

Ebola exercise

Global Health Pathway - 1st year GHP seminar session. November/December 2014

Instructions: Enter the requested information as bullet points.

Source: Interim U.S. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure (CDC, Updated: November 16, 2014)

- Available on the State Department's website: <http://travel.state.gov/>

Key information: (i.e., in the bulleted list below, enter something new that you learned from reading the CDC guidance that you think is important and want to remember)

- **Quarantine & monitoring:**
 - o When people are not symptomatic, they should not be quarantined.
 - o Quarantine precautions specifically refers to those who are not yet ill (not presenting signs or symptoms).
 - o There are multiple levels of monitoring/quarantine/isolation based upon exposure/risk.
 - o People employed in public transportation are not subject to the same movement restrictions after exposure
 - o Asymptomatic people in high risk category should be monitored closely for 21 days
 - **Health Equity:**
 - o Equitable and ethical use of public health orders includes supporting and compensating persons who sacrifice their individual liberties and freedoms for public good.
 - o Individuals that sacrifice their liberties for the common good should be compensated for lost wages and provided food and shelter.
 - **Caring for patients and wearing PPE:**
 - o Healthcare workers taking care of Ebola patients may have unrecognized exposure even while wearing appropriate PPE. (doesn't seem like this should hold up if the only means of transmission is contact like they've been saying)
 - **Prevention:**
 - o You have to maintain a 3 foot distance in public environments.
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Remaining questions: (i.e., in the bulleted list below, enter any remaining question about ebola you have. Or, enter any questions that the CDC document raises that you want to understand better)

Pathophysiology:

Q: What's the mechanism by which Ebola acts? [Michael]

A:

- first the virus enters the body through mucous membranes, breaks in skin or parenterally
- then the virus infects many different cell types
- there is rapid systemic spread
- Dissemination to regional lymph nodes results in further rounds of replication, followed by spread through the bloodstream to dendritic cells and macrophages in the liver, spleen, thymus, and other lymphoid tissues.
- there is both:
 - tissue damage from the virus, and
 - a systemic inflammatory syndrome: from the induction of the release of cytokines, chemokines, and other proinflammatory mediators from macrophages and other cells (this systemic inflammatory response causes diffuse vascular leak and multiorgan failure that is seen later in the disease course).
- vomiting and diarrhea is common, which can result in acute volume depletion, hypotension, and shock

Source: UpToDate: <http://www.uptodate.com/contents/epidemiology-and-pathogenesis-of-ebola-virus-disease#H14>

Epidemiology:

Q: Are there any actual numbers for likelihood of Ebola transmission? [Alli]

A: Reproduction number is 2 → one sick person will infect two people on average (must have symptoms). In comparison, Reproduction number for HIV and SARS is 4, mumps is 10, measles is 18 (most infectious disease known).

Source: <http://www.npr.org/blogs/health/2014/10/02/352983774/no-seriously-how-contagious-is-ebola>

Q: What is the future of ebola? [Laura]

A: Current case count (confirmed, probably, suspected) = 21,171 in Guinea, Sierra Leone, Liberia. Still rising in Guinea, possible leveling off of new cases in Sierra Leone, new cases decreasing in Liberia. See graphs in WHO source to see current trends.

Data for Liberia and Sierra Leone shows large drops in employment and food security due to Ebola as the biggest socioeconomic side effects of Ebola. Will take decades for these countries to recover.

Source: November 9, 2014 article from CDC: "The September 26, 2014, Morbidity and Mortality Weekly Report (MMWR), [Estimating the Future Number of Cases in the Ebola Epidemic—Liberia and Sierra Leone, 2014–2015](#), estimates the future number of cases if current trends continue. The MMWR also adjusts the number of cases based on estimated underreported cases.

- By September 30, 2014, CDC estimates that there will be approximately 8,000 cases, or as high as 21,000 cases if corrections for underreporting are made.
- Without additional interventions or changes in community behavior, CDC estimates that by January 20, 2015, there will be a total of approximately 550,000 Ebola cases in Liberia and Sierra Leone or 1.4 million if corrections for underreporting are made.
- Cases in Liberia are currently doubling every 15-20 days, and those in Sierra Leone and Guinea are doubling every 30-40 days.
- Halting the epidemic requires that approximately 70% of Ebola cases be cared for in Ebola Treatment Units or, if they are at capacity, at home or in a community setting in which there is a reduced risk of disease transmission and safe burials are provided.

Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/qa-mmwr-estimating-future-cases.html> [Lucy]

Source (& charts and graphs): <http://www.who.int/csr/disease/ebola/situation-reports/en/>

Source: <http://www.un.org/apps/news/story.asp?NewsID=49778>

Q: Why did it become an epidemic on this scale this time?
What is different from the other years with outbreak? [Christine]

A:

- New location - ebola has usually been a disease of central african nations. Guinea, Sierra Leone and Liberia were ill equipped to deal with ebola because they had never seen it before.
- Cities and urbanization - increased urbanization, especially in the slums of Monrovia, increased the transmission of the disease. Typically, ebola outbreaks start in more rural communities. It is easier to control outbreaks in smaller and more rural communities.
- Weaker public health systems - Liberia and Sierra Leone were especially weakened by the civil war and, therefore, have depleted public healthcare systems. Few doctors and hospitals were available to respond to epidemic. You are also need the right facilities in order to isolate potentially infected patients and laboratories and lab personnel in order to test for the disease.
- Traditional burial practices - in West Africa, it is tradition to bathe the bodies of the dead before they are buried. This is dangerous because the virus is most contagious just after death. This is why we saw many members of the same household and families becoming infected with the virus.
- Delayed and ineffective international response - WHO failed to respond in time and also failed to label the epidemic accurately. The washington post put out a pretty scathing article on how the WHO failed to respond and cooperate with other international institutions:
<http://www.washingtonpost.com/sf/national/2014/10/04/how-ebola-sped-out-of-control/>

Sources:

<http://www.nytimes.com/2014/12/30/health/how-ebola-roared-back.html>

http://www.nytimes.com/2014/09/07/opinion/sunday/from-bad-to-worse-with-ebola.html?_r=0

http://www.nejm.org/doi/full/10.1056/NEJMp1409903?query=featured_home&

http://www.nejm.org/doi/full/10.1056/NEJMoa1411100?query=featured_home#t=articleResults

Prognosis:

Q: Are pregnant women more susceptible/likely to die from Ebola?

A: "No evidence currently exists to suggest that pregnant women are more susceptible to infection from Ebola than the general population. Unfortunately, limited evidence does suggest that pregnant women are likely to be at increased risk of severe illness and death when infected with Ebola virus"

A: Pregnant healthcare workers recommended to not work with ebola patients because of increased risk to fetus

Source: <http://www.cdc.gov/vhf/ebola/hcp/guidance-maternal-health.html> --[YevinRoh]

A: Pregnant women with Ebola are at higher risk for spontaneous abortion and pregnancy-associated hemorrhage. Neonates born to mothers infected with Ebola have very high mortality rates. [Nichole] source:

Source:

http://journals.lww.com/greenjournal/Fulltext/2014/11000/What_Obstetrician_Gynecologists_Should_Know_About.21.aspx

A: The spread of Ebola has affected the lives of pregnant women by greatly decreasing the percentage of women receiving prenatal and postnatal care. Some women avoid clinics because they are afraid of contracting infections while others are turned away due to "overstretched health facilities." "The reality is that pregnant women are facing a double threat - dying from Ebola, and from pregnancy or childbirth, due to the devastating impact of Ebola on health workers and health systems," (in Sierra Leone they have cut back on 50% of consultations for pregnant women). UNFPA Executive Director Babatunde Osotimehin in a statement." [Hannah R.]

Source: <http://www.reuters.com/article/2014/10/16/us-foundation-ebola-women-idUSKCN0I52FK20141016>.

Treatment:

Q: What is the most effective treatment method? [Hannah H]

A: General medical support is critical and should include replacement of coagulation factors and heparin if disseminated intravascular coagulation develops. Supportive therapy with attention to intravascular volume, electrolytes, nutrition, and comfort care is of benefit to the patient. Intravascular volume repletion is one of the most important supportive measures.

Oral medication includes those that alleviate nausea and vomiting, dyspepsia, anxiety, agitation, or confusion, and pain. In addition to supportive care, oral artemether/lumefantrine for uncomplicated malaria and an oral antibiotic (e.g. amoxicillin, cotrimoxazole, cefixime, or ciprofloxacin) are uniformly administered due to the customary absence of an on-site laboratory capable of safely processing biological samples for alternative diagnoses.

Sources: <http://www.cdc.gov/vhf/ebola/treatment/index.html>
<http://emedicine.medscape.com/article/216288-treatment#aw2aab6b6b3>

Roddy P, et al., "Clinical Manifestations and Case Management of Ebola Haemorrhagic Fever Caused by a Newly Identified Virus Strain, Bundibugyo, Uganda, 2007–2008," PLoS One. 2012; 7(12): e52986. Published online Dec 28, 2012. doi: [10.1371/journal.pone.0052986](https://doi.org/10.1371/journal.pone.0052986). PMID: PMC3532309

Global health funding:

Q: How much money are aid organizations providing to manage the Ebola outbreak? [Jonathan]

A: According to data collected by the Financial Tracking Service 2.43 Billion has already been raised to fund the fight against ebola.

(<http://fts.unocha.org/pageloader.aspx?page=emerg-emergencyDetails&emergID=16506>)

- \$50 million from Gates Foundation ([http://www.gatesfoundation.org/Media-Center/Press-Releases/2014/09/Gates-Foundation-Commits-\\$50%20Million-to-Support-Emergency-Response-to-Ebola](http://www.gatesfoundation.org/Media-Center/Press-Releases/2014/09/Gates-Foundation-Commits-$50%20Million-to-Support-Emergency-Response-to-Ebola))
- \$25 million from Mark Zuckerberg and his wife, Dr. Priscilla Chan (<http://www.usnews.com/news/articles/2014/10/22/private-funding-from-zuckerberg-others-aids-ebola-fight>)
- \$100 million from Paul Allen Family Foundation
- \$6.18 billion from White House(?) (<http://www.cbsnews.com/news/obama-asks-congress-for-6-18b-in-emergency-funding-for-ebola/>)
- \$35 million from Saudi King Abdullah (<http://www.businessinsider.com/r-saudi-king-gives-35-million-grant-for-ebola-fight-2014-12>)

Other:

Q: Are the recommendations by the WHO standardized internationally, that is, if countries do not follow WHO guidelines, are they penalized? [Emily]

A: It doesn't seem like there are any ways they enforce their guidelines. According to one website, in 2007 WHO member states adopted the International Health Regulations for pandemic preparedness and response, but these regulations are "legally binding but contain no provisions for enforcement".

Source: <http://www.cfr.org/global-governance/global-governance-monitor/p18985#!/public-health>

Q: Since the Dallas incident (in which healthcare workers were exposed and then went on vacation) have there been stricter regulations around health care workers who work with these patients? [Sarah, Courtney]

A: "(1) recognized that not every major hospital is fully ready to handle Ebola identification, biocontainment, and treatment requirements, (2) facilitated priority use of specially qualified medical facilities, (3) established CDC response teams to assist private sector medical facilities, (4) strengthened the medical screening of travelers flying into the United States who have recently visited West Africa, and (5) issued interim guidance to assist state and local public authorities in protecting their populations from the spread of Ebola by travelers arriving from West Africa. Also, the Department of Homeland Security (DHS) has strictly limited which airports of entry in the United States individuals may use if they have traveled within the preceding three weeks to a West African country with Ebola cases. Further, a number of state governments have imposed monitoring, isolation, and quarantine regimes designed to protect their citizens from Ebola." The Heritage Foundation 1/12/15

Kaci Hickox is fighting the quarantine in court (washington post) Lawyer states that NJ law is "overly broad," which could be a potential legal argument against the quarantine. However, the authority to impose quarantines is state-dependent, making it unlikely for a Hickox's case to be successful. The quarantine would need to be proven to be "arbitrary, oppressive and unreasonable" (washington post, 1/12/15) Ultimately Hickox lost her case.

Source: <http://www.cnn.com/2014/10/15/health/texas-ebola-nurses-union-claims/>

According to the Nurse's union, although there were guidelines in place the problem is that the hospital in Dallas was not compliant with the proper protocols. Several staff members are said to have made complaints about neck exposure and other PPE issues and were instructed to use "tape" instead of being given the proper equipment.

Source: <http://www.nytimes.com/2014/10/26/us/new-york-ebola-response-polar-opposite-of-dallas.html>

In an article about the ebola case in NY claimed that after all of the problems in Dallas the NY Hospital had honed their ebola protocol to protect their health care workers from exposure. This

shows that both the law/recommendations themselves have changed, and hospitals have taken steps to ensure the incident will not repeat itself by being better prepared.

“Even before the result of his Ebola test, a C.D.C. team was on its way to New York from the agency’s base in Atlanta.”

“One problem was that its protective gear protocols had been developed for use in field hospitals in Africa, where patients are given only basic care, like intravenous fluids, not for use in intensive care units of hospitals in modern medical systems, where large teams perform high-risk procedures that can involve lots of bodily fluids. The agency has substantially rewritten those protocols.”

<http://www.dallasnews.com/news/metro/20141013-cdc-changes-ebola-care-guidelines-for-hospitals.ece>

Q: For people that are quarantined, are there financial assistance programs to cover the cost of missing work, etc? [Brooks]

A: I got this from a law blog. “In other words, quarantined people should be paid. New York State has apparently adopted this policy to a limited extent, but other states imposing quarantines have yet to follow suit.

Aside from being fair – spreading the costs across taxpayers rather than letting them fall entirely on innocent individuals – compensation offers several practical advantages. First, it reduces avoidance and hiding from quarantines. Given that those needing to be quarantined have the best knowledge of whether they fit the profile, promoting voluntary compliance is a major, life-saving benefit. Second, decreasing the hardship of quarantine should reduce the political reluctance to impose such measures at the appropriate time – early, before things have gotten out of hand.” So apparently most people are not paid, but many people believe that they should be.

Q: What percentage of high risk patients do we lose track of- in other words they are not able to monitor consistently? [Vanji]

A: TLDR: A lot. Anywhere from 17-70% (so for every 100 cases, there could actually be 120-250 cases). This estimate is from September, and they predicted that by January we would be around 500k, but we are not there yet. See below for current counts and predicted counts.

“the rate of underreporting of cases of the disease was 17 percent, up to a maximum of 70 percent, not 70 percent, for every 100 known cases, there would have been 250 real cases”

<http://www.nytimes.com/2014/12/16/science/fewer-ebola-cases-go-unreported-than-thought-study-finds-.html? r=0>

“By looking at virus samples gathered in Sierra Leone and contract-tracing data from Liberia, the scientists working on the new study estimated that about 17 percent of cases in West Africa go unreported, up to a maximum of 70 percent. That is far fewer than earlier estimates.”

“The Liberian data, gathered during three weeks of contact tracing in August, showed that the third person in any transmission chain often knew both the first and second person. That is not true in flu, he said, which can be caught from casual contact in offices, on subway cars or in hallways.”

<http://www.nytimes.com/2014/12/16/science/fewer-ebola-cases-go-unreported-than-thought-study-finds-.html? r=0>

"shadow zones", rural areas where there are rumors of cases and deaths that cannot be investigated because of community resistance or lack of staff and transport.

<http://www.reuters.com/article/2014/08/22/us-health-ebola-who-idUSKBN0GM0RW20140822>

current case counts:

<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>

predicted case counts:

<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/qa-mmwr-estimating-future-cases.html>

Q: Am I going to get Ebola? [C.J.]

A:

- The Ebola virus spreads by human-to-human transmission through direct contact of an infected individual's:
 - broken skin
 - mucous membranes
 - blood
 - other body fluids (e.g. faeces and urine, vomit, semen and sweat) .
 - Transmission can occur through direct contact with these body fluids, as described above, or through touching fomites (inanimate objects), such as the floor, utensils and bed linens that have recently been contaminated with infected body fluids.
 - Transmission through intact skin has not been documented, but infection can be transmitted through penetrating injuries of the skin, such as needle-stick injuries.
 - **So if you are not in an area with Ebola, and are not coming into contact with an infected individual's bodily fluids or mucus membranes ... you'll be alright [C.J.]**
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