

# Contact Tracing for an Imported Case of Crimean–Congo Hemorrhagic Fever – Experience from a Tertiary Care Center in Kerala, South India

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## Abstract

A 30-year-old male working in an abattoir in UAE returned home to Kerala, South India, after getting diagnosed with Crimean–Congo hemorrhagic fever infection. He was admitted to a tertiary care center on the day of arrival and was placed under isolation. Due to the risk of spread of infection among health-care workers, contact-tracing and symptom-monitoring activities were undertaken. As strict standard contact precautions, isolation, contact identification and listing, quarantine, and sensitization of health-care workers were implemented, no secondary cases occurred.

**Keywords:** Contact tracing, Crimean–Congo hemorrhagic fever, health-care workers, high-risk contact, Kerala

## INTRODUCTION

Crimean–Congo hemorrhagic fever (CCHF) is a zoonotic viral illness and is considered to be an emerging infectious disease. CCHF is asymptomatic in infected animals, and the symptoms can range from nonspecific febrile illness to a serious hemorrhagic syndrome in humans. The disease has a wide geographical distribution and has been reported from Africa, the Middle East, Central Asia, and Eastern Europe. Hard ticks of the genus, *Hyalomma*, act as the reservoir and the vector for the CCHF virus, whereas animals such as cattle and goats serve as amplifying hosts.<sup>[1]</sup> Primary human infections occur through a tick bite, direct contact with blood of infected ticks, direct contact with blood/tissues of infected wild animals, and livestock. Secondary human-to-human transmission occurs through direct contact with the blood, secretions, organs, or other body fluids of infected persons.<sup>[2]</sup> It has also been demonstrated that the virus has the potential to be transmitted by aerosols.<sup>[3]</sup> CCHF outbreaks constitute a threat to public health services because of its epidemic potential, its high case fatality rate, its potential for nosocomial outbreaks, and the difficulties in treatment and prevention.<sup>[2]</sup> CCHF has been reported to have a case fatality rate in the range of 30%–50%.<sup>[4]</sup> There is no safe and effective vaccine available for humans or animals against CCHF infection.<sup>[5]</sup> The first reported case of CCHF from India

occurred in January 2011 in Ahmedabad. This outbreak resulted in the death of two health-care workers including the doctor who treated the index case.<sup>[6]</sup> Since then, sporadic outbreaks and cases among health-care workers were reported from Rajasthan and Gujarat.<sup>[7]</sup> A systematic review by Leblebicioglu *et al.* reports 21 cases of travel-associated infection.<sup>[8]</sup> An imported case from Oman to India was also reported in 2017.<sup>[9]</sup>

## THE STUDY

A 30-year-old migrant worker from Kerala who was an abattoir worker in the Middle East was diagnosed to have CCHF infection in a hospital in UAE on the 3<sup>rd</sup> week of November 2018 and was treated with ribavirin. After few days of treatment, a second PCR was done, and the result was positive for CCHF viral RNA. The following day, he requested discharge and traveled to Kerala, India. As he was

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suffering from nausea, headache and abdominal discomfort; he was admitted to a tertiary care center in central Kerala on the day of arrival and kept under isolation. Strict adherence to standard contact precaution was undertaken by health-care workers and patient caregivers. The district health authorities were informed, and rapid response team was constituted. Contact-tracing activity was initiated by the Community Medicine Department. Communications were sent to the airport authorities to trace potential contacts. A networked online surveillance system was set up. All patient movements were mapped for contact identification. Persons considered to have had significant exposure were listed as contacts into an online contact listing form using Google Sheets. A total of 27 contacts were identified. Among these, 24 were health-care workers in the tertiary health center, 2 were travel contacts, and 1 was a relative. Most of the health-care workers were unaware of the mode of spread of CCHF as it was the first time that such a case was reported in Kerala. All the contacts were categorized as either high-risk or low-risk exposure based on nature and duration of contact. Contacts who had direct exposure to the patient's body fluids (blood, vomitus, saliva, and urine) by touch and mucocutaneous or percutaneous exposure while attending to the patient were categorized as high risk. Contacts who did not have direct contact with body fluids or blood but had close physical contact with patient without using personal protective equipment and touched or cleaned the linens or clothes of the patient were categorized as low risk.<sup>[10,11]</sup> The contacts were informed of their contact status and the importance of receiving early care if they develop symptoms and preventive information. They were kept under symptom monitoring by direct personal interviews and telephonic interviews twice a day. Two high-risk contacts were placed under modified quarantine for a period of 14 days. The symptom-monitoring and follow-up activities were planned for a duration of 14 days which was the longest incubation period of CCHF infection reported.<sup>[10,12]</sup> On the 5<sup>th</sup> day of contact surveillance, one of the low-risk contacts, who was a resident in the emergency department, developed fever and headache. Immediate strict home isolation of the suspected case was done. The suspected case was started with ribavirin, and the blood sample was taken and sent for PCR testing to the District Medical Office (Health).<sup>[11]</sup> The suspected case's symptoms subsided after 2 days, and his PCR test report came as negative for viral RNA and negative for serology. All the other contacts were closely monitored for 14 days after exposure and all 26 remained asymptomatic. No secondary cases occurred. The index patient's clinical samples were tested 3 days after admission in the center and was found to be negative for viral RNA. The serology done was positive for CCHF IgM and IgG indicating recent infection. The details of contact tracing activity is given in Table 1.

## DISCUSSION

This study highlights the importance of early active contact tracing and risk communication to prevent nosocomial transmissions in hospital settings following admissions of

**Table 1: Results of contact investigation of a patient with Crimean-Congo hemorrhagic fever, Kerala, 2018**

Category	Contacts (n=27), n (%)
Type of contact	
High risk	2 (7.4)
Low risk	25 (92.6)
Age group	
18-30	10 (37)
31-40	11 (41)
>40	6 (22)
Gender	
Male	14 (52)
Female	13 (48)
Use of personal protective measures	
Used	16 (59)
Not used	11 (41)
Management of contacts	
Isolation and treatment	1 (4)
Modified quarantine	2 (7)
Symptom monitoring	24 (89)
Follow-up of contacts	
Telephonic interview	12 (44)
Personal interview	15 (56)
Symptoms	
Symptomatic	1 (4)
Asymptomatic	26 (96)

ECG: Electrocardiogram

viral hemorrhagic fevers and rare zoonotic diseases. The development of contact-tracing strategy for CCHF was a challenge for the team as this was the first reported case of CCHF in Kerala state. Various studies have reported that physical contact during clinical examination, emergency medical interventions, and percutaneous exposure are routes of nosocomial transmission of CCHF. Elata *et al.* reported a nosocomial transmission to an attending physician in Sudan.<sup>[13]</sup> A study by Altaf *et al.* from Pakistan describes an outbreak where a medical student contracted CCHF infection in the emergency room while examining a patient with CCHF.<sup>[14]</sup> In the present study, the authors performed an early risk assessment and divided the contacts into two groups based on the limited evidence about the routes of nosocomial transmission available in various published literature.<sup>[11,15]</sup>

A breach in the hospital infection control protocols is the foremost risk factor implicated in the nosocomial transmission of CCHF.<sup>[16]</sup> In our study, in addition to the provision of personal protective equipment, all health-care workers in the hospital including nursing assistants and cleaning staff in the isolation room were informed and trained about the transmission risks, barrier nursing techniques, and clinical symptoms of CCHF.<sup>[17]</sup> Many reports emphasize the beneficial effects of early use of ribavirin for the treatment and postexposure prophylaxis of CCHF.<sup>[18,19]</sup> The symptomatic contact was started on Ribavirin within 6 hours of onset of symptoms. It was given for 4 days and discontinued as the results were negative for CCHF.<sup>[20]</sup> Early recognition of CCHF cases is pivotal in the prevention

of nosocomial transmission. A delay of up to 4 days occurred for the confirmation of diagnosis in the center as the facilities for serological and molecular diagnosis of CCHF infection were unavailable in Kerala.

## RECOMMENDATIONS

The epidemiology of CCHF transmission suggests multiple strategies to prevent human disease.

1. Immediately isolate all suspected or confirmed cases in isolation room with negative pressure ventilation
2. Notify all suspected and confirmed cases to the district surveillance officer or the district medical officer
3. A universal standard of care that includes personal protective equipment (PPE) such as gloves, gowns, and masks and eye protection gear should be implemented for health-care workers at risk for viral hemorrhagic fever. N95 masks or FFP2 respirators are indicated if patient has respiratory symptoms<sup>[13]</sup>
4. Donning and doffing of PPE requires multiple steps and should be guided by an external monitor
5. Implement strict “safe sharp practices” to prevent phlebotomy-associated percutaneous injuries
6. Keep a heightened clinical suspicion of CCHF in international travelers, patients who had contact with livestock, and abattoir workers
7. Consider early administration of ribavirin in suspected CCHF cases without waiting for laboratory confirmation
8. Public health response in the form of contact tracing, contact listing, follow-up, quarantine of high-risk contacts, and symptom surveillance is necessary to prevent further spread in the community
9. Regular training programs on barrier nursing techniques of infection control are required to improve the awareness of health-care workers.

## CONCLUSION

The nosocomial hazard associated with CCHF can be prevented by following standard precautions in health-care settings. This study highlights the importance of early active contact tracing and risk communication to prevent nosocomial transmissions in hospital settings following admissions of viral hemorrhagic fevers and rare zoonotic diseases. CCHF is a notifiable disease to the World Health Organization.<sup>[10]</sup> Treating physicians and public health personal in India should keep a high index of suspicion of CCHF infection in patients who had recently returned from Africa and Middle East Countries.

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## Conflicts of interest

There are no conflicts of interest.

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