

# When Information Does Not Translate into Knowledge. Ebola and Hemorrhagic Fevers Knowledge among Primary Care Physicians and Nurses

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## Abstract

After the first secondarily-transmitted ebola case in Spain, a wave of divergent opinions flooded mass and sanitary media. Very few of these opinions, however, came from experts on epidemiology or hemorrhagic fevers. This observational study aimed to assess the specific knowledge of Primary Care physicians and nurses about ebola and hemorrhagic fevers by means of analyzing the results obtained from a 5-item self-reported questionnaire dealing on hemorrhagic fevers basic knowledge. Validity and reliability of questionnaire were confirmed by a pilot study. The participants were 138 family doctors and nurses from the 64 public Primary Care centers sited in the North Metropolitan Area of Barcelona (1,400,000 inhab; Catalonia, Spain) taking part in training-the-trainers ebola workshops. Overall, there were 117 (84.8%) respondents out from 138 workshop participants; of them were physicians 61 (51.2%). The main age was 46.7 (8.8) years; stating previous specific knowledge on hemorrhagic fevers 39 (33.3%). On the whole, up to 92 (78.6%) of respondents shown a poor knowledge. Previous specific formation was significantly and independently associated with having proper knowledge ( $p < 0.001$ ); OR = 8.6 (CI 95%: 3.199 - 23.623). In summary, confusion that accompanied the single secondary-transmitted ebola case in Spain could probably be explained by the existence of a serious gap on hemorrhagic fevers knowledge. More accurate, scientific and formally-presented information should be provided to Primary Care physicians and nurses.

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## Keywords

**Ebola, Haemorrhagic Fevers, Primary Care, Spain, Nursing, Knowledge**

### 1. Introduction

In 2014, October 7<sup>th</sup> a Spanish nurse attending an ebola-repatriated missionary from Sierra Leone became the first ebola secondarily-transmitted case outside Africa. In the wake of such an unfortunate event, a tsunami of comments, opinions and recommendations flooded mass media, leading to a general feeling of confusion among sanitary personnel in what the few available experts barely had opportunities to be publicly heard in a country devoid of a proper International Health structure [1].

The alarm that caused this first European-transmitted ebola case prevented orderly develop the designed Ebola National Response Plan [2]. Thereafter, health authorities hastily purchased and supplied virus-proof protective equipment to every public Primary Care Centre of Catalonia (Spain), often without providing the minimum technical and medical knowledge required. According to experts, frontline nurses and physicians should understand clinical and epidemiological key aspects of ebola and other HF. This comprehension can facilitate not only a quickly recognizing of imported cases, but also it could be argued that a clear understanding of the clinical course and transmission risk (very low during the early stages) can facilitate reduce anxieties and allow providing the proper and better medical care to suspected patients [3].

Attempting to regain the initiative, teaching centre-to-centre workshops were organized under the responsibility of the regional PROSICS (International Health Program—The Catalan Health Institute) staffs. Prior to receive any formation, workshop participants could voluntarily fulfil a questionnaire about ebola and other haemorrhagic fevers (HF) knowledge.

The main objective of the article is to analyze and discuss the results from the questionnaires. Key points are highlighted and material is provided to inform future deployed clinical education initiatives.

### 2. Methods

An observational study aiming to determine which are the basic knowledge on HF (preventive measures, clinical characteristics and mode of transmission) among Primary Care physicians and nurses was designed by means of a 5-item self-reported questionnaire (Figure 1). Question 1 regarded with previous specific formal-acquired knowledge either during pre or post-degree studies; the other four questions dealt with epidemiological and clinical aspects of HF.

<b>What you know about haemorrhagic fevers?</b>	
(Please to answer the questionnaire within 1 - 2 minutes)	
1. Prior to the West African ebola outbreak I have been learned specific information about hemorrhagic viruses, either in pre or post-degree.	
a) <b>Yes</b>	b) No
2. Some hemorrhagic viruses have specific vaccination or treatment.	
a) <b>Yes</b>	b) No
3. The concurrence of fever and spontaneous haemorrhage in a traveller coming from Africa is patognomonic (sure diagnose) of viral haemorrhagic fever.	
a) Yes	<b>b) No</b>
4. The only possible mode of transmission of haemorrhagic viruses is the direct contacts with corporal fluids from seek patients.	
a) Yes	<b>b) No</b>
5. Cite two examples of hemorrhagic viruses.	
1. Age.....years	2. Physician/Nurse
Many thanks for your help	

**Figure 1.** Questionnaire on HF (correct answers in bold).

## 2.1. Participants

The population of study was defined as all physicians and nurses in charge of the ebola-guideline implementation in anyone of the 64 Barcelona' North Metropolitan Area Primary Care Centres who took part in those two-hour training-the-trainers workshops, an estimate of 130 health professionals. Those Primary Care Centres serve a population of over 1,400,000 inhabitants and belong to the main public provider of Catalonia (*Institut Català de la Salut*) where the medical visits are free of charge. Up to 23 of these two-hour workshops were performed between 1<sup>st</sup>-18<sup>th</sup> October (2014).

## 2.2. Sample and Variables

The sample size was estimated on the basis of a minimal 50% of response from workshop participants for a confidence level of 95% and an alpha-risk of 5% = 98 individuals. The variables studied were age, professional category (physician/nurse), prior knowledge about HF (yes/no) and two categorical responses to questions 2, 3, 4 and 5 (yes/no). Question 5 was open-ended in which the participants have to cite at least two haemorrhagic viruses or diseases; it was considered as correctly answered if  $\geq 2$  of the following were mentioned: yellow fever, dengue, Lassa, Junín, Machupo, Crimea-Congo, Marburg fevers or any other miscellaneous viruses from *Filovirus*, *Arenavirus*, *Filoviridae* or *Bunyaviridae* families (e.g.: Kyasanur, Omsk, Rift, etc.). The responses were scored and interpreted as follows: poor knowledge if  $\leq 2$  of correct answers to Questions 2 - 5; fair knowledge if 3 correct answers and; good when all 4 questions were right. Individuals working in International Health Units or as PROSICS staff were excluded from the study.

## 2.3. Questionnaire Validation

Since no similar ebola-dealing validated questionnaires were found, we opted for an *in home*-made questionnaire. In order to increase its internal consistence, three key dimensions were defined: 1) epidemiology; 2) mode of transmission and; 3) clinical course. An initial draft version was sent to three PROSICS experts working outside the Barcelona North Metropolitan area, and modified according to their opinions. The two initial workshops were considered as pilot-tests that led to minor questionnaire changes.

## 2.4. Statistical Methods

Categorical data are presented as absolute numbers and proportions, and continuous variables are expressed as means and standard deviations. The squared-Chi ( $\chi^2$ ) test was used to compare the distribution of the questionnaires scores with socio-demographic characteristics (sex, professional category and prior knowledge). Besides, a multivariate logistic regression was performed between having good knowledge on HF as depending variable; independent variables were age, professional category and previous knowledge on HF. Data were analyzed using SPSS 15.0 software (SPSS Inc., Chicago, IL). The p value was set at 0.05 for statistical significance.

## 3. Results

From a total of 138 workshop participants, 117 (84.8%) filled the questionnaire. Of them, 61 (51.3%) were physicians and 57 (48.7%) were nurses. The main age was 46.7 (8.8) years. Up to 39 (33.3%) declared having previous specific knowledge on HF. The global results obtained in Questions 2, 3, 4 and 5 were shown in **Table 1**. Concerning Question 5, among the 29 correctly responding individuals, 27 (93.1%) identified *ebola* as a haemorrhagic virus; other virus cited were dengue 12 (10.2%), yellow fever 11 (9.4%), Marburg 5 (4.3%) and Lassa 1 (0.8%). In the other hand, 11 (9.4%) respondents wrongly cited other viral diseases as measles (1) and rabies (1) or even non-viral diseases as malaria (6), rickettsiosis (1), cholera (1) and tuberculosis (1).

In the bivariate analysis no significant relationship was found when comparing have a proper knowledge with to be a physician/nurse or age. In the multivariate analysis, after adjusting for all other risk factors, displaying a proper knowledge was significantly associated with having previous knowledge on HF ( $p < 0.001$ ) as shown in **Table 2**.

## 4. Discussion

Since the first recognized epidemic of ebola fever (1976, ex-Zaire and South Sudan), at least ten other outbreaks

**Table 1.** Questionnaire answers and level of knowledge (N = 117).

Questions	Correctly answered	Wrongly answered
	N (%)	N (%)
Q.2 (fever and haemorrhages)	80 (68.4)	37(31.6)
Q.3 (vaccine or treatment)	52 (44.4)	65 (55.6)
Q.4 (transmission way)	32 (27.3)	85 (72.7)
Q.5	29 (24.8)	88 (75.2)
<b>Knowledge</b>		
<b>Poor</b> ( $\leq 2$ correct answers)	<b>92 (78.6)</b>	
Fair (3 correct answers)	15 (12.8)	
Good (4 correct answers)	10 (8.5)	
<b>Proper knowledge</b> (fair + good)	<b>25 (21.4)</b>	

**Table 2.** Multivariate analyses with *proper knowledge* as depending variable.

Variable	B	P	OR	CI 95%
Age	-0.053	0.52	-	-
Physician/nurse	-0.098	0.57	-	-
Previous knowledge	-0.476	<0.001	<b>8.6</b>	3.19 - 26.62

have been reported in 4 Central African countries (Uganda, Gabon, Republic of the Congo and Democratic Republic of the Congo) [4]. Those outbreaks had a common denominator: only rural more or less isolated communities were affected. Given the virus low basic number of reproduction (an estimated of 1.2 - 1.9 secondary cases per index case) [5], these epidemics declined promptly and were considered, on the whole, as local “tropical endemic” troubles [6]. Nevertheless, the 2014 ebola virus sudden irruption in the high-densely populated urban areas of West Africa has changed everything: thousands of cases have spread justified fears among the community and local sanitary staffs. According to several reports, the basic practice of medicine has been altered, including limitation of physical examinations, hesitance to giving intravenous manipulations and even closure of supporting hospital facilities [7]. Although in Spain the proper attention to any imported case has been always ensured, some circumstantial, and disproportioned, anxieties have been publicly expressed.

How it was possible? Neither the sanitary structures nor the infection-control resources of a country belonging to European Union have anything to do with West Africa situation. The results of the study could hypothesize that without a proper knowledge on hemorrhagic diseases, any informal information (and especially any over information) does not necessarily translate into quality knowledge not to mention policies of expert leading and management [3] [8]. As reflect of the lacking of key knowledge, it should be emphasized that the highest proportion of incorrect responses were obtained in Question 4, regarding the HF virus transmission ways. This is an obvious core point to strength when drawing up any future formation program.

Nurses did not score significantly less than physicians. However, considering that during HF outbreaks nurses have the greater risk to accidentally contact with body fluids (particularly with contaminated syringes and needles), any eventual specific program on ebola or HF should include and deal with specific nursing aspects of these diseases [9].

Question 5, aiming to assess what the respondents qualified as *hemorrhagic viruses*, shown only a 28.4% of correct responses; in absolute numbers, only 29 individuals cited *ebola* as an *hemorrhagic virus*. This fact exemplifies the difficulties of finding a place for new “exotic” pathogens in the well-structured infectious diseases mental schedules of clinicians. Despite so, and unfortunately, with the ebola outbreak the future has come today: International Health principles should to be incorporated in pre-degree studies [10].

Like in Congo, health authorities adopted reacting measures focused in the purchase of protective equipment. Realising the useless of such a policy without the appropriate technical required knowledge, a training-the-trainers seminars program for both hospital and Primary Care personnel was designed [11]. Although implemented with good intentions, these seminars could not possibly substitute a formal teaching. It should be remarked that the contestants stating previous specific knowledge on HF have obtained clearly the better results. Thus, formalizing this knowledge on “tropical diseases” or “imported diseases” such as ebola and other HF is probably the best way to normalize the perception of HF [12] [13].

Some surprisingly, there were scarce similar studies available in the medical consulted databases (PubMed, EMBASE and Spanish Medical Index) and, thus, the results obtained could not be easily compared. That represents a major limitation of the study and, therefore, its outcomes should be interpreted carefully. Much more about HF and ebola knowledge can be investigate. One obvious deducible line of investigation concerns the results of the given educational workshops [14]. Did the participants enhance their knowledge? Were the training-the-trainers workshops the better affordable strategy? A second part of the study should be designed.

It would be not possible to close the article without reference the ethical aspects of the ebola and HF attention, a topic usually ignored in the turmoil of the mass-media alarmist attitude. Further than the governmental obligation to provide protection to healthcare workers, it should be stated that each of us also has a moral obligation beyond the professional responsibilities when attending any patient with HF suspicion [15]. On the other hand, governments and institutions must take steps to generate and channelize desperately needed resources to the Western African countries [16] [17].

## 5. Conclusion

The wave of panic that accompanied the single secondary-transmitted ebola case in Spain could be explained by the existence of a serious gap in the knowledge on HF. More accurate, scientific and formally-presented information should be provided to Primary Care physicians and nurses. International Health knowledge should to be incorporate during pre and post-degree.

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## Ethics

Research Ethics Committee, North Metropolitan Primary Care Service. Institut Català de la Salut.

## Conflict of Interests

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