

कोरोना भाइरस रोगबाट बच्ने उपायहरू



खोवदा हाइस्युं गर्दा नाक मुख टिस्यु पेपर वा कुहिनाले छोप्ने



बेलाबेलामा साबुनपानीले कम्तिमा २० सेकेन्ड मिचिमिचि हात धुने वा अल्कोहल भएको स्यानिटाइजर प्रयोग गर्ने



हात मिलाउनु वा अंकमाल गर्नुको सट्टा, नमस्कार गर्ने



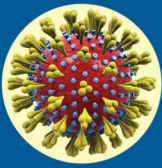
मिडभाडमा नजाने

ज्वरो आएमा, खोकि लागेमा वा श्वाश फेर्न गाह्रो भएमा नजिकको तोकिएको स्वास्थ्य केन्द्रमा सम्पर्क गर्ने



कोरोना भाइरस रोगका बारेमा थप जानकारीको लागि १११५ वा ८८५१२५५८३८, ८८५१२५५८३७, ८८५१२५५८३८ मा सम्पर्क गरौं ।





कोरोना भाइरस रोग (कोभिड-१९)

हाल विश्वभरी फैलिरहेका नयाँ कोरोना भाइरसको संक्रमणबाट लागेको रोगलाई विश्व स्वास्थ्य संगठनले “कोभिड १९” को नाम दिएको छ र यसलाई विश्वव्यापी महामारीको रूपमा घोषणा गरिसकिएको छ ।

कोरोना भाइरस श्वाशप्रश्वाशको माध्यमबाट सर्ने रोग हो । यो संक्रमित व्यक्तिले खोक्दा वा हाछ्युँ गर्दा नाक वा मुखबाट निस्कने छिट्टाको माध्यमबाट एक व्यक्तिबाट अर्को व्यक्तिला सार्दछ ।

कोरोना भाइरस रोगको मुख्य लक्षणहरू



ज्वरो
आउने



खोकि
लाग्ने



श्वाश फेर्न
गाह्रो हुने

यस्ता लक्षणहरू देखा परेमा नजिकको तोकिएको स्वास्थ्य केन्द्रमा सम्पर्क गर्ने ।

यस रोगको संक्रमणको जोखिमबाट बच्नको लागि निम्न उपायहरू अपनाउनुपर्छ ।



ज्वरो र खोकौ लागेको
व्यक्तिबाट टाढा रहने वा
आफूलाई ज्वरो र खोकौ
लागेको छ भने पनि अरु
व्यक्तिबाट टाढा रहने र
मास्कको प्रयोग गर्ने



खोक्दा हाछ्युँ गर्दा नाक मुख टिस्सु
पेपर वा कुहिनाले छोप्ने र प्रयोग गरेको
टिस्सु पेपरलाई बिको भएको फोहर
फाल्ने भाँडोमा फाल्ने र साबुन पानीले
मिचिमिचि हात धुने वा अल्कोहल भएको
स्पानिटाइजर प्रयोग गर्ने



मिडभाडमा
नजाने र
अरुलाई पनि
नजाना सुभाब
दिने, हात
मिलाउनुको
सट्टा नमस्कार
गर्ने



बेलाबेलामा
साबुन पानीले
कारिमा २०
सेकेन्ड मिचिमिचि
हात धुने वा
अल्कोहल भएको
स्पानिटाइजर
प्रयोग गर्ने



कोरोना प्रभावित
देशबाट आएको
व्यक्तिहरूमा
माथिका लक्षणहरू
देखिए स्वास्थ्य
केन्द्रमा तुरुन्त
जानुपर्दछ । घरेमा
बस्दा परिवारका
सदस्यहरूबाट १४ दिन
सम्म छुट्टै आईसोलेसनमा
बस्नु पर्दछ ।



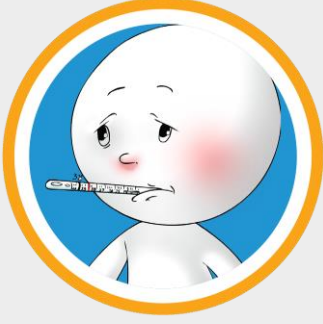
कोरोना भाइरस रोगका बारेमा थप जानकारीको लागि ११११ वा ८८५१२५५८३८,
८८५१२५५८३७, ८८५१२५५८३८ मा सम्पर्क गर्नु ।



NOVEL CORONA VIRUS (nCOV)

सर्बसाधारणका लागि जनचेतनामुलक संदेश

नोवेल कोरोना भाइरसका मुख्य लक्षणहरू



ज्वरो

(100.4°F भन्दा माथि)



श्वास प्रश्वासमा
आत्याधिक समस्या



रुघा र खोकी

“कोरोना भाइरस प्रभावित देशहरूबाट आउने मानिसहरूमा दुई हप्ता भित्र रुघाखोकी लागेमा, ज्वरो आएमा, घाँटी/टाउको दुखेमा, श्वासप्रश्वासमा आत्याधिक समस्या भएमा तुरुन्त नजिकको स्वास्थ्य संस्थामा सम्पर्क गर्ने।”

नोवेल कोरोना भाइरसबाट कसरी आफू र अरूलाई बचाउने?

नियमित रूपमा साबुन-
पानीले हात धुने



खोकदा र हाँच्युं गर्दा
नाक र मुख छोप्ने



यदि फलू जस्तो लक्षण
(Flu-like symptoms)
देखिएमा चिकित्सकसंग
परामर्श लिने



फलू जस्तो लक्षण
देखाउने जो कोहीको
सम्पर्कबाट टाढा रहने



जंगली तथा
घरेलु पशुपन्छी हरूसँग
असुरक्षित सम्पर्कबाट
टाढा रहने



पशुजन्य मासु/अन्डा
राम्रोसंग पाकेको मात्र
खाने



नेपाल सरकार

स्वास्थ्य तथा जनसंख्या मन्त्रालय

स्वास्थ्य सेवा विभाग

इपिडिमियोलोजी तथा रोग नियन्त्रण महाशाखा

प्रायः सोधिने प्रश्नहरू

नोवेल कोरोना
भाइरस भनेको
के हो ?

यो नयाँ प्रजातिको भाइरस हो जुन मानव जातिमा पहिले पहिचान भएको थिएन। यस भाइरसले मानिस र पशुहरूमा संक्रमण गर्दछ। यस भाइरसले सामान्य रुघा खोकी देखि गम्भीर प्रकारको तीव्र श्वासप्रश्वास Severe Acute Respiratory Syndrome (SARS) सम्म गराउन सक्दछ।

के मानिसमा
जनावरहरूबाट
नोवेल कोरोना
भाइरस संक्रमित
हुन सक्दछ ?

नोवेल कोरोना भाइरस जनावरबाट मानिसमा संक्रमित भएको कुनै बैज्ञानिक आधार हाल छैन।

के नोवेल
कोरोना भाइरस
र SARS एउटै
हुन् ?

सन् २००३ मा देखिएको SARS र नोवेल कोरोना भाइरस एउटै प्रजातिका भाइरस हुन्। दुवै भाइरसले बिरामीलाई गम्भीर बनाउन सक्दछन्। सबैभन्दा महत्वपूर्ण कुरा, नोवेल कोरोना भाइरस मानिसहरू बीच सजिलै सर्न सक्दछ भनेर अझै पुष्टी भएको छैन।

मानिस कसरी
यो भाइरसबाट
संक्रमित हुन
सक्छ ?

मानिस कसरी यो भाइरसबाट संक्रमित भएका छन् भन्ने बारेमा आज सम्म बैज्ञानिक तवरले पुष्टी भएको छैन। हाललाई यस बिषयमा अनुसन्धान भइरहेको छ।

के यो एक
व्यक्तिबाट अर्को
व्यक्तिमा सर्न
सक्दछ ?

अहिले निश्चितताका साथ भन्न सकिने अवस्था छैन। एउटै परिवारका सदस्यहरू बिरामी भएको पाइएकोले, मानव-मानव बीचमा सिमित तवरले सर्ने सम्भावना रहेको अनुमान गरिएको छ। साथै, परिवारका सदस्यहरू एकै स्रोतबाट संक्रमण भएको हुन सक्ने सम्भावना पनि रहेको छ।

सामान्यतयः यस भाइरसको संक्रमण कसरी हुन्छ भन्ने बारेमा यकिन जानकारी छैन। तथापि: रुघा, खोकी तथा श्वास प्रश्वासका बिरामीको नजिक नजाने तथा हातको सरसफाई नियमित गरेमा संक्रमणको सम्भावना कम रहन्छ।

यस भाइरसको
संक्रमणबाट
कसरी बच्न
सकिन्छ ?

के कोरोना
भाइरसको लागि
उपचार छ ?

नोवेल कोरोना भाइरसले गर्दा हुने रोगको लागि कुनै खास उपचार छैन। यद्यपि यो भाइरसले निम्त्याएका धेरै लक्षणहरूको उपचार गर्न सकिन्छ, त्यसैले बिरामीको उपचार लक्षणको आधारमा गरिन्छ। साथै यस भाइरसको विरुद्ध हाललाई कुनै खोप उपलब्ध छैन।



नेपाल सरकार

स्वास्थ्य तथा जनसंख्या मन्त्रालय

स्वास्थ्य सेवा विभाग

इपिडिमियोलोजी तथा रोग नियन्त्रण महाशाखा

Algorithm to suspect Novel Corona Virus (nCoV) infection based on the WHO Surveillance Case Definition*

Does the person/patient have Influenza Like Illness (ILI¹)/Acute Respiratory Illness (ARI)?

¹ILI: An acute respiratory infection with history of fever or measured temperature $\geq 38^{\circ}\text{C}$ and cough and / or sore throat with onset within the last 10 days

Yes

No

Do not Suspect nCoV infection

Does the Patient have Severe Acute Respiratory Illness (SARI)²?
²SARI: An acute respiratory infection with history of fever or measured temperature $\geq 38^{\circ}\text{C}$ and cough and or sore throat with onset within the last 10 days and admitted to hospital

Yes

No

Has a known etiology that fully explains the clinical presentation?

Do not Suspect nCoV infection

Yes

No

Do not Suspect nCoV infection

Has the Patient developed unusual or unexpected clinical course, especially sudden deterioration despite appropriate treatment, without regard to place of residence or history of travel?

Is there a history of travel to or residence in Wuhan, Hubei Province, China in the 14 days prior to the onset of illness?

Is the patient a health care worker, who has been working in an environment where SARI patient(s) is/are being taken care of, irrespective of history of travel to or residence in Wuhan, Hubei Province, China in the 14 days prior to the onset of illness?

Has the patient been in close physical contact with a confirmed case of nCoV infection?

Was the patient in the health care facility in a country where hospital associated nCoV infections reported?

Has the patient visited or worked in a live animal market in Wuhan, China?

Was the patient in direct contact with animals (if animal source is identified) in countries where the nCoV is known to be circulating in animal populations or where human infections have occurred as a result of presumed zoonotic transmission.

Yes

No

Do not Suspect novel Corona virus (nCoV) infection

Suspect novel coronal virus (nCoV) infection

^{1 & 2} Case definitions used by NPHL/NIC and EDCD, Nepal

* WHO Surveillance Case Definition: https://www.who.int/docs/default-source/coronaviruse/20200115-surveillance-case-definitions-ncov-final.pdf?sfvrsn=bee0de9b_2&download=true

Risk communication and community engagement readiness and initial response for novel coronaviruses (nCoV)

Interim guidance v1

January 2020

[WHO/2019-nCoV/RCCE/v2020.1](#)



This document provides WHO checklists for risk communication and community engagement (RCCE) readiness and initial response for novel coronaviruses (nCoV) recently identified in Wuhan, China (2019-nCoV). The objective of this document is to provide actionable guidance for countries to implement effective RCCE strategies which will help protect the public's health in the early response to nCoV. This document includes recommended RCCE goals and actions for countries preparing for nCoV cases and for countries that have confirmed nCoV cases.

WHO will update these recommendations as new information becomes available on the situation in Wuhan, China. This interim guidance was adapted from WHO's RCCE guidance and training materials.

Why is it important to include RCCE as part of a national public health emergency response?

Every public health emergency faces new communication challenges and lessons learned. These challenges can lead to a range of outcomes including loss of trust, reputation, economy and at worst case – lives. While there are always new lessons to be learned, there are actions we know will work. This is a call to leaders to ensure RCCE is an essential role in your health emergency preparedness and response for the following reasons.

One of the most important and effective interventions in public health response to any event is to proactively communicate what is known, what is unknown and what is being done to get more information with the objective of saving lives and minimizing adverse consequences.

RCCE helps prevent infodemics (the spread of misinformation), builds trust in the response and increases the probability that health advice is followed. It minimizes and manages false rumours and misunderstanding that undermine response and may lead to further disease spread.

Proactive communication and engagement with the public and at risk populations on a consistent basis can help alleviate confusion and misunderstanding.

People have the right to be informed and understand the health risks they face, in addition to that of their loved ones.

The perception of risk among affected populations often differs from that of experts and authorities. Effective RCCE can help bridge that gap by determining what people know, feel and do related to disease outbreaks, as well as what they ought to know and do to bring the outbreak under control. Effective RCCE helps transform and deliver complex scientific knowledge which is understood by, accessible to, and trusted by populations and communities.

Effective RCCE uses community engagement strategies to involve communities in the response and develops acceptable yet effective interventions to stop further amplification of the outbreak and for individual and group protective measures.

RCCE is essential for surveillance, case reporting, contact tracing, caring for the sick and clinical care, gathering local support for any logistic and operational needs of the response.

RCCE readiness checklist for countries preparing for a possible outbreak

Goals

- Prepare to communicate with unknown information and uncertainty
- Assess national and subnational communication capacity (persons and resources)
- Identify the main actors, and form partnerships
- Plan for activation and implementation of RCCE plan
- Train emergency RCCE staff and potential surge staff on plans and procedures

Action steps

Risk Communication Systems

- Ensure that highest levels of government agree to include RCCE in preparedness and response activities and is ready to release information to protect the public's health rapidly, transparently and accessibly
- Review existing RCCE plan and consider adjustments for a respiratory outbreak
- Agree on procedures for timely release of information such as clearance procedures for messages and information products – keep clearance chains short
- Prepare a budget for communication (including scale-up)
- Set up a RCCE team and define roles and responsibilities

Internal and partner coordination

- Identify partners to include other agencies, organizations, community planners, health care workers, etc., with their contact information (in the case of this outbreak consider Ministry of Agriculture, Travel and Tourism, hospital systems, etc.) – should an outbreak occur, these partners should be activated into a multi-sectoral RCCE response team
- Assess the communication capacity of all relevant partners – identify typical target audiences and channels of communication used by partners
- Plan and agree on communication roles and responsibilities through standard operating procedures (SOPs) (e.g. which agency speaks first on which issue, what specific topics and audiences will be best addressed through which agency/partner, how will messaging be aligned)

Public communication

- Review the roster of spokespeople at all levels, listing their expertise in anticipated public health threats, and, if necessary, train them
- Produce and pre-test message templates
- Identify key media; create and update a list of journalists, and foster media relations
- Identify media and other communication channels and influencers and assess their potential reach for potential target audiences – use channels and influencers trusted, preferred and regularly used by target audiences

Communication engagement with affected communities

- Establish methods for understanding the concerns, attitudes and beliefs of key audiences
- Identify target audiences, and gather information on their knowledge and behaviours (e.g. who they trust, how they are likely to receive information, their daily habits, their concerns, etc.)
- Identify existing community influencers (e.g. community leaders, religious leaders, health workers, traditional healers, etc.) and networks (e.g. women's groups, community health volunteers, unions, social mobilizers for polio, malaria, HIV) that can be repurposed for community engagement

Addressing uncertainty, perceptions and misinformation management

- Prepare to begin communicating before the full picture is known by ensuring leaders agree to communicate with
- Establish a system for monitoring and, if necessary, responding to rumours, misinformation and frequently asked questions

Capacity building

- Consider training needed for RCCE responders on what is known and unknown about novel coronavirus, current plans and procedures as well as sub-national preparation for RCCE response

RCCE initial response checklist for countries where one or more cases have been identified

Goals

- Adapt and apply action steps from readiness checklist above if not already completed
- Establish, build and/or maintain trust with population through regular two way communication and engagement that regularly addresses misunderstanding, misinformation, rumours and frequently asked questions
- Encourage people to adopt protective behaviours
- Manage expectations and communicate uncertainties
- Coordinate and encourage collaboration among response partners
- Assess initial risk perception of affected and at risk populations
- Provide information and guidance

Action steps

Risk Communication Systems

- Adapt existing RCCE plan to the response, and activate the RCCE response team and plan
- Identify and activate spokespersons for the emergency
- Draw up timelines for communication activities and products
- Monitor RCCE response by identifying processes that delay information release and create confusion among affected populations

Internal and partner coordination

- Activate SOPs for RCCE coordination with other response agencies and partners
- Link national, regional and local RCCE operations
- Assign responsibilities for internal (to each response agency) and external (to the public) communication
- Coordinate message preparation, consistency and dissemination

Public communication

- Announce the health threat early and often and update after a risk assessment and an analysis of risk perception
- Provide information as soon as it is received, even if it is not complete and openly explain the degree to which information is uncertain (manage uncertainty), provide the public regular channels to get updated information (e.g. hotlines, website, etc.)
- Use trusted and effective communication channels that target audiences regularly use
- Identify and activate trusted influencers for the audiences

Communication engagement with affected communities

- Conduct a rapid risk perception analysis based on existing formal and informal information
- Segment the audiences for the communication response (e.g. affected people, health care workers, political leaders, donors, etc.)
- Translate materials into relevant languages and adapt to literacy levels

Addressing uncertainty, perceptions and misinformation management

- Communicate what is known and what is not known - explain degree to which uncertainty still exists
- Activate rumour monitoring, verification and response mechanisms
- Monitor mass and social media, hotlines, health care worker feedback from patients and community concerns and continually apply feedback into adapted RCCE strategy

Capacity building

- Plan regular updated guidance to all RCCE responders
- Train surge staff
- Consider training leaders, responders and spokespersons on RCCE guidance as needed

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Laboratory testing of human suspected cases of novel coronavirus (nCoV) infection

Interim guidance

10 January 2020

[WHO/2019-nCoV/laboratory/2020.1](https://www.who.int/docs/default-source/coronavirus/surveillance-guidance/laboratory-testing-of-human-suspected-cases-of-novel-coronavirus-infection-10-january-2020.pdf)



1. Introduction

The purpose of this document is to provide interim guidance to laboratories and stakeholders involved in laboratory testing of patients who meet the definition of suspected case of pneumonia associated with a novel coronavirus identified in Wuhan, China (See: Surveillance case definitions for human infection with novel coronavirus, Interim guidance v1, January 2020, WHO/2019-nCoV/Surveillance/v2020.1).

For the basis of this document various existing WHO documents have been used and adapted for its purpose, including WHO laboratory guidance for MERS-CoV (1-11). As information about the etiology, clinical manifestations and transmission of disease in the cluster of respiratory disease patients identified in Wuhan is limited, WHO continues to monitor developments and will revise these recommendations as necessary.

The etiologic agent responsible for the cluster of pneumonia cases in Wuhan has not yet been fully verified, but a novel Betacoronavirus has reportedly been cultured from at least one pneumonia patient and characterized by electron microscopy and genome sequencing and has been detected by PCR in 15 other patients (12). It is expected that full gene sequence and other information on the putative causative agent will soon be available that can inform the development of specific diagnostic tests. Until that time, the goals of diagnostic testing are to detect suspect cases early, to support disease control activities, and to work with reference laboratories that can perform pathogen discovery and additional testing to clarify the pathogenic role of the putative emergent cause of respiratory disease.

2. Suspected case definition

For case definition see the following document: WHO Surveillance case definitions for human infection with novel coronavirus.

3. Specimen collection and shipment

Rapid collection and testing of appropriate specimens from suspected cases is a priority and should be guided by a laboratory expert. As the causative agent has not been verified and the gene sequence of the putative coronavirus not yet published, multiple tests may need to be performed and sampling sufficient clinical material is recommended. Local guidelines should be followed regarding patient or guardian's informed consent for specimen collection, testing and potentially future research.

Assure SOPs are available, and the appropriate staff is trained and available for appropriate collection, specimen storage, packaging and transport. There is still limited information on the risk posed by the reported coronavirus found in Wuhan, but it would appear samples prepared for molecular testing could be handled as would samples of suspected human influenza (2, 7-9). Attempts to culture the virus require a higher level of biosecurity.

Samples to be collected (see Table 1 for details on sample collection and storage):

1. Respiratory material* (nasopharyngeal and oropharyngeal swab in ambulatory patients and sputum (if produced) and/or endotracheal aspirate in patients with more severe respiratory disease)
2. Serum for serological testing, acute sample and convalescent sample (this is additional to respiratory materials and can support the identification of the true agent, once serologic assay is available)
3. Other specimens to consider in unresolved cases: blood for culture, urine for *Legionella* and pneumococcal antigen detection

*To be modified once information is available on whether upper or lower respiratory material is the better sample for detection of the putative coronavirus.

A single negative test result, particularly if this is from an upper respiratory tract specimen, does not exclude infection. Repeat sampling and testing, lower respiratory specimen is strongly recommended in severe or progressive disease. A positive alternate pathogen does not necessarily rule out either, as little is yet known about the role of coinfections.

Reference 2, 3, 7

Diagnostic algorithm for patients that meet the suspected case definition

Until the cause of respiratory disease originating in Wuhan is confirmed and a diagnostic test available, patients that meet the suspected case definition should be screened for common causes of respiratory illness according to local guidelines (1,5,7). When results of the screening are negative, a sample should be sent to a regional, national or international reference laboratory with pathogen discovery capability (e.g., sequencing, electron microscopy, viral culture). WHO can assist Member States to identify laboratories able to provide this support. Once the causative agent of this outbreak is verified and test reagents made available, specific diagnostics directed to this agent can be added to the diagnostic algorithms.

Example of differential diagnosis for pneumonia in outbreak settings:*

Viral infections such as influenza -A, -B, and -C virus, adenovirus, MERS-, SARS coronavirus, other human coronaviruses, respiratory syncytial virus, parainfluenza virus 1-4, human metapneumovirus, rhinovirus/enterovirus.

Bacterial infections such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Streptococcus pyogenes*, Legionnaires' disease/Pontiac fever (*Legionella pneumophila*, and *Legionella non-pneumophila*), anthrax, leptospirosis and atypical bacterial infection such as *Mycoplasma* and *Chlamydia pneumoniae and psittaci*, Q-fever (*Coxiella burnetii*), mycobacterial infections and in specific patient groups opportunistic infections such as PJP and fungal infections. The possibility of exposure to non-infectious agents (e.g. toxins, radiation) should also be considered depending on the clinical syndrome.

***Needs adaptation in relation to local guidelines, regional occurrence of disease, specific patient risk factors and clinical presentation)**

Note: Coinfections and bacterial superinfections can occur, and non-obligate pathogens detected might not be the cause of illness.

Safety procedures during sample collection and transport

All specimens collected for laboratory investigations should be regarded as potentially infectious, and HCWs who collect, or transport clinical specimens should adhere rigorously to infection prevention and control guidelines and national or international regulations for the transport of dangerous goods (infectious substances) to minimize the possibility of exposure to pathogens (14). Though the mode of transmission of the causative agent(s) is not established, HCWs should assume the potential for respiratory spread. Implement the highest available level of achievable infection prevention and control precautions according to protocol until the mode of transmission and risk from infection is clarified (11).

Infection prevention measurements for a novel coronavirus (route of transmission unknown but suspected to be respiratory)

Ensure that Health Care workers (HCWs) who collect specimens follow the following guideline and use the adequate PPE: Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected, interim guidance, January 2020 (11) and other IPC guidance (10, 15-17).

Ensure that HCWs performing aerosol-generating procedures (i.e. aspiration or open suctioning of respiratory tract specimens, intubation, cardiopulmonary resuscitation, bronchoscopy) use additional precautions (for details see detailed guidelines mentioned above).

Respirators (NIOSH-certified N95, EU FFP2 or equivalent, or higher level of protection). *When putting on a disposable particulate respirator, always check the seal/fitness. Be aware that the presence of facial hair (e.g. beard) may prevent a proper respirator fit for the wearer. In some countries, a powered air-purifying respirator (PAPR) is utilized instead of a respirator.*

- **Eye protection (i.e. goggles or a face shield).**
- **Clean, non-sterile, long-sleeved gown and gloves.** *Note that some procedures require sterile gloves. If gowns are not fluid resistant, a waterproof apron should be used for procedures where it is expected that high fluid volumes might penetrate the gown*

- Perform procedures in an adequately ventilated room: at a minimum natural ventilation with at least 160l/s/patient air flow, or negative pressure rooms with at least 12 air changes per hour and controlled direction of air flow when using mechanical ventilation
- Limit the number of persons present in the room to the minimum required for the patient's care and support; and
- Follow WHO guidance for steps of donning and doffing PPE. Perform hand hygiene before and after contact with the patient and his or her surroundings and after PPE removal.
- Waste management and decontamination procedures: Ensure that all materials used is disposed appropriately. Disinfection of work areas and decontamination of possible spills of blood or infectious body fluids should follow validated procedures, usually with chlorine-based solutions.

Specifics for transport of samples to laboratory:

- Ensure that personnel who transport specimens are trained in safe handling practices and spill decontamination procedures.
- Follow the requirements in the national or international regulations for the transport of dangerous goods (infectious substances) as applicable (14).
- Deliver all specimens by hand whenever possible. Do not use pneumatic-tube systems to transport specimens.
- State the full name, date of birth of the suspected SARI case clearly on the accompanying request form. Notify the laboratory as soon as possible that the specimen is being transported.

Assure good communication with the laboratory and provide needed information

To assure proper and fast processing of samples and to assure adequate biosafety measures in the laboratory, communication and information sharing is essential. Be sure you have alerted the laboratory of the urgency and situation before sending the sample. Also assure that specimens are correctly labelled, and diagnostic request forms are filled out properly and clinical information is provided (see box information to be recorded)

Information to be recorded:

- Patient information – name, date of birth, sex and residential address, unique identification number, other useful information (e.g. patient hospital number, surveillance identification number, name of hospital, hospital address, room number, physicians' name and contact information, name and address for report recipient),
- Date and time of sample collection,
- Anatomical site and location of specimen collection,
- Tests requested,
- Clinical symptoms and relevant patient history (including vaccination and antimicrobial therapies received, epidemiological information, risk factors).

Table 1. Specimens to be collected from symptomatic patients and asymptomatic contacts

Guidance on specimen collection (adapted from reference 5)

Specimen type	Collection materials	Transport to laboratory	Storage till testing	Comment
Nasopharyngeal and oropharyngeal swab	Dacron or polyester flocked swabs*	4 °C	≤5 days: 4 °C >5 days: -70 °C	The nasopharyngeal and oropharyngeal swabs should be placed in the same tube to increase the viral load.
Bronchoalveolar lavage	sterile container *	4 °C	≤48 hours: 4 °C >48 hours: -70 °C	There may be some dilution of pathogen, but still a worthwhile specimen
Tracheal aspirate, nasopharyngeal aspirate or nasal wash	sterile container *	4 °C	≤48 hours: 4 °C >48 hours: -70 °C	
Sputum	sterile container	4 °C	≤48 hours: 4 °C >48 hours: -70 °C	Ensure the material is from the lower respiratory tract
Tissue from biopsy or autopsy including from lung	sterile container with saline	4 °C	≤24 hours: 4 °C >24 hours: -70 °C	
Serum (2 samples acute and convalescent possibly 2-4 weeks after acute phase)	Serum separator tubes (adults: collect 3-5 ml whole blood)	4 °C	≤5 days: 4 °C >5 days: -70 °C	Collect paired samples: • acute – first week of illness • convalescent – 2 to 3 weeks later
Whole blood	collection tube	4 °C	≤5 days: 4 °C >5 days: -70 °C	For antigen detection particularly in the first week of illness
Urine	urine collection container	4 °C	≤5 days: 4 °C >5 days: -70 °C	

*For transport of samples for viral detection, use VTM (viral transport medium) containing antifungal and antibiotic supplements. For bacterial or fungal culture, transport dry or in a very small amount of sterile water. Avoid repeated freezing and thawing of specimens.

Aside from specific collection materials indicated in the table also assure other materials and equipment are available: e.g. transport containers and specimen collection bags and packaging, coolers and cold packs or dry ice, sterile blood-drawing equipment (e.g. needles, syringes and tubes), labels and permanent markers, PPE, materials for decontamination of surfaces.

4. Effective usage of Global Laboratory Networking

Timely and accurate laboratory testing of specimens from cases under investigation is an essential part of the management of emerging infections. All countries should have access to reliable testing, either nationally or internationally, in laboratories willing to perform primary detection or confirmatory testing, and novel pathogen detection. WHO can assist Member States to access testing internationally should the need arise.

5. Testing in reference laboratories

Microscopy

Light and electron microscopy can rapidly provide the first information on the potential causative agent in clinical materials. However subsequent testing is needed to identify the pathogen.

Culture

Viral culture is often considered the “gold standard” for laboratory diagnosis of viral respiratory infections. Laboratories with the appropriate experience and containment facilities, may attempt to isolate the virus. These recommendations do not cover virus isolation procedures. Culture of virus has important biosafety implications, depending on the type of virus, its pathogenicity and mechanism of spread.

Molecular identification and characterization of a novel pathogen

A number of methods and systems for rapid and sensitive identification of the genetic sequence of novel pathogens have been developed and refined. Sharing such gene sequence information among collaborators is essential to rapidly identify the pathogen and to develop pathogen-specific diagnostics.

In addition to identifying the novel pathogen, sequence data can also provide valuable information for understanding the origin of the virus and how it is spreading. WHO has published a Draft code of conduct for the handling of Genetic Sequence Data related to outbreaks (see https://www.who.int/blueprint/what/norms-standards/GSDDraftCodeConduct_forpublicconsultation-v1.pdf?ua=1). That policy framework recommends making sequence data publicly available. Different models for sharing of pathogen sequences exist, open (e.g. GenBank, virological.org) or semi-open (e.g. GISAID) platforms. Laboratories are encouraged to share sequence data with WHO and the scientific community to assist in the rapid development and distribution of diagnostic assays in at risk countries. Leading medical journals now have regulations discouraging publication of articles on outbreak pathogens

when the authors did not expedite the release of sequence information into the public sector. WHO can assist Member States to identify laboratories able to provide support and advise them on the management of sequence data related to an outbreak.

Serological testing

Serological testing may be useful to confirm immunologic response to a pathogen from a specific viral group, e.g. coronavirus. Best results from serologic testing requires the collection of paired serum samples (in the acute and convalescent phase) from cases under investigation.

In the absence of shared sequence information from the putative pathogen from the Wuhan outbreak, laboratories may desire to use a pan-coronavirus assay for amplification followed by sequencing of the amplicon for characterization and confirmation. External confirmation should be sought from a reference laboratory that can deploy additional assays. It is important to consider that four human coronaviruses (HcoVs) are endemic globally: HCoV-229E, HCoV-NL63, HCoV-HKU1 as well as HCoV-OC43. The latter two are betacoronaviruses. Two other betacoronaviruses that cause zoonotic infection in humans are MERS-CoV, acquired by contact with dromedary camels and SARS arising from civets and cave-dwelling horseshoe bats.

Once genome sequences of the novel coronavirus have been released and specific NAAT assays developed, confirmation of cases of the novel virus infection will be based on specific detection of unique sequences of viral nucleic acid by reverse-transcriptase polymerase chain reaction (RT-PCR) with probe detection or sequencing. Alternative NAAT techniques with advantages of speed or simplicity of use may also become available.

Specifics for biosafety practices in the laboratory

Ensure that health laboratories adhere to appropriate biosafety practices. Any testing on clinical specimens from patient meeting the case definition should be performed in appropriately equipped laboratories by staff trained in the relevant technical and safety procedures. National guidelines on the laboratory biosafety should be followed in all circumstances. General information on laboratory biosafety guidelines, see the WHO Laboratory Biosafety Manual, 3rd edition (8).

It is recommended that all manipulations in laboratory settings of samples originating from suspected or confirmed cases of novel coronaviruses can be conducted according to WHO recommendations available at: https://www.who.int/csr/disease/coronavirus_infections/Biosafety_InterimRecommendations_NovelCoronavirus2012_31Oct12.pdf?ua=1 Information on biosafety levers for SARS, a Betacoronavirus that can cause severe respiratory disease can be consulted at [https://www.who.int/csr/sars/biosafety2003_04_25/en/and other guidance](https://www.who.int/csr/sars/biosafety2003_04_25/en/and_other_guidance).

Table 1. Tests to be performed in expert laboratories for patients meeting the case definition

Test	Type of sample	Timing
Whole genome sequencing	Lower respiratory tract <ul style="list-style-type: none"> - sputum - aspirate - lavage Upper respiratory tract <ul style="list-style-type: none"> - naso pharyngeal and - oro pharyngeal swabs - naso pharyngeal wash/naso pharyngeal aspirate 	Collect on presentation, done by an expert laboratory.
NAAT when it becomes available Note: In laboratories that have validated broad range coronavirus RT-PCR available, this might be considered, however at this date insufficient information is available to guarantee proper detection, thus multiple broad range coronavirus assays should be used and amplicon sequencing should always be part of the algorithm.	Lower respiratory tract <ul style="list-style-type: none"> - sputum - aspirate - lavage Upper respiratory tract <ul style="list-style-type: none"> - naso pharyngeal and - oro pharyngeal swabs - naso pharyngeal wash/naso pharyngeal aspirate 	Collect on presentation. To confirm clearance of the virus, sample collection to be repeated until the results are negative on 2 sequential samples. Multiple broad range coronavirus assays, done by an expert laboratory.
Serology, broad corona virus serology on paired samples if available	Serum for serological testing if NAAT is not available	Paired samples are necessary for confirmation with the initial sample collected in the first week of illness and the second ideally collected 3-4 weeks later. If only a single serum sample can be collected, this should occur at least 3-4 weeks after onset of symptoms for determination of a probable case.

Packaging and shipment to another laboratory

Transport of specimens within national borders should comply with applicable national regulations. International Transport Regulations. Novel coronavirus specimens should follow the UN Model Regulations, and any other applicable regulations depending on the mode of transport being used. More information may be found in the WHO Guidance on regulations for the Transport of Infectious Substances 2019-2020 (Applicable as from 1 January 2019) (14). A summary on transport of infectious substances can also be found in Toolbox 4 of the Managing epidemics handbook (1).

Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance, Category B", when they are transported for diagnostic or investigational purposes. Viral cultures or isolates should be transported as Category A, UN2814, "infectious substance, affecting humans". All specimens being transported (whether UN3373 or UN2814) should have appropriate packaging, labelling and documentation, as described above.

6. Reporting of cases and test results

Laboratories should follow national reporting requirements, but in general, suspected cases should be reported to relevant public health authorities as soon as the laboratory receives a specimen, even before any testing is performed. All test results, whether positive or negative, should likewise be immediately reported to national authorities. If the infection becomes widespread, laboratories should notify public health authorities immediately of each new confirmed case or positive screening test if there will be a delay in confirmatory testing. Laboratories should also periodically report the number of negative test results to public health.

States Parties to the IHR are reminded of their obligations to share with WHO relevant public health information for events for which they notified WHO, using the decision instrument in Annex 1 of the IHR (2005) (18).

Detection of a possible human case of emerging pathogen causing severe acute respiratory disease should immediately

be notified to local, subnational and national public health authorities. This will allow these authorities to make immediate decisions about launching the investigation and the extent of response measures. Detection of such a case should be used to trigger notification of traditional and non-traditional health providers, hospitals and outpatient facilities, and community leaders in the area where the case patients lived or travelled, as part of active case-finding efforts. In line with the International Health Regulations (IHR) (2005), the national health authority must notify WHO within 24 hours of all events that may constitute a public health emergency of international concern according to defined criteria. The IHR decision instrument should be used to determine whether an event is to be notified to WHO. Further guidance on the use of the IHR decision instrument, including examples of its application, is available. The national animal health authority must notify OIE of certain animal diseases detected on its territory. OIE focal points should be contacted for further details.

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