

# Infection prevention and control and water, sanitation and hygiene measures for Crimean-Congo haemorrhagic fever in health-care settings

## Operational guide

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### Key messages

- **Immediately isolate patients with suspected or confirmed Crimean-Congo haemorrhagic fever (CCHF) in single-bed patient rooms. If single-bed rooms are limited, do not cohort patients with suspected CCHF.**
- Use contact precautions, including appropriate personal protective equipment (PPE) (fluid resistant gown and examination gloves) when caring for patients with suspected or confirmed CCHF.
- Use airborne and contact precautions, including appropriate PPE (fit-tested respirator, fluid-resistant gown and examination gloves) and eye protection (face shield or goggles) when aerosol-generating medical procedures are performed on patients with CCHF.
- Visitors and caregivers must wear PPE for contact precautions in isolation rooms and in all areas where at least 1 metre of physical distance from a patient with CCHF cannot be maintained. Visitors should be instructed on procedures for hand hygiene and putting on and taking off PPE.
- Closely monitor adherence to standard precautions, particularly: injection and sharps safety, hand hygiene, PPE according to a risk assessment, medical device reprocessing, environmental cleaning and disinfection, and waste management.
- **Investigate and report suspected health-care-associated infections (HAIs) of CCHF. A single case of HAI CCHF meets criteria for declaring an outbreak.**

### Intended audience

This document is for health-facility administrators and managers, infection prevention and control (IPC) personnel, occupational health and water, sanitation, and hygiene (WASH) focal points, and health and care workers in health-care facilities in areas experiencing CCHF outbreaks or where CCHF is endemic.

### Background

#### What is Crimean-Congo haemorrhagic fever (CCHF)?

CCHF is a disease caused by infection with a tick-borne virus (*nairovirus*) (1). Endemic distribution occurs in Africa, Asia, Southeastern Europe, and the Middle East (2, 3). Clinical manifestations present in two phases: pre-haemorrhagic and haemorrhagic. The first phase initiates with non-specific prodromal symptoms and progresses to systemic manifestations characterized by high fever, myalgia, headache, nausea, abdominal pain and cardiovascular signs such as bradycardia and hypotension (3). The haemorrhagic phase is generally short with a

rapid course involving petechiae, conjunctival haemorrhage, epistaxis, haemoptysis, haematemesis; and commonly ecchymosis, melaena, haematuria, and metrorrhagia (4). Case fatality rate varies between 10% – 40% (1), and is attributed to multi-organ failure, disseminated intravascular coagulation and circulatory shock (4).

### **Modes of transmission**

The most common route of transmission for human CCHF infections is through tick bites or direct contact with blood of infected ticks, or direct contact with blood or tissues of infected animals such as livestock (3). Human-to-human transmission has resulted from unprotected contact with substances of human origin (i.e. blood, secretions or other body fluids, or contact with organs) of infected persons (1). In health-care settings, health care-associated infections (HAIs) of CCHF have occurred when managing patients with CCHF due to breaches in IPC measures such as improper decontamination or sterilization of patient care equipment; reuse of syringes; contamination of medical supplies; and inadequate use of personal protective equipment (1, 4).

A review of 158 case studies of HAI CCHF (identified between 1958 and 2016), found that more than half of identified cases occurred through percutaneous (34.3%) and cutaneous (22.2%) exposures (5). Other common exposure points identified in health-care settings included close proximity to infected patients without physical contact (18.2%); indirect contact while wearing gloves involving body fluids or physical contact with the patient (17.2%); and exposure to fomites on contaminated surfaces, such as beds, desks, or patient care equipment (8.1%) (5).

### **Incubation period**

The length of the incubation period depends on the mode of acquisition of CCHF. Following infection by a 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 maximum of 13 days (1).

## **IPC measures for a patient with suspected or confirmed CCHF**

IPC measures are based on the principles of standard and transmission-based precautions. When implemented effectively, IPC measures prevent or control transmission of infections; keeping patients, health and care workers and visitors/caregivers safe.

### **1. Identify and isolate individuals with suspected or confirmed CCHF**

In areas where CCHF is endemic or during outbreaks, screening, triage and initial clinical assessment should include heightened differential diagnostic suspicion of signs and symptoms of CCHF using a standard set of screening criteria that employs either nationally defined case definitions or the case definition described by WHO's CCHF outbreak toolkit (1). Clinical-care teams should maintain vigilance for detection of CCHF symptoms in patients who are receiving care for other reasons.

#### **Screening and triage**

- i. Screening can be performed in areas such as the emergency unit, outpatient department/primary care clinic, in the community by a community health worker or by telemedicine using a simple algorithm (based upon the case definition in use in the country and the defined referral pathway) (6).
- ii. Screening for CCHF should be performed at a distance of at least 1 metre between the patient and the health and care worker (*derived from (7)*).
  - a. Personal protective equipment (PPE) is not required during screening for CCHF where a physical distance of at least 1 metre between the screener and the patient can be maintained (*derived from (7)*).
  - b. If at least 1 metre physical distance cannot be maintained, use contact precautions and perform a risk assessment for use of additional PPE where indicated (*derived from (7, 8)*).

- iii. Ideally, the dedicated space for screening and triage of cases should be located at the entrance to the facility, be well-ventilated, and have appropriate relevant resources available, including:
  - a. hand-hygiene stations and access to alcohol-based hand rub;
  - b. space designed to promote at least 1 metre physical distancing between patients and between patients and health and care workers;
  - c. maximum occupancy limitations to avoid overcrowding;
  - d. PPE for use by health and care workers (e.g. medical mask, eye protection, gowns, gloves);
  - e. signage (promoting the practice of hand hygiene);
  - f. waste bins (6, 9).

## Patient placement

### Immediately isolate any patient(s) with suspected or confirmed CCHF

- i. Isolate patients with suspected or confirmed CCHF in single-bed patient rooms away from other patients to avoid transmission in shared patient spaces (6).
  - a. Patients with suspected CCHF (not confirmed) must remain in single-bed patient rooms. If there is no capacity to isolate suspected cases in single-bed rooms, coordinate referral to a health facility that can facilitate single-bed isolation rooms.
- ii. If single-patient rooms are not available, cohort isolation of two or more patients with laboratory confirmed CCHF in a shared room may be considered when certain criteria is met (6).
  - a. Patients with diagnostic suspicion or laboratory confirmation of other infections transmissible in the health-care setting should not be placed in cohort isolation.
  - b. Patients requiring aerosol-generating medical procedures should be placed in single-bed airborne infection isolation rooms or procedure areas (Box 1).
  - c. Maintain at least 1 metre distance between patients and draw the curtain between patient beds.
- iii. If the facility does not have the capacity to isolate patients with suspected or confirmed CCHF from the susceptible patient population, a referral system should be in place to transport them to facilities where transmission-based precautions may be actioned appropriately.

#### **Box 1. Isolation requirement for aerosol-generating procedures: <sup>1</sup>**

*Any patient with suspected or confirmed CCHF requiring an aerosol-generating procedure<sup>1</sup> must be placed in a single-bed airborne infection isolation room with a minimum ventilation rate of 160 litres per second (6 – 12 air changes per hour) with door kept closed when not required for entry or exit (10, 11).*

*If an airborne infection isolation room is not available, place patient in a room that has good cross-ventilation (two or more windows that open to the outdoors on different walls). Use a fan in one window to exhaust room air to the outdoors, making sure the exhaust window is away from patients, medical supplies, and any air intake openings. Turn off air-conditioning and open windows to enhance ventilation if an independent air supply is not available. Keep the door to the hallway closed, except when health and care workers enter and exit the room (6).*

<sup>1</sup> Aerosol-generating procedures include (12):

- Tracheal intubation, non-invasive ventilation (e.g. bilevel positive airway pressure, continuous positive airway pressure), tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, sputum induction by using nebulized hypertonic saline and autopsy procedures.
- In oral health care: all clinical procedures that use spray-generating equipment such as three-way air/water spray, dental cleaning with ultrasonic scaler and polishing; periodontal treatment with ultrasonic scaler; any kind of dental preparation with high- or low-speed hand pieces; direct and indirect restoration and polishing; definitive cementation of crown or bridge; mechanical endodontic treatment; surgical tooth extraction and implant placement.

## 2. Use standard and transmission-based precautions (6, 9)

To ensure that transmission-based precautions are applied consistently, ensure all health and care workers are aware of the isolation status and transmission-based precautions advised for patients. Signage should also be posted at the doorway to the patient's room that clearly alerts health and care workers and visitors to transmission-based precautions (e.g. contact and airborne precautions) that need to be taken before entering the patient's room.

### Prior to any patient interaction

- i. Health and care workers should assess the likelihood of potential exposure to infectious agents for themselves and others and should take precautions accordingly. These include, for example, patient placement and the selection and use of PPE (9).
- ii. Apply standard precautions for all patients at all times (9). In addition to applying standard precautions, apply transmission-based precautions for patients with known or suspected infection or colonization with transmissible and/or epidemiologically significant pathogens (6).
- iii. When caring for patients with suspected or confirmed CCHF, use the following transmission-based precautions:
  - a. Contact precautions with risk assessment for additional PPE (6).
  - b. If an aerosol-generating procedure is performed, apply airborne and contact precautions plus eye protection (6).

### Prior to entering the patient's room

- i. Prior to entering room of a patient with suspected or confirmed CCHF:
  - a. perform hand hygiene;
  - b. wear a fluid-resistant gown and examination gloves;
  - c. if there is a risk of exposure to splashes or sprays of blood or body fluid, wear a well-fitting fluid-resistant medical mask (at minimum, equivalent to ASTM F2100-11 Level 1, EN14683 Type IIR, or equivalent standard) and eye protection (face shield or goggles meeting EN 166:2001, ANSI Z87.1, or equivalent standard) in addition to contact precautions (6, 12).
- ii. When aerosol-generating procedures are performed:
  - a. perform hand hygiene;
  - b. wear a fluid-resistant gown, a fit-tested respirator (at minimum, equivalent to N95, FFP2, KN95, or KF94 standard), eye protection (face shield or goggles meeting EN 166:2001, ANSI Z87.1, or equivalent standard) and examination gloves;
  - c. health workers must perform a respirator seal-check before entering the room (6, 9).
- iii. For visitors and caregivers:
  - a. perform hand hygiene;
  - b. wear PPE for contact precautions (fluid-resistant gown and examination gloves) when at least 1 metre distance cannot be maintained and be instructed on moments for hand hygiene and any additional PPE needs and procedures for putting on and taking off PPE;
  - c. designate a family member or caregiver for children to limit the number of caregivers/visitors present in the isolation area;
  - d. visitors and caregivers should not be allowed entry to any patient rooms or procedure areas where aerosol-generating procedures are performed.

### IPC precautions during patient care

- i. While wearing PPE:
  - a. refrain from touching eyes, nose or mouth with contaminated gloves or ungloved hands;
  - b. avoid contaminating surfaces not involved with direct patient care (i.e. doorknobs, light switches, mobile phones) (9).
- ii. Use disposable or dedicated patient care equipment (6):
  - a. if this is not possible, clean and disinfect equipment before use on other patients with an approved disinfectant (e.g. with a clean cloth saturated in soap and water, followed by wiping with a 0.5% sodium hypochlorite solution and allowing for five minutes of contact time before use).
- iii. Avoid unnecessary movement of suspected/confirmed patients:
  - a. if the patient must be moved or transported to other areas, ensure transmission-based precautions are maintained.
  - b. if the patient has respiratory symptoms, ensure patient wears a well-fitted medical mask whenever outside of isolation room (6).

### After exiting the patient's room

- i. Remove PPE.
  - a. Use a designated area to follow the steps required for safely removing PPE.
  - b. If a designated area is not available, remove PPE just before exiting the patient room or immediately outside the room.
- ii. Perform hand hygiene.

### 3. Ensure consistent application of environmental controls

- i. Clean and disinfect the patient care environment at least twice, daily (9).
  - a. Clean all surfaces in patient care environment using detergent and water.
  - b. Apply a 0.5% sodium hypochlorite solution by cloth or disposable wipe after cleaning (13).
  - c. Leave surfaces untouched/unused for at least five minutes to allow for contact time for disinfectants to kill remaining microorganisms after cleaning and disinfection is performed.
- ii. Discard, decontaminate or reprocess patient care equipment/devices after each use (14, 15).
  - a. Discard single-use devices as waste.
  - b. Handle equipment soiled with blood, body fluids, secretions and excretions in a manner that prevents skin and mucous membrane exposure, contamination of clothing and transfer of pathogens to other patients or to the patient-care environment.
  - c. Clean and disinfect or sterilize reusable equipment/devices according to the manufacturer's instructions, national or international standards.
- iii. Ensure appropriate management of laundry and linens (9).
  - a. Place soiled linens in clearly labelled, leakproof bags or containers to designate that the linens were used by a patient with CCHF and are to be handled separately from other patient linens.
  - b. When handling linens of patients with CCHF, laundry staff should wear PPE (at minimum a fluid-resistant gown and heavy-duty gloves).
  - c. Heavily soiled linens contaminated with blood or body fluids should be disposed of as infectious waste.
  - d. Wash all linens with warm water and detergent:
    - Machine washing at 60 – 90°C for a full cycle (20 – 30 minutes) is preferred and should be followed by hanging linens in a clean or dry space, preferably in direct sunlight, until dry.

- If machine washing is not possible, linens can be soaked in warm water and soap in a large drum, using a stick to stir, avoiding splashing, until visibly clean. The drum should then be emptied and refilled with clean water, adding sodium hypochlorite to a 0.05% (500 ppm) solution, immersing linen to soak for 30 minutes. Then rinse with clean water and followed by hanging linens in a clean or dry space, preferably in direct sunlight, until dry.
- iv. Ensure appropriate waste management and disposal of PPE and sharps according to local regulations (16).
    - a. Waste is properly sorted and placed in appropriate bins at the point of use.
    - b. Infectious, pathological and sharps waste generated from the care of patients with suspected or confirmed CCHF should follow national policy for minimizing, segregating, collecting, transporting, storing, treating and disposing of waste.
    - c. Regularly remove all waste from the patient-care environment to reduce risk that microorganisms residing on health-care waste will contaminate clean items or accidentally be transmitted to staff and patients.

### **Water, sanitation and hygiene (WASH) in the health-care facility**

Patient care activities should be undertaken in a clean and hygienic environment that facilitates practices related to the prevention and control of infections that can be transmitted as health care-associated infections (HAIs), including all elements around WASH infrastructure and services and the availability of appropriate IPC materials and equipment (17).

### **Health and care worker training, monitoring and exposure management**

#### **1. Health and care worker training**

- i. Health and care workers must be trained on standard and transmission-based precautions (including those targeted to CCHF), as well as the use of standardized screening and triage algorithms to identify and isolate suspected and confirmed cases.

#### **2. Monitoring and management of health and care worker exposure**

- i. A protocol for assessing and managing health and care worker occupational exposures should be in place. An occupational exposure is defined as any unprotected contact, including with non-intact skin, percutaneous or mucocutaneous exposure to blood, body fluids, secretions or excretions from a suspect or confirmed patient with CCHF, or unprotected exposure to contaminated equipment or surfaces, that may result from or be related to the performance of an employee's duties.
- ii. A health and care worker with an identified exposure should be:
  - a. provided with information on the signs and symptoms of CCHF;
  - b. instructed to self-monitor for signs and symptoms for 13 days after the last date on which they may have been exposed to CCHF;
  - c. instructed to seek early medical care if any symptoms of CCHF develop;
  - d. excluded from work duties and clinically assessed for diagnosis and management if they develop any signs or symptoms of infection.

### **HAI surveillance**

#### **1. Surveillance for health care-associated infections**

- i. Health and care workers should monitor inpatients for signs and symptoms of CCHF and, if a patient is suspected to have developed CCHF during the course of inpatient care, the patient should be immediately isolated with transmission-based precautions in place.
  - a. Determine if the patient meets the case definition for suspected or confirmed CCHF according to the standard CCHF case definition (used by local health authorities or as described by WHO's CCHF

Outbreak Toolbox) (1) **AND** the health care-associated infection (HAI) CCHF case definition described below (Box 2).

**Box 2. HAI CCHF case definition:**

A case of suspected or confirmed CCHF (per local case definition or WHO case definition) where:

- case has been admitted to a health-care setting as an inpatient for 13 or more days at time of symptom onset.

**OR**

A case of suspected or confirmed CCHF (per local case definition or WHO case definition) where:

- 4–13 days prior to symptom onset, case was exposed to a health-care setting where a patient with suspected or confirmed CCHF was present

**AND**

- case has no recollection of exposure in a community or household setting to a person with symptoms compatible with CCHF (4 – 13 days prior to symptoms onset)

**AND**

- if case has travelled to or lives in an endemic/outbreak area, case has no evidence or recollection of primary route of transmission (e.g. recent tick bite or direct contact with blood/tissue of livestock or other animals) (1– 9 days prior to symptoms onset)

**2. HAI CCHF investigation line list**

- Below are suggested criteria to include in a line list for cases meeting both the standard CCHF case definition and the HAI CCHF case definition:
  - Unique case ID/patient identifier
  - Date of admission or visit to health facility
  - Demographics: Health and care worker, patient, visitor/caregiver
  - Date of onset of symptom(s)
  - Date of laboratory confirmation of diagnosis (if confirmed)
  - Admission diagnosis or reason for visit
  - Date of discharge
  - Room/bed number or ward/unit
  - Date and location of exposure (if known)
  - Direct or indirect exposure details (if known)
  - Other relevant information or investigational findings (e.g. commonalities among multiple cases, identified contacts for follow-up)

**3. In the event of an outbreak of CCHF in a health-care facility**

- The threshold for an HAI CCHF outbreak is **1** (one) case meeting the HAI case definition described above. Cases of health care-associated infections of CCHF should be isolated and managed according to this operational guide.
- Identify contacts and conduct an investigation, including an audit of IPC practices used in the health-care facility (standard precautions and transmission-based precautions for suspected or confirmed CCHF cases as described in this operational guide).

- iii. If a common exposure point is identified (e.g. a common room, procedure or space that was used by both the index patient and a subsequent case):
  - a. dispose of all PPE and disposable patient care equipment in area as infectious waste;
  - b. ensure appropriate decontamination and/or reprocessing of all instruments and non-disposable patient care equipment present in the area.

#### **4. Identify and manage potentially exposed contacts**

- i. In addition to the above criteria for patients meeting the HAI CCHF case definition, potentially exposed contacts should be identified as direct or indirect contacts.
  - a. A direct contact may be identified as a person who had direct touch exposure to a suspected or confirmed CCHF case without appropriate compliance with standard and transmission-based precautions at any time during the previous 4–13 days.
  - b. An indirect contact may be identified as a person who was potentially exposed to CCHF but had no direct touch contact with a suspected or confirmed case. For example, exposure to a room or to shared equipment that was used by a patient identified with suspected or confirmed CHF during the previous 4–13 days.
- ii. Contacts should be provided with information on the signs and symptoms of CCHF and should be monitored if remaining as inpatients. Contacts who are not inpatients (e.g. health and care workers, caregivers, visitors or outpatients) should be instructed to self-monitor for 13 days after the date on which they may have been exposed to CCHF and to seek immediate medical care if symptoms of CCHF develop.

### **Setting-specific considerations**

#### **Surgical and operating room settings**

Health and care worker infections of CCHF have been documented following body fluid exposures during emergent gastrointestinal surgeries (18). To prevent exposure to body fluids when surgical procedures are performed on patients with suspected or confirmed CCHF, all persons in the operating theatre should utilize transmission-based precautions.

- i. Use contact precautions and perform a risk assessment for use of additional PPE to mitigate risk of splash or spray of blood or body fluids if anticipated (e.g. fluid-resistant medical mask and eye protection).
  - a. When aerosol-generating procedures are performed, use airborne and contact precautions + eye protection as described in the standard and transmission-based precautions section above.
- ii. Perform terminal cleaning of the procedure room after the patient has left the area.
  - a. dispose of all PPE and disposable equipment used during procedures as infectious waste;
  - b. ensure appropriate decontamination and/or reprocessing of all instruments and patient care equipment present in the procedure room or operating theatre.



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## Annex 1. Methods for development

This operational guide is tailored to address essential IPC measures required within the context of a CCHF outbreak. This document serves as a single reference resource for implementing IPC measures by consolidating existing WHO documents, such as guidelines, guidance documents, fact sheets and training modules. Such documents were selected from the WHO database based on their applicability and information relevant to IPC practice.

Subsequently, WHO has worked to develop the present guidance, which is the translation of the standard and transmission-based precautions (6) into practical guidance applicable to CCHF. Many of the statements found in this operational guide are either extrapolated from existing WHO guidance documents (e.g. Transmission-based precautions for the prevention and control of infections: aide-memoire (6) or Standard precautions for the prevention and control of infections: aide-memoire (9)) or are extrapolated from the generic recommendations considering the mode of transmission of CCHF.

The recommendations on transmission-based precautions for CCHF were developed during a member state consultation meeting on the prevention and control of CCHF coordinated by the WHO Regional Office for the Eastern Mediterranean, which took place in Muscat, Oman in December 2015 with relevant discussion and recommendations published in a 2016 summary report (8). The participants included representatives of the ministries of health and ministries of agriculture from the Islamic Republic of Iran, Oman, Russian Federation, and Türkiye, staff from WHO and the United States Centers for Disease Control and Prevention (CDC, Atlanta) as well as infectious disease experts, laboratory scientists and vector/tick control experts attending the meeting in an individual capacity as WHO Temporary Advisers. The WHO Temporary Advisers attending the meeting completed the required WHO declaration of interests and no conflicts of interest with the subject matter of this meeting or with WHO were identified.

An additional rapid search for literature was conducted by the WHO Health Emergencies Infection Prevention and Control Readiness Team to inform contextual factors such as the epidemiology of CCHF. Further evidence is needed for specific areas, such as the requirements for discontinuing isolation and discharge criteria of patients with confirmed CCHF, analysis of aerosol transmission risk of CCHF outside of aerosol-generating medical procedures, and refinement of CCHF HAI case definitions for areas where national or localized CCHF case definitions may not be available. When further evidence is available, the advice will be revised and included accordingly in a future revision to this operational guide.

The standing IPC Public Health Emergencies Working Group of external experts reviewed this document as did various other units within WHO, including infection prevention and control focal points within the six WHO regions; their feedback was integrated into the final document. Conflict of interest declaration forms for external reviewers were collected and reviewed according to WHO policy. No conflicts of interest were identified. For more information on authorship and contributions, please refer to the acknowledgement section.

## Annex 2. Resources

### CCHF resources

- Crimean-Congo haemorrhagic fever. Geneva: World Health Organization [website]; 2022. <https://www.who.int/news-room/fact-sheets/detail/crimean-congo-haemorrhagic-fever>
- Crimean-Congo Haemorrhagic Fever: Introduction. Geneva: World Health Organization [website]; 2023. <https://openwho.org/courses/crimean-congo-haemorrhagic-fever-introduction>
- Geographic distribution of Crimean-Congo Haemorrhagic Fever [website]. Geneva: World Health Organization; 2022. [https://cdn.who.int/media/images/default-source/health-topics/crimean-congo-haemorrhagic-fever/220901global\\_cCHF\\_risk\\_2022.tmb-768v.png?sfvrsn=30115e7\\_1](https://cdn.who.int/media/images/default-source/health-topics/crimean-congo-haemorrhagic-fever/220901global_cCHF_risk_2022.tmb-768v.png?sfvrsn=30115e7_1)
- How to safely collect blood samples by phlebotomy from patients suspected to be infected with Crimean-Congo Haemorrhagic fever (CCHF) virus. Geneva: World Health Organization; 2018. <https://iris.who.int/handle/10665/361593>
- Summary report on the meeting on prevention and control of Crimean–Congo haemorrhagic fever in the Eastern Mediterranean Region, Muscat, Oman, 7–9 December 2015. Cairo: Regional Office for the Eastern Mediterranean, World Health Organization; 2015. <https://iris.who.int/handle/10665/206164>

### General IPC resources

- Core competencies for infection prevention and control professionals. World Health Organization; Geneva; 2020. <https://iris.who.int/handle/10665/335821>
- Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. <https://iris.who.int/handle/10665/251730>.
- Improving infection prevention and control at the health facility: interim practical manual supporting implementation of the WHO guidelines on core components of infection prevention and control programmes. Geneva: World Health Organization; 2018. <https://iris.who.int/handle/10665/279788>.
- Interim practical manual: supporting national implementation of the WHO guidelines on core components of infection prevention and control programmes. Geneva: World Health Organization; 2017. <https://iris.who.int/handle/10665/330073>.
- Outbreak investigations in health facilities. OpenWHO. Geneva: World Health Organization; 2023 [website]. <https://openwho.org/courses/IPC-outbreak>
- Roadmap to improve and ensure good indoor ventilation in the context of COVID-19. Geneva: World Health Organization; 2021. <https://iris.who.int/handle/10665/339857>
- Standard precautions for the prevention and control of infections: aide-memoire. Geneva: World Health Organization; 2022. <https://iris.who.int/handle/10665/356855>.
- Transmission-based precautions for the prevention and control of infections: aide-memoire. Geneva: World Health Organization; 2022 <https://iris.who.int/handle/10665/356853>

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