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TRAINING PROGRAM FOR THE NURSING STAFF REGARDING THE VIRAL HEMORRHAGIC FEVERS (VHFs) IN A FEVER HOSPITAL

By

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Abstract

Viral hemorrhagic fevers (VHFs) refer to a group of illnesses caused by several distinct families of viruses. In general, the term "viral hemorrhagic fever" is used to describe a severe multisystem syndrome (multisystem in that multiple organ systems in the body are affected).

Characteristically, the overall vascular system is damaged, and the body's ability to regulate itself is impaired. These symptoms are often accompanied by hemorrhage (bleeding); however, the bleeding is it rarely life-threatening. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many of these viruses cause severe, life-threatening disease. The selected disaster diseases for this study included: 1- Crimean-Congo hemorrhagic Fever, 2- Dengue Fever, 3- Ebola Fever, 4- Hemorrhagic Fever with renal syndrome (HFRS), 5- Hantavirus Pulmonary Syndrome, 6- Lassa Fever, 7- Marburg Fever, 8- Rift Valley Fever and 9- Yellow Fever.

The educational training program was given over ten sessions to a group of Staff Nurses. The results showed that the program succeeded in enhancing nurses' knowledge, awareness, responsibility, and obligations toward patients with the Viral Hemorrhagic Fevers

The results showed a significant impact of training sessions illuminated in the follow-up test on the knowledge score of nurses in all types of diseases except for the Congo hemorrhagic fever, while, statistical significance varied in some diseases in the study when it comes to the comparison between pre-test and post-test. All results confirmed on the positive impact of the training program in enhancing the knowledge of nurses toward VHFs patients and their relevant. There was a significant positive impact of the training sessions on changing the attitude of nurses toward patients with VHFs. This result was confirmed on the collective level since the total scores on tests revealed significant positive impact of the study on changing the attitude of nurses toward relevant patients. The relationship included personal data (age, sex, level of education, & years of experiences) and main variables (knowledge scores & attitude change to patients) with the disease in question. This part revealed a significant relationship between all personal data and total knowledge score among nurses except for the level of education, while all results were insignificant for the relationship between the personal data and the nurses' attitude. Difference between the total nurses' attitude change and the total knowledge scores was significant on the three tests' levels; pre, post, and the follow-up.

The overall evaluation showed that six criteria were adopted, regarding the educator, the length of presentations, and the evaluation of the studied groups regarding the training facilities, the subject matters, the overall training program, and the importance of diseases in question to their practical working environment. The frequency distribution showed that the educator met nurses' expectations; the material tools were plausible enough to satisfy trainees and presentations were fairly short. But, the training facilities were just excellent by the vast majority of trainees. The entire material met specific needs of relevant health care organizations, but about 43% reported that it was difficult. The vast majority of trainees favored the program under almost all criteria studied in the final questionnaire... Above 50% of trainees were not confident enough toward their ability in applying their knowledge acquired practically.

The final evaluation showed that the most important were Rift Valley fever, Ebola fever, Hanta virus pulmonary syndrome, Crimean Congo fever and lastly Dengue fever. Lassa and Marburg fevers were of less interest to nurses.

Key words: Egypt, Staff Nurses, Educational training program, Viral Hemorrhagic Fevers

Introduction

Bioterrorism is the deliberate release of viruses, bacteria, or other germs (agents) used to intentionally cause illness or death in people, animals, or plants. Most often, the agent used for a bioterrorism attack is a naturally occurring substance as ricin; virus as viral hemorrhagic fever, or bacteria as anthrax, plague, and smallpox that has been altered to make it more harmful to its intended target. Biological agents can be spread through the air, water, or food or by arthropod-vectors. These agents are often difficult to detect initially, and by the time the substance could be detected. The extensively agents used in bioterrorism are separated into three categories, depending on how easily they can be spread and the severity of illness or death they cause (CDC, 2007).

Hemorrhagic fever viruses (HFVs) are a diverse group of viruses that cause a clinical disease associated with fever and bleeding disorder. HFVs associated with a potential biolo-gical threat are Ebola and Marburg viruses (Filoviridae), Lassa fever and New World arena-viruses (Machupo, Junin, Guanarito and Sabia viruses) (Arenaviridae), Rift Valley fever (Bunyaviridae) and yellow fever, Omsk hemorrhagic fever, and Kyanasur Forest disease (Flaviviridae). In terms of biological warfare concerning dengue, Crimean-Congo hemorrhagic fever and Hantaviruses, there is not sufficient knowledge to include them as a major biological threat. Dengue virus is the only one of these that cannot be transmitted via aerosol. Crimean-Congo hemorrhagic fever and the agents of hemorrhagic fever with renal syndrome appear difficult to weapons (Bossi *et al*, 2004). In the U.S. Department of Health and Human Services' (HHS) Public Health Emergency Medical Countermeasure Enterprise (PHEMCE) Implementation Plan, published in April 2007, Ebola, Marburg, and Junin viruses were specified as top priority threats for medical countermeasure development (DHHS, 2007).

Risk factors for VHF to travellers was conservatively estimated at <1 in 1 million travel episodes to African countries where infection is present, and febrile patients returning from these countries are at least 1000 times more likely to have malaria than Lassa fever or another VHF (Beeching *et al*, 2010). Arthropod vectors, such as mosquitoes, ticks, biting midges and sand flies, transmit many viruses that can cause outbreaks of disease in humans and animals around the world. Arthropod vector species are invading new areas due to globalisation and environmental changes, and contact between exotic animal species, humans and arthropod vectors is increasing, bringing with it the regular emergence of new arboviruses (Rückert *et al*, 2014). Vector-borne diseases continue to contribute significantly to the global burden of disease, and cause epidemics that disrupt health security and cause wider socioeconomic impacts around the world. All are sensitive in different ways to weather and climate conditions, so that the ongoing trends of increasing temperature and more variable weather threaten to undermine recent global progress against these diseases (Campbell-Lendrum *et al*, 2015).

Patz *et al*. (2000) stated that the ecological disturbances exert an influence on the emergence and proliferation of malaria and zoonotic parasitic diseases, including, Leishmaniasis, cryptosporidiosis, giardiasis, trypanosomiasis, schistosomiasis, filariasis, onchocerciasis, and loiasis. Each environmental change, whether occurring as a natural phenomenon or through human intervention, changes the ecological balance and context within which disease hosts or vectors and parasites breed, develop, and transmit disease. Each species occupies a particular ecological niche and vector species sub-populations are distinct behaviourally and genetically as they adapt to man-made environments. Although there would be an overall net global warming, the distribution of this

warming might not be the same throughout all regions. Changes in temperature, rainfall, and other climatic elements vary considerably by regions leading to change in the distribution of arthropod-vectors and hence infectious diseases (Franchini and Mannucci, 2015). Certain infectious diseases are not necessarily mitigated by improvements in sanitation, nutrition, immunization and treatment. These diseases present the greatest threat in the absence of both vaccines and specific treatment and abundance of the vectors (El-Bahnasawy and Morsy, 2015).

In general, there was a lack of knowledge among the nursing staff and infection control nurses about the emerging and ongoing hemorrhagic fevers.

To acquaint the Egyptian Military Nursing Staff particularly those Nursing Staff who share with the Peace-Keeping Forces Mission to endemic areas with such diseases.

Therefore, it was thought that a tailored educational program would help in improving nursing staff knowledge and attitude related to the viral hemorrhagic fevers to improve the quality of nursing care and patient outcomes.

Rational: All the time nursing staff is the front line of health care team who face patients, so, early detection and rapid reporting which considered from Nursing (Golden Responsibilities) and utmost important for taking the decision for isolation; treatment and disease spread prevention.

This study aimed to enhance Nursing staff knowledge and attitude regarding Viral Hemorrhagic Fevers (VHFs) in a Military Hospital to prevent diseases spread and to improve the quality of nursing care. The objectives were: 1- To assess Nursing staff knowledge and attitude regarding VHFs before, after program implementation and three months later as well as the educational program evaluation, 2- To assess Nursing staff Reactions toward the educational program after program implementation, and To design a self-instruction booklet on VHFs for Nursing staff containing all the essential data regarding control and prevention of transmission of those deadly infectious diseases.

Subjects, Materials and Methods

A quasi-experimental study was designed and conducted at a Fever Hospital.

Study sample: All Nursing staff available in the study setting during data collection period in the study was (No.75). All the staff nurses on duty in the hospital during the study time that was eligible for inclusion.

Inclusion criteria: Nursing staff who met the following inclusion criteria included: 1- Agreed to participate in emerging educational program, 2- Completed the pre-test at the beginning of the educational program and 3- Successfully completed the program taking the post-test after having the program for at least three months. Exclusion criteria: have no time to participate in the study or withdrawal from the educational program for any reason.

Data collection tools: The instruments of data collection were developed as follows: 1-Educational needs assessment questionnaire: Educational needs assessment questionnaire was developed based on review of related literature to determine the unmet educational needs of Nursing staff regarding viral hemorrhagic fevers. 2- Knowledge Questionnaire (pre-posttest): It was used to assess knowledge of all working nursing staff. It consisted of two parts: Part 1: Socio-demographic data: Such as age, sex, qualifications, experience years, and training courses. Part 2: Questions: To assess Nursing staff knowledge regarding VHFs. 3- Nursing staff attitude towards VHFs questionnaire: The questionnaire was developed based on review of related literature to assess Nursing staff attitude towards VHFs before, after program implementation and 3-months later. 4-Participants' reactions questionnaire: participants' reactions questionnaire was developed to evaluate the outcome of the program from nursing staff point of views. It was included questions related to the objectives, time period, content, time schedule of the program and the methods of

teaching that was used.

Program Design: Training programs regarding VHFs included illustrative lectures, group discussions, and video-films with hand-outs. The program covered ten sessions of 45 minutes each, from the first of February to the end of May 2012. Data were collected two days per week starting from 10:00 am to 1:00 pm.

The program content of VHFs was presented in ten sessions as follows: 1- introduction on educational program, collection of data on educational need assessment about VHFs' 2- attitude questionnaire, (pre/ posttest) of Rift Valley Fever. 3- Yellow Fever (pre/posttest). 4- Ebola Fever (pre/ posttest). 5- Lassa and Hanta Fever (pre/ posttest). 6- Marburg Fever (pre/posttest). 7- Dengue Fever (pre/posttest). 8- Crimean Congo hemorrhagic Fever (pre/posttest). 9- VHFs infection control and10- attitude questionnaires and participant's reactions evaluation, after three month: post-test knowledge and attitude questionnaire.

The methods of teaching used were: a- Validity test: The developed questionnaires and the program content was submitted to a panel of five experts in the field of nursing education and epidemiology and infection control for content language clarity, relevancy, and readability, ease of understanding, question sequence, and completion time. After that questionnaires and program content was edited according to expert's suggestions. b- Pilot study: Once the permission was granted the pilot study was done on 5% of the sample to ensure the clarity and validity of content of tools used in the study sample, to estimate the time needed to answer the test. This pilot sample was excluded from the total number of the study if there is a major change; a minimal modification was done in the final formats.

Data collection procedure: Before implementation of educational program, assessment of nursing staff educational needs, knowledge and attitude regarding VHFs that potentially dangerous to nursing staff in a Fever Hospital would be done.

An educational program was developed and implemented by the researcher based on review of the literature and the information yielded from initial assessments of Nursing staff after the implementation of educational program, assessment of Nursing staff knowledge and attitude regarding viral hemorrhagic fevers that potentially dangerous to Nursing staff in a Fever Hospital was done and 3 months later.

At the end of the educational program the participants' program evaluation questionnaire was used to evaluate the outcome of the program from participants' point of views. Before conducting the educational program, nursing staff were screened for inclusion and exclusion criteria. The nurses who met the inclusion criteria were identified and asked for participation in this study. when they agreed to participate in this study, the researcher explained to them the purpose, benefit, and ethical considerations of this study, then they completed the educational needs questionnaire to collect data related to educational preparation in viral hemorrhagic fevers management, epidemiology, infection control, their previous training and their desire to attend an educational program on selected diseases of VHFs. Based on the learning needs assessment results, the topics of the program were developed based on the review of related literature. At the beginning the educational program, an orientation of the program and its purpose took place, and the nurses informed about the duration and sessions place, then knowledge test of the participants were first assessed on the selected viral hemorrhagic fevers diseases (pre-test) that were served as baseline levels of their knowledge. At the end of each session nurses took knowledge (post-test) and 3 month later. They filled the attitude form, and after the program finished, and three month later. The participant's reactions questionnaire was used to evaluate the outcome of the program from

viral hemorrhagic fevers and infection control nursing staff point of views. It was included questions related the objectives, time period, content, time schedule of the program and the methods of teaching used. The actual field work started at 1- 3-2012.

Administrative and Ethical Considerations: Permission and official approvals to carry out the study and ethical approval of the protocol was obtained from the responsible authorities for data collection. All principles of ethics in research were followed. Informed written consents were obtained from all participants. Total confidentiality of any obtained data was secured.

Statistical design: Data was computerized and analyzed using SPSS 16.0 software package. Categorical variables were compared using chi-square or Fisher exact tests as suitable. Statistical significance was considered at p-value<0.05.

VHFs refer to a group of illnesses caused by several distinct families of viruses. The term viral hemorrhagic fever described a severe multisystem syndrome (multisystem in that multiple organ systems in body are affected). Characteristically, the overall vascular system is damaged, and body's ability to regulate itself is impaired. These symptoms are often accompanied by bleeding, however, bleeding is it rarely life-threatening. While some types can cause relatively mild illnesses, many of these viruses cause severe, life-threatening disease.

The most important VHFs from the Egyptian point of view in alphabetical order: 1- Crimean-Congo (CCHF), 2- Dengue, 3- Ebola, 4- Hemorrhagic fever with renal syndrome (HFRS), 5- hantavirus pulmonary syndrome, 6- Lassa, 7- Marburg, 8- Rift Valley, and 9- Yellow fever

The study enhanced nurses' knowledge and attitude regarding VHFs in a Military Hospital.

Results

The results are shown in the following tables and figures:

Table 1: Distribution of socio-demographic data of samples (n=75):

Demographic data	No	%
Age: less than 20 years	4	5.3
20 to 30	29	38.7
31-40	39	52.0
More than 40 years	3	4.0
mean ± SD 31.2±6.98		
• Male	2	2.7
• Female	73	97.3

A total of 52.0% aged from 31- 40years old with mean of 31.2±6.98, 97.3% female and 2.7% males.

Table 2: Distribution of studied group regarding education level and years of experience (n=75)

Demographic data	Number	Percent
Level of education:		
Diploma Nursing school	48	64.0
Technical Institute of Nursing	15	20.0
Bachelor degree in Nursing	9	12.0
Master in Nursing	2	2.7
Doctorate in Nursing	1	1.3
Years of experience:		
5 years	3	4
10 years	30	40
15 years	33	44
20 years	7	9.3
Above 20 years	2	2.7

64.0% had diploma nursing school graduate, 44.0% with 15 years of experiences and 2.7% with more than 20 years of experiences.

Table 3: Distribution of samples regarding attending training program about ViHFs (*n=75*)

Attending training courses	Yes		No	
	No.	%	No.	%
1. Attending previous training program about VHFs	0	0	75	100
2.Attending educational program on infectious diseases & universal infection control precautions	0	0	75	100
3. Reasons for not attending training about infectious				
• 3.a. Lack of capacity	0	0	0	0
• 3.b. lack of sufficient time	0	0	0	0
• 3. c. lack of interest of officials trained nurses	75	100	0	0
4. Desire to attend a training program about VHFs	75	100	0	0
5. Best time to receive lecture time				
5.a. during the working time	40	53.3	0	0
5.b. time away from work	35	46.7	0	0
6. Most appropriate place for the program:-				
6.a. Inside the hospital	22	29.3	0	0
6.b. in conference center	53	70.7	0	0

Samples did not attend any educational programs on VHFs, program about how to manage infectious diseases, and its universal precautions. Also, samples reported that the reason of not attending the educational program was because of the lack of interest in official trained nurses programs. More than half of samples (53.3%) considered best time to receive lecture was during working time, 70.7% of them selected the most appropriate place for program in conference center and only 29.3% inside hospital.

Table 4: Distribution of samples according level of education (*n=75*)

Level needed	No	%
low level of need for obtaining knowledge	1	1.3
Middle level of need for obtaining knowledge	0	0
High level of need	74	98.7

A total of 98.7% expressed higher need level for knowledge about VHFs.

Table 5: Comparison between studied sample attitudes towards Patients with VHF through:

Items	Pre	Post	Follow up	*F-stat*	*ρ-value*
	2.53±.811	2.68±.619	2.84±.494		
1- Patients should be on a separate ward in a hospital or clinic	2.91±.293	2.89±.452	2.81±.562	4.12*	.017
2- Staff & healthcare professionals should be notified on admitting patient	2.87±.502	2.92±.273	2.87±.475	.945	.390
3- Beds of patients should be marked	2.85±.356	2.92±.273	2.85±.512	.386	.680
4- Caring of Patients should be done with total security & precaution	2.36±.832	2.87±.502	2.80±545	.719	.488
5- Relatives of patients should be notified about patient's status even without his consent	1.20±.403	2.11±.781	2.83±.503	13.72*	.000
6- You will feel comfortable when caring for patients	2.03±.492	2.53±.622	1.40±.615	145.7*	.000
7- You will feel legally and/or morally obliged when caring for patients	1.91±.470	2.07±.475	1.23±.481	71.92*	.000
8- Treating patients a waste of resources	2.05±.462	2.92±.273	1.23±.481	66.03*	.000
9- Treating patient by medication may prolong patients' life?	2.67±.644	2.77±.583	2.88±.327	310.4*	.000
10- I will be concerned about becoming infected patient care	2.77±.583	2.85±.456	2.81±.538	2.972	.053
11- Thinking about caring for patients worries me.	1.07±.251	1.16±.546	1.21±.576	.430	.651
12- I am willing to take care of patients	2.75±.595	2.97±.231	2.76±.612	1.788	.170
13- People with VHF should not to be admitted to hospital.	1.88±.614	1.92±.731	2.13±.622	4.659*	.010
1 4- My risk of infection with VHF through my work is low.	1.05±.280	1.08±.273	1.19±.538	3.213*	.042
15- I enjoy taking risks in life.	2.88±.327	2.77±.583	2.79±.552	2.535	.082
16- I will use standard precautions to protect myself whenever I suspect I might be exposed to VHF	2.93±.251	2.87±.445	2.77±.559	1.011	.366
17- When looking after a patient with VHF infection I try to spend as little time with them as possible	1.16±.369	1.17±.476	1.21±.552	2.532	.082
18-I have no problem looking after someone with VHF regardless of how they caught disease	1.93±.300	1.35±.557	1.20±.545	.260	.772
19- Touching someone with VHF will not make me uncomfortable.	1.49±.645	1.27±.445	1.27±.644	48.5*	.000
20- I can't always follow standard precautions because my patient's needs come first.	2.83±.503	2.75±.548	1.27±.644	3.748*	.025
21- My workplace has a strong commitment to occupational health & safety	2.73±.600	2.81±.562	2.69±.657	179.4*	.000
22- It is necessary to take extra infection control precautions for VHF patients.	2.72±.648	2.80±.569	2.75±.572	.758	.470
23-Hospital employees should be allowed to refuse patients care.	2.75±.572	2.83±.503	2.69±.657	.348	.706
24- I will not provide care for patients if given a choice				1.001	.369

Significance level at ρ-value <.05: with significance between samples attitudes. More specifically responses on questions 1, 5, 6, 7, 8, 9, 10, 13, 14, 19, 20, & 21 with illuminated importance of training sessions in enhancing knowledge, responsibility, awareness and obligations of nurses in study towards VHFs patients.

Table 6: Comparison between attitude of samples towards VHFs patients (*n=75*)

Item	Pre	Post	Follow	F-stat	ρ- value
	mean ± SD	mean ± SD	mean ± SD	*20.98	.000
Total score of nurses' attitude	57.2±1.98	58.7±1.46	58.7±1.46		

A significant difference between pre, post and follow up regarding nurses' attitude towards patients with VHFs as *F-stat*. of 20.98 at *ρ-value* of 0.000. Nurses have fair attitude score in pre, post and follow up during the study (97.3%, 98%, and 96% respectively) and only 4% of samples have good attitude score in follow up compared to none in pre and post education..

Table 7: Positive and negative responses of nurses: responded to questions:

Items		Positive	Negative	-Pre to follow positive up impact	Post to up-follow impact+**ve**
1. Patients with VHF should be on a separate ward in a hospital or clinic.	Pre	70	5		
	Post	75	0	+5	0
	Follow-up	75	0	(+7.14%)	(0%)
2. Staff and healthcare professionals should be notified when a patient with VHF should be marked.	Pre	75	0		
	Post	75	0	0	0
	Follow-up	75	0	(0%)	(0%)
3. Beds of patients with VHF should be marked.	Pre	75	0		
	Post	75	0	0	0
	Follow-up	75	0	(0%)	(0%)
4. Caring of with VHF patients should be done with total security and precaution.	Pre	70	5		
	Post	75	0	+5	0
	Follow-up	75	0	(+7.14%)	(0%)
5. Relatives of patients with VHF should be notified of patient's status even without his/her consent.	Pre	50	25		
	Post	75	0	+25	0
	Follow-up	75	0	(50%)	(0%)
6. You will feel comfortable when caring for patients with VHF	Pre	1	74		
	Post	3	72	-1	-3
	Follow-up	0	75	(-100%)	(-100%)
7. You will feel legally and (or) morally obliged when caring for patients with VHF.	Pre	10	65		
	Post	44	31	+40	+6
	Follow-up	50	25	(+400%)	(+13.64)
8. Treating patients with VHF is waste of resources.	Pre	10	65		
	Post	10	65	-8	-8
	Follow-up	2	73	(-80%)	(-80%)
9. Treating patient with VHF by medication may prolong the patient life?	Pre	10	65		
	Post	64	11	+60	+6
	Follow-up	70	5	(+600%)	(+9.38%)
10. I will be concerned about becoming infected with VHF through patient care.	Pre	70	5		
	Post	70	5	-4	-4
	Follow-up	66	9	(-5.71%)	(-5.71)%
11. Thinking about caring of hemorrhagic fever patients worries me.	Pre	75	0		
	Post	75	0	0	0
	Follow-up	75	0	(0%)	(0%)
12. I am willing to take care of patients with hemorrhagic fever.	Pre	0	75		
	Post	0	75	0	0
	Follow-up	0	75	(0%)	(0%)
13. People with hemorrhagic fever should not be admitted to hospital.	Pre	75	0		
	Post	75	0	0	0
	Follow-up	75	0	(0%)	(0%)
14. My risk of becoming infected with hemorrhagic fever through my work is low.	Pre	10	65		
	Post	18	57	+13	+5
	Follow-up	23	52	(+130%)	(+27.778)
15. I enjoy taking risk in life.	Pre	0	75		
	Post	0	75	0	0
	Follow-up	0	75	(0%)	(0%)
16. I will use standard of precautions to protect myself whenever I suspect I might be exposed to hemorrhagic fever infection.	Pre	75	0		
	Post	75	0	0	0
	Follow-up	75	0	(0%)	(0%)
17. When looking after a patient with VHF I try to spend as little time with them as possible.	Pre	70	5		
	Post	75	0	+5	0
	Follow-up	75	0	(+7.14%)	(0%)
18. I have no problem looking after someone with VHF regardless of how they caught the disease.	Pre	0	75		
	Post	0	75	0	0
	Follow-up	0	75	(0%)	(0)
19. Touching someone infected with VHF will not	Pre	1	74		

make me uncomfortable.	Post Follow-up	3 0	72 75	-1 (-100%)	-3 (-100%)
20. I cannot always follow standard precautions because my patient's needs come first.	Pre Post Follow-up	18 0 0	57 75 75	 -18 (-100%)	 0 (0)
21. My workplace has a strong commitment to occupational health and safety.	Pre Post Follow-up	70 67 66	5 8 9	 -4 (-5.714)	 -1 (-1.49)%
22. It is necessary to take extra infection control precautions for patients with VHF.	Pre Post Follow-up	75 75 75	0 0 0	 0 (0%)	 0 (0%)
23. Hospital employees should be followed to refuse to care for patients with VHF	Pre Post Follow-up	70 72 75	5 3 0	 +5 (+7.14%)	 +3 (+4.167)
24. I will not provide care for patients with VHF if given a choice.	Pre Post Follow-up	75 75 75	0 0 0	 0 (0%)	 0 (0%)
Total (Positive impact)				122 (11.56%)	1 (0.09%)

Positive and negative responses were on questions evaluated by numbers of nurses in their responded on questions. The change and the change rate of numbers of nurses responded whether positively or negatively on the 24 questions in the study. Change rate of the impact of the training sessions on the result of the pre-test that the training sessions have increased the total positive response from 11.564% to post-test by 0.085% only.

Table 8-a: Distribution of total knowledge score regarding Congo HF among samples (*n=75*):

Knowledge about Congo Hemorrhagic Fever	Pre		Post		Follow up	
	No	%	No	%	No	%
Poor	9	12.0	2	2.7	2	2.7
Good	38	50.7	2	2.7	4	5.3
Excellent	28	37.3	71	94.7	69	92.0

Table 8-b: Total knowledge score regarding Congo HF among samples (*n=75*)

Total knowledge score	Pre &Post		Pre &Follow up		Post &Follow up	
	χ^2	*ρ-value*	χ^2	*ρ -value*	χ^2	*ρ -value*
	30.98	.000	32.8	.000	30.98	.000

As in tables 50.7% have good knowledge score in pre educational program compared to 2.7%, 5.3% have good knowledge in post and follow up post program respectively. Also, 37.3% of them have excellent knowledge in pre educational program as compared to 94.7%, 92% of them have excellent knowledge in post and follow up of program respectively, with significance differences between pre and post, pre and follow up, post and follow up.

Table 9-a: Distribution of total knowledge score regarding Dengue HF among samples (*n=75*):

Knowledge about Dengue Hemorrhagic Fever	Pre		Post		Follow up	
	No	%	No	%	No	%
Poor	12	16.0	4	5.3	2	2.7
Good	30	40.0	10	13.3	16	21.3
Excellent	33	44.0	61	81.3	57	76.0

Table 9-b: Total knowledge score regarding Dengue HF among samples *(n=75)*

Total knowledge score	Pre &Post		Pre &Follow up		Post &Follow up	
	χ^2	*ρ-value*	χ^2	*P-value*	χ^2	*ρ -value*
	32.6	.000	57.4	.000	78.7	.000

As in table 40% have good knowledge score in pre educational program as compared to 13.3%, 21.3% have good knowledge in post and follow up post program respectively. Also,, 44% of them have excellent knowledge in pre educational program as compared to 81.3%, 76% of them have excellent knowledge in post and follow up of program respectively, with significance differences between pre and post, pre and follow up, post and follow up

Table 10-a: Distribution of total knowledge score regarding Ebola H F among samples (*n=75*)

Knowledge about Ebola Hemorrhagic Fever	Pre		Post		Follow up	
	No	%	No	%	No	%
Poor	6	8.0	5	6.7	12	16.0
Good	60	80.0	3	4.0	6	8.0
Excellent	9	12.0	67	89.3	57	76.0

Table 10-b: Difference between total knowledge score regarding Ebola HF among samples (*n=75*)

	Pre &Post		Pre & Follow up		Post &Follow up	
Total knowledge score	χ^2	*P-value*	χ^2	*P-value*	χ^2	*P-value*
	32.6	.000	57.4	.000	78.7	.000

As in tables 80% got good knowledge score in pre educational program as compared to 4%, 8% have good knowledge in post and follow up post program respectively. Also, 12% got excellent knowledge in pre educational program as compared to 89.3%, 76% of them shave excellent knowledge in post and follow up respectively, with significance difference between pre and post, pre and follow up, post and follow up

Table 11-a: Distribution of total knowledge score regarding Hanta virus pulmonary and renal syndrome.

	Pre		Post		Follow up	
Knowledge about Hanta Virus Pulmonary and Renal Syndrome	No	%	No	%	No	%
Poor	68	90.7	4	5.3	13	17.3
Good	2	2.7	6	8.0	4	5.3
Excellent	5	6.7	65	86.7	58	77.3

Table 11-b: Difference between total knowledge score regarding Hanta virus pulmonary and renal syndrome among samples (*n=75*)

	Pre &Post		Pre & Follow up		Post &Follow up	
Total knowledge score	χ^2	*ρ-value*	χ^2	*ρ-value*	χ^2	*ρ-value*
	34.9	.000	36.8	.000	54.4	.000

As in tables 90.7% had poor knowledge score in pre educational program as compared to 5.3%, 17.3% with poor knowledge in post and follow up post program respectively.
Also, 6.7% of them got excellent knowledge in pre educational program as compared to 86.7%, 77.3% who got excellent knowledge in post and follow up of program respectively, with significance differences between pre and post, pre and follow up, post and follow up

Table 12-a: Distribution of total knowledge score regarding Lassa HF among samples (*n=75*):

	Pre		Post		Follow up	
Knowledge	No	%	No	%	No	%
Poor	10	13.3	4	5.3	5	6.7
Good	62	82.7	6	8.0	3	4.0
Excellent	3	4.0	65	86.7	67	89.3

Table 12-b: Difference between total knowledge score regarding Lassa HF among samples:

	Pre &Post		Pre &Follow up		Post &Follow up	
Total knowledge score	χ^2	*ρ-value*	χ^2	*ρ-value*	χ^2	*ρ-value*
	75.0	.000	36.7	.000	66.0	.000

As in tables 82.7% got good knowledge score in pre training program compared to 6%, 4% have good knowledge in post and follow up post program respectively. Also, 4% got excellent knowledge in pre educational program as compared to 86.7%, 98.3% who got excellent knowledge in post and follow up respectively, with significance differences between pre and post, pre and follow up, post and follow up

Table 13-a: Distribution of total knowledge score regarding Marburg HF among samples (*n=75*):

	Pre		Post		Follow up	
Knowledge about Marburg Fever	No	%	No	%	No	%
Poor	60	80.0	3	4.0	7	9.3
Good	8	10.7	9	12.0	10	13.3
Excellent	7	9.3	63	84.0	58	77.3

Table 13-b: difference between total knowledge score regarding Marburg HF among samples (*n=75*):

	Pre &Post		Pre &Follow up		Post &Follow up	
Total knowledge score	χ^2	*ρ-value*	χ^2	*ρ-value*	χ^2	*ρ-value*
	48.9	.000	60.7	.000	69.04	.000

As in tables 80% got poor knowledge score in pre educational program compared to 4%, 9.3% who got poor knowledge in post and follow up post program respectively. Also, 9.3% have excellent knowledge in pre educational program compared to 84%, 77.3% who got excellent knowledge in post and follow up respectively, with significance differences between pre and post, pre and follow up, post and follow up

Table 14-a: Distribution of total knowledge score regarding Rift Valley Fever among samples (*n=75*)

Knowledge about Rift Valley Fever	Pre		Post		Follow up	
	No	%	No	%	No	%
Poor	58	77.3	4	5.3	5	6.7
Good	12	16.0	3	4.0	10	13.3
Excellent	5	6.7	68	90.7	60	80.0

Table 14-b: Difference between total knowledge score regarding Rift Valley Fever among samples (*n=75*):

Total knowledge score	Pre &Post		Pre &Follow up		Post &Follow up	
	χ^2	*ρ-value*	χ^2	*ρ-value*	χ^2	*ρ-value*
	40.5	.000	59.4	.000	73.2	.000

As in tables 77.3% got poor knowledge score in pre educational program compared to 5.3%, 6.7% with poor knowledge in post and follow up post program respectively. Also, 6.7% got excellent knowledge in pre educational program as compared to 90.7%, 80% of them who got excellent knowledge in post and follow up respectively, with marked significance differences

Table 15-a: Distribution of total knowledge score regarding Yellow Fever among samples (*n=75*)

Knowledge about yellow fever	Pre (*n=75*)		Post(*n=75*)		Follow up (*n=75*)	
	No	%	No	%	No	%
Poor	58	77.3	4	5.3	10	13.3
Good	12	16.0	11	14.7	11	14.7
Excellent	5	6.7	60	80.0	54	72.0

Table 15-b: Difference between total knowledge score regarding Yellow fever among samples (*n=75*):

Total knowledge score	Pre &Post		Pre &Follow up		Post &Follow up	
	χ^2	*ρ-value*	χ^2	*ρ-value*	χ^2	*ρ-value*
	2.83	.585	6.53	.162	92.6	.000

As in these tables 77.3% got poor knowledge score pre educational program as compared to 5.3%, 13.3% who have poor knowledge in post and follow up post program respectively. Also, 6.7% have excellent knowledge pre educational program as compared to 80%, 72% who got excellent knowledge in post and follow up respectively, with significance difference between post and follow up post program.

Table 16: Pre, post & follow up results regarding total knowledge of eight VHFs among samples (*n=75*):

Total knowledge score	Pre (n=75)	post (n=75)	Follow up (n=75)	F-stat.	ρ-value
	mean ± SD	mean ± SD	mean ± SD		
Crimean- Congo hemorrhagic fever	5.57±1.265	8.87±.502	8.87±.445	396.859	.000
Dengue hemorrhagic fever	6.01±.951	8.16±.494	8.71±.895	232.006	.000
Ebola hemorrhagic fever	4.23±.452	10.59±.974	10.07±1.927	576.781	.000
Hantavirus Pulmonary Syndrome	2.03±.162	5.84±.369	5.57±.774	1338.511	.000
Lassa Fever	2.77±.421	4.75±.438	4.71±.540	433.362	.000
Marburg hemorrhagic fever	2.47±2.792	9.71±.785	8.96±1.688	316.902	.000
Rift Valley fever	4.53±1.119	14.13±2.009	14.93±2.559	636.603	.000
Yellow fever	3.71±1.667	9.87±.502	9.69±.753	769.608	.000

Significance level at *ρ-value <.05*

Table showed significances differences between total knowledge mean scores in eight studied viral hemorrhagic fevers topics.

Table 17-a: Distribution of total knowledge score about VHF among samples (*n=75*)

Total knowledge score about VHF	Pre (n=75)		Post (n=75)		Follow up (n=75)	
	No	%	No	%	No	%
Poor	25	33.3	3	4.0	5	6.7
Good	50	66.7	5	6.7	9	12.0
Excellent	0	0	67	89.3	61	81.3

Table 17-b: Total knowledge score regarding total knowledge score about VHF among samples (*n=75*)

Total knowledge score	Pre &Post		Pre &Follow up		Post &Follow up	
	χ^2	*ρ-value*	χ^2	*ρ-value*	χ^2	*ρ-value*
	7.14	.028	5.53	.063	97.0	.000

As in tables 33.3% got poor knowledge score in pre educational program compared to 4% & 6.7% with poor knowledge in post and follow up post program respectively. None got excellent in pre educational program compared to 89.3%, 81.3% who got excellent knowledge in post and follow up respectively, with significance differences between pre and post program, and between post and follow up, but without significance differences between pre and follow up.

Table 18: Relationship between age and total knowledge score among samples:

Items	Pre			Post			Follow up			χ^2
	Poor	Good	Excellent	Poor	Good	excellent	Poor	Good	excellent	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	
< 20 years	2	2	0	0	1	3	0	1	3	49.778*
20 to 30	21	8	0	0	24	5	0	18	11	
31-40	27	12	0	0	39	0	0	39	0	
> 40 years	0	3	0	0	3	0	0	0	3	

Table showed *Significance level at *<.05* difference between age and total knowledge.

Table 19: Relationship between sex and total knowledge score among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-value*
	Poor	Good	Excellent	Poor	Good	Excellent	Poor	Good	Excellent		
	No.	No.	No.	No.	No.	No.	No.	No.	No.		
Male	1	1	0	0	1	1	0	0	2	28.767*	.000
Female	49	24	0	3	3	67	0	61	12		

*Significance level at *ρ-value <.05*

Table 19 showed a statistical difference between sex and total knowledge.

Table 20: Relationship between education level of and total knowledge score among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-value*
	Poor	Good	Excellent	Poor	Good	Excellent	Poor	Good	Excellent		
	No.	No.	No.	No.	No.	No.	No.	No.	No.		
Diploma	42	6	0	0	40	8	0	34	13	9.682	.288
Technical	8	7	0	0	15	0	0	15	0		
Bachelor	0	9	0	0	9	0	0	9	1		
Master	0	2	0	0	2	0	0	0	2		
Doctorate	0	1	0	0	1	0	0	0	1		

Table 20 showed no statistical difference between level of education and total knowledge.

Table 21: Relationship between level of years of experience and total knowledge score among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-value*
	Poor	Good	excellent	Poor	Good	excellent	Poor	Good	Excellent		
	No.	No.	No,	No.	No.	No,	No.	No.	No,		
years5	1	2	0	0	0	3	0	0	3	60.9*	.000
10 years	26	4	0	0	25	5	0	19	11		
15 years	23	10	0	0	33	0	0	33	0		
20 years	0	7	0	0	7	0	0	1	6		
> 20 years	0	2	0	0	2	0	0	0	2		

Table showed statistical difference between years of experience and total knowledge.

Table 22: Relationship between age and nurses' attitude among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-value*
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good		
	No.	No.	No.	No.	No.	No.	No.	No.	No.		
< 20 years	0	4	0	0	0	4	0	0	3	3.2	.352
20 to 30	0	29	0	0	2	27	0	3	26		
31-40	0	39	0	0	0	39	0	0	39		
>40 years	0	3	0	0	0	3	0	0	4		

Table showed no statistical difference between age and nurses' attitude.

Table 23: Relationship between sex and nurses' attitude among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-value*
	Poor	fair	Good	Poor	fair	Good	Poor	fair	Good		
	No.	No.	No.	No.	No.	No.	No.	No.	No.		
Male	0	0	2	0	1	1	0	2	0	.058	.812
Female	0	2	71	0	2	71	0	69	4		

Table showed no statistical difference between sex and nurses' attitude.

Table 24: Relation between level of education and nurses' attitude among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-value*
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good		
	No.	No.	No.	No.	No.	No.	No.	No.	No.		
Diploma	0	24	24	0	2	46	0	8	40	1.15	.885
Technical	0	2	13	0	0	15	0	0	15		
Bachelor	0	0	9	0	0	9	0	2	7		
Master	0	0	2	0	0	2	0	0	2		
Doctorate	0	0	1	0	0	1	0	0	1		

Table showed no statistical difference between level of education and nurses' attitude.

Table 25: Relationship between years of experience and nurses' attitude among samples:

Items	Pre			Post			Follow up			χ^2	*ρ-val-ue*
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good		
	No.	No.	No.	No.	No.	No.	No.	No.	No.		
5 years	0	0	3	0	0	3	0	0	3	3.08	.544
10 years	0	20	10	0	2	28	0	2	28		
15 years	0	20	13	0	0	33	0	0	33		
20 years	0	0	7	0	0	7	0	9	0		
> 20	0	2	0	0	0	2	0	0	0		

Table showed no statistical difference between years of experience and nurses' attitude.

Table 26: Difference between total nurses' attitude and total knowledge score among samples

Items	*T-test*	*ρ-value*
Attitude pre –knowledge score	39.253	.000
Attitude post –knowledge score	67.957	.000
Attitude follow up –knowledge score	84.446	.000

Table revealed statistical significance differences between nurses' total attitude and total knowledge score.

Table 27: Frequency distribution of samples evaluation as regards educator (*n=75*)

Educational program evaluation	Excellent		Very good		Good		Fait		Poor	
1-Educator:	No	%	No	%	No	%	No	%	No	%
A-knowledge of subject.	48	64	27	36.	0	0	0	0	0	0
b-Ability to teach & communicate with learners	66	88	9	12.	0	0	0	0	0	0
c-Ability to answer questions	70	93.3	5	6.7	0	0	0	0	0	0
d-Explanations clear &complete	65	86.7	10	13.3	0	0	0	0	0	0
E-Concepts reviewed by educational program.	10	13.3	60	80.	5	6.7	0	0	0	0
f-professional, organized & prepared	72	96.0	3	4.0	0	0	0	0	0	0
g-promoted learning (motivation, friendliness, patience)	72	96.0	3	4.0	0	0	0	0	0	0
H-Use good examples &situation.	67	89.3	8	10.7	0	0	0	0	0	0

I-Overall, how you satisfied with educator?	70	93.3	5	6.7	0	0	0	0	0	0
2-presentation materials/media:										
a-audio-visual	75	100.	0	0	0	0	0	0	0	0
b-hand –out content	75	100.	0	0	0	0	0	0	0	0

Table revealed that, 96.0, 96.0, 93.0%, 86.7% of samples stated that, researcher excellent regarding ability to initiate learning motivation, organization and preparation, ability to answer questions, and clear and complete explanation.

Table 28: Frequency distribution of samples evaluation regarding to length of presentation (*n=75*):

Length of presentation	Too long		Too short		Just short	
	No	%	No	%	No	%
a-Group discussion	2	2.7	30	40.0	43	57.3
b-Time of questions	0	0	55	73.3	20	26.7

Table showed that 57.3% stated that group discussion just short; 73.3% revealed that time of questions too short.

Table 29: Frequency distribution of samples evaluation regarding training facilities (*n=75*):

	Excellent		Very good		Good		Fair		Poor
Training facilities	No	%	No	%	No	%	No	%	No
Classroom ready on time/cleanliness	75	100	0	0	0	0	0	0	0
Training length sufficient for topic	66	88	9	12	0	0	0	0	0
how satisfied are you with training facilities	69	92	6	8.0	0	0	0	0	0

All nurses revealed that classroom was excellent in readiness and cleanliness. Also, 88% and 92% stated training length excellent regarding sufficiency and satisfaction with training facilities.

Table 30: Frequency distribution of samples evaluation as regards subject matters (*n=75*):

Subject matters	No	%
Just rights	52	69.3
Too complicated	23	30.7
Tailor her presentation to meet specific needs of your health care organization:		
• Partially	5	6.7
• Yes	70	93.3

Table showed that 69.3% stated that subject matters were rights and 30.7% revealed that subject matters too complicated.

Table 31: Frequency distribution according to training program evaluation (*n=75*):

Training program evaluation	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	No	%	No	%	No	%	no	%	No	%
1.Training program met my expectations	66	88.0	7	9.3	2	2.7	0	0	0	0
2.I will be able to apply knowledge learned	49	65.3	14	18.7	12	16.	0	0	0	0
3. Sessions content organized, follow easy	44	58.7	16	21.3	15	20.	0	0	0	0
4. Materials distributed pertinent &useful.	75	100.0	0	0	0	0	0	0	0	0
5. Trainer met educational objectives.	75	100.0	0	0	0	0	0	0	0	0
6. Quality of instruction was good.	70	93.3	5	6.7	0	0	0	0	0	0
7. Trainer was knowledgeable.	75	100.0	0	0	0	0	0	0	0	0
8.Class participation & interaction encouraged	75	100.0	0	0	0	0	0	0	0	0
9. Adequate time for questions & discussion.	59	78.7	16	21.3	0	0	0	0	0	0

All nurses strongly agreed that distributed materials were pertinent and useful, trainer met educational objectives, knowledgeable, and encouraging class participation and interaction

Table 32: Frequency distribution of samples according to most useful topics in training program (*n=75*):

*Most useful topics	No	%
Crimean-Congo hemorrhagic fever (CCHF)	13	17.3
Dengue hemorrhagic fever	3	4.0
Ebola hemorrhagic fever	42	56.0
Hantavirus Pulmonary Syndrome	15	20.0
Lassa Fever	0	0
Marburg hemorrhagic fever	0	0
Rift Valley fever	66	88.0

Table showed that a total of 88& 56% of nurses stated that useful topics among VHFs; Rift Valley Fever and Ebola respectively.

Discussion

Generally speaking, the viral hemorrhagic fever (VHF) syndrome is a potentially life-threatening infectious disease typified by combination of a capillary leak syndrome and bleeding diathesis. Most but not all agents causing VHF are arboviruses, with transmission to humans resulting from an arthropod bite. Agents of the VHFs affect humans on all the continents. The population growth, urbanization, human activities, and even climate change all contribute to a continual flux in the epidemiology of many arboviruses (Pigott, 2005).

The Egyptian Public Health Authorities must keep in mind the viral hemorrhagic fevers which are more or less common in Sub-Sahara of Africa and extended abroad even to the European Union and the Americans. El-Bahnasawy *et al*. (2012) in Gharbia Governorate identified two human cases of the CCHR among Egyptian returning back from Saudi Arabia. Also, Heikal *et al*. (2011), El-Bahnasawy *et al*. (2011), Shoukry and Morsy (2011), Shoukry *et al*. (2012) and Morsy (2012a,b) declared the introduction of *Aedes aegypti*, or tiger mosquito which is the main vector of Yellow fever and Dengue fever. Moreover, El Bahnasawy *et al*. (2013) reviewed West Nile fever with reference to local region and El Bahnasawy *et al*. (2015) reviewed Lassa fever

The present study focused on: 1- Crimean-Congo hemorrhagic fever (CCHF), 2- Dengue hemorrhagic fever, 3- Ebola hemorrhagic fever, 4-Hantavirus Pulmonary and renal Syndrome 5- Lassa Fever, 6- Marburg hemorrhagic fever, 7- Rift Valley fever, and 8- Yellow fever.

No doubt, the Military Medical Staff worldwide particularly the nursing group were the critical risky group and must be involved in having at least the general knowledge concerning the VHFs, these fatal infectious arthropod-borne diseases, which could be used as biological weapons.

The empirical study tried to test the hypothesis of the significant positive impact of the training program implemented on 75 nurses in a Military Hospital on enhancing their knowledge, awareness, responsibility and obligations toward the VHFs and on improving the nursing care quality in this regard in general. The empirical study was divided into 7 main sections in order to deal with the research problem from all aspects.

In the present study, personal data variable such as age, level of education and year of experience, the study depicted the main characteristics of the sample of the study that has been divided to four-aging groups; less than 20 years old, from 20 to 30 years old, from 31 to 40 years old, and above 40 years old. The vast majority of the 75 nurses in the study were females in the age of 31-40 years old. The distribution of the studied groups of nurses regarding their training levels and years of experiences have also been included in section I that revealed that the majority of nurses in the study held diploma and they were well experienced with experience years of 10 years and more.

From questioning the nurses in the study regarding their previous training experiences; the researcher found that all nurses had not taken any similar training in the past. The reasons here were because of the lack of their interest in such training workshops. Yet, the 75 nurses in the study showed a great interest in taking the training program designed for the current study; 40 nurses have chosen to take the training sessions during their working hours while the rest of nurses have chosen to take the sessions in different hours. 22 of the 75 nurses have chosen to take the sessions in the hospital while the rest has chosen to take sessions of training inside sophisticated training units.

In the present study, as to training needs assessment, the vast majority of nurses; specifically 74/75 nurses were in a great need and enthusiasm in taking the designed training program. Most importantly all the nurses

did not attend any educational programs about viral hemorrhagic fevers, program about how to manage infectious diseases, and its universal precautions, moreover, the studied sample reported that the reason of not attending the educational program was because of the lack of interest in official trained nurses programs. In addition, more than half of them (53.3%) mentioned that the best time to receive the lecture was during the working time, 70.7% of the studied group selected the most appropriate place for the program in conference center and only 29.3%inside the hospital**.** This could be explained by the fact that nurses were eager to be aware about these new issues especially because they are highly infectious diseases, present worldwide included Egypt and the nurses' staff need to attain this program to gain knowledge about diagnosis and prevention.

The first step in planning any professional development activity is to assess the learning needs of the target group or individual to determine the structure of the program in terms of objectives, content, and activities. The learning needs could be individual, organizational, or societal and must be clearly defined during the planning process (DeSilets, 2007). Learning needs analysis was a central component of continuing professional development but a lack of psychometrically developed learning needs assessment tools. Self-assessment questionnaires were emerging as a key method for assessment of community health workers in a developing country (Haq and Hafeez, 2009).

In the present study, the distribution of the knowledge scores among nurses for Congo Hemorrhagic Fever, Dengue Hemorrhagic Fever, Ebola Hemorrhagic Fever, Hanta Virus Pulmonary, Lassa Hemorrhagic Fever, Marburg Fever, Rift Valley fever, and the Yellow Fever, showed a significant impact of training sessions illuminated in the follow-up test on the knowledge score of nurses in the study in all types of diseases except for the Crimean Congo Hemorrhagic Fever, while, the statistical significance varies in some of the diseases in the study when it came to the comparison between the pre-test and the post-test. All results confirmed on the positive impact of the training program in enhancing the knowledge of nurses toward the VHFs and relevant the patients, this was because the nurses ware interested in such new issue. Lakhani *et al.* (2002) in Pakistan stated that the differences in the knowledge of different groups were obvious but it was essential to raise the knowledge regarding VHFs at all levels including the housekeeping staff. The continuing medical education was a bad need for all health care workers to emerging health problems.

Rahnavardi *et al.* (2008) reported that there was a need to establish professional education campaigns in highly endemic deprived areas to improve physicians' attitudes encourage nurses' use of academic materials and increase know-ledge of less-educated ones. Haq and Hafeez (2009) stated that the primary health care was a set of health services which meet the developing world needs. Community health workers act as a bridge between health system and community in providing this care. The appropriate knowledge and communication skills of the workers were a key to confidence and elementary for the system success. They concluded that a continued process should be ensured to provide opportunities to health workers to update knowledge sharpen communication skills and bring credibility to person a as health educators.

In the present study, 33.3% of nurses got poor knowledge score in pre educational program compared to 4%, 6.7% with poor knowledge in post and follow up post program respectively. None of them had excellent knowledge in pre-educational program as compared to 89.3%, 81.3% who had excellent knowledge in post and follow up respectively. There were significance differences between pre and post program, and between post and follow up but, without significance differences between pre and follow

up regarding total knowledge score about viral hemorrhagic fever among the studied sample.

In the present study, education program had successfully raised nursing knowledge regarding VHFs. This agreed with Henderson *et al*. (2006) who mentioned that when knowledge score of almost all nurses improved post program, compared to that before program implementation, which indicated that the participants were highly interested in the program contents, media and teaching methods were successful in stimulating their enthusiasm. Itrat *et al*. (2008) in Pakistan reported that adult population of Karachi has adequate knowledge related to Dengue on isolated aspects, but the overall prevalence of 'sufficient knowledge' based on the criteria was poor. They demonstrated adequate prevalence of preventive practices against the disease. Further studies correlating the association between knowledge and its effectiveness against dengue will be helpful in demonstrating the implications of the awareness campaigns. Stiffler *et al.* (2009) reported that women's health care in United States was described as unsatisfactory and falling behind the healthy people 2010 objectives. They recommended that advanced practice nurses were well suited to address this need. Therefore, in the present study the use of a continuing education program successfully influenced the nursing knowledge. This in-service education program turned to be effective in increasing the level of participants' knowledge regardless their basic educational preparation.

In the present study as to the change in nurse's attitude toward VHFs patients, the majority of responses revealed a significant positive impact of the training sessions on changing the attitude of nurses toward such patients. The collective level since the total scores on tests revealed also the significant positive impact of the study on changing the attitude of nurses toward relevant patients.

As to real impact on the nurses' attitude regarding the responsibility, obligations, and knowledge of the disease in question, the smallest impact of the training sessions on the change of the pre-test positive response as illuminated in question 20, which confirmed on the effectiveness of the training sessions on increasing awareness at nurses in questions. On the other hand, boundaries of the impact of the training sessions on the post-test fall between questions 7& 9 in the upper bound and question 8 in the lower bound which reconfirm on the positive impact of the training sessions on enhancing awareness, knowledge, responsibility and obligations at nurses in questions.

Scheithauer *et al*. (2012) stated that despite several guidelines on the hand hygiene (HH), compliance especially in physicians is reported to be low which had huge implications for the healthcare-associated infections They suggested implementing regular education and practical training on HH from early on in the medical studies curricula to improve overall quality of patient care. Regular education and practical training on HH from early on in the medical studies curricula to improve overall quality of patient care. Kiliç-Akça *et al*. (2013) in Turkey determined knowledge and attitudes of emergency nurses about Crimean-Congo haemorrhagic Fever. They found that 68.8% claimed to have sufficient knowledge about disease, 99.3% considered it a virus, and 94.3% said that health-care personnel exposed to it were under great risk. But, most of them had relatively good knowledge about disease but did not want to run high risk of infection and mortality by treating infected patients.

In the present study, there were statistical significant differences between nurse's total attitude and total knowledge score, the attitude follow up to knowledge score t test was 84.447 in relation to 39.253 attitudes pre-knowledge score. This could be explained by the fact that the present program spot light on the importance of these topics and how can nurse deal with VHFs. Bauer (1990) stated that nursing literature and conferences were advocating a return to the humanistic values

and caring approach to people that has been a hallmark of nursing. A theory base for caring in nursing is emerging. He concluded that promoting a caring framework for nursing and faculty modeling of caring behaviors and attitudes could affect student recruitment, with the ongoing highly technologic society, great emphasis being placed on person-to-person relationships. Reaffirming the caring nature of nursing to the public and actively promoting these behaviors may make the nursing profession a more attractive and appealing career choice.

Miljković *et al.* (2014) assessed whether an educational program would have impact on changes of attitudes and sun-protective behaviors of high school students. They concluded that educational program had an impact, but broader activities involving schools, local communities and media were needed for significant changes in sun behavior and attitude. Kurz (2014) reported that experts advocate educational programs addressing misinformation regarding donation decisions to increase potential donor pool to evaluate the impact of an educational intervention on nursing students' knowledge, attitudes, registering as an organ donor, and family discussions. He concluded that family discussions did not differ significantly from pretest to posttest in either group. One lecture/laboratory experience made a difference in registering as an organ donor but not in discussing the decision with family members. Students can learn about organ donation from more than one specific class.

Fildes *et al*. (2015) reported that to have positive change in the teaching practice of teams that service large numbers of diverse students from multiple degree programs provided many challenges. Changing attitudes must involve training staff in new teaching and learning approaches and strategies, and creating a collaborative, supportive team-based teaching environment, where the planned changes could be implemented and evaluated. As a result senior academics are now directly involved in delivering sections of the face-to-face teaching in the new environment. Through promoting positive change that enabled deeper student engagement with the theoretical concepts delivered in lectures as evidenced by favorable student evaluations, feedback, and improved final examination results. A collaborative team-based approach that recognizes the importance of distributed leadership combined with a clearly articulated change management process were central to enabling academics to design, try, and evaluate the new teaching and learning practices.

In the present study, six evaluation criteria have been adopted to evaluate training program. These were evaluation of samples regarding educator, presentations length, training facilities, subject matters, overall training program, and importance of diseases in question to their practical work. The results showed that the educator was capable to meet expectations of nurses; the material tools were plausible enough to satisfy trainees, presentations were fairly short enough. Besides, the training facilities were just excellent as indicated by the great majority of trainees. The entire material met the specific needs of relevant health care organizations by positive responses, but 43% agreed that the material was difficult. Overall, the nearly all trainees favored the program under almost all criteria studied in the final questionnaire that tested the satisfaction of the entire training program. About 50% were not confident enough toward applying their knowledge acquired practically.

The most important topics from trainees' point of view were Rift Valley fever, Ebola fever, Hanta Virus Pulmonary Syndrome, Crimean Congo Hemorrhagic fever and lastly Dengue fever. Lassa fever and Marburg Fever were of no interest to nurses.

The present results agreed with Suchitra and Lakshmi (2007) in India who reported that the education gave a positive impact on retention of knowledge, attitudes and practices in all the staff categories. There was a need to develop a continuous education sys-

tem to reduce incidence of nosocomial infections, compliance with interventions were mandatory. Also, Yang *et al*. (2012) in Taiwan stated that advanced life support (ALS) guidelines were widely adopted for healthcare provider training with recommendations for retraining every two years or more. They concluded that the available evidence suggests that ALS know-ledge and skills decay by 6 months to 1 year after training and that skills decay faster than knowledge. They added that more studies were needed to help provide evidence-based recommendations for assessment of current knowledge and skills and need for refresher training to maximize maintenance of ALS competency.

In the present study, the relationship between personal data and knowledge scores and change of the attitude toward patients with the disease in question, showed a significant relationship between all personal data and the total knowledge score among the nurses except for the level of education.

Parvan *et al.* (2015) reported that for patients with chronic renal disease dealing with many potential problems with hemodialysis for all their life, face to face training proved more effective than training pamphlet. Wittenauer *et al.* (2015) stated that the links among poverty and health disparities are well established and research demonstrates that attitudes of providers can influence how those in poverty use health services. They concluded that gaining knowledge about attitudes towards and the factors influencing those attitudes, for example, education were important in helping combat the disparities associated with poverty.

In the present study, the group aged between 20-30 years old in follow up test had got excellent score more than in posttest, which could be explained by the fact that the VHFs topics were new to all samples and this age were interesting to know the updated diseases disasters Ali *et al.* (2014) in UK stated that disabling fatigue is common in the working age population. It is essential that occupational health (OH) professionals were up-to-date with the management of fatigue in order to reduce the impact of fatigue on workplace productivity. They reported that fatigue can lead to severe functional impairment with adverse work-place outcomes. One-day workshops could be effective in training OH professionals in how to diagnose and manage fatigue and CFS. Training may increase general know-ledge of fatigue and confidence in fatigue management in an OH setting. Saleh *et al.* (2014) in Egypt stated that the foodborne parasitic infection in the hospital constitutes a major health problem particularly for vulnerable patients more than healthy ones to parasitic risks, and that parasitosis represented an area of concern for advanced practice nurse. They recommended that nurses in all roles and settings could be leadership in infection prevention and control by using their knowledge, skill and judgment to initiate appropriate and immediate infection control procedures.

In the present study, there was statistical difference between years of experience and total knowledge as nurses with more experience got excellent score, which explained that long experienced nurses had more knowledge via their practical work. Simonsen *et al*. (2014) reported that little nurses experience in medication knowledge; particularly in drug dose calculations, but also in drug management and pharmacology. The weak knowledge could be a result of deficiencies in the basic nursing education, or lack of continuing maintenance training during working. They found that the nurses expressed higher degree of certainty and lower risk of error, both overall and for each topic ($p < 0.01$). Low risk of error was associated with high knowledge and high sense of coping ($p < 0.001$). They concluded that knowledge among experienced nurses was superior to bachelor students in nursing, but nevertheless insufficient and that more emphasis should be put into the basic nursing education and in the introduction to medication procedures in clinical practice to improve

the nurses' medication knowledge and reduce risk of error.

In the present study, difference between the total nurses' attitude changed and the total knowledge scores throughout the study was significant on the pre, the post, and the follow-up tests. Lu *et al.* (2013) in Taiwan mentioned that nurses' insufficient knowledge is considered to be one of the most significant factors contributing to medication errors. Most medication errors cause no harm to patients, but the incorrect administration of high-alert medications can result in serious consequences. They found that educational intervention was effective in strengthening nurses' knowledge of high-alert medications and power-point file as teaching material was suitable and feasible for hospital-based continuing education.

Ganasegeran and Al-Dubai (2014) in Malaysia stated that the majority of medical residents had a positive attitude toward communication skills learning. The socio-demographic factors influenced communication skills learning attitude among medical residents. Incorporating communicative skills modules during hospital continuous medical education for medical residents is essential to cultivate communicative skills attitudes for effective doctor-patient relationship during the routine medical encounters. This was in consonance with findings. They added socio-demographic factors influenced communication skills learning attitude among medical residents. Saini *et al*. (2014) reported that nurses involved in graduate studies, whether as a principal investigator, a study coordinator, clinical trials nurse, or as a staff nurse caring for patients who were research subjects with a responsibility to promote the ethical conduct of clinical research. They strongly recommended the Indian Nursing Council-the Statutory Licensing body of the nurses in India to ensure strict compliance of all researches (at masters as well as bachelors level) in nursing education with all the principles and components of bioethics. Sharma *et al.* (2014) reported that Nursing has been identified as an occupation that has high levels of stress. Job stress brought about hazardous impacts not only on nurses' health but also on their abilities to cope with job demands. They found that the main nurses' occupational stressors were poor the doctor's attitude, posting in busy departments (emergency/ICU), inadequate pay, too much work, and so on. Thus, hospital managers should initiate strategies to reduce the amount of occupational stress and should provide more support to the nurses to deal with the stress. Yang *et al*. (2014) evaluated the effectiveness of a poverty simulation in increasing understanding of and attitudes toward poverty and resulting in changes in clinical practice among nursing seniors. They found that the poverty simulation led to a greater empathy for the possible experiences of low income individuals and families, understanding of barriers to health care, change in attitudes towards poverty and to those living in poverty, and changes in the students' nursing practice. They added that use of poverty simulation was an effective means to teach nursing students about the experience of living in poverty. The simulation experience changed nursing students' clinical practice, with students providing community referrals and initiating interprofessional collaborations.

Machin and Pearson (2014) in UK found that action learning sets (ALS) were used widely for organizational and workforce development, including in nursing, a multifaceted educational pilot program for new nurses and midwives was implemented to accelerate their clinical practice and leadership development (NHS Education Scotland, 2010). Action learning sets were provided for peer support and personal development. Thematic data analysis of context, mechanism and outcome configurations generated five themes: creating and sustaining a collective learning environment; challenging constructively; collective support the role of feedback and effectiveness of ALS. They suggested that nursing and midwifery action

learning should (a) be facilitated positively to improve participants' experience; (b) be renamed to avoid learning methodology confusion; and (c) be outcome focused to evidence impact on practice.

Conclusion

Changes in infectious disease transmission patterns are a likely major consequence of climate change, which need more studies on the underlying complex causal relationships, and apply this information to the prediction of future impacts, using more complete, better validated, integrated, models. Now, there is a very marked increase in many infectious diseases, including some newly-circulating ones (HIV/AIDS, Hanta-virus, hepatitis C, SARS, etc.), and who knows what else? This reflects the combined impacts of rapid demographic, environmental, social, technological and other changes in the humans ways-of-living.

The present training program succeeded in enhancing nurses' knowledge, awareness, responsibility and obligations to VHFs' patients. Nonetheless and despite the difficulty of the topics and concepts related to them nurses have shown great enthusiasm toward the training program enabled the authors enjoying working environment during training sessions. Strong communications between authors and trainees could successfully enrich their skills in applying all aspects of the empirical study in a highly professional manner as well. The visual instructing tools helped creating an enjoyable training environment to trainees.

Recommendations

Viruses causing hemorrhagic fever are initially transmitted to humans when the activities of infected reservoir hosts or vectors and humans overlap. The viruses carried in rodent reservoirs are transmitted when humans have contact with urine, fecal matter, saliva, or other body excretions from infected rodents. The viruses associated with arthropod vectors are spread most often when the vector mosquito or tick bites a human, or when a human crushes a tick. However, some of these vectors may spread virus to animals, livestock, for example. Humans then become infected when they care for or slaughter the animals.

Some viruses that cause hemorrhagic fever can spread from one person to another, once an initial person has become infected. Ebola, Marburg, Lassa and Crimean-Congo hemorrhagic fever viruses are examples. This type of secondary transmission of the virus can occur directly, through close contact with infected people or their body fluids. It can also occur indirectly, through contact with objects contaminated with infected body fluids. For example, contaminated syringes and needles have played an important role in spreading infection in outbreaks of Ebola hemorrhagic fever and Lassa fever.

Specific signs and symptoms vary by the type of VHF, but initial signs and symptoms often include marked fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion. Patients with severe cases of VHF often show signs of bleeding under the skin, in internal organs, or from body orifices like the mouth, eyes, or ears. However, although they may bleed from many sites around the body, patients rarely die because of blood loss. Severely ill patients may show shock, nervous system malfunction, coma, delirium, and seizures. Some types of VHF are associated with renal failure (CDC, 2008).

The following some procedures that must be followed: 1- Glass containers should not be used. Disposable sharp objects, such as scalpel blades, also should not be handled unnecessarily after use and should be auto-

claved or incinerated. 2. Venous blood samples must be collected with extreme care to avoid self-inoculation. Ten milliliters of clotted blood should be placed in a sealed plastic container. Needles should not be recapped, bent, broken, removed from disposable syringes, or otherwise handled. Blood-taking equipment should be put in a rigid plastic container filled with disinfectant solution and autoclaved or incinerated. 3. Midstream urine specimens should be collected by clean catch. Five milliliters of urine should be put in a plastic screw-cap container with one of the following: rabbit serum albumin diluted to a final concentration of 25%, human serum albumin diluted to a 1% concentration, or bovine serum albumin at a final concentration of 10%. 4. Throat swabs must be placed in plastic screw-cap containers in 1ml of sterile, phosphate-buffered neutral saline containing25% rabbit serum, 1% human serum albumin, or 10% bovine serum albumin (CDC, 2008).

The following would improve Egyptian nursing staff knowledge and attitude regarding the VHFs:

1. Establish an active update viral infectious control department.
2. Establish an update training program for nurses according to their educational levels with special stress on those who will be in duty for International Peacekeeping Forces.

General Principles

Managing patients with VHF is to provide the highest quality of care with the least risk of transmitting infection.. Patients require close supervision, and some will need modern intensive-care facilities. Since pathogenesis is not entirely understood and antiviral therapy is limited, treatment is largely supportive. It is essential to give careful attention to fluid and electrolyte balance. In severe cases, therapy will be required for shock and blood loss. The supportive care of patients critically ill with VHF is the same as the conventional care provided to patients with other causes of multisystem failure. Adult respiratory distress syndrome, renal failure, seizures, and coma may require specific interventions, such as mechanical ventilation, dialysis, and neurologic intensive care. If surgery is required (e.g., obstetric intervention), it should be done.

Autopsy and handling of a corpse: Before an autopsy is done on a patient suspected to have died from VHF, the possible risks and benefits must be carefully considered. Autopsies have been conducted safely on these patients, sometimes without prior knowledge of the diagnosis (34), but under some circumstances it may be wiser to forego this procedure. Limited autopsy or postmortem collection of blood and percutaneous liver biopsy material may be appropriate.

The same precautions recommended for clinicians and laboratory staff working with infected patients and specimens must be followed. Double gloves, caps and gowns, waterproof aprons, shoe covers, and protective eye wear are required. Aerosol formation must be avoided (for example, electrical cutting instruments must not be used). All solid and liquid waste should be decontaminated with disinfectant solution or by heating for 1 hour at 60^{o}C. The liquid waste can then be washed down the drain; solid waste should be incinerated.

All unnecessary handling of the body, including embalming, should be avoided. Persons who dispose of the corpse must take the same precautions outlined for medical and laboratory staff. The corpse should be placed in an airtight bag and cremated or buried immediately.

Decontamination Procedures

Disposable items as pipette tips, specimen containers, swabs, etc., should be placed in a container filled with disinfectant solution and incinerated. Clothes and blankets that were used by the patient should be washed in a disinfectant, such as hypochlorite solution.

Non-disposable items such as endoscopes used in patient care must be cleaned with decontaminating fluids (for example, gluteraldehyde or hypochlorite). Laboratory equi-

pment must be treated similarly. All non-disposable materials that withstand autoclaving should be autoclaved, after they have been soaked in disinfectant solution. The patient's bed and other exposed surfaces in the hospital room, or in vehicles used to transport the patient, should be decontaminated with disinfectant solution.

Identification and management of patient contacts: A contact is defined as a person who has been exposed to an infected person or to an infected person's secretions, excretions, or tissues within 3 weeks of the patient's onset of illness. Contacts may be subdivided into 3 risky levels:

1. Casual contacts are persons who had remote contact with patient, as persons on the same airplane, in the same hotel, etc. Since the agents of VHF are not spread by such contact, no special surveillance is indicated.
2. Close contacts are persons who had more than casual contact with the patient. They include persons living with the patient, nursing or serving the patient when he or she was ill, shaking hands with or hugging the patient, handling the patient's laboratory specimens, etc. These contact persons must be identified by state and local health departments, in collaboration with CDC, as soon as VHF is considered a likely diagnosis for the index case. Once the diagnosis is confirmed, close contacts should be placed under surveillance. This requires these individuals to record their temperatures twice daily and report any temperature of 101 degrees F (38.3°C) or above or any symptom of illness to public health officer responsible for surveillance. Surveillance should be continued for 3 weeks after the person's last contact with the index patient.
3. High-risk contacts are persons who have had mucous membrane contact with patient, such as kissing or sexual intercourse, or have had a needle stick or other penetrating injury involving contact with the patient's secretions, excretions, blood, tissues, or other body fluids. These individuals should be placed under surveillance as soon as VHF is considered a likely diagnosis in the index case.

Any contact that develops a temperature of 101 degrees F (38.3°C) or higher or any other symptoms of illness should be immediately isolated and treated as a VHF patient. Ribavirin should be prescribed as postexposure prophylaxis for high-risk contacts of patients with Lassa fever. Although experience is more limited, post-exposure prophylaxis with ribavirin is also recommended for high-risk contacts of patients with CCHF.

The convalescent patients and their contacts should be warned that some of the causative agents of VHF may continue to be excreted for many weeks in semen, as detected with Marburg and Ebola, and in urine, as occurs sometimes with Lassa. It is recommended that the persons listed in the Introduction be contacted about arranging shipment to CDC of seminal fluid and urine specimens from patients in the convalescent period for virus isolation. Convalescent patients must be meticulous about personal hygiene. While data are limited concerning infectivity in the convalescent period, abstinence from sexual intercourse is advised until genital fluids proved to be virus-free. If patient does engage in sexual intercourse before tests are done, condoms is advised.

Critical investigations, as a blood smear for malaria and inoculation of blood cultures, must not, but, be postponed. Laboratory staff dealing with specimens must take the same personal precautions as patient-care staff. Surgical gloves, gowns, shoe covers, and masks should be worn. When possible, laboratory tests should be performed in biological safety cabinets. Blood cultures should be prepared in a closed system. Every effort should be made to avoid creating an aerosol or splashing, and protective eye wear should be worn if possible. A full-face respirator with a high efficiency particulate air filter is an acceptable, but cumbersome alternative to masks and protective eye wear. Nonessential tests should not be performed, nor should routine automated equipment be

used unless the specimen has been inactivated. Abundant supplies of disinfectant solutions should be readily available. Safe laboratory work has been done with use of these precautions for many years in VHF-endemic areas with poorly equipped hospitals.

The laboratory personnel accidentally exposed to infected material should immediately wash infected part, apply a disinfectant as hypochlorite solution, and must notify the concerned physician or the infection control staff. Consequently, this one should be considered as a high-risk contact and placed under surveillance.

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