal virus. The public that flies in planes may have a risk, but the people that are at greater 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 fellow 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.1471). 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, as occurs during the provision of care." (Gilsdorf, Morgan, & Leitmeyer, 2012, p.1472). This would indicate that the persons providing care over time is at greater risk and current events have proved this to be true. The infected persons 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 stricken.

Signs and Symptoms:

Ebola virus disease is, "characterized by a sudden onset of fever, intense weakness, headache, and sore throat," 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 elevated liver enzymes." (WHO, 2014).



The CDC says screen for temps "greater than 101.5 Fahrenheit." Intense weakness vomiting

Underlying Pathophysiology:

Ebola virus usually infects humans through openings in the skin or mucous membranes. Antigen-presenting cells such as macrophages and dendrite cells (DCs) located at the site of infection, are primary targets of Ebola replication...the cells become functionally deregulated 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 monocytes and macrophages elicits the release of massive amounts of pro-inflammatory cytokines and chemokines. This "cytokines 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 ancillary sites of virus replication. (Choi & Croyle, 2013, p.566). 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 few patients who survive infection develop antibodies to the virus during the second week of illness, while fatally infected persons apparently undergo terminal immunosuppression similar to that with septic shock.(Parrino, Hotchkiss, & Bray, 2007, p.194).

Significance of Pathophysiology:

The pathophysiology of Ebola may be the answer for a vaccine or serum to stop the virus. Choi and Croyle (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...[this]is not desirable, since high doses of adenovirus particles can participate severe, toxic inflammatory responses in humans." (p.568). Another vaccine approach is to give a live recombinant virus. This protected small rodents, but when the virus was gamma-irradiated it lost its ability to protect those same animals. (Choi & Croyle, 2013, p. 568). So other methods are also being looked at.

Virus entry is an essential step in the virus life cycle and is often an attractive target for therapy, since inhibition of this process blocks replication at an early stage, significantly reducing the chance for the virus to evolve and develop drug resistance. (Choi& Croyle, 2007, p.571).

Lastly, overproduction of pro-coagulant tissue factors is being explored. This is done by stimulating coagulation by giving factor VIIa or activating the natural anticoagulant protein C pathway, thus decreasing production of pro-inflammatory cytokines. These along with other ways are being tested to save Ebola infected people. (Choi & Croyle,2013, p. 571).

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 room ready for those who they suspect might 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 and those recommendations include, single patient rooms with an entry log, all personnel entering must wear gloves, fluid resistant gowns, eye protection and a face mask (PPE). If the patient is vomiting or bleeding double gloving, shoe covers and leg covering is recommended. Sharps 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 after death as well. 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 now that Ebola is here.



Conclusion:

A few months ago, Ebola was an African virus that Americans did not need to worry about, how quickly things change. America has had an Ebola patient die after traveling to a 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 he went. These all seem like innocent everyday activities.**

Nurses are at a high risk to come in contact with Ebola patients' body fluids without effective PPEs in place. This virus is going to affect many nurses. It may be positive or negative, time will tell.

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