2020 Coronavirus Outbreak Preparedness in Bangladesh

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Organized by
icddr,b, Central Police Hospital Dhaka, and Bangladesh Biosafety and Biosecurity Society

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Coronavirus

- Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold (four human coronaviruses (HCoVs) are endemic globally: HCoV-229E, HCoV-NL63, HCoV-HKU1 as well as HCoV-OC43) to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans.
- Coronaviruses are zoonotic, meaning they are transmitted between animals and people. Detailed investigations found that SARS-CoV was transmitted from civet cats to humans and MERS-CoV from dromedary camels to humans. Several known coronaviruses are circulating in animals that have not yet infected humans.
- Common signs of infection include respiratory symptoms, fever, cough, shortness of breath and breathing difficulties. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death.
- Standard recommendations to prevent infection spread include regular hand washing, covering mouth and nose when coughing and sneezing, thoroughly cooking meat and eggs. Avoid close contact with anyone showing symptoms of respiratory illness such as coughing and sneezing.
2019-nCoV Case definitions for surveillance

Suspect case

A. Patient with severe acute respiratory infection (fever, cough, and requiring admission to hospital), AND with no other etiology that fully explains the clinical presentation AND a history of travel to or residence in China during the 14 days prior to symptom onset,

OR

B. Patient with any acute respiratory illness AND at least one of the following during the 14 days prior to symptom onset:

• contact with a confirmed or probable case of 2019-nCoV infection, or

• worked in or attended a health care facility where patients with confirmed or probable 2019-nCoV acute respiratory disease patients were being treated.
Case definitions for surveillance

**Probable case**

- Probable case: A suspect case for whom testing for 2019-nCoV is inconclusive or is tested positive using a pan-coronavirus assay and without laboratory evidence of other respiratory pathogens.

**Confirmed case**

- A person with laboratory confirmation of 2019-nCoV infection, irrespective of clinical signs and symptoms.
Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected
Interim guidance
Principles of IPC strategies associated with health care for suspected nCoV infection

• An IPC program with a dedicated and trained team or at least an IPC focal point should be in place and supported by the national and facility senior management.

• In countries where IPC is limited or inexistent, it is critical to start by ensuring that at least *minimum requirements* for IPC are in place as soon as possible, both at the national and facility level, and to gradually progress to the full achievement of all requirements of the IPC core components according to local priority plans.
IPC strategies to prevent or limit transmission in healthcare settings include the following

• Ensuring triage, early recognition, and source control (isolating patients with suspected nCoV infection);

• Applying standard precautions for all patients;

• Implementing empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of nCoV infection;

• Implementing administrative controls;

• Using environmental and engineering controls.
Ensuring triage, early recognition, and source control: isolating patients with suspected nCoV infection

To facilitate the early identification of cases of suspected nCoV infection, healthcare facilities should:

• Encourage HCWs to have a high level of clinical suspicion;

• Establish a well-equipped triage station at the entrance of health care facility, supported by trained staff;


• Post signs in public areas reminding symptomatic patients to alert HCWs.
Applying standard precautions for all patients

Standard precautions include

• Hand and respiratory hygiene,
• The use of appropriate personal protective equipment (PPE) according to risk assessment,
• Injection safety practices,
• Safe waste management,
• Proper linens,
• Environmental cleaning, and
• Sterilization of patient-care equipment.
Ensure that the following respiratory hygiene measures are used:

• Ensure that all patients cover their nose and mouth with a tissue or elbow when coughing or sneezing;
• Offer a medical mask to patients with suspected 2019-nCoV infection while they are in waiting/public areas or in cohorting rooms;
• Perform hand hygiene after contact with respiratory secretions.
Ensure that hand hygiene measures are used

- Hand hygiene includes either cleansing hands with an alcohol-based hand rub (ABHR) or with soap and water;
- Alcohol-based hand rubs are preferred if hands are not visibly soiled;
- Wash hands with soap and water when they are visibly soiled.
Implementing empiric additional precautions: Contact and droplet precautions

• In addition to using standard precautions, all individuals, including family members, visitors and HCWs, should use contact and droplet precautions before entering the room where suspected or confirmed nCoV patients are admitted;
• HCWs should use a medical mask (surgical/N95);
• HCWs should wear eye protection (googles) or facial protection (face shield) to avoid contamination of mucous membranes;
• HCWs should wear a clean, non-sterile, long-sleeved gown;
• HCWs should also use gloves;
Implementing empiric additional precautions: Contact and droplet precautions

• Patients should be placed in adequately ventilated single rooms. For general ward rooms with natural ventilation, adequate ventilation is considered to be 60 L/s per patient;9
• When single rooms are not available, patients suspected of being infected with nCoV should be grouped together;
• All patients’ beds should be placed at least 1 m apart regardless of whether they are suspected to have nCov infection;
• Where possible, a team of HCWs should be designated to care exclusively for suspected or confirmed cases to reduce the risk of transmission;
Implementing empiric additional precautions: Contact and droplet precautions

- The use of boots, coverall and apron is not required during routine care;
- After patient care, appropriate doffing and disposal of all PPE’s and hand hygiene should be carried out. Also, a new set of PPE’s is needed, when care is given to a different patient;
- Equipment should be either single-use and disposable or dedicated equipment (e.g., stethoscopes, blood pressure cuffs and thermometers). If equipment needs to be shared among patients, clean and disinfect it between use for each individual patient (e.g., by using ethyl alcohol 70%);
- HCWs should refrain from touching eyes, nose or mouth with potentially contaminated gloved or bare hands;
- Avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable X-ray equipment and/or other designated diagnostic equipment. If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and have the patient using a medical mask;
- Ensure that HCWs who are transporting patients perform hand hygiene and wear appropriate PPE as described in this section;
- Notify the area receiving the patient of any necessary precautions as early as possible before the patient’s arrival;
- Routinely clean and disinfect surfaces which the patient is in contact;
- Limit the number of HCWs, family members and visitors who are in contact with a suspected and confirmed 2019-nCoV patient;
- Maintain a record of all persons entering the patient’s room, including all staff and visitors.
Airborne precautions for aerosol-generating procedures

Ensure that HCWs performing aerosol-generating procedures:

• Perform procedures in an adequately ventilated room – that is, natural ventilation with air flow of at least 160 L/s per patient or in negative pressure rooms with at least 12 air changes per hour and controlled direction of air flow when using mechanical ventilation;

• Use a particulate respirator at least as protective as a US NIOSH-certified N95, European Union (EU) standard FFP2, or equivalent. When HCWs put on a disposable particulate respirator, they must always perform the seal check. Note that if the wearer has facial hair (i.e., a beard) it may prevent a proper respirator fit;

• Use eye protection (i.e., goggles or a face shield);

• Wear a clean, non-sterile, long-sleeved gown and gloves. If gowns are not fluid resistant, HCWs should use a waterproof apron for procedures expected to have high volumes of fluid that might penetrate the gown;

• Limit the number of persons present in the room to the absolute minimum required for the patient’s care and support.
Implementing administrative controls

Administrative controls and policies for the prevention and control of transmission of 2019-nCoV infections within the healthcare setting include, but may not be limited to:

• Establishing sustainable IPC infrastructures and activities educating patients’ caregivers;
• Developing policies on the early recognition of acute respiratory infection potentially caused by 2019-nCoV;
• Ensuring access to prompt laboratory testing for identification of the etiologic agent;
• Preventing overcrowding, especially in the emergency department;
• Providing dedicated waiting areas for symptomatic patients; appropriately isolating hospitalized patients;
• Ensuring adequate supplies of PPE;
• Ensure the adherence of IPC policies and procedures for all facets of health care.
Implementing administrative controls: Administrative measures related to healthcare workers

- Provision of adequate training for hcws;
- Ensuring an adequate patient-to-staff ratio;
- Establishing a surveillance process for acute respiratory infections potentially caused by ncov among hcws;
- Ensuring that hcws and the public understand the importance of promptly seeking medical care;
- Monitoring HCW compliance with standard precautions and providing mechanisms for improvement as needed.
Using environmental and engineering controls

• These controls address the basic infrastructure of the health care facility. These controls aim to ensure there is adequate ventilation in all areas in the healthcare facility, as well as adequate environmental cleaning.

• Additionally, spatial separation of at least 1 meter should be maintained between all patients. Both spatial separation and adequate ventilation can help reduce the spread of many pathogens in the healthcare setting.

• Ensure that cleaning and disinfection procedures are followed consistently and correctly. Cleaning environmental surfaces with water and detergent and applying commonly used hospital disinfectants (such as sodium hypochlorite) is an effective and sufficient procedure. Manage laundry, food service utensils and medical waste in accordance with safe routine procedures.
Duration of contact and droplet precautions for patients with nCoV infection

• Standard precautions should be applied at all times.
• Additional contact and droplet precautions should continue until the patient is asymptomatic.
• More comprehensive information about the mode of 2019-nCoV infection transmission is required to define the duration of additional precautions.
Collecting and handling laboratory specimens from patients with suspected 2019-nCoV infection

- Ensure that HCWs who collect specimens use appropriate PPE (i.e., eye protection, a medical mask, a long-sleeved gown, gloves). If the specimen is collected with an aerosol-generating procedure, personnel should wear a particulate respirator at least as protective as a NIOSH-certified N95, an EU standard FFP2, or the equivalent;
- Ensure that all personnel who transport specimens are trained in safe handling practices and spill decontamination procedures;
- Place specimens for transport in leak-proof specimen bags (i.e., secondary containers) that have a separate sealable pocket for the specimen (i.e., a plastic biohazard specimen bag), with the patient’s label on the specimen container (i.e., the primary container), and a clearly written laboratory request form;
- Ensure that laboratories in health care facilities adhere to appropriate biosafety practices and transport requirements, according to the type of organism being handled;
- Deliver all specimens by hand whenever possible. DO NOT use pneumatic-tube systems to transport specimens;
- Document clearly each patient’s full name, date of birth and suspected nCoV of potential concern on the laboratory request form. Notify the laboratory as soon as possible that the specimen is being transported.
Recommendation for outpatient care

The basic principles of IPC and standard precautions should be applied in all health care facilities, including outpatient care and primary care. For 2019-nCoV infection, the following measures should be adopted:

• Triage and early recognition;

• Emphasis on hand hygiene, respiratory hygiene and medical masks to be used by patients with respiratory symptoms;

• Appropriate use of contact and droplet precautions for all suspected cases;

• Prioritization of care of symptomatic patients;

• When symptomatic patients are required to wait, ensure they have a separate waiting area;

• Educate patients and families about the early recognition of symptoms, basic precautions to be used and which health care facility they should refer to.
Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases
Interim guidance
Laboratory testing

- The etiologic agent responsible for the cluster of pneumonia cases in Wuhan has been identified as a novel betacoronavirus, (in the same family as SARS-CoV and MERS-CoV) via next generation sequencing (NGS) from cultured virus or directly from samples received from several pneumonia patients.

- Electron microscopy revealed a virus with a characteristic crown morphology: a coronavirus. Working directly from sequence information, the team developed a series of genetic amplification (PCR) assays used by laboratories associated with the China CDC to detect several dozen cases as of today.
Laboratory testing

- China CDC Primers and probes for detection 2019-nCoV (24 January 2020)
- Diagnostic detection of Wuhan coronavirus 2019 by real-time RT-PCR – Charité, Berlin Germany (17 January 2020)
- Detection of 2019 novel coronavirus (2019-nCoV) in suspected human cases by RT-PCR – Hong Kong University (23 January 2020)
- PCR and sequencing protocol for 2019-nCoV - Department of Medical Sciences, Ministry of Public Health, Thailand (Updated 28 January 2020)
- PCR and sequencing protocols for 2019-nCoV- National Institute of Infectious Diseases Japan (24 January 2020)
- US CDC panel primer and probes– U.S. CDC, USAV – U.S. CDC, USA (28 January 2020)
- US CDC panel primer and probes– U.S. CDC, USA (28 January 2020)
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 extensive testing is still needed to confirm the 2019-nCoV and the role of mixed infection has not been verified, 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. Attempts to culture the virus may require heightened biosafety control measures.
Samples to be collected

• Respiratory material (nasopharyngeal and oropharyngeal swab in ambulatory patients and sputum (if produced) and/or endotracheal aspirate or bronchoalveolar lavage in patients with more severe respiratory disease)

• 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)

• 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.
Sample collection and storage

- 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.

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

• Implement the appropriate infection prevention and control precautions, guidance on IPC for the 2019-nCoV has been drafted.
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.
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).
Ensure that HCWs performing aerosol-generating procedures use additional precautions

• 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, long-sleeved gown and gloves. If gowns are not fluid resistant, a waterproof apron should be used for procedures where it is expected that fluid might penetrate the gown
Tests to be performed in expert laboratories for patients meeting the case definition

<table>
<thead>
<tr>
<th>Test</th>
<th>Type of sample</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>In laboratories that have validated broad coronavirus RT-PCR</td>
<td>Respiratory sample</td>
<td>Collect on presentation. Done by an expert laboratory.</td>
</tr>
<tr>
<td>assays it is advised to check the primers against the published</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019-nCoV sequence and check if primers are overlapping and</td>
<td></td>
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<tr>
<td>have the capacity to detect the 2019-nCoV. On a positive results</td>
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<tr>
<td>sequencing should be performed to determine the precise virus</td>
<td></td>
<td></td>
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<tr>
<td>detected (e.g. on an amplicon of a non-conserved region).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAAT for 2019n-CoV when it becomes available (assays currently</td>
<td>Respiratory sample</td>
<td>Collect on presentation. Done by an expert laboratory until validation has been finalized.</td>
</tr>
<tr>
<td>under validation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole genome sequencing</td>
<td>Respiratory sample</td>
<td>Collect on presentation. Done by an expert laboratory.</td>
</tr>
<tr>
<td>Serology, broad corona virus serology on paired samples if available.</td>
<td>Serum</td>
<td>Paired samples necessary for confirmation, the first sample collected in week 1 of illness and the second collected 3-4 weeks later. If a single serum sample can be collected, collect at least 3 weeks after onset of symptoms. Done by expert laboratory until more information on performance of available assays.</td>
</tr>
</tbody>
</table>
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.
References

Information collected from the following and other internet sources:

**World Health Organization**
- Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases, Interim guidance
- Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected, Interim guidance
- Emerging respiratory viruses, including nCoV: methods for detection, prevention, response and control

**Public Health Agency of Canada**
- Novel Coronavirus from Wuhan, China (2019-nCoV) Biosafety Advisory

**Singapore**
- Interim Biosafety Guidelines for Laboratories and Personnel Handling Samples or Materials Associated with the 2019 Novel Coronavirus (2019-nCoV)

**United Kingdom**
- Guidance – Wuhan novel coronavirus: handling and processing of laboratory specimens

**US Centers for Disease Control and Prevention**
- Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with 2019 Novel Coronavirus (2019-nCoV)
- Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Patients Under Investigation (PUIs) for 2019 Novel Coronavirus (2019-nCoV)

**European Union**
- Advice to healthcare workers: management of patients with 2019-nCoV infection