CD Alert

National Centre for Disease Control,
Directorate General of Health Services, Government of India

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Crimean-Congo Hemorrhagic Fever (CCHF)

INTRODUCTION

Crimean-Congo hemorrhagic fever (CCHF) is an Emerging Zoonotic Viral Disease of the Nairovirus group of the Bunyaviridae family. Its first outbreak was reported in 1944 when soviet troops re-occupying areas of Crimean Peninsula developed an acute febrile illness with symptoms like shock and bleeding (Grashchenkov) and was given the name Crimean hemorrhagic fever. In 1969, this agent was found identical to that isolated in Belgian Congo in 1956 (Casals, 1969) hence, led to disease being named as Crimean Congo Hemorrhagic fever.

The common vector for CCHF virus is ticks of the genus Hyalomma. CCHF virus is primarily a zoonotic virus, which means that the transmission cycle mainly involves ticks and wild or domestic animals. The virus is transmitted to humans either directly by Hyalomma ticks or by contact with blood or secretions of infected domestic animals or their meat. The geographic range of CCHF virus is most extensive among the tick-borne viruses that affect human health, and second most widespread among all medically important arboviruses, after Dengue viruses.

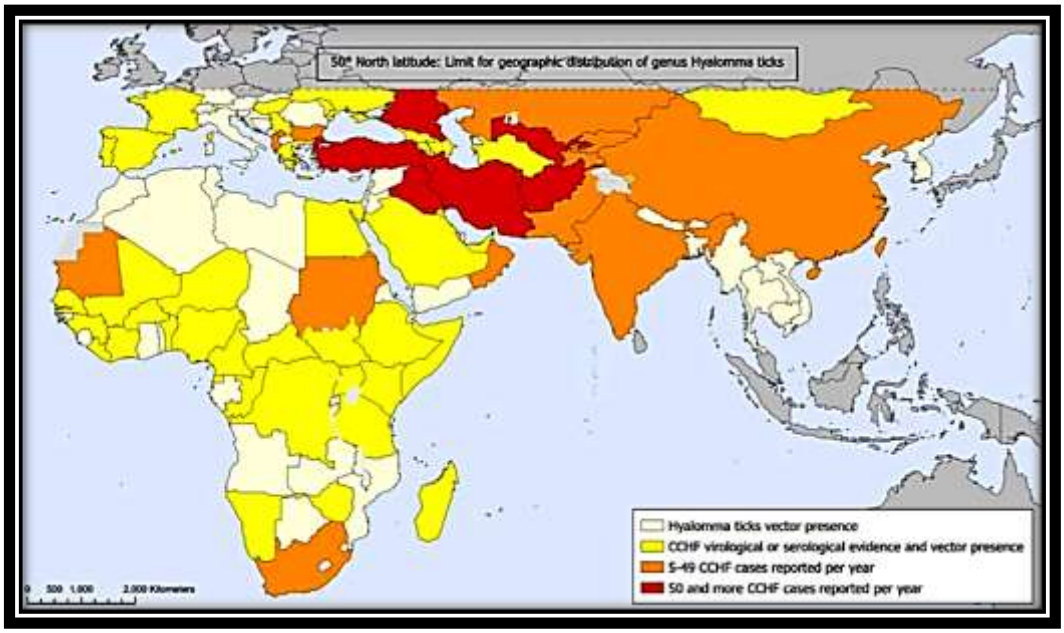
CCHF outbreaks constitute a threat to public health services because of its epidemic potential, its high case fatality ratio (CFR) ranging from 30% to as high as 80% (in hospitalized patients), its potential for nosocomial (hospital acquired infection) outbreaks and the difficulties in its treatment and prevention.

GEOGRAPHIC DISTRIBUTION (GLOBAL)

CCHF is endemic in Africa, the Balkans, the Middle East and Asian countries south of the 50th parallel north – the geographical limit of the principal tick vector (Hyalomma genus). CCHFV is widely distributed in Asia, extending from the Xin Jiang region of western China to the Middle East and southern Russia.

Cases have been reported in the following countries:

- South eastern Europe and Russian Federation: Ukraine, Bulgaria, Albania,



Geographic Distribution of CCHF (Source WHO 2022)

Serbia & Montenegro (Kosovo), Turkey, Macedonia, Russian Federation.

- Asia: China, Kazakhstan, Tajikistan, Pakistan, Afghanistan, India
- Middle East: Iraq, Iran, the United Arab Emirates (UAE), Saudi Arabia, Oman. Iraq had reported a large outbreak in 2022 with 212 cases & 27 deaths notified to WHO.
- Africa: Mauritania, Senegal, Burkina Faso, Congo (Republic and Democratic Republic), Uganda, Kenya, Tanzania, South Africa, Namibia.

The first clinical case of CCHF was reported in Greece in July 2008.

Indian Scenario

In India, the first laboratory confirmed outbreak (nosocomial transmission) was reported in January 2011 in Gujarat where 7 cases and 2 deaths were reported from Ahmadabad. Subsequently outbreaks of CCHF have been reported from different parts of Gujarat every year. Outbreaks have been reported from UP, Rajasthan & Kerala.

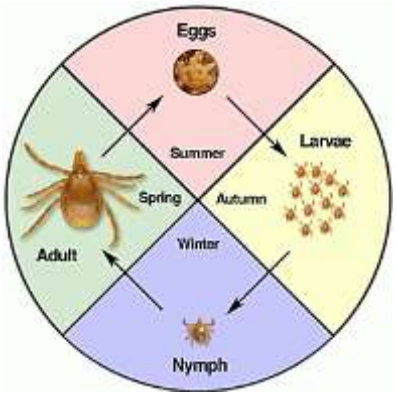
- **Rajasthan (2014, 15 & 19)**- Outbreaks have been reported from Rajasthan (Chittorgarh, Jodhpur & Sirohi)
- **Uttar Pradesh (2015)** - An outbreak was also reported from Moradabad
- **Kerala (2018)** – A case from Thrissur district (expat from UAE)
- **Gujarat (2023)**- One case Kutch district and two cases from Amreli district

EPIDEMIOLOGY

Causative Agent: CCHF virus belongs to family Bunyaviridae, genus Nairovirus. It is an enveloped, single stranded negative- sense RNA virus with tripartite genome. Since it is an enveloped virus, it can be readily inactivated. Suitable disinfectant solutions include 1 % sodium hypochlorite, 10% aqueous solution of household bleach, solution of glutaraldehyde (2% or as recommended by the manufacturer) and phenolic disinfectants (0.5%-3%). Soaps and detergents can also inactivate the virus and should be used liberally for washing hands. The virus gets inactivated by heating at 560 C for 30 minutes. CCHF virus is stable for up to 10 days in blood kept at 40 0C.

Vector: Ticks are arthropods which suck blood from animals and humans. Several tick genera can become infected with CCHF virus, but the most efficient and common vector of CCHF are the member of Hyalomma genus, the family Ixodidae. The ticks are also natural reservoir of CCHF virus. The Hyalomma ticks are hard ticks, can be easily distinguished by four pairs of legs in adults and lack of clear segmentation of the body. The adult ticks are flat and oval. The ticks have four life stages viz. eggs, larvae, nymph and adults. Larvae, nymph and adults need blood meal for their maturation. Both larvae and nymph largely feed on lower vertebrates (such as rodents, rabbits, hare etc.) while the adults feed on higher vertebrates (such as cattle, goat, sheep etc.). Male and female ticks suck blood. Both male and female can act as a vector for disease transmission. Transovarial transmission (transmission of the virus from infected female ticks to offspring via eggs) and trans-stadial (ie, from larvae to nymph to adult) transmissions have been demonstrated amongst some vector species, indicating a mechanism which may contribute to maintaining the circulation of the virus in nature.

Hyalomma tick and its life stages



Reservoir: Hard ticks are the reservoir and the vector for CCHF virus. In addition, infected animals may also act as reservoir during the period of viraemia.

The CCHF virus may infect a wide range of wild animals and domestic ruminant animals such as hares, rats, camel, cattle, sheep and goats. Many birds are resistant to infection, but ostriches are susceptible and may show a high prevalence of infection in endemic areas. Animals become

infected with CCHF from the bite of infected ticks. The most important source for acquisition of the virus by ticks is believed to be infected small vertebrates on which immature Hyalomma ticks feed. Domestic ruminant animals, such as cattle, sheep and goats, are viremic for around one week after becoming infected. During this period the virus may be transmitted to humans who have close contact to these animals such as agricultural workers, slaughterhouse workers, cooks and veterinarians.

Environmental factors: Ecological changes, poverty, social instability, poor health services, and absence of standard infection control practices have contributed to increased transmission of the CCHF virus.

Factors which are affecting the emergence of CCHFV include:

- Deforestation and increased agricultural activity
- Climate change climate change leading to an expanding range of the Hyalomma tick Critical element of temporal and geographic distribution of ticks, their life cycle
- Diverse migratory bird population provide long range transport of CCHFV infected ticks on birds and play a potential role in increasing contacts between humans, domestic, and wild animals
- Population densities
- Decreasing wildlife habitats
- Change in human animal interaction
- Transboundary movement of animals leads to increase in vector density
- Increased in animal trade global trade leading to the introduction of tick vectors to new continents

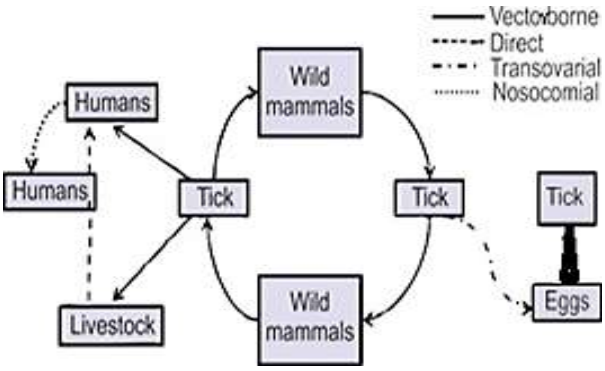
Modes of transmission

Animal to Human Transmission: Human beings may acquire the CCHF virus by direct contact with blood or other tissues of infected livestock or they may become infected through a tick bite or crushing of infected tick. Meat itself is not a risk because the virus is inactivated by post-slaughter acidification of the tissues and would not survive cooking.

Human to Human Transmission: Humans can become infected if blood, body fluids and wastes from patients with the disease comes into contact with broken skin or mucous membranes, as occurs when medical care personnel sustain accidental needle stick injury. In advanced stages of the disease, aerosol contact of blood of the patient can also lead to transmission of the virus.

Population at Risk: In endemic countries, majority of cases have occurred in those involved with the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians. Health care workers attending on suspect/ probable/ confirmed CCHF cases and not following contact precautions are at high risk of acquiring infection.

Transmission cycle: CCHF virus circulates in an enzootic tick–vertebrate–tick cycle, and there is no evidence that the virus causes disease in animals.



Incubation period: The incubation period for the illness depends upon the mode of acquisition of the virus. Following infection via tick bite, the incubation period is usually one to three days, with a maximum of nine days. The incubation period following contact with infected blood or tissues is usually five to six days, with a documented maximum of 13 days.

Communicability: Highly infectious in the hospital settings. Nosocomial infections are common after exposure to blood and secretions.

Susceptibility: Immunity after infection is probably lifelong.

CASE DEFINITION (as per revised IDSP definition 2019)

Suspect case: A patient with abrupt onset of high fever >38.5°C and one of the following symptoms:

- severe headache, myalgia, nausea, vomiting, and/or diarrhea

AND/OR

- History of insect (tick) bite within 14 days prior to the onset of symptoms; OR
  History of contact with tissues, blood, or other biological fluids from a possibly infected animal (e.g., abattoir workers, livestock owners, veterinarians) within 14 days prior to the onset of symptoms; OR
- History of exposure to a suspect, probable, or laboratory-confirmed CCHF case, within 14 days prior to the onset of symptoms (contacts of the patient including health care workers)

Probable case:

A suspected CCHF case with two of the following hemorrhagic manifestations:

- Petechiae, purpuric rash, rhinorrhagia, hematemesis, hemoptysis, gastrointestinal hemorrhage, gingival hemorrhage, or
- Any other hemorrhagic manifestation in the absence of any known precipitating factor for hemorrhagic manifestation

Confirmed case:

A presumptive case with:

- Detection of CCHF virus genome by validated RT - PCR in a clinical specimen AND/ OR sequencing OR
- Demonstration of seroconversion by ELISA or IFA of specific IgM antibodies against CCHF virus OR
- A 4-fold increase in specific IgG antibodies against CCHF virus in two specimens collected in the acute and convalescence phases OR
- CCHF virus isolation

SURVEILLANCE

Surveillance programmes for humans, animals and ticks in endemic and bordering non-endemic areas can be used to monitor the spread of disease.

As infected animals are usually asymptomatic, only active surveillance or human case detection will reveal CCHFV in circulation.

In India, testing and surveillance of the viral hemorrhagic fever have been an ongoing activity.

As the incidence of tick-borne diseases increases in any area, surveillance in other/adjoining geographic areas is carried out among humans and animals at expanded level.

Whenever any deceased CCHF positive patient is reported, immediate surveillance is conducted for members of the community, for unusual fever symptoms, as well as IgG antibody screening of domestic animals and viral RNA detection in infested ticks.

CLINICAL FEATURES

Four phases of the CCHF are described as under:

- Incubation (2-14 days)
- Pre-hemorrhagic (1-7 days)
- Hemorrhagic (2-3 days)
- Convalescence

The pre-hemorrhagic period is characterized by the

- Sudden onset of fever (39–41ºC) (On an average, fever persists for 4–5 days)
- Headache
- Myalgia
- Giddiness
- Nausea, vomiting, diarrhea
- Abdominal pain
- Neck pain
- Prostration
- Photophobia
- Hyperemia of the face, neck, and chest
- Congested sclera
- Conjunctivitis

The pre-hemorrhagic period lasts an average of 3 days (range: 1–7 days).

The hemorrhagic period is short (usually 2–3 days). It develops rapidly, and usually begins between the third to fifth days of disease. There is no relation between the temperature of the feverish patient and onset of hemorrhage.

Hemorrhagic manifestations: It ranges from petechiae to large hematomas appearing on the mucous membranes and skin. The most common bleeding sites are the nose, gastrointestinal system (hematemesis, melena, and intraabdominal bleed), uterus (menometrorrhagia) and urinary tract (hematuria). Bleeding from other sites, including the vagina, gingival bleeding, and cerebral hemorrhage have been reported.

The severely ill may develop disseminated intravascular coagulation (DIC), hepatorenal and pulmonary failure. The mortality rate from CCHF is approximately 30-80%, with death occurring in the second week of illness. In those patients who recover, improvement generally begins on the ninth or tenth day after the onset of illness

The convalescence period begins in survivors about 10–20 days after the onset of illness.

In the convalescent period

- Labile pulse
- Tachycardia
- Temporary or complete loss of hair
- Polyneuritis
- Difficulty in breathing
- Xerostomia
- Poor vision
- Loss of hearing
- Loss of memory

Triage

Patients are divided into 3 categories:

Patient category	Presentation	Treatment
Cat A	Relatively mild disease No bleeding manifestation	Supporting therapy, do not require Ribavirin
Cat B	Severely ill, local and systemic bleeding manifestation, (first 5 days of illness)	Aggressive therapy, Administration of Ribavirin immediately
Cat C	Comatose/terminal state with DIC and multi-organ failure (after day 5)	Intensive treatment Ribavirin Poor prognosis

DIFFERENTIAL DIAGNOSIS

Malaria, Leptospirosis, Rickettsial diseases, Typhoid Disease, Viral hepatitis, Meningococcemia, Dengue Hemorrhagic Fever, Hemolytic Uremic Syndrome, Thrombocytopenic Purpura, Other viral hemorrhagic fevers are to be considered in differential diagnosis, pending lab confirmation.

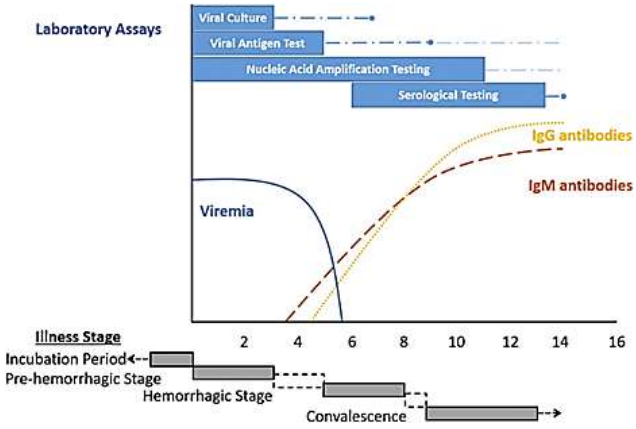
LABORATORY DIAGNOSIS

As CCHF virus is classified as risk group 4 virus and hence the clinical samples if not inactivated should be handled in specially-equipped, high biosafety level laboratories (BSL 3 plus or 4). CCHF virus infection can be diagnosed by several different laboratory tests:

- Enzyme Linked Immunosorbent Assay (ELISA);
- Antigen detection;
- Serum neutralization;
- Reverse Transcriptase Polymerase Chain

CCHF virus infection can be diagnosed by several different laboratory tests:

- Enzyme Linked Immunosorbent Assay (ELISA);
- Antigen detection;
- Serum neutralization;
- Reverse Transcriptase Polymerase Chain Reaction (RT PCR) assay; and
- Virus isolation by cell culture or mice inoculation.

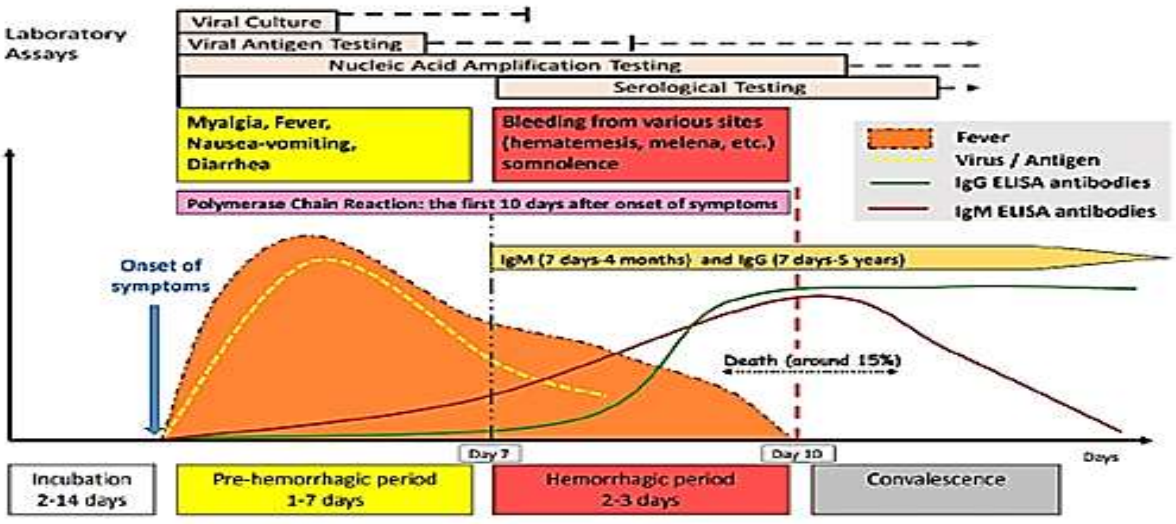


Which Test to choose? Source (J Clin Microbiol. 2020 Apr; 58(4): e01580-19.)

Sample Collection: Serum, plasma or tissue sample (liver, spleen, bone marrow, kidney, lungs and brain).

- ➢ Ante-mortem: Blood sample: Serum/Plasma
- ➢ Post-mortem: Tissue sample (liver, spleen, bone marrow, kidney, lung and brain)
- ➢ In the first few days of illness diagnosis is achieved by virus/genome detection in blood or tissue samples.

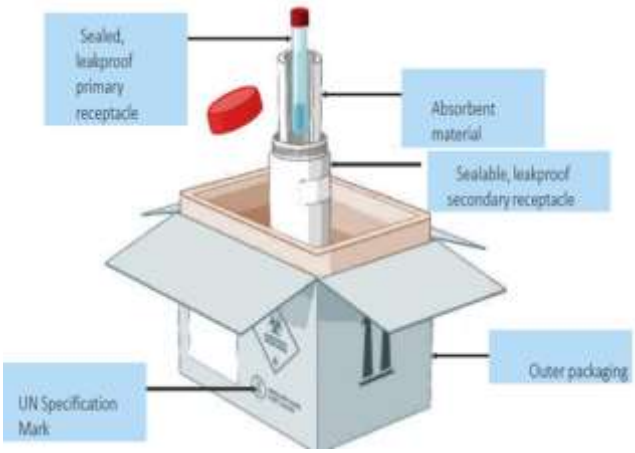
Collection: Samples should be collected with all biosafety precautions and should be accompanied with detailed history of patient on Performa which can be obtained from testing laboratory. Before dispatching sample disinfect outer surface of container using 1:100 dilution of bleach or 5% Lysol solution.



Source: CCHF Learning Resource Package, MoHFW and WHO

Transportation of sample: Sample should be safely packed in Triple container packing and should be transported under cold chain to the reference laboratory with prior intimation. The packaging consists of three layers as follows.

1. Primary receptacle. A labelled primary watertight, leak-proof receptacle containing the specimen. The receptacle is wrapped in enough absorbent material to absorb all fluid in case of breakage.
2. Secondary receptacle. A second durable, watertight, leak-proof receptacle to enclose and protect the primary receptacle(s). Several wrapped primary receptacles may be placed in one secondary receptacle. Enough additional absorbent material must be used to cushion multiple primary receptacles.



3. Outer shipping package. The secondary receptacle is placed in an outer shipping package which protects it and its contents from outside influences such as physical damage and water while in transit.

   Specimen data forms, letters and other types of information that identify or describe the specimen and identify the shipper and receiver should be taped to the outside of the secondary receptacle. However, in the areas where obtaining such container is difficult the samples can be sent as follows:

   - The case sheets with complete information about the samples should be filled in Case report Form (separate sheet) and provided along with the samples.
   - The blood sample [Serum or plasma or blood in EDTA] should be kept in screw cap plastic vials, with proper label.
   - The sample containing vials should be kept in good quality plastic bags which should be sealed so that inside material, if leaks, should not come out of the bag.
   - This plastic bag should be placed in another plastic container which should be sealed with adhesive tape. This carrier should then be placed in another plastic bag sealed with rubber bands and be placed in a thermocol or vaccine carrier containing ice.
   - If plastic container is not available, then good quality of double plastic bags can be used.
   - The case sheets with complete information should be placed in a plastic bag or envelop and be pasted outside of the thermocol or vaccine container.
   - Person handling the sample should wear gloves and a gown to avoid direct contact with the infectious material. After completing the packing of samples, person should thoroughly wash hands with soap and water.
   - Before dispatching the container, Bleach can be used for disinfection. A 1:100 dilution of bleach or 5% Lysol solution should be used to clean the outer surfaces of the container.

Virus Isolation: It should always be carried out in maximum bio-containment laboratory i.e. BSL-4. The virus may be isolated from blood or tissue specimens in the first five days of illness and grown in cell lines.

Molecular Technique: The Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) is the test of choice for laboratory diagnosis of CCHF virus infection for detecting virus- specific genome. It is a sensitive and specific method. Specificity and sensitivity can be further enhanced by using automated real time PCR.

Serology: Viral antigens may often be detected in tissue samples using immune fluorescence or "ELISA". IgG and IgM antibodies may be detected in serum by enzyme-linked immunoassay (the "ELISA") from about day six of illness. IgM remains detectable for up to four months, and IgG levels decline but remain detectable for up to five years. Recent or current infection is confirmed by demonstrating sero-conversion or a fourfold or greater increase in antibody titre in paired serum samples. Patients with fatal disease, as well as in patients in the first few days of illness, do not usually develop a measurable antibody response and so diagnosis in these individuals is achieved by virus or RNA detection in blood or tissue samples. The immunity among the survivors needs to be studied by sero-survey in a research mode.

Biosafety: Tests on patient samples present an extreme biohazard risk and should only be

conducted under maximum biological containment conditions. However, if samples have been inactivated (e.g. with viricides, gamma rays, formaldehyde, heat, etc.), they can be manipulated in a basic biosafety environment.

TREATMENT AND PROPHYLAXIS PROTOCOL

Treatment is primarily supportive and meticulous monitoring of fluid and electrolyte balance is necessary. Supportive therapy includes the administration of thrombocytes, fresh frozen plasma, and erythrocyte preparations.

Antiviral Chemotherapy: Ribavirin is the recommended antiviral agent as it has shown inhibitory effects on CCHF virus replication. The benefits of starting ribavirin are best, if started within 5 days of symptom-onset.

Ribavirin Dosage: in the table below

Adverse effects: The most common side effect of ribavirin is mild to moderate haemolytic anaemia which is reversible. Anemia associated with ribavirin therapy is often asymptomatic and can be managed by monitoring blood count and serum biochemistry. Ribavirin administered as an intravenous bolus has been reported to induce rigors; consequently, it is recommended that the drug be administered as an infusion over 10-15 minutes. There have been reports of pancytopenia and pancreatitis associated with use of intravenous ribavirin.

Contra-indications and precautions: Ribavirin is contraindicated in pregnant women. Ribavirin has demonstrated significant teratogenic and embryocidal potential in all animal species in which adequate studies have been conducted. It can be given to pregnant women only if the benefit of ribavirin therapy appears to outweigh any fetal risk. Given the high risk of CCHF-related mortality both for pregnant women and foetuses, ribavirin still may be recommended. Ribavirin is contraindicated in patients with chronic anaemia and haemoglobin levels below 8 g/dl, and in patients with severe renal impairment (creatinine clearance <30 ml/min). The drug may accumulate in patients with impaired renal function. These patients should be carefully monitored during therapy with ribavirin for signs and symptoms of toxicity, such as anaemia.
Severe cases should be defined and treated, while mild cases do not require ribavirin treatment.

Other drugs / Critical care support
In case of hypotension and hemodynamic instability patient should be managed on standard guidelines for the treatment of shock which includes resuscitation, fluid supplements (crystalloids/ colloids) and inotropic support. Replacement therapy with blood products should be done after checking the patient's complete blood count.
In suspected secondary bacterial infection patient should be treated on standard guidelines / practice for community acquired/ nosocomial infections. Proton pump inhibitors can be considered on case to case basis to address potential bleeding foci in peptic ulcer patients.
There is no definite role of steroids for managing this illness per se. Correction of coagulation abnormalities with fresh frozen plasma (FFP) or cryoprecipitate may be considered if active bleeding or any invasive procedure is planned. (usually coagulation abnormalities are not corrected in the absence of these indications).
Platelet transfusion (random donor platelets (RDP) or single donor platelets (SDP) may be considered if there is significant bleeding with thrombocytopenia.
Use Paracetamol for fever, avoid other NSAID.
Ventilator/ renal support may be provided as per standard guidelines.
Avoid intramuscular injections and drugs that affect the coagulation system.
Breast feeding is not recommended during the acute illness phase of CCHF, due to established risks of CCHF transmission to the baby.
Chemoprophylaxis: Prophylactic administration of oral Ribavirin to contacts of CCHF patients is NOT

Adults				
Administration	Dosage	Loading Day 1	Day 2-4	Day 5-10
Intravenous	Dose (mg/kg)	17 mg/kg (max 1000 mg per dose)	17 mg/kg (max 1000 mg per dose) every 6 hours	8 mg/kg (max 500 mg per dose) every 8 hours
Oral	Dose (mg)	2000 mg	1000 mg every 6 hours	500 mg every 6 hours
Children				
Intravenous	Dose (mg/kg)	17 mg/kg every 6 hours	17 mg/kg every 8 hours	-
Oral	Dose (mg/kg)	30 mg/kg every 6 hours	15 mg/kg every 6 hours	7 mg/kg every 6 hours

recommended. Symptomatic contacts can be given therapeutic dose as mentioned above. Consider full therapeutic dose of Ribavirin for Health Care Workers with severe exposure (Needle stick injury, direct contact with blood /body fluids). For person with mild exposure observe and closely monitor HCW for any symptoms.

PREVENTION AND CONTROL

In disease affected areas:

- Educate public about the mode of transmission and the means for personal protection.
- Tick control in the affected areas in cattle can be undertaken in consultation with Animal husbandry department.
- To minimize exposure, wear light clothing that covers legs and arms, tuck pants into socks, regularly examine clothing and skin for ticks, and apply tick repellent such as DEET (N,N-diethyl toluamide) to the skin or permethrin (a repellent and contact acaricide) to the clothing's.
- Persons working with livestock or other animals in the endemic areas should take practical measures to protect themselves. They include the use of repellents on the skin (e.g. DEET) and clothing (e.g. permethrin) and wearing gloves or other protective clothing to prevent skin contact with infected tissues or blood.
- Safe handling of dead bodies using personal protection measures.

Infection Prevention and Control in Health Facilities:

- Universal Infection Prevention and Control practices should be strictly adhered to in all healthcare facilities dealing with suspected, probable and confirmed cases.
- At the point of entry into the healthcare facility, patients with signs and symptoms consistent with CCHF should be identified as quickly as possible, separated from other people.
- Patients with suspected or confirmed CCHF should be managed in an isolation room for the period of communicability and barrier-nursing techniques should be followed to avoid nosocomial infection.
- Only designated medical / para-medical staff and attendants should attend the patient. Non-essential staff and attendants should not be allowed to enter the room.

Non–Pharmaceutical Interventions: When patients with CCHF are admitted to hospital, there is a risk of nosocomial spread of infection. In the past, serious outbreaks have occurred in this way and it is imperative that adequate infection control measures/Barrier nursing be observed.

- Place patients in an isolation room. A negative pressure room is not necessary during early stages of the disease but may be necessary if patients have prominent cough, vomiting, diarrhea, or hemorrhage. Prevent nonessential staff and visitors from entering the room.
- All staff should wear suitable PPE entering the room of the suspected/confirmed patient.
- Hand washing / Hand sanitization before and after clinical examination/ conducting procedures on the patient.
- Persons coming within 3 feet of the patient should wear face shields or surgical masks with eye protection (including side shields). Use HEPA filter masks if patients have prominent respiratory, GI, or hemorrhagic symptoms.
- Specimens of blood or tissues taken for diagnostic purposes should be collected and handled using universal precautions.
- Sharps (needles and other penetrating surgical instruments) and body wastes should be safely disposed of using appropriate decontamination procedures.
- Before exiting the room, discard all used protective barriers and clean shoes with a hospital disinfectant or solution of household bleach. If possible, use an anteroom for putting on and removing protective barriers and for storing supplies.
- Hospital clothing, bed sheets and other linen used in patient care should be treated as infectious and autoclaved and incinerated.
- All used materials such as syringes, gloves, cannula, tubing etc. used for patient care should be collected in autoclavable bag, autoclaved and incinerated.
- All instruments, equipment's etc. should be decontaminated/ autoclaved before re use.
- Surfaces should be decontaminated with liquid bleach.
- CCHFV can be inactivated by disinfectants including 1% hypochlorite and 2% glutaraldehyde.
- Avoid spills, needle pricks, injury and accidents during case management.
- Healthcare workers who have had contact with tissue or blood from patients with suspected, probable or confirmed CCHF

should be followed up with daily temperature and symptom monitoring for at least 14 days after the putative exposure.

- Hospital waste management practices should be as per standard guidelines.
- The patient and attendants need to be examined for ticks using universal precautions. Application of acaricidal agents is recommended if there is evidence of tick infestation.

Vaccination: No vaccine is available for either humans or animals.

RISK COMMUNICATION

Hospital setting provides an enabling environment for risk communication. Adequate stress upon IPC in healthcare facilities needs to be laid. OPD may be used as a venue for educating patients on animal human vector interface and simple measures for disease prevention such as personal hygiene, hand washing, daily bath, keeping domestic animals clean and free from ticks, and general health and sanitation measures in the house and within the surroundings. Self-reporting of symptomatic cases should be encouraged. Use of repellents on animals before the slaughter could reduce the number of infected slaughterhouse workers. Patients with suspected or confirmed CCHF should be managed in an isolation room for the period of communicability and barrier nursing techniques should be followed to avoid nosocomial infection. Adequate IEC targeting primary care physicians for early recognition of suspected cases of CCHF should be carried out.

BARRIER NURSING

Definition: Isolation / barrier nursing is the use of infection control practices aimed at controlling the spread of and eliminating pathogenic organisms.
It is undertaken in the patient's own room or home.
There are two reasons for barrier nursing patients for infection prevention and control purposes:

- To prevent transfer of infection from the patient to others (Source isolation /barrier-nursing)
- To prevent transfer of infection from care giver to susceptible patient (Protective Isolation / reverse Barrier- nursing)

Application of Standard Infection Control Precautions when isolating / Barrier Nursing a patient of CCHF:

- Wherever possible the patient should be kept in isolation.
- Patients who are infected or suspected to be infected should be physically separated (i.e., >3 feet apart) from each other.
- All medical, nursing, and laboratory staff, (including mortuary attendants) should wear complete PPE.
- Donning of PPE must be done appropriately and hand hygiene with almost hand rub should be performed after doing PPE.
- To reduce the risk of transmission / further spread of infection each patient should be attended individually by name.
- All equipment's used by patients should be cleaned with mild detergent after every use.
- Visitors should be instructed to use and dispose PPE adequately and encouraged to practice hand hygiene.

Daily Clean –The cleaner should undertake cleaning of affected patient's room/s, surfaces, flush handles, door handles etc. daily with a mild detergent and hot water or use a detergent wipe. It should be followed with cleaning by a chlorine containing product mixed to a concentration of 1,000 parts per million.

Terminal Clean - The cleaner will undertake a 'terminal clean' of the affected patient's room and surrounding environment immediately following discontinuation of isolation / barrier nursing precautions.

Infection control Measures for CCHF: Infection control measures would be targeted according to the risk profile as follows:

Contact means	Contacts include: family, neighborhood and health care facility contact
Monitoring contacts	All contacts should be self-monitored twice daily for any clinical symptoms (such as fever, muscular pain or bleeding) for 14 days (at least) from the day of last contact with the patient or other source of infection. In case of onset of any symptom, he/she should immediately report to nearest health facility.
Testing blood	Appropriate laboratory testing is recommended in cases meeting the case definition

Instructions for Monitoring and Laboratory Testing for Contacts of CCHF Cases

DIRECT PATIENT CARE (FOR KNOWN OR SUSPECTED CCHF PATIENTS)

- Restrict all non-essential staff from CCHF patient care areas.
- Maintain a log of persons entering the patient's room.
- Ensure that all visitors use personal protective equipment (PPE) according to the health care facility (HCF) guidance and are provided with instructions in its use and in hand hygiene practices prior to entry into isolation room/ area.
- Do not allow other visitors to enter the care area and ensure that any visitors wishing to observe the patient do so from an adequate distance from the care area (approximately 15 m).
- Apply infection control precautions to avoid any possible unprotected direct contact with blood and body fluids when providing care to any CCHF patient, including suspected cases.
- Perform hand hygiene before and after direct patient care, after any contact with potentially contaminated surfaces, and after removal of PPE. Neglecting to perform hand hygiene after removing PPE will reduce or negate any benefits of the protective equipment.
- Wear gloves (non-sterile examination gloves or surgical gloves) when entering the patient care area.
- Wear a disposable, impermeable gown to cover clothing and exposed skin. Wear a waterproof apron over any non-impermeable gown or when undertaking any strenuous activity (e.g. carrying a patient).
- Wear facial protection to prevent splashes to the nose, mouth and eyes. (1) Medical mask and eye protection (eye visor or goggles), or (2) with a face shield.
- Before exiting the isolation area of a patient with suspected CCHF, carefully remove and dispose of protective equipment.

  When removing protective equipment, be careful to avoid any contact between the soiled items (e.g. gloves, gowns) and any area of the face (i.e. eyes, nose or mouth).
- Ensure that clinical and non-clinical personnel are assigned exclusively to CCHF patient care areas and that members of staff do not move freely between the CCHF isolation areas and other clinical areas during the outbreak.
- Limit the use of needles and other sharp objects as far as possible.

Limit the use of phlebotomy and laboratory testing to the minimum necessary for essential diagnostic evaluation and patient care. Preferably should be done in an area very close to the care area, to avoid exposing whole lot of laboratory personnel at risk. Samples should be in double package as done for the specimen for diagnostic sample for pathogen identification.

If the use of sharp objects cannot be avoided, ensure that the following precautions are observed:

- Never replace the cap on a used needle.
- Never direct the point of a used needle towards any part of the body.
- Do not remove used needles from disposable syringes by hand, and do not bend, break or otherwise manipulate used needles by hand.
- Never re-use syringes or needles.
- Dispose of syringes, needles, scalpel blades and other sharp objects in appropriate, puncture-resistant containers.
- Ensure that containers for sharp objects are placed as close as possible to the immediate area where the objects are being used ('point of use') to limit the distance between use and disposal, and ensure that containers remain upright at all times.
- Ensure that the containers are securely sealed with a lid and replaced when ¾ full.
- Ensure that the containers are placed in an area that is not easily accessible by visitors, particularly children.
- Closed, resistant shoes (e.g. boots) should be used by all individuals in the patient care area to avoid accidents with misplaced, contaminated sharp objects.

Non-Patient Care Activities (For Known or Suspected CCHF Patients) Community Triage

- Contact tracing and case finding interviews should be conducted outdoors whenever possible and more than one meter should be maintained between interviewer and interviewee.
- Protective equipment is not required if 1 meter distance is assured. Protective equipment is not required when interviewing asymptomatic individuals.

DIAGNOSTIC LABORATORY ACTIVITIES

Activities such as micro-pipetting and centrifugation can mechanically generate fine aerosols that might pose a risk of transmission of infection through inhalation.

- Laboratory personnel handling potential CCHF clinical specimens should wear gown, gloves, particulate respirators (e.g., EU FFP2, US NIOSH-certified N951) and eye protection or face shields, or powered air purifying respirators (PAPR) when aliquoting, performing centrifugation or undertaking any other procedure that may generate aerosols.
- When removing protective equipment, avoid any contact between the soiled items (e.g. gloves, gowns) and any area of the face (i.e. eyes, nose or mouth).
- Perform hand hygiene immediately after the removal of protective equipment used during specimen handling and after any contact with potentially contaminated surfaces.
- Place specimens in clearly-labelled, non-glass, leak-proof containers as double package and deliver directly to designated specimen handling areas.
- Disinfect all external surfaces of specimen containers thoroughly (using an effective disinfectant) prior to transport.

POST-MORTEM EXAMINATIONS

- Post-mortem examination of CCHF-patient remains should be limited to essential evaluations only and should be performed by trained personnel.
- Personnel examining remains should wear eye protection, mask, gloves and gowns as recommended for patient care.
- In addition, personnel performing autopsies of known or suspected CCHF patients should wear a particulate respirator and eye protection or face shield, or a powered air purifying respirator (PAPR).
- When removing protective equipment, avoid any contact between soiled gloves or equipment and the face (i.e. eyes, nose or mouth).
- Hand hygiene should be performed immediately following the removal of protective equipment used during post- mortem examination and that may have come into contact with potentially contaminated surfaces.
- Place specimens in clearly-labelled, non-glass, leak-proof containers and deliver directly to designated specimen handling areas.
- All external surfaces of specimen containers should be thoroughly disinfected (using an effective disinfectant) prior to transport.
- Tissue or body fluids for disposal should be carefully placed in clearly marked, sealed containers for incineration.

MOVEMENT AND BURIAL OF HUMAN REMAINS

- Personnel handling remains should wear personal protective equipment (gloves, gowns, apron, surgical masks and eye protection) and closed shoes.
- Only trained personnel should handle remains during the outbreak.
- Protective equipment should be put on at the site of collection of human remains and worn during the process of collection and placement in a body bag.
- Protective equipment is not required for individuals driving or riding a vehicle to collect human remains.
- Remains should not be washed or embalmed.
- Spray dead body with 1:10 liquid bleach. Wrap with a winding sheet. Spray the winding sheet with bleach solution.
- Place the wrapped and bleached body in plastic bag. Seal with adhesive tape and transport
- Protective equipment should be removed immediately after remains have been placed in a body bag and then placed inside a coffin.
- Remains should be wrapped in sealed, leak-proof material and should be buried promptly.
- Disinfect ambulance / transport vehicle.

CLEANING

Environmental surfaces or objects contaminated with blood, other body fluids, secretions or excretions should be cleaned and disinfected using standard hospital detergents/disinfectants.

- Application of disinfectant should be preceded by cleaning.
- Do not spray (i.e. fog) occupied or unoccupied clinical areas with disinfectant.
- Wear gloves, gown, face shield and closed shoes (boots) when cleaning the environment and handling infectious waste and soiled linen.

- Soiled linen should be placed in clearly-labelled, leak-proof bags or buckets at the site of use and the container surfaces should be disinfected (using an effective disinfectant) before removal from the site. Linen should be transported directly to the laundry area and laundered promptly with water and detergent. For low-temperature laundering, wash linen with detergent and water, rinse and then soak in 0.05% chlorine for approximately 30 minutes. Linen should then be dried according to routine standards and procedures.
- If safe cleaning and disinfection of heavily soiled linen is not possible or reliable, it may be prudent to burn linen to avoid any unnecessary risks to individuals handling these items.

WASTE MANAGEMENT DURING CCHF OUTBREAKS

- Waste should be triaged to enable appropriate and safe handling.
- Sharp objects (e.g. needles, syringes, glass articles) and tubing that has been in contact with the bloodstream should be placed inside puncture resistant containers. These should be located as close as practical to area in which items are used.
- Collect all solid, non-sharp medical waste using leak-proof waste bags and covered bins.
  Waste should be placed in a designated pit of appropriate depth (e.g. 2 m deep and filled to a depth of 1–1.5 m). After each waste load, it should be covered with a layer of soil 10–15 cm deep.
- An incinerator may be used for short periods during an outbreak to destroy solid waste.
- Placenta and anatomical samples should be buried in a separate pit.
- The area designated for final treatment & disposal of waste should have controlled access to prevent entry by animals, untrained personnel or children.
- Wear gloves, gown, face shield and closed shoes (e.g. boots) when handling infectious waste.
- Waste, such as faeces, urine and vomit, and liquid waste from washing, can be disposed of in the sanitary sewer or pit latrine. No further treatment is necessary.

MANAGING EXPOSURE TO INFECTION

- Persons including health care workers (HCWs) with percutaneous or mucocutaneous exposure to blood, body fluids, secretions, or excretions from a patient with suspected CCHF should immediately wash the affected skin surfaces with soap and water. Mucous membranes (e.g. conjunctiva) should be irrigated with copious amounts of water or eyewash solution.
  Exposed persons should be medically evaluated and receive follow-up care, including fever monitoring, twice daily for at least 14 days after exposure. Immediate consultation with an expert in infectious diseases is recommended for any exposed person who develops fever within 14 days of exposure.
  HCWs suspected of being infected should be isolated, and the same recommendations outlined in this document must be applied until a negative diagnosis is confirmed.
- Contact tracing and follow-up of family, friends, co- workers and other patients, who may have been exposed to a CCHF virus through close contact with the infected HCW is essential.

….about CD Alert

CD Alert is a technical bulletin of the National Centre for Disease Control (NCDC), Directorate General of Health Services, to disseminate information on various aspects of communicable diseases to medical fraternity and health administrators. The bulletin may be reproduced, in part or whole, for educational purposes.

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