

Doctors' Knowledge of Viral Haemorrhagic Fevers

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Abstract

Viral Haemorrhagic Fevers (VHF) such as Ebola Virus Disease (EVD) are of increasing concern to clinicians and public health bodies across Europe and America due to the on-going epidemic in West Africa. We conducted an online study to assess clinicians' knowledge of VHF across six hospital sites in London. This showed suboptimal knowledge of Public Health England guidance, EVD epidemiology and the risk factors for acquiring VHF. Knowledge about VHF was dependent on seniority of grade with the most junior grade of doctors performing worse in several areas of the survey. Poor knowledge raises concerns that those at risk of VHF will be inappropriately risk stratified and managed. Education of doctors and other healthcare professionals about VHF is necessary to address these knowledge gaps.

Keywords

viral haemorrhagic fevers, Ebola virus, doctor's knowledge, Education.

Key Learning Points

- Clinicians should be aware of the PHE guidance on risk assessment of patients returning from a VHF endemic area which can be accessed through: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377142/Algorithm_v5.pdf)
- Training and education of Healthcare staff through face to face teaching and eLearning is important in addition to increasing their awareness through posters and emails

Introduction

The 2014 outbreak of the Ebola virus disease (EVD) in West Africa is the largest outbreak of Ebola virus ever recorded.¹ The outbreak started in Guinea and spread to neighbouring countries through the travel of infected individuals.¹ Cases outside of Africa have been associated with the return of infected individuals, either during the incubation period or as repatriates for medical treatment. Cases of person-to-person transmission have arisen in both Spain and the USA after the repatriation of infected individuals.²

At the time of writing, there had been 1 case of EVD diagnosed within the UK in a healthcare professional returning from volunteer work in Sierra Leone, West Africa.^{2b} In addition, a patient infected with EVD has been repatriated to the UK to the Royal Free Hospital for treatment of confirmed EVD.³ Due to the potential spread of EVD, Public Health England (PHE) has released guidance on the management of viral haemorrhagic fevers (VHF) including a risk assessment for patients who may have been exposed to a VHF.⁴

Whilst most VHF transmission has been through contact with infected individuals, PHE guidance recognises other risk factors are associated with transmission. These factors include contact with bush animal (thought to be the possible cause of the current outbreak),⁵ mining and caving⁶ and contact with bodily fluids of cave-dwelling animals e.g. fruit bats, which are known to inhabit the geographical range of the current EVD epidemic and from which Ebola virus-related sequences have been isolated.⁷

Clinicians in acute assessment settings such as urgent care, emergency departments or acute medical units may be responsible for the assessment of these individuals with potential exposure to VHF. The aim of this study was to assess clinicians' knowledge of VHF and their ability to act in accordance with PHE guidance on management of potentially exposed patients.

Material and Methods

Setting and population

The study population was comprised of clinicians across 6 hospitals in London. These hospitals all have

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emergency departments and medical assessment units for the assessment and management of acutely unwell patients. There is therefore a possibility of a patient with suspected EVD attending their site. Clinicians across all grades were included in the study population to determine their knowledge of VHF and to assess for knowledge differences between clinicians of varying experience and speciality.

Study design and procedure

A 19 point questionnaire was designed by a team of Acute Medicine clinicians. It included basic demographic information including age, gender and clinical speciality. Questions were formulated to assess knowledge of the major areas covered in the PHE guidance. These areas included risk assessment, symptoms, disease management and infection control. At the time of questionnaire design and response collection, Nigeria was designated as having had an EVD case which resulted in the spread to 18 other people in total; 7 people died from EVD. Nigeria was later declared clear of EVD on 20th October 2014. The Democratic Republic of Congo also experienced cases of EVD in an unrelated outbreak.

Data collection and analysis

The questionnaire was administered online via survey monkey between 1st September 2014 and 30th September 2014 inclusive. Participation was voluntary. Requests for participation were sent out twice to clinicians at each hospital site designated Hospital A, Hospital B, Hospital C, Hospital D, Hospital E and Hospital F by administrators within their Department of Postgraduate Medical Education.

Data from respondents' entries were analysed using IBM SPSS v22. The questionnaire was analysed to interpret questions explicitly from the PHE guidance. Non-parametric Pearson chi-squared tests were used to analyse the differences between subgroups and determine interactions between subgroups.

Results

1. Demographics

Replies were received from 341 respondents, representing a 23% response rate. The demographics of respondents are shown in Figure 1.

2. Clinicians' knowledge of VHF and PHE guidance

Only 114/341 (33.4%) could identify the four VHFs included in a list of tropical diseases: Ebola, Marburg, Lassa and Crimean Congo fever. However, 340/341 (99.7%) did correctly identify that Ebola virus disease is classified as a VHF.

Respondents were asked whether they were aware of PHE guidance on the management of VHF. Only

Gender	n	%
Male	162	47.5%
Female	179	52.5%
	341	100.0%
Age		
<25	20	5.9%
25-34	219	64.2%
35-44	52	15.2%
>44	50	14.7%
	341	100.0%
Grade		
FY	102	29.9%
SHO	100	29.3%
SpR	60	17.6%
Cons	79	23.2%
	341	100.0%
Hospital Site		
Other O	32	9.4%
Hospital D	57	16.7%
Hospital C	78	22.9%
Hospital A	71	20.8%
Hospital B	47	13.8%
Hospital F	23	6.7%
Hospital E	33	9.7%
	341	100.0%
Specialty		
Medicine	226	66.3%
A&E	23	6.7%
Surgery	25	7.3%
Anaesthetics	21	6.2%
Paediatrics	20	5.9%
Other	26	7.6%
	341	100.0%

Figure 1. Demographics of survey respondents (n=341).

76/341 (22.3%) were aware of the PHE guidance on management of patients suspected to have VHF.

Further questions were designed to test participants' ability to identify a patient's relative risk of VHF based on assessment in an acute setting. Only 121/341(35.5%) identified the four countries currently experiencing an EVD epidemic in West Africa (Guinea, Sierra Leone, Liberia and Nigeria).

Whilst most transmission has been through contact with infected individuals, PHE guidance recognises other risk factors are associated with transmission of VHF. Respondents were asked to identify risk factors for VHF exposure as per the PHE guidelines. 338/341 (99.1%) identified travel to an area with a recent VHF outbreak as a risk factor. Other risk factors (Figure 2) were identified by the following proportions: being involved in

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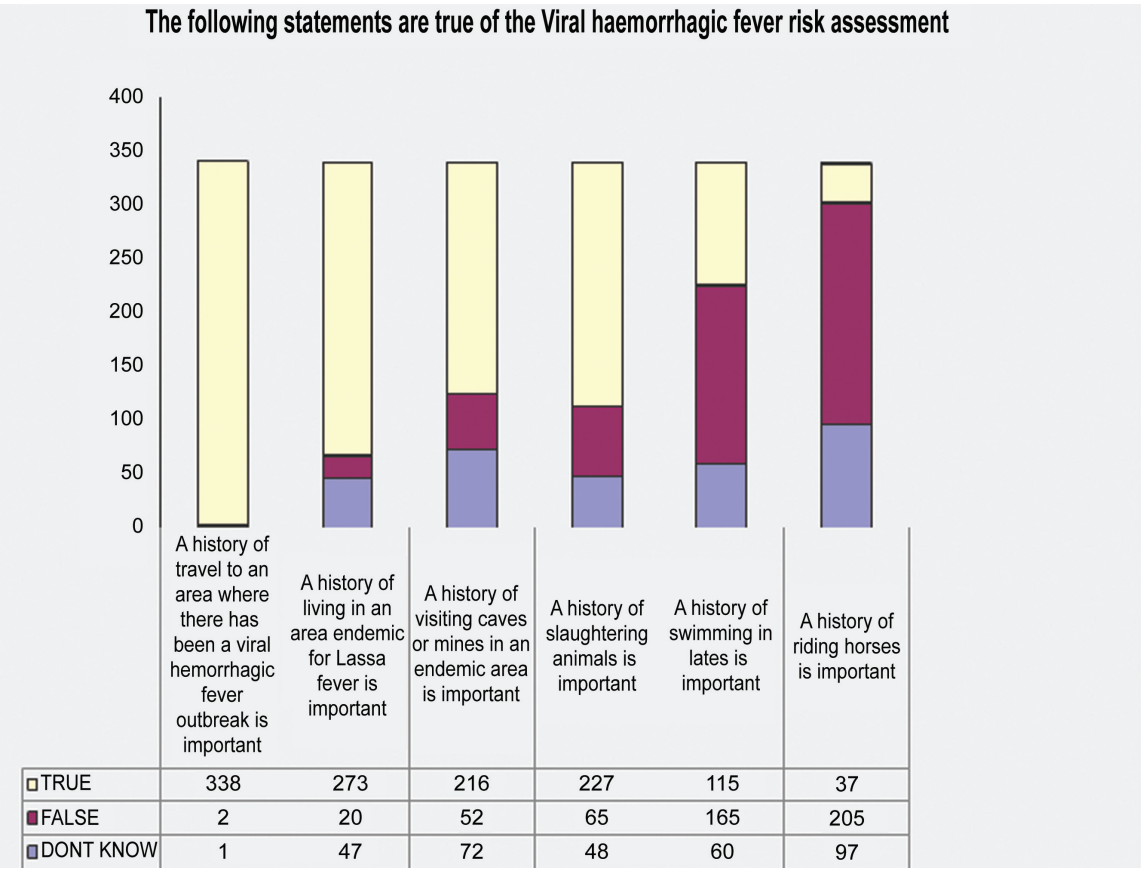


Figure 2.

animal slaughter: 227/341 (66.6%); visiting caves or mines: 216/341(63.3%), contact with bats: 178/341 (52.2%); and contact with primates 95/341 (27.9%).

Almost all (327/341, 95.9%) respondents correctly identified contact with bodily fluids as the mechanism of spread of infection. However, 87/341 (25.5%) also thought aerosols were a mechanism of spread. When asked to choose the incubation period for Ebola virus disease only 158/341 (46.3%) correctly opted for 2–21 days. Additionally, 87/325 (25.5%) identified a shorter incubation period and 90/341 (26.4%) responded that they did not know.

Clinicians were asked to identify early symptoms of EVD. The majority identified that fever (333/341, 98%); fatigue (269/341, 79%) and sore throat (222/341, 65%) were early features of the disease. Only 103/341 (30%) identified maculopapular rash as an early symptom. Other non-specific symptoms were commonly selected, including headache (277/341, 81%), myalgia (274/341, 80%), and arthralgia (215/341, 63%). Only 85/241 (25%) thought bleeding from mucus membranes was an early feature of EVD.

3. Differences in knowledge between subgroups

The results were analysed to determine differences in knowledge by both grade of doctor (Figure 3) and hospital site of work (Figure 4). Seniority of grade

was associated with differences in awareness of PHE guidance, identification of common VHF, correct recognition of 4 countries currently experiencing epidemic of EVD and correctly identifying incubation period.

Foundation doctors were also worse at identifying common causes of VHF (p=0.002), with only 19/102 (18.6%) identifying the four of the most common VHFs. This compared with senior house officers: 29/100 (39.0%), registrars 26/60 (43.3%) and consultants 30/79 (38.0%). Foundation year doctors were also worse at identifying the 4 countries experiencing the current EVD outbreak (p=0.009), with only 24/102 (23.5%) responding correctly. The score for senior house officers was 42/100 (42%), registrars 28/60 (46.7%) and consultants 27/79 (34.2%). Finally, foundation year doctors were least likely to know the incubation period for EVD with 43/102 (42.2%) compared to senior house officers 51/100 (51%), registrars 38/60 (63.3%) and consultants 46/79 (58.2%) (p=0.04).

Only 10/102 (9.8%) of Foundation doctors reported being aware of PHE guidance compared to senior house officers: 22/96 (22.9%), registrars: 21/60 (35.0%) and consultants 23/79 (29.1%) (p=0.001).

Subgroup analysis was also undertaken to look at differences across hospital sites. Site of work

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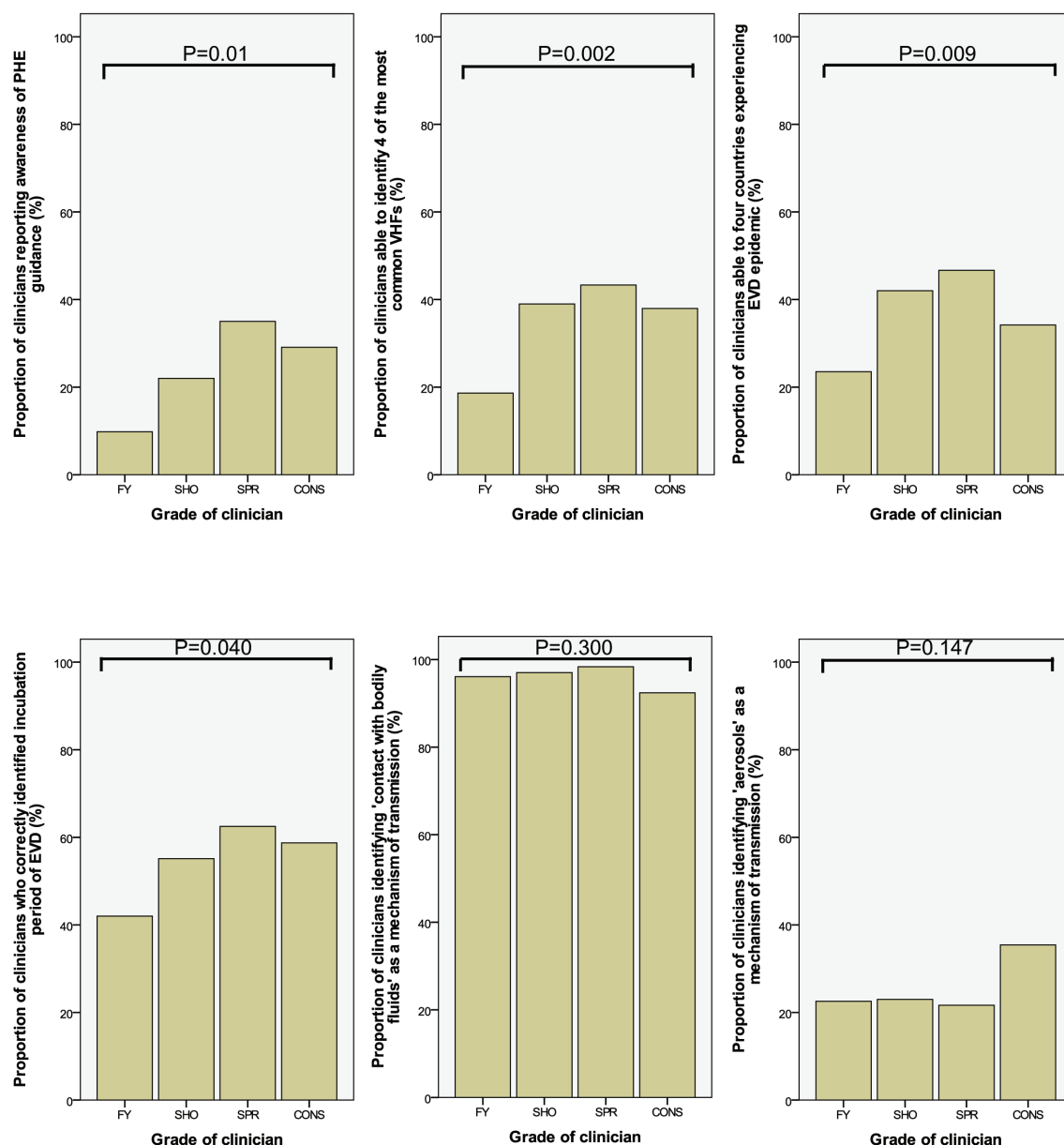


Figure 3. Differences in knowledge by grade of doctor.

was significantly associated with difference in self-reported awareness of PHE guidance ($p=0.035$). Hospital F performed worse, with none of the 23 (0%) respondents claiming awareness of PHE guidance. In comparison, 7/47 (14.9%) claimed awareness at Hospital B, 11/57 (19.3%) at Hospital D, 15/71 (21.1%) of Hospital A doctors, 10/33 (30.3%) at Hospital E, 24/78 (30.8%) of those at Hospital C and 9/32 (28.1%) at Hospital F. There was no difference between identification of the mechanism of spread between site of hospital and grade of doctor.

Discussion

This survey showed poor knowledge on information contained in the PHE guidance. Less than a quarter

of respondents were aware of the PHE guidance on management of patients potentially exposed to VHF.

Reassuringly, the overwhelming majority of clinicians know that the Ebola virus is a viral haemorrhagic virus although only a third of respondents could correctly identify the other three VHF's included in a list of tropical diseases (Marburg, Lassa and Crimean Congo fever). This suggests clinicians do not have a good understanding of the heterogeneous aetiology of VHF's. This raises questions about whether relevant risk factors and geographical ranges would be identified.

Almost all clinicians are aware that return from a VHF area puts a patient at risk of VHF themselves. However it is unclear whether doctors would identify a patient returning from an EVD epidemic area as at

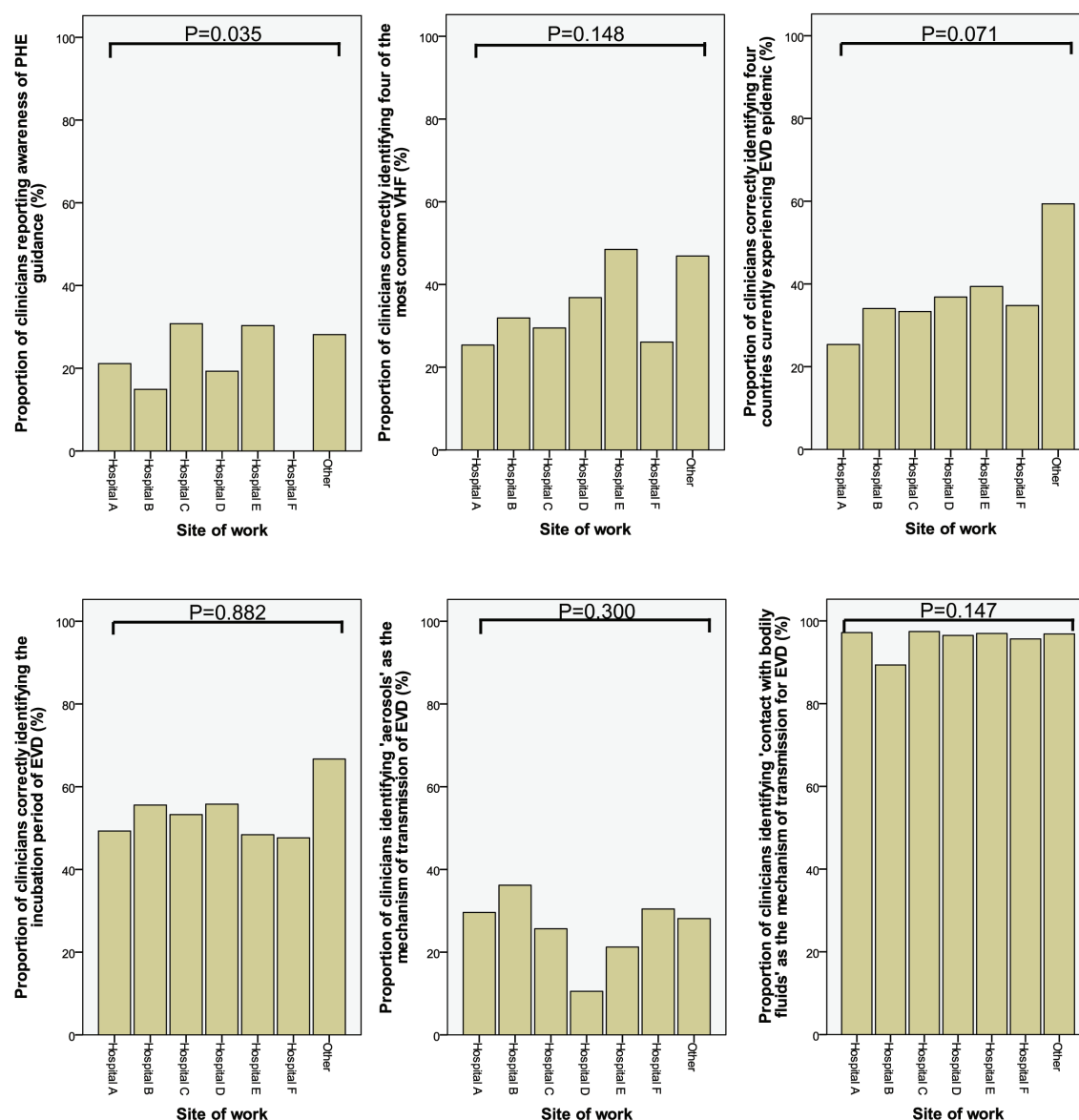
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Figure 4. Differences in knowledge by site of work.

risk of EVD. Just over one third of respondents could identify the three countries currently experiencing an EVD epidemic in West Africa.

Whilst most VHF transmission has been through contact with infected individuals, PHE guidance recognises other risk factors are associated with transmission. However, the inability of respondents to identify other important risk factors for VHF suggests a limited understanding of relevant epidemiology.

Almost all respondents correctly identified contact with bodily fluids as the mechanism of spread of infection. However around one quarter also thought aerosols were a mechanism of spread. There is no evidence aerosol transmission occurs between humans, as reviewed by the CDC⁸ and supported by recent estimates of the reproductive number as below 2.0.⁹

This incubation period of EVD is 2-21 days as described in WHO guidance.¹ Recent analysis of the first 9 months of the epidemic provides a strong evidence base for this, suggesting over 95% of cases developed symptoms within 21 days of exposure. Over half of all doctors did not know the incubation period, one in four thinking it was significantly shorter than evidence suggests.

These results raise major concerns as to whether clinicians would be able to correctly identify high risk returning travellers as at risk of VHF. Failure to appreciate the areas of the current epidemic, risk factors for exposure, mechanism of transmission and incubation period may prevent early recognition of patients with VHF. Such delays may hinder effective management of the patient and prevent infection control measures to limit spread from being taken.

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Foundation year doctors performed significantly worse in many questions. This may be unsurprising given foundation year doctors are the most junior of clinicians. However, in most hospitals foundation year doctors are involved in the assessment of new patients attending acute assessment units. Efforts should be therefore be made to include foundation year doctors in education to aid early recognition of risk factors and symptoms.

This study has highlighted the deficits in the knowledge of clinicians in those hospitals surveyed. Whilst this assesses individual knowledge, it does not assess how teams would perform in assessing at-risk patients in clinical situations. Teams might be more likely to consider VHF as a diagnosis, especially where senior input is common. Furthermore, our survey does not cover triage nurses who may be the first healthcare practitioners assessing individuals at risk of VHF. Likewise, this survey does not describe the knowledge of different medical specialities. In some hospitals infectious disease teams may be responsible for assessing returning travellers presenting with fever. These clinicians would be expected have better knowledge of VHF.

Concerning the methodology used, online surveys are now widely used in survey research. However there remains considerable debate about the best strategies to assure response rates that will allow one to generalise from the data. In an attempt to improve response rates, a reminder was sent to non-responders 2 weeks after the start of the survey. Given that low response rates are typical of many online surveys and given the public health relevance of this piece of work, we are satisfied that the available data as “exploratory data” looking at doctors knowledge of VHF is justifiable.

This study was carried out in September 2014. Continued extensive coverage of the ongoing outbreak in the media may well have increased clinician awareness of the outbreak as well as their knowledge with regards to risk factors, mode of spread, clinical presentation and PHE guidance.

Conclusions

Few clinicians were aware of the guidance from PHE which may hinder prompt and appropriate management of patients and put the health of health care professionals at risk. Clinician's knowledge of risk factors for VHF transmission and the basic epidemiology of its spread could be improved which would help in the possible early diagnosis of patients with EVD and preventing its spread, especially in the context of the current EVD outbreak. Specifically the ability to identify the commonest causes of VHF, identify the countries experiencing the current EVD outbreak, knowledge of the clinical presentation and incubation period of EVD as well as knowledge and familiarisation of PHE guidance is essential. These knowledge deficits are currently being addressed through specific training and education sessions aimed at all staff.

Acknowledgements

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Conflict of interest

Nothing to declare

Main Findings

- Almost all clinicians know EVD is VHF that is spread through contact with bodily fluids.
- Almost all clinicians are aware that those returning from VHF regions are at risk of VHF.
- Clinicians report being unaware of guidance released by PHE.
- Clinicians are largely unaware of the risk factors for acquiring VHF or the incubation period.
- A significant proportion of clinicians wrongly think EVD is spread by aerosols.

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