

**Ebola: The Outbreak of Information**

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**August 2017**

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### **Abstract**

The outbreak of Ebola (2014-2016) while devastating presents a rare opportunity to examine information use using information and knowledge transfer models from the field of library and information science. With an emphasis on information use and cultural, a review of the literature suggests that the World Health Organization (WHO), and other organizing stakeholders, utilized the services of a cultural knowledge broker to better transmit information within the field. The review highlights important areas of cultural distinction that impacted the transfer of information in outbreaks prior to 2014 and the control and treatment of the disease that followed. Finally, the importance of incorporating a cultural broker to improve use of research-based information in current and future outbreaks is highlighted as a means to prevent disease and misunderstanding between health care workers and the local populace.

**Keywords:** Knowledge Utilization, Knowledge Implementation, Ebola, Ebola epidemic, Cultural Broker, Knowledge Management, Information Transfer Model

### **Ebola: The Outbreak of Information**

Library and information science (LIS) has not yet addressed the problem of the 2014-2016 Ebola epidemic in West Africa as an information transfer issue. Perhaps the field sees this problem as one that only medical science can solve, or ameliorate, through newly discovered vaccines or medicines. LIS professionals have the opportunity to incorporate their knowledge base that includes the information transfer model and the role of a cultural knowledge broker to assess and improve information flow and utilization within Western Africa. Furthermore, by examining successes and difficulties in previous hemorrhagic fever outbreaks, the LIS professional can assist the cultural broker, using their theoretical lens to suggest practical changes to interactions on the ground without comprising the biosafety of doctors or patients. Finally, LIS professionals can determine if further changes need to be made to the World Health Organization's (WHO) International Health Regulations (IHR) guidelines and what further changes can best serve the human population in the case of another outbreak of severe disease.

#### **What is Ebola?**

Ebola is a disease that is classified with other viral hemorrhagic fevers that include Ebola virus, Marburg virus, and Lassa fevers (Brown & Kelly, 2014). Ebola can be subdivided into many different strains that have different transmission and fatality rates. According to Hoenen and Feldmann (2014), in previous Western African outbreaks of the disease the fatality rate was “up to 90% for *Zaire ebolavirus*, approximately 50% for *Sudan ebolavirus*, and approximately 35% for *Bundibugyo ebolavirus*” (p.1). Each strain of the virus has similar symptoms, but the percentage of individuals who contract any specific symptom differs by virus type. All start with flu-like symptoms, headache, nausea, and fever. Then symptoms progress to diarrhea, nausea, vomiting concluding with massive hemorrhaging. According to Chippaux (2014) in *Zaire*

*Ebolavirus*, a specific virus type, “hemorrhages occur in 30-80% of patients mostly at the end of the illness” (p. 2). The similarity of the symptoms to flu, or malaria, make it difficult to diagnosis at the beginning of the epidemic that makes treatment challenging.

Ebola, while not a new disease, had not manifested in such extensive and widespread loss of life before the 2014-2016 epidemic. Instead, instances of Ebola occurred 27 times during 14 of the years between 1976-2014<sup>1</sup> and previously only included the countries Sudan, DRC, Gabon, Uganda, Congo, excluding single cases and those clearly originating from outbreak countries (Chippaux, 2014). The 2014-2016 Ebola outbreak included the countries Guinea, Sierra Leone, Liberia, primarily with a small outbreak in Nigeria, and a few countries where individual cases originated in other countries, such as Senegal, the United States, Mali, and Spain (Situation Report, 2014). Fourteen (14) of those outbreaks have been with the *Zaire Ebolavirus*, seven (7) with the *Sudan Ebolavirus*, one (1) *Tai Forest Ebolavirus*, two (2) with the *Bundibugyo Ebolavirus*, and three (3) with undetermined strain of Ebolavirus (Chippaux, 2014).

The 2014-2016 West African outbreak is officially considered to have begun March 10, 2014, but is suspected to have originated from a two-year-old who died on December 6th, 2013. As typical of the *Zaire Ebolavirus* strain, the disease fatality has been about 86%. Women are more likely to get the disease than men and the ratio of infected individuals is 41:59 (male to female). The greater susceptibility to women for this disease is not of physical origin, but cultural, and is tied to their caregiving role in taking care of family members who are sick (Baize et al., 2014). Baron, McCormick, and Zubeir (1983) found that those who nurse the sick within families have “a 5.1-fold increased risk of developing disease” (p.1000). Knowing the identity of potential victims of disease is vital to those passing along information about how to prevent said

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<sup>1</sup> 1976, 1979, 1994, 1995, 1996, 2000, 2001, 2002, 2003, 2004, 2005, 2007, 2008, 2012

disease.

According to Chippaux (2014) as with earlier outbreaks, the 2014 outbreak was tied to a single introduction of the virus into humans from eating an infected fruit bat. Fruit Bats have been identified as hosts of the *Ebolavirus* in that while they have Ebola in their body, they do not get sick from the disease. Gene sequences also suggest a single introduction of the virus into humans from animals. Local indigenous healers have noted, and research studies have also suggested, an increased likelihood of transmission of the disease around the end of the rainy season.

This literature review focuses primarily on the country of Guinea because of its centrality in the immediate outbreak of the disease. However, even a focus on Guinea specifically necessitates a global concern because of both the increased rates of transmission and fatality that accompany Ebola. First off, this outbreak is the first known in Guinea's history, therefore this paper explores the epidemic in other countries in order to find the best practices for the current Guinean and global concern. The present study, therefore, encompasses not just Guinea, but other outbreaks of the Ebola virus and other health concerns in the region of Western Africa. In many areas, the concern about Ebola is limited to the fear that someone with Ebola will board a plane and transmit the disease to other countries or continents, a problem that has unfortunately already happened (Buchanan, L., Copeland, B., Yourish, K., & Martinez, M. 2014). Further concerns about Ebola include the possible mutability of the virus to a strain that is airborne and much more likely to be spread and create a pandemic (Osterholm, 2014). Finally, while Ebola has been seen before in Africa, it is the case that the Africa of today and the Africa of 1976 when the virus was first seen is not the same. There has been a 300 percent increase in the population of Africa over the last four decades and many of those people live in large city slums, which

could other potential hotbeds for disease (Osterholm, 2014).

Both within and without Western Africa, the global concern about Ebola has increased calls for vaccines and medicines to prevent and treat the disease. However, the transmission of information about Ebola is at least as vital of a concern as medicinal solutions. First, although a vaccine has been tested and found effective in nonhuman primates, it has not yet been tested in humans. Some experimental drugs have also been approved by the WHO even though typically they would still be in testing stages. However, the use of these drugs on people can give the wrong impression that people are purposefully being experimented on (Hoenen & Feldmann, 2014). Therefore, without a solid medical solution in site, the best offense against Ebola is prevention by a thorough understanding of the disease, how it is transmitted, and avoidance techniques.

The LIS knowledge base, particularly the matter of information transfer, is highlighted by the ELRHA (enhancing learning & research for humanitarian assistance) in their August 2014 call for research in the areas of “anthropology, clinical management, diagnosis, disease control and prevention, ethics, health systems, social mobilisation, surveillance, and treatment” (“Research for Health in Humanitarian Crises,” 2014, para. 4). The ELRHA organization asserts that these topics are worthy of funding. They do not all correlate directly to the medical aspect of Ebola treatment, but also to the anthropology, ethics, social mobilization, and surveillance of Ebola that directly relate to the transmission of information about the disease. Okware et al., (2002) has also reported that previous research on epidemics have noted that providing effective communication to the public about the disease is one of the most necessary interventions (2002). In addition, Roddy et al. (2007, II) states that other research on outbreak control has seen that effective control depends on the collaboration of the community, including their understanding

of why certain biosafety procedures are in place. Finally, Chippaux (2014) reports that in the 27 separate recorded instances of Ebola outbreak, 15 had episodes where the transmission of the virus was due to nursing patient transmission, 6 were direct nosocomial<sup>2</sup> transmission, 11 related to funeral or burial rites, and 2 of eating bush meat.. In all these scenarios, a better transmission of information would have likely prevented the deadly transmission of Ebola.

### **Culture, Knowledge Transfer, and Transmission of Information**

Preventing the transmission of Ebola is key to containing the outbreak. Several theories highlight how the breakdown of information can occur within an epidemic and how culture interacts to make information more, or less, easily communicable. Greer's (2007) information transfer theory influenced by Shannon and Weaver's (1949) mathematical theory of communication describes a lifecycle of information that includes "creation, recording, reproduction, dissemination, bibliographic control, organization by disciplines, diffusion, utilization, preservation, and deletion" (p 75). A related theory, the knowledge transfer model in health care (Graham, 2008), also known as knowledge utilization and policy implementation, focuses on how research-based evidence is practiced, or not, in a healthcare setting. In the health field, knowledge transfer has been also studied under the term knowledge utilization and policy implementation and also under the term knowledge exchange. Knowledge exchange and knowledge transfer highlight the increased relevance in having patients and local doctors reciprocally communicate rather than rely on a hierarchical approach from doctor to patient. Ha, Anat, and Longneck (2010) note that successful and reciprocal communication has been shown to be more effective in producing the knowledge utilization desired. Specifically, the model of knowledge transfer most closely follows the interactive model with its emphasis on different

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<sup>2</sup> nosocomial refers to an incidence of transmission directly related to hospital mistakes such as reuse of needles or other compromised equipment.

stakeholders and their cooperation with each other. In an updated view of Greer's information transfer theory (Greer, Grover, & Fowler, 2013), "policies that govern the transfer of information for their respective agencies ...are consistent with their culture" (p.57). In this quote, agencies refers to, "any social organization, school, library, college or university, business, or government agency at any level <which> may articulate a policy for information use" (p.56). Understanding these information transfer models, both from the information professionals and those of the medical profession, will help shed new light on the breakdown in transmission of information about causes, treatment, and potential prevention of Ebola.

### **Community Collaboration or Alienation**

Outbreak control depends heavily on the collaboration of doctors with the local community so that the latter understand why certain biosafety procedures are in place (Roddy et al., 2007, II). A lack of strong community collaboration can result in community alienation and panic in the face of an epidemic. Community members who lack an understanding about what and why health care workers are using certain procedures can be led to violence (Hewlett, Epelboin, Hewlett & Formenty, 2005). For example, during an outbreak in Angola health care workers sprayed homes with disinfectant leading people to suspect that the health care workers were poisoning them (Roddy et al., 2007, II). During the 2014-2016 epidemic in Guinea, there was violence against local health care workers (Phillip, 2014). As noted before, the use of experimental drugs and vaccines erodes confidence in the healthcare system and the ability to control the disease. Hospitals began to be seen as death-traps because of both the high level of mortality of Ebola and because of some unfortunate situations in which hospitals inadvertently transferred the disease to others through poor practices meaning that individuals increasingly

avoided them during sickness<sup>3</sup> (Hoenen & Feldmann, 2014).

On the other hand, understanding community concerns and cultural standards helps with community collaboration on the disease. A few problematic cultural scenarios that have transmitted Ebola include burial rituals, funeral rites, and the practice of eating bush meat. Different epidemics have handled the problem of funeral rites in a few different ways, but one health oriented suggestion considered allowing certain aspects of ritual such as the songs, dancing, and the practice of covering the grave with earth in lieu of hugging and handling the body (Roddy et al., 2007). The practice of eating bushmeat has also been noted as problematic and it has been suggested to limit contact between humans and wildlife (Brown & Kelly, 2014). Unfortunately, many people rely on bushmeat for survival and often became sickened from bushmeat not during the height of the epidemic, but actually at its onset, therefore, at times when individuals were less aware of and focused on the disease. According to Chippeaux (2014), further suggestions for research included identifying when epidemics usually start such as at the end of the rainy season during migrations.

### **Dissemination of Information**

In any epidemic, there is an immediate need to know about available information and how and if that information is being utilized by the local people treating or dealing with the epidemic. A historical overview of how epidemics have been handled can inform how to approach this outbreak of disease. Overall, the most useful sources of authority about the epidemic of Ebola in 2014-2016 have been those studies that primarily addressed the epidemics of Ebola and Marburg virus that have occurred in Central Africa prior to 2014. A few sources, not epidemic related, are discussed here to further explore the cultural transmission of health

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<sup>3</sup> 6 cases of nosocomial transmission over 27 instances of Ebola between 1976 and present. (Chippeaux, 2014) Also (Baron et al., 1983) showed hospital transmission

information that has occurred in Western Africa. These studies relate how those geographic areas managed health-related issues both culturally and specifically.

Historically, government officials have attempted to solve the spread of epidemics through pamphlet distribution, announcements, warnings, all forms of dissemination of information, thinking that was all that was needed to solve epidemics (CDC, 2013). These government officials operate under the assumption that, if individuals merely knew how to stop the spread of disease, then they would understand that information and utilize it properly in the prevention of transmission. However, according to Roddy et al, (2007), the incidence of illness of death in past epidemics show that mere arbitrary dissemination is not enough to prevent the spread of disease. To be effective, dissemination of information must be accompanied with means for diffusion, or the process of information becoming useful knowledge.

Information access is central to achieving the goal of a healthy society. Chilimo and Ngulube (2009) find that an individual's means of information access may differ according to their country or cultural group, their gender, their educational level, age, or role in society. Health care workers in past epidemics have explored different ways of transmitting information, such as through person-to-person communication, radio, print, and electronic media. Radio, in particular, has remained a popular medium in Africa even as it has dwindled in the Western world. According to Okware, et al (2002) past epidemics promoting biosafe practices through the radio have reached approximately 60% of the population. More successful than radio, or other one-sided vectors of communication, however, were local level village volunteers and health care workers who, having been trained at the district level, were then sent out to each village within 23 sub-counties within Uganda. These scouts both provided information to individuals and then reported back daily to supervisors, thus making a one-sided data stream into

a two-way conversation about the spread of disease within the villages. The government's insistence on using local individuals to spread information and their emphasis on timely, specific information meant that rumors were kept to a minimum and that public input was solicited on the continued care and safety of the local people.

Timely, accurate information and co-functioning populations were vital to containing the misinformation and ill-will that are likely to spread during the stress of a serious outbreak. For example, Roddy et al (2007) illustrated how during an epidemic of Marburg virus in Angola information was transmitted by the Information, Education, and Communication (IEC) team that initially said, "There is no cure for the disease" (S166). Individuals translated this statement to mean that there was no reason for them to go to the hospital. Indigenous healers made a contradictory claim that they were able to provide cures. Chastened by the results of their initial statement, the IEC team overcorrected and implied that they too were able to assure a cure for all people. Being untrue, this second claim served to confuse people and make the job of health workers extremely difficult. Raabe et al. (2010) noted that other outbreaks of disease within Central and Eastern Africa have raised rumors that Western doctors are intentionally killing people, stealing body parts or blood, and experimenting with a form of population control on the African people.

### **Diffusion of Information**

Disseminating timely and accurate information is one way for epidemics to remain under control, however, diffusion of information to health care workers and media personnel is also vital. Media personnel were included in the training because they were needed to understand the disease, give out accurate information and prevent panics (Okware et al., 2002). Jeffs et al., (2007) noted that diffusion of information to local medical staff was also important as medical

workers who had no previous experience in treating individuals with the Marburg virus initially did not wish to treat these patients, partially because they were unclear how to keep themselves protected while providing care. In addition, Chippaux (2014) suggests that medical personnel also needed training in order to help prevent the spread of disease to other patients. In the 27 separate instances of Ebola outbreak from 1976-2014, at least 21 of those outbreaks had documented cases of either transmission of the virus from patient to nursing staff or from patient to patient that could have potentially been prevented.

According to Roddy et al, (2007), the need to diffuse or educate the local populace about Ebola also benefits local health care workers. In order to cooperate with the health care workers and prevent disease it was important that the local people did not just receive information about Ebola, but that they truly understood it and that the information was provided in a culturally sensitive manner. Médecins Sans Frontières (MSF) found during an outbreak of Marburg virus in Angola that some of their policies were not culturally sensitive and that the local population held an ill-will towards the foreign staff who had arrived to help combat the outbreak of the disease. Specific protocols such as the spraying of houses with disinfectant by people wearing full biohazard gear and goggles disturbed local people who didn't understand what was going on and thought they were being deliberately poisoned.

In addition, Roddy et. al (2007) notes that MSF ultimately found that, while the WHO protocol for dealing with local populations during an epidemic was more time consuming, the culturally sensitive approach helped involve the population in the prevention and care of the disease. MSF's experience with this epidemic led them to make several immediate changes in their interaction protocol to be more like the WHO. The changes enacted by MSF included providing a cultural interpreter near the care facility that was dressed in plain clothes, not

biohazard gear, and whose only job was to explain the procedures being done within the facility. Other individuals who did have to wear biohazard gear changed from dressing in the gear at home to arriving at the camp and then changing at the scene. Jeffs et al. (2007) saw a use for transparent fencing that was utilized for some outdoor camps, allowing individuals with family inside the Ebola ward to see inside the facility and assess the health care treatment of their family members. Finally, other researchers (Roddy et al., 2007) found that when trusted community members were utilized to spread fencing and when nurses were hired to help patients families communicate with hospital staff local concerns were eased.

### **Knowledge Utilization**

Other researchers, such as Hewlett & Amola (2003), found that identifying the cultural understanding of disease was essential in determining a culturally appropriate response to controlling it. Individuals in a Ugandan community were surveyed to find out their understandings about the disease and their concerns with the medical response. For example, in this particular outbreak, there was confusion within the community about the nature of the disease and its severity including the best ways to combat the disease. However, the local population did have a cultural model for an epidemic, which they called *gemo*. Once the severity of the disease was considered the level of *gemo*, the community understood the need to change some of their specific cultural practices. For example, burial practices during a *gemo* were changed from burial in traditional plots to burial outside of the community. Knowing that the cultural models changed during *gemo* the health care workers were better able to suggest other burial practice changes. Once health care workers utilized this cultural model the population became much more accepting of the other burial changes. Furthermore, Okware et al. (2002) found that previously in the same district burial of individuals in cemeteries and away from their

own home was considered against tradition and only acceptable after counselling.

Other researchers such as Chen et al (2008) found that culturally acceptable messages also need to consider the differing roles of men and women in some societies and the differing ways that women utilize health information. Women have been seen to be less likely to go to health facilities and more likely to use traditional healers. This preference may be because of financial reasons. They are also less likely to notify partners of ill health because they may fear possible disempowerment within their relationships. In addition, Howard et al. (2011) have seen that because of the differences in how women use health information, studies of prenatal women in Guinea have shown that women may prefer to receive health care within the facility, but may not choose to do so for financial reasons or distance from a facility. For this reason, it is necessary for women to have more information about the danger signs of pregnancy and when they needed extra help. However, pregnancy is not the only time when women need extra health care information. Baize et al. (2014) and Roddy et al. (2007) examined how many women provide the front lines for caregiving in their societies and are, therefore, more susceptible to disease. They often provide what has been called home based risk reduction (HBRR) for family members who either refuse or cannot access hospital care for many reasons.

Ultimately, knowledge utilization is the ultimate goal for information dissemination and diffusion. Knowledge is a powerful tool in an outbreak, when local staff working with diseased patients have accurate information, they are able to keep themselves safe. On one hand, Roddy et al. (2007) illustrates an example of an outbreak of Marburg virus in which no nursing staff were ultimately affected. On the other hand, both Jeffs et al. (2007) and Fernandez & Healy, (2014) cite lack of knowledge by local staff members that has the effect of contributing to a lack of biosafety and continued infections. Furthermore, MSF staff found that when they have a

record of best practices and did not use the knowledge that they agreed upon to be best they had more difficulties with local patients than when they utilized their information (Jeffs et al., 2007).

### **Suggestions for Current and Future Epidemics**

Suggestions for improved information use are organized in this section by stakeholder groups.

#### **World Health Organization and Other State Level Stakeholders**

Through the IHR, the WHO, States, and their health departments organize and plan for “public health emergencies of international concern” (PHEIC) (World Health Organization, n.d.). The IHR provides binding laws on the states that are within the WHO and serves to provide guidelines for how to handle public health emergencies while maintaining trade and commerce. An emphasis on appropriate knowledge diffusion and management could help the WHO and member states quickly contain and deal with outbreaks. Specifically, the WHO should include a knowledge manager, or broker, within the field of experts for their IHR Emergency Committee. This individual would help create an information policy that further addresses the knowledge transfer of information on the ground during an outbreak. As Graham (2008) notes, while the IHR currently looks at member states to contribute information to the WHO about outbreaks, they are woefully short in other areas of information transfer such as the connection between dissemination, diffusion, and utilization on the ground.

A knowledge broker would also be in charge of planning materials for outbreaks in many different cultural scenarios and provide varying levels of access to information through the information transfer cycle. A knowledge broker could organize the construction of visual aids for those who are illiterate or potentially literate in a nontraditional language, drama groups, radio and television and other methods of recording and dissemination information. In addition,

a knowledge broker would assure that knowledge transfer was an exchange and that doctors and hospitals in varying countries provided information in an appropriate way to their patients.

In addition to adding a knowledge broker to their team of experts, the WHO also needs to acknowledge the difficulties that are present outside the diffusion of knowledge. Even if individuals wished to go to hospital or doctor, people in poverty are often not able to act on what they understand would be their best personal interest. Howard et al. (2011) note that funds, location, and lack of medical care in their regions may very well prevent them from seeking help. As the WHO (2005) notes, they can be a leader in improving local health concerns such as collaborating with state parties to mobilize financial resources to provide for building, strengthening and maintaining the capacities required under the IHR. Ultimately, local conditions are going to drastically effect how well states can implement such regulations suggested by the WHO such as “Each State Party shall develop, strengthen and maintain, as soon as possible but no later than five years from the entry into force of these Regulations for that State Party, the capacity to detect, assess, notify and report events in accordance with these Regulations, as specified in Annex 1” (p.11).

### **Imported Doctors**

Roddy et al. (2007) reports that PHEIC often results in many imported doctors going to affected regions to help boost the access to medical treatment. Médecins Sans Frontières is one organization that has this as its singular mission. Any imported doctors who wish to treat patients in other countries should receive training in how they work with local people and patients. They should understand that foreign doctors are often viewed with suspicion and may have difficulties interacting with a local populace. Furthermore, all doctors, foreign doctors included, can use concrete ideas that have been seen to work in other epidemics such as not

arriving to the hospital in full biohazard suits, but changing immediately before entering a biosafe ward, using biohazard suits that have clear face shields rather than goggles that obstruct the view of their face, and utilizing a cultural broker in order to talk with families.

### **Local Doctors**

Local doctors are the first to initially come in contact with individuals with serious illness. It is imperative that these doctors can identify the disease and understand best practices for treatment. For those illnesses, which have been identified as serious health risks, it is imperative that these episodes are reported to the WHO. Breakdowns occur when doctors are not expecting serious diseases to occur in that area so that they and their staff are not prepared to deal with said disease, such as the example of the Ebola outbreak in Western Africa, many thousands of miles from the previous outbreak. Dissemination breakdown can also occur during an epidemic on the ground. Overall, it is the local doctors who are the practitioners of knowledge and, hopefully, also knowledge disseminators to those who very clearly need accurate information about the disease.

### **Home Based Risk Reduction**

Like local doctors, people in affected epidemic countries are the first to deal with the consequences of disease. Historically, as in the Angola Marburg crisis, HBRR was included for patients who refused hospital treatment, and therefore, family members were encouraged to help at home in order to keep infection down (Roddy et al., 2007). Likewise, in West Africa, many family members are replacing what hospitals should be doing because of lack of access to healthcare (Onishi, 2014). Therefore, the people in Guinea among others in West Africa need more information than might be expected because their increased role as health care providers.

Local people, therefore, need as much access to information about Ebola as possible and

it is necessary to consider the roles of dissemination, diffusion, and utilization. For example, if information about Ebola is being primarily disseminated through Internet and electronic means, but the people of Guinea have extremely low access to electronics, then the information is not going to be disseminated to all people. Many studies on the use of information and communication technologies (ICTs) have noted the need to recognize older technologies such as radio and television in developing countries (Chilimo & Ngulube, 2009). Once it is clear that local people are able to access information and that it is being disseminated properly through the affected areas, a knowledge manager should assess whether or not the information is being understood and utilized by the local people. It is not just outbreaks of contagious disease that lead to misunderstandings and violence. Even efforts to prevent episodes of disease, such as the spread of polio vaccines in Nigeria, led to deaths of local health care workers by gunmen (“More Vaccine Worker Killings, 2013). A trained knowledge manager would be able to make sure that local information followed cultural guidelines and included influential local people to transmit information about the disease. Howard et al. (2008) offers as example the guidelines and practices of organizations such as the training of refugees to lead Reproductive Health Groups (RHG) during the conflict and crisis in Liberia and Sierra Leone during the 1990’s. Other studies by Woodward et al. (2011) in the same refugee health group saw that peer education led to an increase in safe practices to prevent HIV transmission for both men and women. Raabe et al. (2010) notes that a cultural broker would also be able to ensure that other practices may be put into place such as the use of body bags with viewing areas that would allow people to be able to see their loved one and say goodbye to the body. Such practices would not drastically alter the ability of the doctors to perform their duties but would increase cultural cooperation.

### **Conclusion**

Overall, epidemics will be less likely to expand beyond their area of immediate impact and will be less severe with the collaboration of different stakeholders, such as the WHO, State Governments, local and imported doctors, and local people. These collaborations, coined by the WHO as “surveillance” are defined as the “the systematic ongoing collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary” (“International Health Regulations”, 2005, p.11). Collaborations are not just for the benefit of the WHO, however, as all stakeholders need access to good and accurate information to keep themselves and their constituents safe.

LIS has much to contribute to the problem of the Ebola epidemic in West Africa. LIS can view the transmission of information through the field and provide a unique understanding of how to improve local knowledge utilization. As the present study points out, a cultural knowledge broker can use the knowledge transfer theory model to better assess and improve information flow and utilization within Western Africa. This cultural broker will examine the effectiveness of current information transmission and incorporate this model into the World Health Organization’s International Health Regulations and determine what further changes can best serve the human population in the case of another outbreak of severe disease.

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