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CRIMEAN-CONGO HAEMORRHAGIC FEVER (CCHF)

INTRODUCTION

Crimean-Congo haemorrhagic fever (CCHF) is a viral haemorrhagic fever of the *nairovirus* group.



The disease was first described in the Crimea (former USSR) in 1944 and given the name Crimean haemorrhagic fever. In 1969, it was recognized that the pathogen causing Crimean haemorrhagic fever was the same as that responsible for an illness identified in 1956 in the Congo, and linkage of the 2 place names resulted in the current name for the disease and the virus. The geographic range of CCHF virus is the most extensive among the tick borne viruses that affect human health, and the second most widespread among all medically important arboviruses, after Dengue viruses.

The disease is endemic in many countries in Africa, Europe Middle East and Central Asia with sporadic outbreaks recorded in Kosovo, Albania, Iran, and Turkey. In India, the first laboratory confirmed case was reported on 19th January, 2011 in Gujarat. In India's neighbourhood, Pakistan reports 50-60 cases annually. CCHF outbreaks constitute a threat to public health services because of its epidemic potential, its high case fatality ratio (10-40%), its potential for nosocomial (hospital acquired infection) outbreaks and the difficulties in its treatment and prevention (**Source WHO**).

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 56° C for 30 minutes. CCHF virus is stable for upto 10 days in blood kept at 40 °C.

Vector: Ticks are arthropods which suck blood from animals and humans. A number of tick genera are capable of becoming 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 in shape. 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.

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 viraemic for around one week after becoming infected.

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.

Mode of transmission

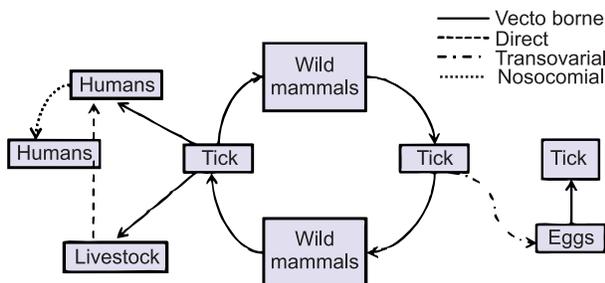
Animal to Human Transmission: Human beings may acquire the CCHF virus by direct contact with blood or other tissues of infected livestock or they may become infected through a tick bite or crushing of infected tick. Meat itself is not a risk because the virus is inactivated by post-slaughter acidification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

Hospital acquired infection outbreaks (Nosocomial spread) have been reported in many countries.

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.

CLINICAL FEATURES

Onset of symptoms is sudden, with fever, myalgia, dizziness, neck pain, stiffness, backache, headache, sore eyes and photophobia. There may be nausea, vomiting and sore throat early on, which may be accompanied by diarrhoea and generalized abdominal pain. Over the next few days, the patient may experience sharp mood swings, and may become confused and aggressive. After two to four days, the agitation may be replaced by sleepiness, depression and lassitude, and the abdominal pain may localize to the right upper quadrant, with detectable hepatomegaly (liver enlargement).

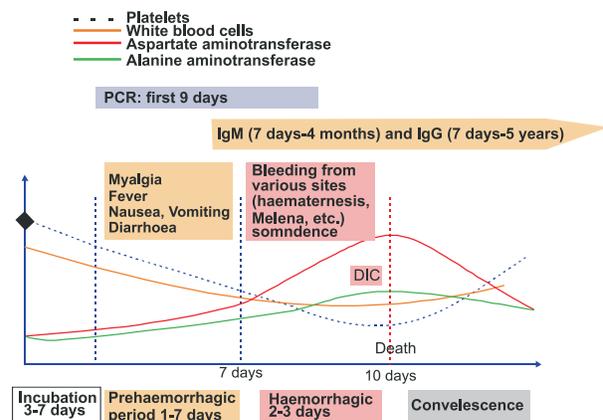
Other clinical features include tachycardia, lymphadenopathy and a petechial rash both on internal mucosal surfaces, such as in the

mouth and throat, and on the skin. The petechiae may give way to ecchymoses (like a petechial rash, but covering larger areas) and other haemorrhagic phenomena such as melaena (bleeding from the upper bowel, passed as altered blood in the faeces), haematuria (blood in the urine), epistaxis (nosebleeds) and bleeding from the gums. There is usually evidence of hepatitis. The severely ill may develop hepatorenal and pulmonary failure after the fifth day of illness.

The mortality rate from CCHF is approximately 9-50% 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 and loss of memory have been reported.

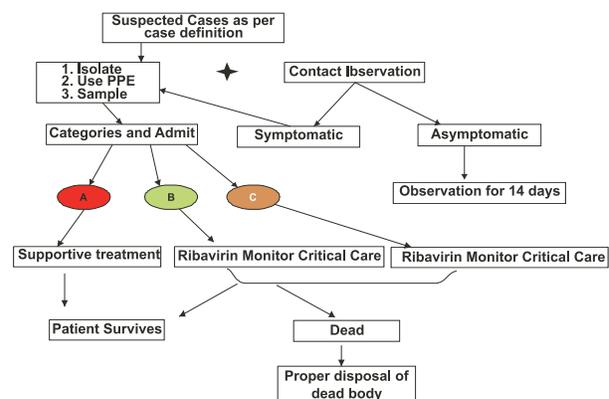
Course of illness:



DIFFERENTIAL DIAGNOSIS

The following diseases are to be considered in differential diagnosis, pending lab confirmation: Malaria, Leptospirosis, Rickettsial diseases, Meningococemia, Dengue Haemorrhagic Fever, Haemolytic Uremic Syndrome, and Thrombocytopenic Purpura.

TRIAGE



Patients are divided into 3 categories:

Category-A: Those that have relatively mild disease (fever < 38.5°C, No systemic bleeding, Alanine Transaminase (SGPT) levels < 150 IU, Platelet count > 50,000). These patients improve spontaneously in about day 10 of illness. Patient can be managed

with supporting therapy and regular monitoring for worsening of symptoms. These patients do not require Ribavirin.

Category-B: Those who are in the first 5 days of illness and are severely ill with high grade fever (> 38.5°C), local and systemic bleeding manifestations, having Alanine Transaminase (SGPT) levels of 150 IU or more, Aspartate Aminotransferase (SGOT) of 200 IU or more, platelets (< 50,000) or Activated Partial Thromboplastin Time (APTT) of 60 seconds or more. Even if the patients still look comparatively well at this stage these clinical path values are markers of poor prognosis if recorded during the first 5 days of illness and persons in this group should be treated as soon as possible with ribavirin. Those who are recognized and treated early enough respond remarkably well to ribavirin.

Category C: Patients first seen/recognized as CCHF after day 5 and are in comatose/terminal state with DIC and multi organ failure. Treatment with ribavirin is indicated but the prognosis is very poor.

Category B&C patients, even if they subsequently test negative, should receive the full course of ribavirin.

Pre-hospital Care: Supportive care is based on the patient's physiologic condition. Because most patients requiring pre-hospital evaluation and transport are in the early stages of the disease, universal precautions should be adequate. In patients with respiratory symptoms (e.g., cough, rhinitis), use face shields and high-efficiency particulate air (HEPA) filter masks. The ambulance should be disinfected after patient transportation with bleach/ sodium hypochlorite solution.

Care in Hospital Settings

Supportive therapy: General supportive therapy is the mainstay of patient management in CCHF. Intensive monitoring to guide volume and blood component replacement is required. Supportive care includes fluid management by Intravenous crystalloids, oxygen, cardiac monitoring and administration of blood and blood products as clinically indicated.

Avoid intramuscular injections and use of aspirin or other anticoagulants. Minimize invasive procedures because of the risk associated with viral transmission from sharp objects.

CASE DEFINITION

Suspected 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 probable CCHF case is defined as a suspected CCHF case fulfilling in addition the following criteria: Thrombocytopenia < 50,000/cmm

AND

Two of the following hemorrhagic manifestations: hematoma at an injection site, 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 confirmed CCHF case is defined as a case that fulfills the criteria for suspect/ probable CCHF and in addition is laboratory-confirmed with one of the following assays:

Detection by RT-PCR of CCHF virus genome in a clinical specimen confirmed by sequencing of the PCR product.

Detection 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.

- CCHF virus isolation.
- Laboratory Diagnosis

LABORATORY DIAGNOSIS

As CCHF virus is classified as risk group 4 virus and hence the clinical samples should be handled in specially-equipped, high biosafety level laboratories (BSL 3 plus or 4).

Sample Collection

- **Ante-mortem:** Blood sample: Serum/Plasma
- **Postmortem:** 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 the performa which can be obtained from the testing laboratory. Before dispatching the sample disinfect the outer surface of container using 1:100 dilution of bleach or 5% Lysol solution.

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. 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 completely 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 either be sealed by heat or tied with rubber bands 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 hand 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.

Viral antigens may often be detected in tissue samples using immune-fluorescence or "ELISA".

Serology: 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 or detection of IgM antibodies by IgM capture ELISA (MAC ELISA) in a single sample.

TREATMENT AND PROPHYLAXIS PROTOCOL

Pharmaceutical Interventions: There is currently no specific antiviral therapy for CCHF. However, ribavirin has been shown to inhibit in-vitro viral replication in Vero cells and reduced the mean time to death in a suckling mouse model of CCHF. Additionally, several case reports have been published that suggest oral or intravenous ribavirin is effective for treating CCHF infections.

Ribavirin is a member of the nucleoside anti metabolite drugs that interfere with duplication of viral genetic material. This is the only antiviral known to have some affect on the viruses causing VHF.

Dosage regimen (for adults)

Administration	Loading dose (day1)	Day 1-4	Day 5-10
IV	17 mg/kg * (max 1000 mg per dose)	17 mg/kg (max 1000 mg per dose) 6hourly	8 mg/kg (max 500 mg per dose) 8hourly
Oral	2000 mg	1000 mg 6 hourly	500 mg 500 mg 6 hourly

*If there appears to be a delay in beginning the treatment a loading dose of 30 mg / kg [IV] (max 2 Gms) might be necessary as the loading dose.

Box-1: Treatment Protocol for adults with CCHF Disease

- 2 gm loading dose
- 4 gm/ day in 4 divided doses(6 hourly) for 4 days
- 2gm/day in 4 divided doses for 6 days

Dosage recommended for children

Administration	Loading dose day1	day 1-4	day 5-10
IV	17 mg/kg	17 mg/kg 6 hourly	8 mg/kg 8 hourly
oral	30 mg/kg	15 mg/kg 6 hourly	7 mg/kg 6 hourly

Adverse effects: The most common side effect of Ribavirin is mild to moderate haemolytic anaemia which is reversible. Anaemia 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 for treatment 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 fetuses, 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.

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 ionotropic support.
- 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.
- There is no definite role of steroids for managing this illness per se. Correction of coagulation abnormalities (only if present) with the use of PRP/SDP; FFP, cryoprecipitate, as per indications may be considered.
- Platelet transfusion 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.

Chemoprophylaxis: Prophylactic administration of oral Ribavirin to contacts of CCHF patients is NOT 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 clothings.
- 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, diarrhoea, or haemorrhage. Prevent nonessential staff and visitors from entering the room.
- All staff entering the room should wear personal protective equipments.
- 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.

- If large amounts of blood or other body fluids are present in the environment, use leg and shoe coverings.
- 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, canulla, tubing etc used for patient care should be collected in autoclavable bag, autoclaved and incinerated.
- All instruments, equipments etc should be decontaminated/ autoclaved before re use.
- Surfaces should be decontaminated with liquid bleach.
- CCHFV can be inactivated by disinfectant including 1% hypochlorite and 2% gluteraldehyde.
- 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.

Dead body disposal:

- Use rubber gloves or double surgical gloves for handling dead body. The persons handling the dead body in hospitals should also wear mask/ PPE.
- 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
- Disinfect ambulance / transport vehicle.
- Maintaining a safe and clean patient environment.
- Medical, Para-medical staff and attendants should be educated to follow the Universal Infection Prevention and Control Practices.
- Every effort should be made to avoid spills, pricks, injury and accidents during the management of patients. Needles should not be re-capped but discarded in proper safety disposal box.
- Staff must report to the management if they are exposed to the patient's blood or body fluids, if they sustain a 'sharps injury' or if they develop fever, body aches or any bleeding tendency.
- Signs, posters and other reminders / educational material on Infection Prevention and Control Practices should be displayed prominently at appropriate places in the hospitals.

- The designated laboratory should be informed in advance about the sample, which should be transported to the designated laboratory with great caution to ensure non breakage or spills.
- After the patient is discharged, room surfaces should be cleaned and then wiped down by an appropriate disinfectant to kill the virus.

RISK COMMUNICATION

Hospital setting provides an enabling environment for risk communication. 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, general health and sanitation measures in house and within the surroundings and self reporting of symptomatic cases.

Instructions for Monitoring and Laboratory Testing for Contacts of CCHF Cases

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 (maximum) 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 the nearest health facility.
Testing blood for CCHF	Appropriate laboratory testing is recommended in cases meeting the case definition

BARRIER NURSING

Definition: Isolation / barrier nursing is the use of infection control practices aimed at controlling the spread of, and eradicating pathogenic organisms. Isolation / barrier nursing 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 patients should be attended individually by name.

- All equipments 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 – Following manufacture’s instructions, the cleaner will undertake cleaning of affected patient’s room/s, surfaces, flush handles, door handles etc on a daily basis with a mild detergent and hot water or use a detergent wipe. Follow this with 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:

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 the 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 HF 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.

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 the containers remain upright at all times.
- Ensure that the containers are securely sealed with a lid and replaced when $\frac{3}{4}$ 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 HF PATIENTS) COMMUNITY TRIAGE

- Contact tracing and case finding interviews should be conducted outdoors whenever possible and a distance of 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 aliquotting, 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 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

- Remains should not be sprayed, washed or embalmed.
- Only trained personnel should handle remains during the outbreak.
- Personnel handling remains should wear personal protective equipment (gloves, gowns, apron, surgical masks and eye protection) and closed shoes.
- Protective equipment is not required for individuals driving or riding a vehicle to collect human remains.
- 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 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.

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 and closed shoes (e.g. boots) when cleaning the environment and handling infectious waste. Cleaning heavily soiled surfaces (e.g. soiled with vomit or blood) increases the risk of splashes. On these occasions, facial protection should be worn in addition to gloves, gown and closed, resistant shoes.

- 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.
- Linen that has been used by CCHF patients can be heavily contaminated with body fluids (e.g. blood, vomit) and splashes may result during handling. When handling soiled linen from CCHF patients, use gloves, gown, closed shoes and facial protection.
- If safe cleaning and disinfection of heavily soiled linen is not possible or reliable, it may be prudent to burn the linen to avoid any unnecessary risks to individuals handling these items.
- Wear gloves, gown, closed shoes and facial protection, when handling liquid infectious waste (e.g. any secretion or excretion with visible blood even if it originated from a normally sterile body cavity).
- Avoid splashing when disposing of liquid infectious waste. Goggles provide greater protection than visors from splashes that may come from below when pouring liquid waste from a bucket.

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 21 days after exposure. Immediate consultation with an expert in infectious diseases is recommended for any exposed person who develops fever within 21 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 an CCHF virus through close contact with the infected HCW is essential.

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 the area in which the 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 the waste 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. However, it is essential to ensure that total incineration has taken place. Caution is also required when handling flammable material and when wearing gloves due to the risk of burn injuries if gloves are ignited.
- Placenta and anatomical samples should be buried in a separate pit.
- The area designated for the final treatment and disposal of waste should have controlled access to prevent entry by animals, untrained personnel or children.
- Wear gloves, gown and closed shoes (e.g. boots) when handling solid 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.

In India first outbreak of CCHF was reported in January 2011 in Gujarat. After the first case the infection was transmitted to health care workers along with the contact of the patient. High index of clinical suspicion, early laboratory diagnosis and institution of containment measures curtailed further spread of disease.

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...about CD Alert

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