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ORIGINAL RESEARCH ARTICLE

THE PRACTICE OF UNIVERSAL PRECAUTION BY HEALTHCARE PROVIDERS POST EBOLA VIRUS DISEASE EPIDEMIC: A SURVEY AT A PRIVATE PRIMARY HOSPITAL IN GHANA

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Conflict of interest: None declared

Abstract

Background: In 2014, the global health community was shaken by the largest recorded Ebola Virus Disease (EVD) epidemic in West Africa, underscoring the urgent need for rigorous adherence to universal precautions in healthcare settings. By January 2015, over 8,000 deaths had been reported from 21,121 cases. In response, the WHO and CDC issued interim guidelines on infection prevention.

Objective: To evaluate the preparedness of healthcare workers and the risk of infection transmission at a primary hospital in Ghana post-EVD outbreak.

Methods: A cross-sectional study was conducted from December 2014 to May 2015 among 40 randomly selected clinical healthcare workers at a primary hospital in Ghana. Structured questionnaires and interviews assessed demographics, knowledge, and adherence to universal precautions before and after the EVD outbreak. Data were analyzed using SPSS v16, with descriptive statistics, correlation analysis, paired t-tests, and confidence intervals calculated to determine statistical significance.

Results: Among respondents, 52.5% had in-depth knowledge of universal precautions. Handwashing practices improved from 50% pre-outbreak to 62.5% post-outbreak ($p = 0.021$). Glove use rose from 30% to 45% ($p = 0.036$), and facemask use increased from 20% to 32.5% ($p = 0.041$). PPE usage remained low, improving from 5% to 10%. Correlation coefficients showed a strong positive relationship in practice adherence pre- vs. post-outbreak ($r = 0.983$ always, $r = 0.984$ occasionally; $p < 0.001$). 75% of participants rated institutional preparedness as unsatisfactory.

Conclusion: Despite modest improvements post-EVD, healthcare workers remained moderately unprepared. Findings emphasize the need for institutional reforms, policy enforcement, and regular PPE training to enhance infection control practices.

Key words: Ebola, universal precautions, healthcare workers, epidemic preparedness, infection control

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INTRODUCTION

In 2014, the relevance of strict adherence to universal practice precautions among health care providers, took a paradigm shift as the scientific community was startled with sudden brutal, lethal and by far the largest viral assault since 1976 ever recorded in some countries in the West African sub-region by Ebola virus disease, one of the three select-agent Filoviridae genera of which the others are Marburg virus and Cuenavirus[4]

Following an emergency meeting held in Accra, Ghana on 2nd – 3rd July 2014 involving health ministers from eleven countries, the World Health Organization (WHO) declared the Ebola virus disease epidemic on August 8, 2014 as an international public health emergency that required collaborative international emergency response and control measures to curb the epidemic[12] The World Health Organization and the Center for Disease Control and prevention, United States, in August 2014, recommended "the Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Hemorrhagic Fever in Health-Care Settings, with Focus on Ebola virus disease."[12] In October 2014, Part II (E) relevant for Personal Protective Equipment (PPE) for the preventing transmission of infectious agents of the guidelines for the practice of universal precaution was revised[32]. The united nations security council in September 2014, declared the Ebola virus epidemic in West Africa sub region a "threat to international peace and security", and adopted a resolution to fight the outbreak through the provision of adequate resources by member states[1]. The Guinean ministry of health notified the World Health Organization of the current Ebola virus epidemic on 23rd March 2014 in forested areas of southeastern Guinea, following the death of the first two-year old Ebola virus disease victim, Emile Ouamouno in December 2013 according to retrospective report. A record of forty-nine (49) cases including twenty-nine (29) deaths and case fatality rate of fifty-nine per cent (59%) had been reported in Gueckedou, Macenta, Nzerekore and Kissidougou districts as of 22nd march, 2014. In addition, three suspect cases with two deaths in Conakry, and reports of suspected cases around the borders of Liberia and Sierra Leone were under investigation[12]. By January 7, 2015 the death toll has reached 8304 out of 21121 total Ebola virus disease cases with 13408 laboratory-confirmed cases and case fatality ratio between 50%-90% in Guinea, Liberia, Sierra Leone, Mali, the United Kingdom, Nigeria, Senegal, Spain and United States of America [29]. The problem stated effective adherence and safe practice of the principles of universal precautions among healthcare providers would decrease the rate of self-infection and cross patient infection, thereby reducing the morbidity and mortality rates among healthcare providers and patients. However, the failure of safe practice of universal protection by healthcare providers has contributed to increased Ebola virus infected case counts and mortality among healthcare providers and patients, with subsequent financial cost and burden in treating affected patients, loss of productivity and human capital in the affected countries. As of December 28, 2014, 820 Ebola virus infected cases with 488 deaths among medical staffs were recorded so far in the affected countries[6]. The death toll by January 7, 2015 has reached 8304 out of 21121 total Ebola virus infected cases with 13408 laboratory-confirmed cases[12].

As of January 4 2014, the Centre for Disease Control and prevention morbidity and Mortality weekly report, USA, released update of 20, 747 infected Ebola cases with the death toll of 8, 235. The difference in less than a week was 374 new cases and 69 deaths, suggesting an alarming rate and failure of existing control systems to prevent further transmission[6].

The cost of treating an Ebola patient in United States hospitals ranges from USD25, 000 - USD50, 000 per day whiles the World Bank estimate the possible cost of treatment of the Ebola epidemic in sub Saharan Africa to be USD 3 billion to USD 4 billion[17] The United Nations Office for the Coordination of Humanitarian

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Affairs (OCHA), on September 16, 2014 said it had received so far $378 million and a further pledge of $217 million out of expected estimate of $988 million to tackle the disease in Guinea, Liberia and Sierra Leone until February 2015[5]. The research will optimize effective policies and practice of universal precautions by intensive, skillful and practical training of health workers on the 2007 guidelines for preventing transmission of infectious agents with emphasis on Part II E. relevant to personal protective equipment.

Literature Review

Universal practice precautions are a set of infection control guidelines to help prevent the spread of infection among healthcare providers and patients. Healthcare providers are inevitably exposed to numerous and various infectious pathogens through blood and other bodily fluids, and as such are required to be knowledgeable of and adhere to the practice of universal precautions to prevent self-infection and cross-patient infection. The need for strict emphasis of universal precautions practice among healthcare providers by the World Health Organization and the Centre for disease control and prevention, USA, is because, at the time of writing, no specific therapy or Food and Drug Agency (FDA)-approved vaccine or medicine was available that has demonstrated efficacy in the treatment of Ebola virus disease, since its outbreak.

Meanwhile, Zmabb a nucleoside analogue has proven limited effectiveness only in palliative care, as ongoing research for Ebola virus vaccines development has not tested for safety or effectiveness yet[12]. Treatment available is only supportive with intravenous fluid therapy, good nutrition, maintaining oxygen status, treating secondary infections, ensuring comfort, and strict adherence to universal precautions.

Infection Prevention and Practice of Universal Precautions

Since there is no Food and Drugs Authority-approved medicine or vaccine to effectively treat affected victims of the recent Zaire Ebola virus epidemic, much emphasis has been laid on prevention and control strategies to halt transmission and spread in affected countries as well as avoid transmigration importation to neighboring countries within the sub-region, the continent and globally. Practice of Universal Precaution before Ebola virus disease epidemic The center for disease control and prevention in the United States of America introduced the practice of universal precautions in 1985-1988 to protect the healthcare provider from direct contact with bodily fluids of patients with infectious disease by wearing non-porous gears such as gloves, goggles, face masks, etc. The practice was effective during the outbreak of Human Immunodeficiency Virus and Acquire Immune Deficiency Syndrome in the 1980s. In 1987, a set of rules known as the body substance isolation that goes further to isolate the individual from pathogens was introduced to adjust the practice of universal precautions, and both were replaced by standard precautions in 1996. Standard precaution combines major elements of universal precaution and body substance isolation and are based on the principle that all blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agent[18].

Practice of Standard precaution and implications for stigma and discrimination

Studies conducted by Rintamaki et al (2007) and Welch & Bunin (2010) reported degree of stigmatization and discrimination by healthcare providers against patients with infectious diseases such as HIV and hepatitis C [23, 26].

Practice of Universal Precautions during Ebola Virus Disease Epidemic

In 2007, the center for disease control and prevention (CDC), USA, set out guidelines for isolation precautions: preventing transmission of infectious agents in healthcare settings including Ebola virus disease. Part II of the guidelines is relevant for fundamental elements needed to prevent transmission of infectious agents in **healthcare settings. Despite**

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the intensive control measures, on December 10, 2014, the Director General of the World Health Organization, Dr. Margaret Chan said, "The Ebola virus that has killed thousands in West Africa is still running ahead of efforts to contain it, and that the WHO and the world failed to Act quickly enough"[26].

Objective of Study

This research aimed to assess the preparedness of healthcare providers and the risk of self-infection and cross-patient infection transmission in the wake of Ebola virus disease outbreak in Ghana.

Justification of Study

On December 10, 2014, the Director General of the World Health Organization, Dr. Margaret Chan said, "it is fair to say the whole world including the World Health Organization, failed to see what was unfolding, what was going to happen in front of our eyes"[26]. She further acknowledged that, the outbreak was difficult and very challenging to control[26]. This research project focused on the practice of universal precautions by healthcare providers before and during Ebola virus disease epidemic. In particular, the research focused on the preparedness of healthcare providers in terms of training on universal precaution guidelines, Ebola virus disease control policies, practical and skillful use of personal protective equipment. Therefore, the study would contribute to the reduction of increased morbidity and mortality rates among healthcare providers and patients in the wake of outbreak of Ebola virus disease Ghana.

Method Design

Cross-sectional prospective study design.

Setting

The study was carried out at a 150 bed-capacity private primary hospital

Participants

40 clinical staff (doctors, Physician assistants, nurses, midwives, health assistants) involved in patient care

Sampling: Stratified random sampling across three work shifts

Data Tools: Structured questionnaires with closed and open-ended items; verbal interviews

Inclusion and exclusion criteria

The study focused on healthcare providers who were directly exposed to patients during care and at risk of contracting any infectious disease through contact transmission. There was no age limit to respondents as long as respondents were sound in mind to understand the purpose of study and willing to partake after relevant explanation, they were included. Healthcare providers included were doctors, physician assistants, medical assistants, nurses, midwives and laboratory technicians. Healthcare providers such as pharmacists, record-keepers and other staffs who are not exposed directly to patients were excluded from the study.

Procedure

Ethical clearance was granted from the Institutional Review Board (IRB) of Central University for the research topic; the Medical Director of the hospital and departmental heads of the hospital. Each respondent signed a consent and identity non-disclosure form. The study population was sampled at random from the three duty shifts, morning, afternoon and night. The topic and purpose of study were clearly explained followed by signing of consent form and administration of questionnaires. Respondents generally took between 30 minutes-72 hours to return the answered questionnaires. Verbal interviews were conducted and responses transcribed.

Data analysis

Descriptive statistics, paired t-tests (for pre-post differences), Pearson correlation (for association), and 95% confidence intervals; SPSS v16 used for analysis

Results Demographics: 85% female, 15% male. Age group 20–30 years (52.5%) was the majority. The most common role was healthcare assistants (50%).

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Changes in Practice (Before vs. After 2014):

- **Handwashing:** 50% → 62.5% (p = 0.021)
- **Glove use:** 30% → 45% (p = 0.036)
- **Facemask use:** 20% → 32.5% (p = 0.041)
- **Clean gown:** 15% → 17.5% (not statistically significant)
- **Sterile gown:** 10% → 15% (not statistically significant)
- **PPE:** 5% → 10% (low compliance)

Correlation of Practice:

- Always: r = 0.983, p < 0.001
- Occasionally: r = 0.984, p < 0.001

Institutional Preparedness:

- 75% rated as unsatisfactory[32]
- 25% rated as satisfactory

Healthcare Worker Fear & Health:

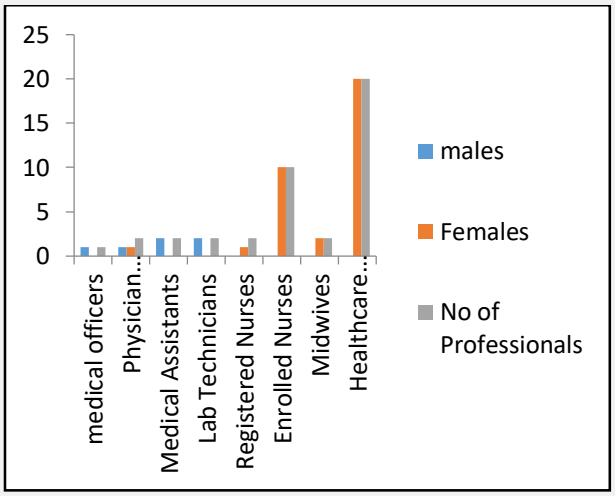
- 87.5% expressed some fear toward EVD[26]
- 85% rated personal health as excellent, 15% very good

1.1 Distributions of respondents by professional specialty and gender

Profession	Male	Female	Total respondents
Medical officers	1	0	1
Physician Assistants	1	1	2
Medical Assistant	2	0	2
Laboratory Technicians	2	0	2
Registered General Nurses	0	1	1
Enrolled Nurses	0	10	10
Midwives	0	2	2
Healthcare Assistants	0	20	20
Total	6	34	40
%Distribution	15%	85%	100%

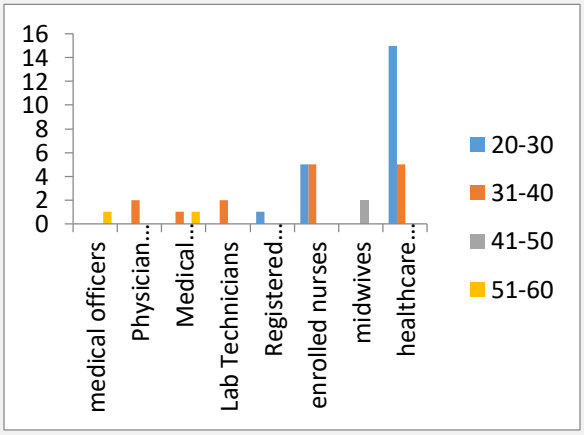
The results also revealed that health care assistants represented the greatest number of employees representing 50% (20) followed by enrolled nurses representing 25% (10), laboratory technicians, midwives, medical assistants and physician assistants representing 5% (2) each, whiles medical officers and registered nurses least represented 2.5% (1) each of total respondents.

Figure 1.1 Distributions of respondents by profession and gender



The results presented in table 1.1 and figure 1.1 revealed that females represented the highest gender distribution of 85% (34) with a mean of 4.25 and males 15% (6) with mean of 0.75.

Figure 1.2 Distribution of respondents by age



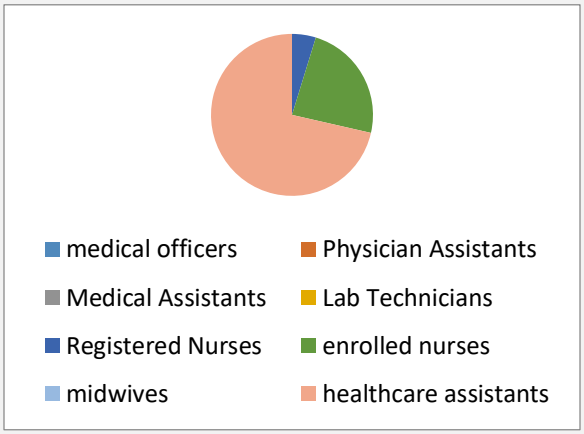
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The results presented in table 1.1 and figure 1.2 reveals that the highest number of respondents was between the ages 20-30 years representing 52.5% (21) of respondents, followed by 37.5% (15) of respondents between the ages 31-40 years, 5% (2) of respondents between the ages 41-50 years and 2.5% (1) of respondent between the ages 51-60 years.

Figure 1.3 Distribution of respondents by age



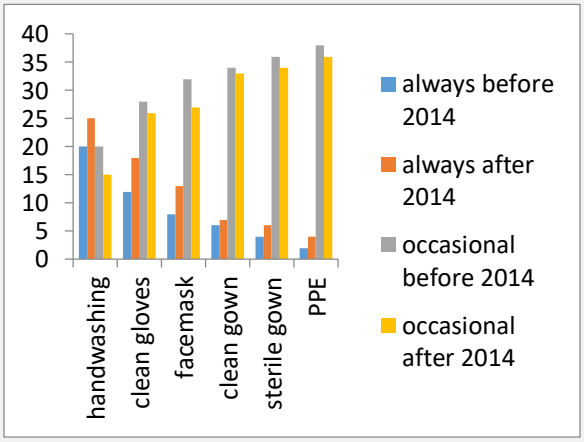
1.2 Percentage of Respondents who practiced universal precaution

Universal precaution practice	Percentage of Respondents who practiced universal precaution			
	Always		**Occasional**	
	Before 2014	After 2014	Before 2014	After 2014
Hand washing	50 (20)	62.5 (25)	50 (20)	37.5 (15)
Clean gloves	30(12)	45(18)	70(28)	65(26)
Facemask	20(8)	32.5 (13)	80(32)	67.5(27)
Clean gown	15.0 (6)	17.5(7)	85(34)	82.5(33)
Sterile gown	10(4)	15(6)	90(36)	85(34)
PPE	5(2)	10(4)	95(38)	90(36)
Mean	8.66	12.1	31.3	28.5
Median	7	10	33	30
variance	42.6	66.1	42.66	59.5
SD	6.53	8.13	6.5	7.7
95% CI of mean	1.81-15.52	3.63-20.7	24.48-38.19	20.4-36.6
IQR	10.5	14.25	10.5	11.25

The results from table 1.2 and figure 1.4 revealed 50% (20) of healthcare providers usually practiced hand washing after clinical activities before 2014 compared with 62.5% (25) after the Ebola virus disease outbreak in 2014, a percentage increase of 12.5%.

The results also revealed that 30% of respondents usually wore clean gloves during relevant clinical duties such as taking of blood samples, setting up of intravenous infusion, delivery of babies and surgical procedures before 2014 compared to 45% after 2014, a percentage increase of 15%. Most respondents attributed to infrequent supply of gloves and lack of conscious practice of the routine.

Figure 1.4 Percentage of Respondents who practiced universal precaution



The results presented in table 1.2 and figure 1.4 also revealed that only 20% of respondents before 2014 compared with 32.5% after 2014 usually used

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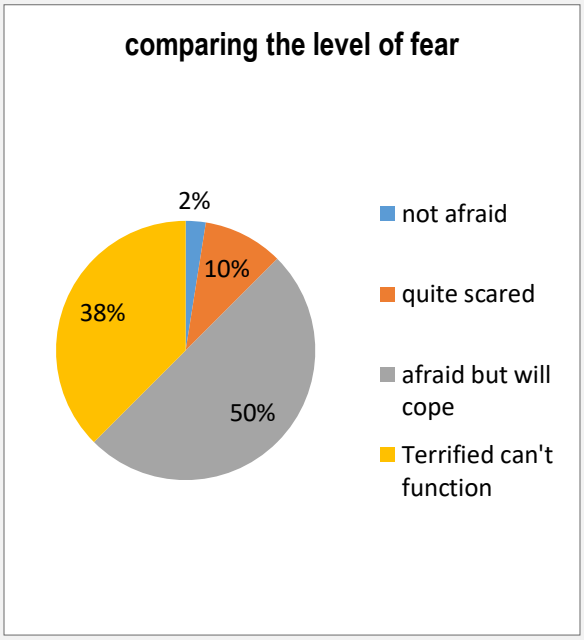
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facemask during clinical activities such as wound dressing, delivery of babies and surgical procedures.

15% before 2014 compared with 17.5% after 2014 of respondents usually wore clean gown during clinical activities to prevent infection transmission. The results also revealed that 10% before 2014 compared with 15% after 2014 of respondents usually wore sterile gown during surgical procedures at the theater. 5% (2) before 2014 compared with 10% (4) after 2014 of respondents used personal protective equipment in suspected isolation cases such as tuberculosis, cholera and other infectious disease. The correlation coefficient was 0.983 for the number of respondents who practiced universal precautions always before the Ebola virus disease outbreak in 2014 and after 2014. Test for correlation coefficient P= 0.000397 95% CI of mean 3.63-20.7 > 1.81-15.52

The correlation coefficient was 0.984 for the number of respondents who occasionally practiced universal precautions before the Ebola virus disease outbreak in 2014 and after 2014. Test for correlation coefficient P= 0.000362 95% CI of mean 20.4-36.6< 24.48-38.19 respectively

Figure 1.5 Level of fear of respondents



The results presented in figure 1.5 revealed that 2.5% (1) of respondents said they were not afraid of the outbreak of Ebola virus disease; 10% said they were quite scared of the Ebola virus disease outbreak; 50% said they were afraid but will cope to care for an Ebola virus disease patient; whiles 37.5% said they were terrified and can't function in the case of the 2014 Ebola virus disease outbreak.

85% (34) and 15% (6) of respondents rated their general state of health as excellent and very good respectively, whiles none recorded any ill health with exposure to bodily fluids or substances or occupational injury. 75% of respondents rated overall preparedness of the institution in terms of specific preventive, maintenance strategies, surveillance systems and infection prevention routines unsatisfactory, whiles 25% rated the preparedness of the institution satisfactory in case of outbreak of Ebola virus disease.

DISCUSSION

The overall study consistent with other research findings [10, 23, 26, 31] revealed minimal preparedness of health institutions and healthcare providers in terms of knowledge, attitudes, training and practice of universal precautions before and after Ebola virus disease outbreak in 2014.

Despite an increase in awareness post-outbreak, gaps in practical adherence remain. Key barriers include insufficient PPE, poor infrastructure, and lack of routine infection control training[27]. These findings echo global studies showing healthcare worker vulnerability due to inadequate systemic support [6,23, 26,33, 35].

LIMITATIONS

The sample size of forty (40) was the foremost limitation to extrapolation of results to the general population of over 100,000 health workers in Ghana.

Secondly, the health workers were mal-distributed at the study setting likely to polarize responses however reflective of the distribution of health staff worldwide as evidenced that nursing and nurse auxiliary staff outnumber other clinical staff.

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CONCLUSION

The study indicates a moderate improvement in universal precaution practices post-EVD outbreak. However, systemic barriers continue to hinder optimal infection control. Institutions must prioritize structured training, policy implementation, and adequate PPE provision to protect both staff and patients.[6, 23, 26, 31].

RECOMMENDATIONS

- Health institutions should optimize effective policies and practice of universal precautions Integrate universal precautions training in continuing medical education[32]
- Enforce PPE protocols and availability across departments
- Conduct regular preparedness audits and simulation drills

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REFERENCES

1. BBC News: "Ebola 'Threat to the World'-UN Security Council", September 18, 2014, [Retrieved January 9, 2015)
2. Braubuger K et al 2012, Forty-Five Years Of Marburg Virus Research, Viruses 4, 1878-1927
3. Bwaka, M. A. et al 1999, Ebola Hemorrhagic Fever in Kikwit, Democratic Republic of Congo: Clinical Observations in 105 Patients, J. Infect. Disease; 179 (suppl. 1): S1-S7
4. Carol S et al, 2013; Olival K. & Hayman J, 2014)., molecular evolution of viruses of the family filoviridae based on 97 whole-genome sequences, J. Virology, 87, 2608-2616
5. Clar Ni Chonghaile, 2014: 'Funding the Fight against Ebola: How much is needed and where will it go?' The Guardian News, 17 Oct. [accessed January 5, 2015]
6. Doctor team, 2015, The Toll of a Tragedy, www.economist.com/./ebola-graphics, Jan. 8, [accessed Jan. 9 2015]
7. Dowell S. F. et al 1999, Transmission of Ebola Hemorrhagic Fever: A Study of Risk Factors In Family Members in Kikwit, Democratic Republic of Congo, the Journal of Infectious Disease; 179 suppl. 1: S87-97
8. Feldman h et al 2003, ebola virus: from discovery to vaccine, Nat. Rev. Immunology, 3, 677685
9. Formenty P. C et al 1999, A wider Human Infection due to Ebola Virus, Subtype cote D'Ivoire: Clinical and Biologic Presentation, J. Infect. Disease; 179(suppl. 1): S48- S53
10. Francesconi P, Yoti Z, Declich S et al 2003, Ebola Hemorrhagic Fever Transmission and Risk Factors of Contracts, Uganda, Infectious Disease, 9 (11): 1430-1437
11. Ghana Statistical Service: Population Census, 2000; 2010)
12. Jahrling P. B et al 1990, Preliminary Report: Isolation of Ebola Virus from Monkeys Imported to USA, Lancet; 335:502-5
13. Johnson E et al 1995: Lethal Experimental Infections by Aerosolized Ebola Virus, Int. J. Exp. Pathology Aug: 76 (4): 227-36
14. Kate Kelland, 2014: WHO declares ebola epidemic as international public health emergency, reuters.com (London), 8 August 1.09 pm EDT- [4 January, 2015]
15. Lauber C & Gorbalenya A. E 2012, genetics-based classification of filovirus calls for expanded sampling of genomic sequences, Viruses 4, 1425-1437
16. Leroy E. M et al 2005, "Fruits Bats as Reservoir of Ebola Virus", nature, 438, 575-576
17. Liz Szabo, 2014: Cost of Responding to Ebola Adding up, USA Today News, November 25 [accessed January 5, 2015]
18. Lynch P. et al 1990, Implementing and evaluating a system of generic infection Precautions: Body Substance Isolation, Am J Infect Control; 18(1):1
19. Medscape Drugs and Disease, emedicine.medscape.com/article/2162

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E- ISSN: 2720 –765X

ORIGINAL RESEARCH ARTICLE

20. Olival K. J & Hayman T. S 2014, "Filoviruses in Bats: Current Knowledge and Future Directions", Viruses, 6, 1759-1788; doi: 10. 3390/v6041759
21. Peters C. J. et al 1991, Filoviruses in Emerging Viruses, ed. Morse S. Oxford University Press, New York, pp. 159-75
22. Pourrut X. et al, 2005, The Natural History of Ebola Virus in Africa, microbes infectious inst. Pasteur, 7, 1005-1014
23. Reeds D. S. et al 2011, Evaluation of Transmission Risks Assessment with in Vivo Replication of Several High Containment Pathogens in A Biosafety Level Four Labor, microbes Infect. Oct. 13 (11): 930-6
24. Rintamaki et al 2007, male patients' perceptions of HIV stigma in health care context, AIDS patients care & STDs 21 (12); 956-969
25. Sanchez A et al 2007, Marburg and Ebola Viruses in Field Virology, eds. Knipe D. & Hawley P, Lippincott Williams & Wilkins, Philadelphia, PA, USA, 1279-1304
26. Tulip Mazumda (Global Health Reporter) 2014, 'Ebola Outbreak: Virus Still Running Ahead of us', BBC News, (TV broadcast) 10 Dec. 2014 [accessed January 5, 2015]
27. Welch S. E & Bunin J. 2010, glove use and the HIV positive massage therapy client, Journal of bodywork & movement therapies, 14 (1); 35-39
28. WHO- Endemic and Pandemic alert and Response: special ministerial meeting on Ebola virus disease in west Africa, Accra Ghana, July 2014, Disease Outbreak News, [retrieved Jan. 9, 2015]
29. WHO Global Alert Response, Ebola Virus Disease Update on Jan 7, 2015, reuters.com [accessed, Jan 7, 2015]
30.
31. WHO Ebola virus disease update, http://www.who.int/csr/disease/ebola/en/ [accessed Jan. 7, 2015]
32. WHO Ebola virus disease update, http://www.cdc.gov/vhf/ebola/index.html [accessed Jan. 7, 2015]
33. WHO 2014, "Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in healthcare settings, with Focus on Ebola." (August 2014) available at http://www.who.int/csr/resources/publications/ebola/filovirus_infection_control/en/ [accessed Jan. 7, 2015]
34. WHO 2014, "Personal Protective Equipment (PPE) In the Context of Filovirus Disease Outbreak Response: Technical Specifications for PPE Equipment to Be Used by Health Workers Providing Clinical Care for Patients October 2014" available at http://apps.who.int/iris/bitstream/10665/137411/1/WHO_EVD_Guidance_SpecPPE_14.1_eng.pdf?ua=1&ua=1 [accessed Jan. 7, 2015]
35. WHO 2014, "Personal Protective Equipment in the Context of Filovirus Disease Outbreak Response: Rapid Advice Guideline October 2014" available at http://apps.who.int/iris/bitstream/10665/137410/1/WHO_EVD_Guidance_PPE_14.1_eng.pdf ?ua=1 [Jan. 7, 2015]
36. Zaki Sherif R et al 1997, A Novel Immunohistochemical Assay for the Detection of Ebola Virus in Skin: Implications for Diagnosis, Spread and Surveillance of Ebola Hemorrhagic Fever, J. infect. Dis. suppl. 1 pp. S36-47

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