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Original Research Article

Crimean-Congo haemorrhagic fever: knowledge and practices of doctors at a tertiary care hospital in Lahore

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ABSTRACT

Background: Crimean-Congo haemorrhagic fever (CCHF) is a potentially fatal yet preventable zoonotic haemorrhagic disease which has consumed the lives of many health care workers in different regions of Pakistan over the past few years. There is neither a specific therapy nor an effective vaccine for the disease, which makes prevention the most rational approach towards CCHF. Hence, our main objective in this study was to determine the knowledge and practices of doctors regarding Crimean-Congo haemorrhagic fever (CCHF) at a tertiary care teaching hospital in Lahore.
Methods: Non-probability convenience sampling was used to recruit the study sample (N=136). A structured questionnaire was used to collect data comprising of 35 multiple response questions pertaining to demographic information and knowledge and practice of the respondents regarding CCHF. Descriptive statistics was used to present data as numbers and percentage.
Results: The study participants included 46 house officers, 69 post-graduate trainee/medical officers and 21 consultants. Among the respondents, 80% rated their knowledge regarding CCHF to be insufficient and 71% revealed that they did not feel confident while managing a patient of CCHF. While managing patients with active haemorrhage, 32% of our respondents either never or only sometimes used personal protective equipment. Nearly all study participants (93%) expressed the desire to acquire more education on CCHF in future.
Conclusions: Knowledge of doctors regarding CCHF and compliance in terms of standard infection control protocols were inadequate.

Keywords: Crimean-Congo haemorrhagic fever, Knowledge, Compliance, Health care workers, Zoonotic

INTRODUCTION

Crimean-Congo haemorrhagic fever (CCHF) is a potentially fatal zoonotic haemorrhagic disease caused by infection with a tick-borne negative-stranded RNA virus (Nairovirus) belonging to the family Bunyaviridae.[1] After dengue virus, nairovirus is the most widespread of all medically significant arboviruses.[2] The disease was first characterized in the Crimean Peninsula in 1944 and the virus was first isolated in 1969 in the Democratic Republic of Congo, thus resulting in the current name of the disease.[1] Crimean-Congo haemorrhagic fever has a widespread geographical distribution ranging from eastern Europe throughout the Mediterranean, in north-western China, central Asia, southern Europe, Africa, the Middle East, and the subcontinent.[3-5] According to Salimi et al.,[2] the strongest evidence for presence of CCHF has been documented in 5 countries namely Turkey, Iran, Afghanistan, Tajikistan, and Pakistan. CCHF poses a major threat to public health services due to its fatal

potential and an alarming case fatality rate ranging from 10-50%.[6,7]

CCHF is a deadly illness, the hosts of which include a wide range of domestic as well as wild animals such as cattle, sheep, goats and hares. The Hyalomma species of the hard tick are the principal vectors of this disease. This viral disease is asymptomatic in infected animals while poses a serious threat to humans. The disease may be transmitted in humans by the bite of a Hyalomma tick; contact with blood, secretions or tissues of infected animals; drinking unpasteurized milk and direct contact with the blood, secretions or tissues of an infected person, including nosocomial transmission.[8,9] Hence knowledge of medical personnel regarding CCHF should be assessed and evaluated frequently.

CCHF starts with a sudden onset of high grade fever associated with non-specific symptoms like headache, joint pains, myalgias, nausea, vomiting, diarrhoea, sore throat, jaundice, conjunctivitis, photophobia and mood disorders.[5,7] Fever is generally unresponsive to antibiotic and antimalarial treatment. These initial symptoms are later followed by haemorrhagic symptoms (petechiae, purpura, ecchymosis, haemoptysis, hematemesis, haematuria, mucosal bleeds and internal bleeding) together with lymphadenopathy and hepatomegaly.[10] Severely ill patients may develop liver failure, deterioration of kidney functions, respiratory failure, shock and DIC.[9] The ratio of subclinical to clinical CCHF cases is approximately 5:1, and up to 80% of infections can be asymptomatic/subclinical.[11,12]

Anaemia, leukopenia, thrombocytopenia, elevated AST/ALT together with prolonged prothrombin time (PT) and activated partial thromboplastin time (aPTT) maybe some of the laboratory findings of CCHF patients.[9] However, the definitive diagnosis of the disease is made by the detection of IgG and IgM antibodies (ELISA), viral RNA Sequence (RT-PCR) and virus isolation techniques.[13]

Treatment of CCHF patients is mainly supportive including fluid and electrolyte balance, hemodynamic stability and appropriate treatment for secondary infections. The antiviral drug Ribavirin has been used in the treatment of CCHF patients with reported success.[14] Since there is no safe and effective commercially available vaccine against CCHF, the recommended way of reducing transmission of the disease is by prevention and control measures.[7] Health care workers are a high-risk occupational group for CCHF infections and hence, probable CCHF patients should immediately be isolated and strict barrier nursing techniques must be adapted to reduce nosocomial transmission.[2] It is essential for health care workers to adapt standard infection control protocols (including personal protective equipment, basic hand hygiene, safe injection practices, safe sampling and safe burial practices) to prevent occupational exposure.[5]

Most of the nosocomial transmission reported in literature has been due to managing CCHF patients with inadequate personal protective measures (especially during invasive procedures like inserting endotracheal tubes and nasogastric tubes); through subcutaneous needle stick injuries; accidents during surgical interventions; mouth to mouth resuscitation and while handling blood or body fluids of CCHF patients without gloves.[3,15] The use of universal infection control precautions and early case detection has been proven to significantly reduce the nosocomial transmission of CCHF from patients to Health care workers.[15] CCHF has been labelled by the World Health Organization as one of the emerging diseases for which prevention and control has to be transformed, intensified and strictly implemented.[2]

In Pakistan, the first ever case of CCHF was reported in 1976 at the Central General Hospital, Rawalpindi and since then multiple sporadic outbreaks have occurred in Pakistan making it an endemic disease in the country.[8] A total of 294 cases of CCHF have been confirmed by the National Institute of Health, Islamabad from 2012 up till 2016 with Baluchistan being the most affected province followed by Khyber Pakhtunkhwa. These growing figures have been associated with increased nosocomial transmission from patients to health care workers due to lack of or improper use of personal protective equipment (PPE) during the early phase of the disease when CCHF has not yet been recognized.[16,17] To make matters worse, case fatality rates among nosocomial cases are supposedly higher than in community-acquired cases, which makes the situation all the more grave.[11] In a study regarding the seroprevalence of CCHF virus among at-risk health care workers, Gozel et al reported that sero-prevalence was low in health care workers who had the highest compliance rates for the usage of personal protective equipment (including gowns, gloves, surgical masks and eye protection).[18]

The first ever outbreak of CCHF in Pakistan in 1976 involved a surgeon who died in the line of duty while operating upon a patient with abdominal pain, melena and hematemesis. December 1994 saw another outbreak of this disease with 2 surgeons being infected with the deadly Nairovirus while operating upon a bleeding patient.[8] In 2002, a nosocomial outbreak occurred in Rawalpindi where 2 health care workers were infected and one of them passed away.[15] Over the past few years, health care-related CCHF infections continue to be reported despite sophisticated infection control policies being drafted which is an indicator of poor infection control practices.[4,17] The availability and use of personal protective equipment together with education of HCWs regarding standard infection control practices is the main mode of prevention against nosocomial spread.[18]

The death of health care workers in Pakistan due to this fatal yet preventable disease has been an alarming situation for the health care authorities. It is essential for

doctors to update their knowledge regarding newly emerging diseases which are not taught routinely as part of the curriculum. There is dearth of studies, especially in Pakistan, which assess the knowledge of doctors regarding CCHF and determine their compliance with infection control measures while managing suspected CCHF patients. The results of the present research could help in formulating future health policies and strategies aimed at improving the knowledge levels of doctors and reducing the nosocomial transmission of the disease by complying to universal infection control precautions.

METHODS

Study design

A descriptive cross sectional study was conducted over a period of one month in January 2017, at Ghurki Trust Teaching Hospital (GTTH), Lahore. This is a 580 bedded tertiary care hospital, affiliated with Lahore Medical and Dental College (LMDC). A total of 136 volunteering doctors currently employed at GTTH were recruited as study participants through a non-probability convenience sampling technique.

Data collection and analysis

A structured questionnaire was used to collect data comprising of 35 multiple response questions pertaining to background information, knowledge and practice of doctors regarding CCHF.

In the knowledge and practice section, correct answers were mixed with incorrect statements to assess the knowledge in a non-biased manner. Data entry and cleaning was done using SPSS version 16. Descriptive statistics was used to present data as numbers and percentage.

RESULTS

Among 136 doctors interviewed, 73 (54%) were males while 63 (46%) were females. As seen in Table 1, the study participants mostly comprised of post-graduate trainee or medical officers (51%) and house officers (34%). Around 79% of doctors had work experience of five years or less, 46% used internet on daily basis, only 24% had previously worked in a rural area and 88% of the participants had never encountered a CCHF patient.

Among the doctors interviewed, only 40% could correctly identify the causative agent of CCHF as Bunyaviridae, 60% could recognize ticks to be the principal vector of the disease, though 29% selected mosquitos to be the disease vector. Multiple transmission routes of CCHF were identified by doctors which included blood/secretions of infected animals (54%), bite of infected insect (48%) and sick people's blood or secretions (43%). Large number of participants (60%) did not regard health care workers to be a high risk group for contracting CCHF (Table 2).

Table 1: Background characteristics of respondents (N=136).

Category	N	Percentage (%)
Department		
Medicine and allied	62	45.6
Surgery and allied	74	54.4
Designation		
House officers	46	33.8
Postgraduate trainee/medical officers	69	50.7
Consultants	21	15.4
Duration of medical practice		
≤1 year	57	41.9
2-5 years	50	36.8
≥ 5 years	29	21.3
Use of internet to update medical knowledge		
Daily	63	46.3
Weekly	30	22.1
Need based	43	31.6
Practiced in rural area		
Yes	33	24.3
No	103	75.7
Encountered a CCHF patient before		
Yes	16	11.8
No	120	88.2

Table 2: Knowledge regarding characteristic features of CCHF (N=136).

Category	Positive response by respondents	
	n	Percentage (%)
Causative agent of CCHF		
Bunyaviridae	55	40.4
Filo virus	41	30.1
Marburg virus	14	10.3
Wolbachia pipientis	14	10.3
Others	12	8.8
Vector for CCHF		
Tick	81	59.6
Mosquito	39	28.7
Tsetse fly	4	2.9
Others	12	8.8
Transmission routes		
Contact with blood/secretions of infected animals	73	53.7
Bite of infected insect	66	48.5
Ingestion of meat of infected animals	18	13.2
Contact with sick people's blood or secretions	58	42.6
Inhalation	11	8.1
High risk groups for CCHF		
Butchers	68	50.0
Animal breeders	78	57.4
Healthcare workers	54	39.7
Fishermen	4	2.9
Soldiers	3	2.2

Table 3: Knowledge regarding prevention and management of CCHF (N=136).

Category	Positive response by respondents	
	n	Percentage (%)
Approach to a suspicious CCHF patient		
Hospitalize the patient immediately	110	80.9
Provide barrier nursing to CCHF patients	61	44.9
Penetrative procedure should be reduced	36	26.5
Discharge patients after supportive therapy	29	21.3
Management of CCHF		
Fluid/electrolyte replacement	106	77.9
Blood replacement	66	48.5
Vasopressors in cases of shock	33	24.3
Broad spectrum antibiotics	15	11.0
There is no specific treatment for CCHF	88	64.7
There is no effective vaccine against CCHF	84	61.8
Precautions that should be taken by healthcare personnel		
Wear gloves and N95 masks at all times	95	69.9
Used needles should be disposed of in a medical waste box	72	52.9
Apply mosquito repellents	39	28.7
Wear safety glasses during invasive procedures	54	39.7
Reuse protective suits before examining the same patient again	21	15.4

Knowledge levels of the respondents regarding symptoms of CCHF are summarized in Figure 1. Fever was the most commonly recognized symptom of CCHF (77%), followed by haemorrhage (56%), petechiae (52%) and diffuse muscle pain (50%). Only 10% of doctors could identify that CCHF can be an asymptomatic or a subclinical disease.

Among the respondents, 74% associated low platelets with CCHF while only 31% considered reverse

transcriptase-polymerase chain reaction (RT-PCR) to be an essential diagnostic investigation for this disease (Figure 2).

Table 3 highlights the knowledge of study participants regarding prevention and management of CCHF. For suspected cases of CCHF, the majority (81%) correctly identified the significance of early hospitalization of the patient, however very few doctors selected the option of providing barrier nursing (45%) or reducing penetrative procedures (26%). Some study participants (21%) were of the opinion that suspected CCHF patients could be discharged after supportive therapy.

Considering the management of CCHF patients, 65% of the doctors accurately acknowledged that there is no specific treatment for CCHF, 78% knew that fluid and electrolyte replacement is the mainstay of the supportive management while 62% were aware of the fact that there is no commercially available safe and effective vaccine available for CCHF.

Table 4: Respondent's compliance with safety protocols and precautions against CCHF (N=136).

Category	Yes (%)	No (%)
Do you always use of personal protective equipment (PPE) while managing a patient with active haemorrhage?	92 (67.6)	44 (32.4)
Do you always use of personal protective equipment (PPE) while managing a patient with nausea, vomiting and enteritis?	61 (44.9)	75 (55.1)
Do you always use gloves during invasive procedures (like obtaining blood samples) in the emergency room?	101 (74.3)	35 (25.7)
Do you always dispose of used sharp equipment and needles in the medical waste box after invasive procedures in the emergency room?	118 (86.8)	18 (13.2)
Do health care workers in your department undergo daily check-ups (of temperature and other symptoms) for 14 days after contact with infected blood and secretions?	35 (25.7)	101 (74.3)

Table 5: Information status and knowledge gap of respondents regarding CCHF (N=136).

Category	n	% (N=136)
How serious is the risk of transmission of CCHF to health care workers?		
Not serious	17	12.5
Serious	71	52.2
Very serious	48	35.3
How will you rate your CCHF knowledge level at this stage?		
Insufficient	109	80.1
Good	25	18.4
Very good	2	1.5
With your current knowledge do you feel confident while managing a patient with CCHF?		
Yes	40	29.4
No	96	70.6
Would you like to have more education on CCHF?		
Yes	127	93.4
No	9	6.6
What are the best ways of enhancing knowledge of health care workers regarding infectious diseases?		
Seminars and workshops		
Yes	98	72.1
No	38	27.9
CME conferences		
Yes	44	32.4
No	92	67.6
Medical journals		
Yes	20	14.7
No	116	85.3
Internet		
Yes	41	30.1
No	95	69.9

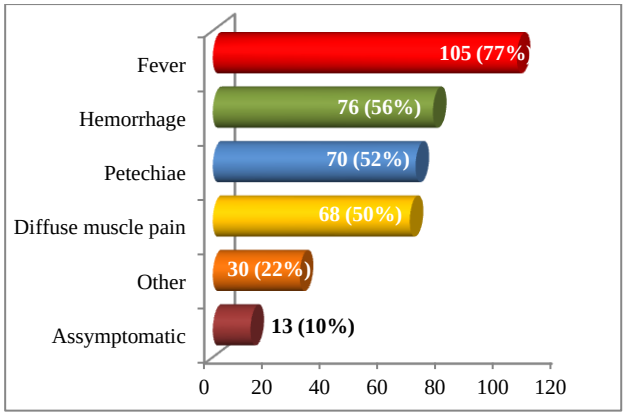

Figure 1: Knowledge regarding symptoms of CCHF (N=136).

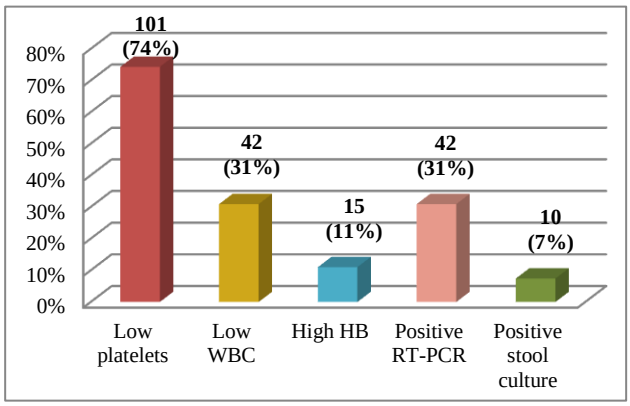

Figure 2: Knowledge about diagnostic features of CCHF (N=136).

When it comes to precautionary measures needed by health care professionals while approaching CCHF cases, 70% of the respondents acknowledged the necessity of wearing gloves and N95 masks at all times while managing a patient with active haemorrhage, 53% approved proper disposal of used needles while only 32% were aware of using bleach for disinfection of instruments.

Assessment of practices of doctors while handling CCHF cases revealed that compliance in terms of the use of personal protective equipment (PPE) by health care professionals (masks, gloves and gowns) was varied in different situations. PPE was used when managing active haemorrhage cases (68%), cases of vomiting or enteritis (45%) or when obtaining blood samples (74%). Proper disposal of sharps was acknowledged by 87% of study participants (Table 4).

The study participants were not sure whether personal protective equipment was available for doctors at GTTH, as 69 (51%) participants said these were present and 67 (49%) said they were not readily available. Similarly, on the topic of presence of a standard isolation area in the hospital to handle CCHF patients, 65 (48%) of doctors said it was present while 71 (52%) were of the opinion that such area does not exist at GTTH. When asked about 14 days monitoring of doctors post exposure to CCHF patients, only 35 (26%) committed that this is routinely done in their Departments, while 101 (74%) of the doctors revealed that no such follow up is done in their departments.

Table 5 presents the information status and knowledge gap of doctors regarding CCHF. Around 87% of the study participants regarded the risk of nosocomial transmission of CCHF to health care workers to be serious or very serious, 80% regarded their knowledge about CCHF to be insufficient, 71% were not confident in managing CCHF patients and 93% desired to have more education on this disease. Doctors' preferred media of information transfer regarding CCHF in descending order were seminars/workshops (72%), CME Conferences (32%), internet (30%) and medical journals (15%).

DISCUSSION

The alarming death toll of health care workers in Pakistan due to the nosocomial transmission of Crimean-Congo haemorrhagic fever should be a wake-up call for health care workers as well as relevant government authorities. A physician is expected to timely diagnose and effectively manage the patients of CCHF but this should not be at a compromise to their own safety. Gozel et al reported that the availability and use of personal protective equipment together with education of HCWs regarding standard infection control practices is the main mode of prevention against nosocomial spread of CCHF.[18] The first step in this regard is to assess the current knowledge of at-risk doctors and to evaluate their compliance with standard infection control protocols while managing suspected CCHF patients.

Our study is the first one to analyse the knowledge, attitudes and practices of the junior and senior doctors working in different departments of a tertiary care teaching hospital at a non-endemic region in Punjab, Pakistan. The first step in solving any problem is to identify the existence of that problem, however like study participants of research conducted by Salimi et al, majority of the respondents in our study did not regard their own profession to be a high risk group for CCHF and a few did not consider the risk of transmission of CCHF to health care workers a serious threat.[2]

Majority of respondents in our study correctly identified that there is neither a specific therapy nor an effective vaccine against CCHF and supportive therapy is the mainstay of management, however the approach towards a CCHF patient was questionable. Contrary to the results of Yolcu et al, the necessity of providing barrier nursing and reducing penetrative procedures was shrugged off by 55% and 74% of our respondents respectively and 21% of the participants claimed that CCHF patients could be discharged after supportive therapy.[11] These measures may not only be detrimental to the health of the patients

but may also pose a serious threat to the life of the medical professionals caring for the patients.

While the study sample acknowledged the imperative need to use personal protective equipment to reduce nosocomial transmission, the compliance rates were below national and global standards expected of health care workers. This demonstrates the fact that theoretical knowledge may not always translate into practical application and hence the need to conduct such KAP surveys on a periodic basis. The unavailability of personal protective equipment and a standard isolation area for CCHF patients was also a dubious issue identified which is a shocking revelation amidst constant warnings by the National Institute of Health (NIH) Pakistan and World Health Organization (WHO).

The results of this study revealed that majority of the surveyed doctors had inadequate knowledge regarding CCHF which is comparable to other such studies conducted in the past.[2,10,11,16,19] The inadequacy in knowledge may partially be due to the fact that 88% of the participants had never encountered a CCHF patient before. 80% rated their knowledge to be insufficient and 71% of our respondents revealed that they did not feel confident while managing a patient of CCHF.

It is an imperative responsibility of health care authorities and hospital administration to enhance and update the knowledge of doctors regarding infectious diseases which pose a grave threat to the safety and life of the concerned health care personnel. This may be achieved by introducing educational campaigns and training programs aimed at creating awareness among the health care workers regarding prevention, early detection and prompt management of CCHF. Standard infection control protocols and safety measures should be an essential component of the undergraduate curriculum to enforce this concept into the minds of the medical students and to ensure behaviour changes from the very onset. Furthermore, a proper surveillance system needs to be implemented to ensure adequate availability of personal protective equipment (PPE) and strict adherence to standard safety precautions.

Limitations of the study

Due to limited time and resources, the present study was conducted only in one hospital in a non-endemic region of Punjab where only doctors were interviewed. Other health care workers including nurses, paramedics, laboratory personnel and midwifes were not included in the survey. Hence this sample size may not be representative of all the health care workers in all the hospitals in Punjab, Pakistan.

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