2019 Novel Coronavirus (2019-nCoV)

Training slides based on guidelines for case-finding, diagnosis, management and public health response in South Africa

Compiled by
Centre for Respiratory Diseases and Meningitis and Outbreak Response, Division of Public Health Surveillance and Response, National Institute for Communicable Diseases (NICD) of the National Health Laboratory Services (NHLS)

and

National Department of Health, South Africa
Including Communicable Diseases Cluster, Zoonotic Diseases Cluster, Port Health, Environmental Health and Emergency Medical Services

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Outline

• Welcome and objectives
• Microbiology, epidemiology and clinical presentation
• Surveillance for imported cases including case definitions
• Laboratory diagnosis
• Infection prevention and hospital readiness
• Patient flow and actions required at each step
• Co-ordinating a public health response
THIS SITUATION IS RAPIDLY EVOLVING

BEFORE USING THIS POWERPOINT AND GUIDELINES PLEASE CHECK FOR UPDATES ON THE NICD AND NDOH WEBSITES

(www.nicd.ac.za and www.ndoh.gov.za )

or

CALL YOUR PROVINCIAL COMMUNICABLE DISEASE CO-ORDINATOR
Objective of training

• To familiarise attendees with RSA guidelines for
  • surveillance,
  • case detection/diagnosis
  • and management, and
  • public health response to suspected and confirmed cases of infection with 2019-nCoV
Microbiology, epidemiology and clinical presentation
Introduction

31 December 2019, the World Health Organization (WHO) China country office reported a cluster of pneumonia cases in Wuhan, Hubei Province of China.

7 January 2020, causative pathogen identified as a novel coronavirus (2019-nCoV).

Initially person-to-person transmission not apparent and the majority of the cases were epidemiologically linked to a seafood, poultry and live wildlife market (Huanan Seafood Wholesale Market) in Jianghan District of Hubei Province.

Number of cases continued to increase rapidly, and evidence of person-to-person transmission mounted.
Microbiology and epidemiology

• Coronaviruses are enveloped, single-stranded positive-sense RNA viruses.
• The envelope of the coronaviruses is covered with club-shaped glycoproteins which look like ‘crowns’, or ‘halos’ – hence the name ‘coronavirus.’
• Coronaviruses are responsible for the common cold, and usually cause self-limited upper respiratory tract infections.
  • Examples 229E, NL63, OC43 and HKU1
In 2003, a new coronavirus emerged leading to the SARS (severe acute respiratory syndrome) outbreak.

In 2012, the Middle East respiratory syndrome (MERS) was found to be caused by a coronavirus associated with transmission from camels.

Following the identification of a cluster of pneumonia cases in Wuhan, Hubei Province of China, Chinese authorities reported on 7 January 2020 that the causative pathogen was identified as a novel coronavirus (2019-nCoV).

These new coronaviruses have RNA sequences that are very similar to coronaviruses from animals

- MERS-CoV = camel coronavirus
- SARS = bat coronavirus

Microbiology and epidemiology
What is Coronavirus?

Coronaviruses are a large family of viruses that cause illness ranging from the common cold to more severe diseases like pneumonia, MERS and SARS

COMMON SYMPTOMS
- Fever
- After 2 to 7 days develop a dry cough
- Mild breathing difficulties at the outset
- Gastrointestinal issues
- Diarrhea
- General body aches

SEVER SYMPTOMS
- High Fever
- 38°C
- Pneumonia
- Kidney Failure
- Death

TRANSMISSION
Coughs or sneezes from infected person or touching contaminated objects

* Source: Centers for Disease Control and Prevention/ USA Today
Transmissibility

• Main route of transmission respiratory **droplets** (airborne transmission has not proven)
• Excreted in stool (possibly faeco-oral)
• Mean incubation period 5.2 days (95% confidence interval [CI], 4.1 to 7.0), 95th percentile of the distribution at 12.5 days.
• 14 days of isolation or quarantine is suggested as it allows a window of 1.5 additional days. (Li, 2020)
• In early stages, epidemic doubled in size every 7.4 days
• Basic reproductive number was estimated 2.2 (95% CI, 1.4 to 3.9) - on average each infectious case gives rise to just over 2 infectious cases.
Clinical presentation

• **Who is at highest risk?**
  - Largest published series to date from China - 99 2019-nCoV patients with pneumonia the commonest symptoms were fever (83%), cough (82%) and shortness of breath (31%). (Chen et al Lancet 2020)
  - The majority (but not all) of severe cases are elderly or have severe underlying illness
  - Among pneumonia patients 51% had chronic diseases
  - 11 patients who died, 7 aged >60 years, 3 had long history of smoking and 3 had hypertension

• **Number of cases and deaths continue to increase**
  - Approximately 2% of reported confirmed cases have died
  - Likely a substantial overestimation of the true case fatality ratio:
    - More severe disease tends to be reported first
    - Initial case definition in China really focused on patients with pneumonia
    - Possible backlog in testing and confirming cases in China
Surveillance and case definitions
Clinical and epidemiological criteria for person under investigation (PUI)

- Patients with acute respiratory infection (sudden onset of at least one of the following: cough, sore throat, shortness of breath) requiring hospitalisation or not

AND

In the 14 days prior to onset of symptoms, met at least one of the following epidemiological criteria:

- Were in close contact with a confirmed or probable case of 2019-nCoV infection;

  OR

- Had a history of travel to areas with presumed ongoing community transmission of 2019-nCoV; i.e. China

  OR

- Worked in or attended a health care facility where patients with 2019-nCoV infections were being treated.
Who Should be tested

• Presently, the only persons who should undergo testing for 2019-nCoV are those described above under Person Under Investigation (PUI).

• All case to be discussed with NICD doctor on call before collecting samples

• The test will be free of charge for patients meeting the case definitions above

NICD Hotline
082-883-9920
If testing is indicated, what next?

- **Isolate the patient** using appropriate infection prevention control (see next section)
- Collect a specimen ASAP (see next section)
- Identify contacts
If testing is indicated, what next?

- **Isolate the patient** using appropriate infection prevention control (see next section)
- Collect a specimen ASAP (see next section)
- Identify contacts

Who is a close contact

- A person having had face-to-face contact (within 2 metres) or was in a closed environment with a 2019-nCoV case; this includes,
  - amongst others, all persons living in the same household as a 2019-nCoV case and, people working closely in the same environment as a case.
  - A healthcare worker or other person providing direct care for a 2019-nCoV case.
  - A contact in an aircraft sitting within two seats (in any direction) of the 2019-nCoV case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated.
How to do contact tracing and monitoring of close contacts

• Once laboratory testing confirms 2019-nCoV infection:

• Provincial CDCC needs to identify close contacts, and make a contact line list using Appendix in guidelines (see next slide)

• EVERY contact to complete the contact demographic section on the contact monitoring form PDF version at: [http://www.nicd.ac.za/diseases-a-z-index/novel-coronavirus-infection/](http://www.nicd.ac.za/diseases-a-z-index/novel-coronavirus-infection/) (see next slide)

• Completed linelist and contact form also to be emailed to ncov@nicd.ac.za

• Close contacts will be asked to self-quarantine at home for 14 days since exposure to the confirmed 2019-nCoV and take their temperature daily (thermometers need to be issued)

• CDC / NICD/ delegated person will call contacts telephonically to identify if symptoms are present
Monitoring of close contacts and Health workers with occupational exposure

- Monitoring of close contacts may switch from telephonic monitoring to self-monitoring dependant on the number of contacts to be followed up.

- **Close contacts under monitoring should be advised to:**
  - Remain at home (NICD can provide an official letter for employment or education facilities)
  - Avoid unnecessary social contact
  - Avoid travel
  - Remain reachable for monitoring

- **Health Worker with occupational Exposure**
  - Lists of healthcare workers with occupational exposure should be compiled by the health facility
  - They should be actively monitored for symptoms and rapidly isolated and tested should symptoms develop
Quarantine

• Quarantine means separating asymptomatic persons who are exposed to a disease from non-exposed persons
• Quarantine is to be distinguished from isolation, which is the act of separating a sick individual with a contagious disease from healthy individuals without that contagious disease
• Quarantine procedures can be effective in limiting and slowing the introduction of a novel pathogen into a population but may entail the use of considerable resources and may infringe on the rights of members of society.
• Quarantine may take place
  • in the home
  • or in a designated facility.
• Depending on level of risk, and intensity of the exposure, different levels of quarantine will be employed, for example
  • If a person is expatriated from Wuhan, voluntary quarantine at a facility will be recommended.
  • A household member of a confirmed case will be asked to stay in their home for 14 days
  • if health worker wearing appropriate PEP is exposed to a confirmed case, the health worker would be allowed to work but would be requested to self-quarantine if symptoms develop within 14 days.
# 2019-nCoV CONTACT LINE LIST

Complete a contact line list for every case under investigation and every confirmed case.

## Details of case under investigation/confirmed case

<table>
<thead>
<tr>
<th>NICD Identifier</th>
<th>Date Symptom Onset</th>
<th>DD/MM/YYYY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surname</td>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Contact number</td>
<td>Alternative number</td>
<td></td>
</tr>
</tbody>
</table>

## Details of health official completing this form

<table>
<thead>
<tr>
<th>Surname</th>
<th>Name</th>
<th>Role</th>
<th>Facility name</th>
<th>Telephone number(s)</th>
</tr>
</thead>
</table>

## Details of contacts (With close contact† 2 days prior to symptom onset, or during symptomatic illness.)

<table>
<thead>
<tr>
<th>Surname</th>
<th>First name(s)</th>
<th>Sex (M/F)</th>
<th>Age (Y)</th>
<th>Relation to case</th>
<th>Date of last contact with case</th>
<th>Place of last contact with case</th>
<th>Residential address (for next month)</th>
<th>Phone number(s), separate by semicolon</th>
<th>HCWP† (Y/N) if Yes, facility name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DD/MM/YYYY</td>
<td>(Provide name and address)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1. Close contact: A person having had face-to-face contact (2 metres) or was in a closed environment with a 2019-nCoV case; this includes, amongst others, all persons living in the same household as a 2019-nCoV case and, people working closely in the same environment as a case. A healthcare worker or other person providing direct care for a 2019-nCoV case, while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection). A contact in an aircraft sitting within two seats (in any direction) of the 2019-nCoV case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated.  

† Close contact: A person having had face-to-face contact (2 metres) or was in a closed environment with a 2019-nCoV case; this includes, amongst others, all persons living in the same household as a 2019-nCoV case and, people working closely in the same environment as a case. A healthcare worker or other person providing direct care for a 2019-nCoV case, while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection). A contact in an aircraft sitting within two seats (in any direction) of the 2019-nCoV case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated.  

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## Close Contact Monitoring Tool

### 2019-nCoV Daily Symptom Monitoring Tool

Complete for each contact of confirmed case. Use electronic database if possible.

If not captured electronically at site, forward to ncov@nicd.ac.za, on completion of last day of monitoring.

### Details of Contact of Case under Investigation/Confirmed Case

<table>
<thead>
<tr>
<th>Details of contact of case under investigation/confirmed case</th>
<th>Place last contact</th>
<th>Place last contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICD identifier</td>
<td>Name</td>
<td>Name</td>
</tr>
<tr>
<td>SURNAME</td>
<td>Age (Years)</td>
<td>Sex: M: F:</td>
</tr>
<tr>
<td>Contact #</td>
<td>Alternative contact</td>
<td>Contact</td>
</tr>
<tr>
<td>Relation to case</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthcare worker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarantine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical address (for next month, in South Africa)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Details of Health Official completing form

<table>
<thead>
<tr>
<th>Details of health official completing form</th>
<th>Today's date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surname</td>
<td>Name</td>
</tr>
<tr>
<td>Role</td>
<td>Facility name</td>
</tr>
<tr>
<td>Email address</td>
<td>Telephone number(s)</td>
</tr>
</tbody>
</table>

### Instructions for completion:
Mark “Y” if symptom present and “N” if not. If any symptoms are present collect, contact immediately and make immediate arrangements for the collection of a combined nasopharyngeal and oropharyngeal swab. Refer to 2019-nCoV Quick Guide on the NICD website for additional details.

### Day 1

<table>
<thead>
<tr>
<th>Symptom</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever (≥38°C)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Chills</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Cough</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Sore throat</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Myalgia/body pains</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

### Day 8

<table>
<thead>
<tr>
<th>Symptom</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever (≥38°C)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Chills</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Cough</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Sore throat</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Myalgia/body pains</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

Management of close contacts who develop symptoms

• Should a contact develop symptoms, both the provincial CDCC and NICD call centre team should be informed.

• Arrangements will be made by the provincial CDCC with assistance from NICD to visit the patient in their home on the same day to collect a specimen and to complete the required documentation.
  • Appropriate PPE should be used (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection) during home visits.
  • If a healthcare worker is not available, the patient will be requested to visit their nearest healthcare facility to have a specimen collected.

• The CDCC should inform the healthcare facility of the incoming patient in order for the healthcare facility to use appropriate infection prevention and control (IPC) measures.
Contact tracing summary

Initial screening of persons listed on contact line list (Appendix 9)

Risk assessment (Apply definition of contact)

- Close* contact
  - Self-quarantine
- Casual** contact
  - Avoid nonessential contact
- Not a contact
  - No monitoring required
    - Stop

* Close contact: A person having had face-to-face contact (≤2 metres) or was in a closed environment with a 2019-nCoV case; this includes, amongst others, all persons living in the same household as a 2019-nCoV case and, people working closely in the same environment as a case. A healthcare worker or other person providing direct care for a 2019-nCoV case, while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection). A contact in an aircraft sitting within two seats (in any direction) of the 2019-nCoV case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated.

** Casual contact: Anyone not meeting the definition for a close contact but with possible exposure.

***Monitoring methods: Active-telephonic monitoring; NICD call centre will phone person who is home-quarantined each day for a symptom report; Self-monitoring: person to consult healthcare practitioner in the event of symptom development.

Monitoring required for 14 days since date of last contact with confirmed case

- Active telephonic monitoring***
- Self-monitoring***

Symptoms develop

Case investigation (Testing, CIF contact form, complete Appendix 7-9)

- Case
- Not a case
  - Stop

No symptoms develop

Stop

Investigate who they came in contact with for contact tracing

Is this a case?

Stop

Monitoring those at risk

Evaluating and quantifying risk

Screening individual at risk
Laboratory diagnostics
Who should be tested?

• Only patients under investigation (PUI) for 2019-nCoV should be tested

• Please discuss plans to collect samples with doctor on call before collecting sample: NICD hotline – 082 883 9920

• Rapid collection, transport and testing of appropriate specimens from PUI is a priority

• Patients should be managed as potentially infected when the clinical and epidemiological data strongly suggest 2019-nCoV infection
Specimen Collection

• Lower respiratory tract samples are preferred.
• Respiratory samples are the primary method if diagnosis.
• Respiratory samples include:
  • Combined nasopharyngeal and oropharyngeal swab (*placed in the same tube*) in ambulatory patients and
  • sputum (if produced)
  • Tracheal aspirate or Broncho alveolar lavage in patients with more severe respiratory disease.
• Serum for serological testing - acute and convalescent samples may be submitted in addition to respiratory samples.
• Use universal/viral transport medium for swabs if available and if not dry swabs; sterile container for sputum and aspirates; clotted blood container for serum
Table 1. Type of specimens that can be collected for 2019-nCoV diagnostics and the transport requirements of these specimens

<table>
<thead>
<tr>
<th>Specimen type</th>
<th>Collection materials</th>
<th>Storage and transportation</th>
<th>Dangerous goods shipping category</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOR SYMPTOMATIC PATIENTS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sputum*</td>
<td>Deep cough sputum in sterile leak proof container</td>
<td>Refrigerate and ship at 2-8 °C up to 48 hrs, if &gt;48 hrs freeze at -70°C and ship on dry ice</td>
<td>Biological substance, Category B</td>
<td>The preferred sample but need to ensure the material is from the lower respiratory tract</td>
</tr>
<tr>
<td>Bronchoalveolar lavage*</td>
<td>2-3 ml in sterile leak proof container</td>
<td>Refrigerate and ship at 2-8 °C up to 48 hrs, if &gt;48 hrs freeze at -70°C and ship on dry ice</td>
<td>As above</td>
<td>There may be some dilution of virus but still a worthwhile specimen</td>
</tr>
<tr>
<td>(Endo)tracheal or nasopharyngeal aspirate*</td>
<td>2-3 ml in sterile leak proof container</td>
<td>Refrigerate and ship at 2-8 °C up to 48 hrs, if &gt;48 hrs freeze at -70°C and ship on dry ice</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>Nasopharyngeal and oropharyngeal swab</td>
<td>Dacron or nylon flocked swab in Universal Transport Medium (UTM) in a sterile leak proof container</td>
<td>Refrigerate at 2-8 °C up to 5 days, if &gt;5 days freeze at -70°C and ship on dry ice</td>
<td>As above</td>
<td>Nasopharyngeal and oropharyngeal swabs should be placed in the same tube to increase the viral load</td>
</tr>
</tbody>
</table>
| Serum                                | Serum separator tube**                                                                 | Store upright for at least 30 minutes after collection. a Refrigerate and ship at 2-8 °C within 5 days | As above                          | Collect paired samples:  
  - Acute – first week of illness  
  - Convalescent – 2-3 weeks later                                                                                                       |
| Lung tissue from biopsy or autopsy   | Sterile container with saline                                                           | Refrigerate and ship at 2-8 °C up to 24 hrs, if >24 hrs freeze at -70°C and ship on dry ice |                                                                                   |                                                                                                                                       |

* Aerosol-generating procedures may pose an infection risk for health care workers. ** Children and adults: collect 1 tube (5-10ml) of whole blood. Infant: a minimum of 1ml in a serum separator tube.
Collection of naso/oropharyngeal swabs for detection of respiratory viruses

 COLLECTION OF NASO/OROPHARYNGEAL SWABS FOR DETECTION OF RESPIRATORY VIRUSES:

Respiratory viruses are best isolated from material that contains infected cells and secretions. Therefore, swabs should aim to brush cells and secretions off the mucous membranes of the upper respiratory tract. Good specimen quality (i.e., containing sufficient cells and secretions), appropriate packaging and transport (i.e., to keep virus viable and intact) are essential. Please discuss plans to collect samples with doctor on call before collecting samples at NICOHS site. 0608181802

Step 1: Equipment and materials
1. Specimen submission form and case investigation form
2. Nasopharyngeal (NP) and oropharyngeal (OP) foiled swabs
3. Tube containing universal transport medium (UTM)
4. Tongue depressor
5. Gloves
6. NAS mask (fit tested)
7. Biohazard bag for disposal of non-sharp materials
8. Tissue for patient to sneeze into after sample collection
9. Cooler box and ice packs
10. Ziploc plastic specimen bag

Step 2: Record keeping
1. Complete the specimen submission form and case investigation form (available on NICOHS website)
2. Place the specimen submission form into a ziplock bag
3. Label the tube of universal transport media (UTM) with the patient's name and date of birth

Step 3: Collection of nasopharyngeal swab (NP)
1. Don a pair of gloves, and an N95 respirator, making sure the respirator has a good fit. Open a sterile foiled swab at the plastic shaft
2. Ask the patient to sit or lie back. Estimate the distance from the patient's nose to the ear. This is how far the swab should be inserted
3. Gently insert swab into the nasal and back (not crown) to the nasopharynx; a slight resistance is met
4. Rotate swab 2-3 times and hold in place for 2-3 seconds
5. If resistance is met remove and try another attempt
6. Slowly withdraw swab and without touching it, put it into a UTM
7. Brush plastic shaft at the break point line and close the tube

Step 4: Collection of oropharyngeal swab (OP)
1. Keeping the same pair of gloves on, and holding the UTM with the nasopharyngeal swab in, take a second foiled swab and open it at the plastic shaft
2. Ask the patient to tilt their head back and open mouth wide
3. Hold the tongue down with a tongue depressor
4. Have the patient say "ahh" to elevate the uvula
5. Swab each tonsil first then, the posterior pharynx in a "figure 8" movement
6. Avoid sucking the soft palate and do not touch the tongue with the swab tip as this procedure can induce gag reflex
7. Place the swab into the same UTM tube with the NPS already in and break off the shaft at the break point line
8. Tightly close the tube
9. Place the closed tube with two swabs in the Ziploc
10. Remove gloves and NAS mask
11. Wash hands with soap and water

Step 5: Transport of specimens
1. Ensure the cooler box and ice packs stay at 2-8°C
2. Transport to CHROM, NICOHS on same day if collection
3. Mark: Suspected Novel coronavirus, CHROM
4. NICOHS, Centre for Respiratory Disease and Meningitis (CROM)
5. Lower North Wharf, SAPiF building 1, Modderfontein Rd, Sandringham, Johannesburg, 2131
6. NASS laboratories use usual overnight national courier service
7. Private laboratories required to organise shipment using existing systems, or contact CHROM for assistance if not available

Step 6: Contact details for additional assistance
Sample collection
Shongwe Wolowicz shongwe@nicd.ac.za 011 386-0436/083-657-4741

Sample transport
Linda de Gouveia linda@nicd.ac.za 011 550-0327
Amelia Booy anelia@nicd.ac.za 011 386-0439
Cardia Fourie cardia@nicd.ac.za 011 386-0373

Swabs Important Information

• Clearly mark each specimen (e.g. Left Nasal Swab Tight Nasal Swab)

• If you send multiple swabs unmarked the lab has no idea where they come from

• You must identify which facility the swab comes from

• Clinicians name and contact details are important
DO NOT send any specimen to NICD without prior discussion and notification
Hand hygiene before and after any interaction with the patient
Equipment and materials

1. Specimen submission form and case investigation form.
2. Nasopharyngeal (NP) and oropharyngeal (OP) flocked swab.
3. Tube containing universal transport medium (UTM).
4. Tongue depressor.
5. Gloves.
6. N95 mask (fit tested).
8. Tissue for patient to wipe nose after sample collection.
9. Cooler box and cooled ice packs.
10. Ziploc plastic specimen bag.
Step 1: Report the PUI

1. Report the PUI to the NICD to allow a risk assessment to be carried out and guide laboratory testing
2. Contact the NICD Hotline +27 82 883 9920
3. The test will be free of charge for patients meeting the case definitions above
Step 2: Record keeping


• 2. Place the specimen submission form into a ziplock bag.

• 3. Label the tube of universal transport media (UTM) with the patient’s name and date of birth.
Complete the correct forms

- For each person under investigation (PUI) a laboratory specimen submission form and a person under investigation (PUI) form has to be completed and submitted together with the specimens.
- Always check on the NICD website that you have the current version of the forms [http://www.nicd.ac.za/diseases-a-z-index/novel-coronavirus-infection/]
Person under investigation form (CIF)
Step 3: Collection of nasopharyngeal swab (NPS)

1. Don a pair of gloves, and an N95 respirator, making sure the respirator has a good fit. Open a sterile flocked swab at the plastic shaft.

2. Ask the patient to tilt his/her head back. Estimate the distance from the patient’s nose to the ear: This is how far the swab should be inserted.

3. Gently insert swab into the nostril and back (not upwards) to the nasopharynx until a slight resistance is met.

4. Rotate swab 2-3 times and hold in place for 2-3 seconds.

5. If resistance is met remove and try another nostril.

6. Slowly withdraw swab and without touching it, put it into a UTM.

7. Break plastic shaft at the break point line and close the tube.
Step 4: Collection of oropharyngeal swab (OPS)

1. Keeping the same pair of gloves on, and holding the UTM with the nasopharyngeal swab in, take a second flocked swab and open it at the plastic shaft

2. Ask the patient to tilt their head back and open mouth wide

3. Hold the tongue down with a tongue depressor

4. Have the patient say “aahh” to elevate the uvula

5. Swab each tonsil first, then the posterior pharynx in a “figure 8” movement

6. Avoid swabbing the soft palate and do not touch the tongue with the swab tip as this procedure can induce the gag reflex.

7. Place the swab into the same UTM tube with the NPS already in and break off the shaft at the break point line

8. Tightly close the tube

9. Place the closed tube with two swabs in the Ziploc

10. Remove gloves and N95 mask

11. Wash hands with soap and water
Step 5: Transport of specimens

1. Ensure the cooler box and ice packs stay at 2-8 degrees Centigrade.

2. Transport to CRDM, NICD on same day as collection.

3. Mark: **Suspected Novel coronavirus, CRDM NHLS/NICD, Centre for Respiratory Disease and Meningitis (CRDM) Lower North Wing, SAVP building 1 Modderfontein Rd, Sandringham, Johannesburg, 2131.**

4. NHLS laboratories use usual overnight regional courier service.

5. Private laboratories/clinics to organise shipment using existing systems, or contact CRDM for assistance if not available.
Packaging of specimens for transfer to NICD

• The principle of triple layer packaging should be followed (Figure 1).
• UN/WHO approved shipping containers for hazardous specimens are commercially available, e.g. SAF-T-PAK® (www.saftpak.com) or PATHOPAK® (www.intelsius.com).

Figure 1. Example of the triple packaging system for the packing and labelling of Category B substances.
Step 6: Contact details for additional assistance

- **Sample collection**
  - Sibongile Walaza sibongilew@nicd.ac.za 011-386-6410

- **Sample transport**
  - Linda de Gouveia lindad@nicd.ac.za 011-555-0327
  - Amelia Buys ameliab@nicd.ac.za 011-386-6373
  - Cardia Fourie cardiaf@nicd.ac.za 011-386-6373

Laboratory diagnostic assays

• Real-time reverse-transcription polymerase chain reaction (rRT-PCR) - amplification and detection of unique 2019-nCoV viral nucleic acid sequences
• TAT - 24 hours
• Positive specimens - characterised by viral culture and whole genome sequencing

Detection of 2019 novel coronavirus (2019-nCoV) by real-time RT-PCR

Victor M Corman¹, Olfert Landt², Marco Kaiser², Richard Molenkamp³, Adam Meijer⁴, Daniel KW Chu⁵, Tobias Bleicker¹, Sebastian Brünink¹, Julia Schneider¹, Marie Luisa Schmidt¹, Daphne GJC Mulders³, Bart L Haagmans³, Bas van der Veer⁴, Sharon van den Brink⁴, Lisa Wijsman⁴, Gabriel Goderski⁴, Jean-Louis Romette⁴, Joanna Ellis⁷, Maria Zambon⁷, Malik Peiris⁶, Herman Goossens⁸, Chantal Reusken⁴, Marion PG Koopmans³, Christian Drosten¹

Eurosurveillance Jan 2020
Interpretation of rRT-PCR results

• Negative result does not rule out possibility of infection
• Factors that could lead to a false –negative result:
  • Poor specimen quality
  • Specimen was collected late or very early in the illness
  • Specimen was not handled and shipped appropriately, ( eg. the cold chain)
  • Technical reasons inherent in the test, e.g. virus mutation

If negative results are obtained from patients with a high index of suspicion for 2019-nCoV infection, especially when only upper respiratory tract samples were collected, additional specimens, including lower respiratory samples should be collected and tested.
Infection prevention and control
Principles of disease transmission

**Direct contact**
- Touching an ill persons or a contaminated surface
- E.g. agents of diarrhoea, skin infections, common cold, ebola virus

**Control**
- Gloves, +/- gowns, masks, visors (to prevent mucous membrane splashes, contamination of clothing)

**Droplet transmission**
- Inhaling droplets (up to 1/4mm in diameter)
- Persons within 2m radius are at risk. On aircraft, 2 rows behind and in front
- E.g. agents of bacterial pneumonia, Neisseria meningitidis

**Control**
- Gloves, surgical masks, +/- gowns, masks, visors (to prevent mucous membrane splashes, contamination of clothing)

**Airborne transmission**
- Inhaling droplets nucleii (10-20um in diameter)
- Persons breathing the same air
- E.g. influenza, measles, chickenpox,

**Control**
- Gloves, N95 masks, +/- gowns, masks, visors (to prevent mucous membrane splashes, contamination of clothing)

**Vector transmission**
- Contact with vector
- E.g. malaria, dengue, Zika,

**Control**
- Prevent/eliminate exposure to vector
- Chemoprophylaxis if possible
Principles of disease transmission

Direct contact
- Touching an ill person or a contaminated surface
- E.g. agents of diarrhoea, skin infections, common cold, ebola virus

Control
- Gloves, +/- gowns, masks, visors (to prevent mucous membrane splashes, contamination of clothing)

Coronavirus

Droplet transmission
- Inhaling droplets (up to 1/4mm in diameter)
- Persons within 2m radius are at risk. On aircraft, 2 rows behind and in front
- E.g. agents of bacterial pneumonia, Neisseria meningitidis

Control
- Gloves, surgical masks, +/- gowns, masks, visors (to prevent mucous membrane splashes, contamination of clothing)

Airborne transmission
- Inhaling droplets nuclei (10-20um in diameter)
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- Gloves, N95 masks, +/- gowns, masks, visors (to prevent mucous membrane splashes, contamination of clothing)

Vector transmission
- Contact with vector
- E.g. malaria, dengue, Zika,

Control
- Prevent/eliminate exposure to vector
- Chemoprophylaxis if possible
IPC strategies to address suspected nCoV infection

• Ensure triage, early recognition and source control (early isolation of persons with suspected nCoV infection)
• Apply standard precautions for all patients
• Implement empiric additional precautions for suspected cases (droplet, contact and airborne where applicable)
• Implement administrative controls (*IPC committee, checklist, assign responsibility for opening windows and triaging*)
• Use environmental controls (*open windows, UV light, ensure airflow direction protects HCW*)
• Use engineering controls (*ensure air-conditioning is working, Uvlight germicidal irradiation unit is functional*)
In all facilities....

• Implement screening for COUGH, respiratory symptoms and TRAVEL HISTORY at entrance to the facility / clinic / casualty / hospital

• Put a sign up asking for persons with a travel history to China in last 14 days to identify themselves to staff

• Provide surgical masks to persons who sneeze, cough etc

• See persons who have symptoms first

• Encourage hand hygiene amongst patients and HCW
In all facilities......

- Ensure hand hygiene for HCW and patients is possible, and done!
- Provide soap, basins
- Use posters to show 5-movements of hand hygiene
- Provide hand sanitiser
- Use health promotion staff to demonstrate hand and cough hygiene
When caring for someone with suspected nCoV-

• Implement contact and droplet precautions

  • Put in a well ventilated isolation room
  • Provide them with a mask
  • Implement contact and droplet precautions
  • Limit the number of staff who can enter the isolation room

• Implement contact and droplet precautions:
  • Surgical/medical mask
  • Disposable gown
  • Gloves
  • Eye protection

• Not required for droplet precautions
  • Boots, apron not required
  • Negative pressure respiratory isolation room not required.
When caring for someone with suspected nCoV-

- When taking a sputum specimen or nasopharyngeal swab use **airborne and contact precautions** are required
  - E.g. nasopharyngeal swabs, intubation, tracheal aspirate
- Use N95 respirator
- Use waterproof apron, boots
- Use a face-shield or goggles
Training in use of IPC

• Ensure staff are trained and familiar with
  • Triage
  • Handwashing
  • Screening
  • Case definitions
  • Use of PPE
If in doubt, refer to this WHO guideline
It is ESSENTIAL to distribute this guideline to your facility staff and follow up on implementation.
Management of the deceased

• Confirm the diagnosis in deceased persons who are close contacts of nCoV cases.
  • NP swabs, bronchial washings can be taken post mortem

• Use contact and droplet precautions when handling the body
  • Airborne precautions not required as the deceased do not create airborne particles

• Environmental Health Practitioners are informed following the assists with procedures

• Follow Appendix 12 of RSA guideline
  • Triple body bag, first two are transparent and sealed, and third is black and unsealed
  • A biohazard warning tab should be attached as per SOP
How can I know if my facility is ready?

- Use our facility readiness checklist
- Call your facility IPC committee
- Talk through the checklist
- Talk through a ‘desktop simulation scenario’
## Facility self assessment

### (SOUTH AFRICA Facility) Novel Coronavirus (nCoV) Country Readiness Checklist

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>Number of HCWs deployed working in your facility</th>
<th>Number of designated points of entry for ill patients</th>
<th>Do you have an incident management plan in the Facility? If so, how many beds?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total infrastructure</td>
<td>CEO Name</td>
<td>CEO Contact details</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cell</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Office</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>email</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax</td>
</tr>
</tbody>
</table>

### General Information

**Number of beds**

- Private
- Other

**Isolation area in emergency department identified**

**ICU isolation capacity**

**Consortiums/other partnerships**

### Interventions Area

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Values</th>
<th>Fac/No</th>
<th>Comments</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a Facility preparedness and response plan for events caused by respiratory pathogens?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a committee established in the Facility to ensure all plans are in place?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a plan to ensure the compliance of the committee?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a plan to implement surge capacity procedures and standards of care?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you believe you have everything in place to identify and isolate patients with COVID-19 or other respiratory symptoms?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a plan for the staff in the isolation areas to be properly equipped?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a plan for the staff in the emergency department to be properly equipped?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a plan for the staff in other areas to be properly equipped?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a plan for the staff in the isolation areas to be properly equipped?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a contingency plan if the demand for PPE or other supplies exceeds capacity?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you designated an area for the isolation of patients who may be at risk for COVID-19?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you made plans to ensure the stock is accessible in the Facility?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a screening protocol in place at all points of entry to the Facility?</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has training on nCoV been communicated in your Facility?</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Facility CEO/Manager Signature**
Patient and PUI* flow and actions required at each step

*PUI=person under investigation
1.1 Appendix 1 – process flow for detection and response to cases

DETECTION AND REPORTING OF SUSPECTED 2019-nCoV CASE

- The case definition must be strictly adhered to
- For any suspected case, isolate the patient in a suitable room/unit for assessment, apply IPC measures, contact NICD Hotline to confirm if case definition is met and if sample collection is warranted.
- If so, collect specimen and complete accompanying documentation (Appendix 7).
- Guidelines for the collection and submission of specimens to NICD available on NICD website: [http://www.nicd.ac.za/diseases-a-z-index/novel-coronavirus-infection/](http://www.nicd.ac.za/diseases-a-z-index/novel-coronavirus-infection/) (see quick reference for healthcare workers) or appendix 5 and 6
- The facility IPC focal point, clinician or designated port health officer should complete the case investigation form and contact line list (Appendix 8, 9), forward the forms to the Provincial Communicable Disease Control and n cov@nicd.ac.za.
- All suspected cases who meet the case definition should be notified as Class 1 notifiable medical condition under “Respiratory Disease caused by a novel respiratory pathogen”

MEDICAL MANAGEMENT

- For all cases irrespective of symptom severity, isolate the patient and apply infection precautions in accordance with site-specific standard operating procedures for this purpose. When the number of confirmed cases becomes too high, mild cases may be managed at home (self-isolation)

Contacts and details:
Consultant on call for Infectious Diseases
According to site-specific protocol
NICD Hotline
082-883-9920
National Health Operations Centre
012-395-9636/37

Contacts and details: see Appendix 14
National and Provincial CDC
Provincial Port Health
EMS
DETECTION AND REPORTING OF SUSPECTED 2019-nCoV CASE

- The case definition must be strictly adhered to.
- For any suspected case, isolate the patient in a suitable room/unit for assessment, apply IPC measures, contact NICD Hotline to confirm if case definition is met and if sample collection is warranted.
- If so, collect specimen and complete accompanying documentation (Appendix 7).
- The facility IPC focal point, clinician or designated port health officer should complete the case investigation form and contact line list (Appendix 8, 9), forward the forms to the Provincial Communicable Disease Control and ncov@nicd.ac.za.
- All suspected cases who meet the case definition should be notified as Class 1 notifiable medical condition under "Respiratory Disease caused by a novel respiratory pathogen".

TRANSPORT AND/OR REFERAL OF SUSPECTED nCoV-2019 CASE TO HOSPITAL

- If facility is able to provide required clinical care for patient in isolation, referral or transfer is not indicated. If facility cannot offer required care, transfer or referral should be discussed by calling NICD Hotline.
- Transfer of patients from port of entry to healthcare facilities to be discussed with NICD Hotline, EMS will facilitate the transport arrangements.

MEDICAL MANAGEMENT

- For all cases irrespective of symptom severity, isolate the patient and apply infection precautions in accordance with site-specific standard operating procedures for this purpose.
- When the number of confirmed cases becomes too high, mild cases may be managed at home (self-isolation).

Laboratory testing **excludes** 2019-nCoV

Laboratory testing **confirms** 2019-nCoV

- Finalize reporting and do gap analysis for responses to the case.
- Perform mitigation of any shortcomings identified during case management.

MULTI-DISCIPLINARY PUBLIC HEALTH RESPONSE

- NICD report back case was confirmed to healthcare facility, clinician, patient, provincial CDC.
- Provincial CDC/designated NICD personnel to perform contact tracing as described in appendix 3.
- Collate information and share reports with key stakeholders.
- Handling of mortal remains of a **confirmed or suspected** case must be in accordance with guidelines.
- Efficient and transparent communication with the media (press release/briefs) must be provided.
- Writing of reports e.g. daily updates, preliminary and final (Appendix 13).

Contact Details:

- Consultant on call for Infectious Diseases
  - According to site-specific protocol
  - NICD Hotline: 082-883-9920
- National Health Operations Centre: 012-395-9636/37

Appendix 1 – Process Flow for detection and response to cases
Initial diagnosis and management of suspected case (PUI), including infection control measures

**2019 novel coronavirus (2019-nCoV) process flow for use in healthcare facilities**

1. Evaluate patient in private room
2. Request patient to wear surgical mask
3. Isolate PUI (ideally an airborne infection isolation room if available)
4. Use appropriate infection control for PUI
   a. Adequate standard precautions for all patients
   b. Add contact and droplet precautions for all patients
   c. Apply airborne precautions (eg N95 mask) and eye protection must be used when performing aerosol-generating procedures
   d. If available, airborne precautions can be used at all times
   e. Limit movement of patient (eg. use designated portable X-ray equipment)

Does the patient meet the case definition?

- Patients with acute respiratory infection (sudden onset of at least one of the following: cough, sore throat, shortness of breath) requiring hospitalisation or not AND
  - In the 14 days prior to onset of symptoms, met at least one of the following epidemiological criteria:
    - Were in close contact with a confirmed or probable case of 2019-nCoV infection; OR
    - Had a history of travel to areas with presumed ongoing community transmission of 2019-nCoV, i.e. China; OR
    - Worked in or attended a health care facility where patients with 2019-nCoV infections were being treated.

2019-nCoV testing indicated. Follow IPC measures (left)

- Collect specimen: Combined nasopharyngeal and oropharyngeal swab in ambulatory patients and sputum (if produced) and/or tracheal aspirate or bronchoalveolar lavage in patients with more severe respiratory disease
- Ship specimens and documentation to NICD. Mark: Suspected Novel coronavirus, CRDM NHL/S/NICD, Centre for Respiratory Disease and Meningitis (CRDM), Lower North Wing, SAVP building 1 Medendorpfontein Rd, Sandringham, Johannesburg, 2131
- Notify to provincial CDC and NMC system

Other aetiologies been excluded?

- Discuss with NICD (Hotline: 082-883-9920)

Reassess, if patient fails to improve and no alt diagnosis confirmed

- Request respiratory panel, especially influenza, RSV

**IPC measures**

1. Monitoring stopped
2. Asymptomatic, post-exposure
   - Complete specimen submission form, patient under investigation form, and contact list. Email to: ncov@nicd.ac.za
   - Home quarantine
   - Avoid unessential contact
   - Close* contacts
   - Monitor for symptom development for 14 days post-exposure
   - Initiate contact tracing
   - Admit to hospital and isolate
   - Sequential swabbing

3. Symptomatic contact
   - Does the patient meet the case definition?
   - Yes
     - 24h NICD Hotline: 082-883-9920
     - Website: www.nicd.ac.za
   - No
     - 2019-nCoV testing indicated. Follow IPC measures (left)
   - No
     - Request respiratory panel, especially influenza, RSV
     - Other aetiologies been excluded?
     - Discuss with NICD (Hotline: 082-883-9920)
     - Reassess, if patient fails to improve and no alt diagnosis confirmed

**Contact details: Provincial CDC coordinators**

ECP: Ms Nosipho Nqobo 060 579 9027
FSP: Ms Delekele Baleni and team 060 579 9037 051 401 1794 051 408 1595
FSP: Ms Bapali Nyckong 060 579 9044 083 452 8954
GP: Ms Caroline Kuvakweshe 060 579 9061
NCP: Ms Premi Gwerder 060 579 9005 071 699 2505 033 940 2690
LSP: Ms Mairinie Freda Ngobeni 060 579 9060 079 491 1909
MP: Mr Mandla Zwane and team 060 579 9044 082 229 8893 013 766 3078
NCP: Ms Gloria Hotte 072 391 3345
NWP: Ms Chiselda Lebeke 079 521 5004 082 421 7985
WCP: Ms Charlene Jacobs-Laurence 082 229 8893 013 766 3078

* Close contact: A person having had face-to-face contact (<2 metres) or was in a closed environment with a 2019-nCoV case; this includes, amongst others, all persons living in the same household as a 2019-nCoV case and people working closely in the same environment as a case. A healthcare worker or other person providing direct care for a 2019-nCoV case, while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection). A contact in an aircraft sitting within two seats (in any direction) of the 2019-nCoV case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated.

** Casual contact: Anyone not meeting the definition for a close contact but with possible exposure.**
Initial diagnosis and management of suspected case (PUI), including infection control measures

2019 novel coronavirus (2019-nCoV) process flow for use in healthcare facilities

Does the patient meet the case definition?

Patients with acute respiratory infection (sudden onset of at least one of the following: cough, sore throat, shortness of breath) requiring hospitalisation or not AND in the 14 days prior to onset of symptoms, meet at least one of the following epidemiological criteria:
- Were in close contact with a confirmed or probable case of 2019-nCoV infection; OR
- Had a history of travel to areas with presumed ongoing community transmission of 2019-nCoV; i.e. China; OR
- Worked in or attended a health care facility where patients with 2019-nCoV infections were being treated.

Yes

No

2019-nCoV testing indicated. Follow IPC measures (left)

Collect specimen: Combined nasopharyngeal and oropharyngeal swab in ambulatory patients and sputum (if produced) and/or tracheal aspirate or bronchoalveolar lavage in patients with more severe respiratory disease

Discuss with NICD (Hotline: 082-883-9920)

Other aetiologies been excluded?

Yes

No

Request respiratory panel, especially influenza, RSV

Reassess, if patient fails to improve and no alt diagnosis confirmed

Notify to provincial CDC and NMC system

Complete specimen submission form, patient under investigation form, and contact list. Email to: ncov@nicd.ac.za

Home quarantine

Close* contacts

Monitor for symptom development for 14 days post-exposure

Ship specimens and documentation to NICD.

Mark: Suspected Novel coronavirus, CRDM NHLS/NICD, Center for Respiratory Disease and Meningitis

Contact details: Provincial CDC coordinators
ECP Ms Nosiphiwo Mgobo 060 579 9027
Ms Dekeledi Kekana and 083 757 8217
Initial diagnosis and management of suspected case (PUI), including infection control measures:

- Were in close contact with a confirmed or probable case of 2019-nCoV infection;
- Had a history of travel to areas with presumed ongoing community transmission of 2019-nCoV; i.e. China; OR
- Worked in or attended a health care facility where patients with 2019-nCoV infections were being treated.

- Apply airborne precautions (e.g. N95 mask) and eye protection must be used when performing aerosol-generating procedures.
- If available, airborne precautions can be used at all times.
- Limit movement of patient (e.g. use designated portable X-ray equipment).

Monitoring stopped:
- Asymptomatic contact, 14 days post-exposure.
- Symptomatic contact.

2019-nCoV testing indicated. Follow IPC measures (left):
- Complete specimen submission form, patient under investigation form, and contact list. Email to: ncov@nicd.ac.za
- Collect specimen: Combined nasopharyngeal and oropharyngeal swab in ambulatory patients and sputum (if produced) and/or tracheal aspirate or bronchoalveolar lavage in patients with more severe respiratory disease.

Discuss with NICD (Hotline: 082-883-9920):
- Other aetiologies been excluded?

- Patient discharged:
  - nCoV Negative.
  - nCoV Positive.

- Self-monitoring:
  - Daily, telephonic-monitoring.
  - Home quarantine.
  - Avoid unessential contact.
  - Casual contacts.

- Symptomatic contact:
  - Close* contacts.
  - Monitor for symptom development for 14 days post-exposure.
  - Initiate contact tracing.

- Patient discharge:
  - Admit to hospital and isolate.

- Website: www.nicd.ac.za
- 24h NICD Hotline: 082-883-9920
- Document submission: ncov@nicd.ac.za

- Ship specimens and documentation to NICD.
  - Mark: Suspected Novel coronavirus, CRDM
  - NHLS/NICD, Centre for Respiratory Disease and Meningitis (CRDM), Lower North Wing, SAVP building 1 Modderfontein Rd, Sandringham, Johannesburg, 2131

- Positive test result 2019-nCoV
- Negative test result 2019-nCoV
<table>
<thead>
<tr>
<th>Symptom status</th>
<th>Arrival and disembarkation</th>
<th>Screening by Port Health</th>
<th>Screening by Port Health</th>
<th>Seen at Immigration and customs</th>
<th>In depth assessment at Port Health</th>
<th>Meets case definition, awaiting transfer by EMS</th>
<th>Transported by EMS to health facility</th>
<th>In Emergency Medicine Department (casualty)</th>
<th>Admission pending nCoV result</th>
<th>Confirmed positive test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No symptoms, does not meet case definition</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermoscan positive</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meets case definition</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STAGE OF ASSESSMENT OF TRAVELLERS/PERSONS UNDER INVESTIGATION FOLLOWING ARRIVAL AT PORT**

**ACTIONS REQUIRED BY HEALTH CARE WORKERS REGARDING IPC, reporting and data collection AT THIS STAGE**

<table>
<thead>
<tr>
<th>Level of IPC care required by personnel</th>
<th>Avoid crowds, keep 1m from people, frequent hand hygiene, MASKS not required*</th>
<th>Avoid crowds, keep 1m from people, frequent hand hygiene, MASKS not required*</th>
<th>Avoid crowds, keep 1m from people, frequent hand hygiene, MASKS not required*</th>
<th>Droplet precautions, incl surgical masks, gloves, disposable gowns, eye visor/goggles if collecting throat swab</th>
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<th>Droplet precautions, incl surgical masks, gloves, disposable gowns, eye visor/goggles if collecting throat swab</th>
<th>If possible, facilities should use airborne precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions required</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Immediately Port Health official gives patient a mask and moves traveller to private room,</td>
<td>Call NICD, collect throat swab, send to NICD</td>
<td>Arrange transfer to medical facility</td>
<td></td>
<td>Limit staff entry to isolation room</td>
<td>Call ahead and request facility to prepare isolation room for clinical assessment</td>
<td>Take patient straight to isolation room</td>
</tr>
<tr>
<td>References</td>
<td>WHO guidelines ‘Advice on use of masks’ (*individual may choose to wear mask)</td>
<td>WHO guidelines ‘Advice on use of masks’ (*individual may choose to wear mask)</td>
<td>WHO guidelines ‘Advice on use of masks’ (*individual may choose to wear mask)</td>
<td>WHO Coronavirus guidelines on NICO website WHO ‘IPC for NCoV’</td>
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*individual may choose to wear mask

#If possible, facilities should use airborne precautions

- Avoid crowds, keep 1m from people, frequent hand hygiene, MASKS not required
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## STAGE OF ASSESSMENT OF TRAVELLERS/PERSONS UNDER INVESTIGATION FOLLOWING ARRIVAL AT HEALTH FACILITY

<table>
<thead>
<tr>
<th>Symptom status</th>
<th>Arrival and registration</th>
<th>Screening by triage nurse</th>
<th>Screening by triage nurse</th>
<th>In depth assessment by Emergency Doctor</th>
<th>Admission pending nCoV result</th>
<th>Confirmed positive test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meets case definition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

### ACTIONS REQUIRED BY HEALTH CARE WORKERS REGARDING IPC, reporting and data collection AT THIS STAGE

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<tr>
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<th>Droplet precautions*, incl surgical masks, gloves, disposable gowns, eye visor/goggles if collecting throat swab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions required</td>
<td>Screen for travel history and main complaint</td>
<td>Repeat screen for travel history and main complaint</td>
<td>Immediately provide patient with mask, and isolate patient</td>
<td>Collect throat swab, send to NICD</td>
<td>Adhere to facility IPC protocols for respiratory isolation; consider moving patient to designated facility</td>
<td>Adhere to facility IPC protocols for respiratory isolation; consider moving patient to designated facility</td>
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<td>References</td>
<td>WHO guidelines ‘Advice on use of masks’ (*individual may choose to wear mask)</td>
<td>WHO guidelines ‘Advice on use of masks’ (*individual may choose to wear mask)</td>
<td>RSA Coronavirus guidelines on NICD website WHO ‘IPC for NCoV’ (*airborne precautions if possible)</td>
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</tr>
</tbody>
</table>
Actions following confirmation of diagnosis

• Implement airborne precautions
• Inform hospital manager and IPC focal point
• Notify the case on the NMC system and inform the provincial CDC co-ordinator
• Collaborate with IPC focal point, and CDC co-ordinator to collate a list of contacts
• Complete Case Report Form DAILY
• Take respiratory specimen every 2-3 days and a day before anticipated discharge to monitor for presence of virus
Clinical management
*prepared by Dr Jeremy Nel, Helen Joseph Hospital
Clinical management of suspected /confirmed nCoV case is essentially management of a Severe Acute Respiratory Illness (SARI)

There are two issues:

- **Keep a Broad Differential Diagnosis Before Diagnosis Confirmed**
- **Supportive Care of a Severe Acute Respiratory Illness**
Important differential diagnosis

- Conventional bacterial pneumonia
- Atypical bacterial pneumonia
- Other viral pneumonias
- *Pneumocystis* pneumonia
Bacterial pneumonia

• Severe pneumonias generally require **broad-spectrum antibiotics** empirically.

• Recommended options for community-acquired pneumonia:

<table>
<thead>
<tr>
<th>Amoxicillin-clavulanate (Augmentin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
</tr>
<tr>
<td>2(^{nd}) or 3(^{rd}) generation cephalosporin (e.g. ceftriaxone)</td>
</tr>
</tbody>
</table>

**PLUS**

macrolide (e.g. azithromycin)

2017 SA Community-acquired Pneumonia Guidelines
Corticosteroids

• **Avoid routine administration**

• Although corticosteroids may be of benefit in severe bacterial pneumonias, they have been associated with prolonged viral shedding and increased mortality in influenza.  
  (PMID: 30798570)

• Concern about possible similar effects in other viral pneumonias (including possibly 2019-nCoV)

• Should only be used if, after careful consideration, risks outweigh benefits
  • E.g. Suspected adrenal insufficiency, COPD, *Pneumocystis* pneumonia
Atypical bacterial pneumonias

• Important differential diagnosis of a viral pneumonia. Like a viral pneumonia these may have:
  • Flu-like symptoms: pharyngitis, headache, myalgias, dry cough, rhinorrhoea
  • Bilateral infiltrates – can appear reticulonodular / patchy – don’t have to have consolidation

• Empiric treatment options:
  • Macrolide (e.g. azithromycin) OR
  • Quinolone (e.g. levofloxacin, moxifloxacin) OR
  • Doxycyline
Viral pneumonia

• Influenza, parainfluenza, human metapneumovirus, respiratory syncytial virus, adenovirus, etc.

• **Influenza** is an important differential diagnosis to entertain, since:
  • It is currently influenza season in the Northern hemisphere, where many of the 2019-nCoV suspects will have come from.
  • It is potentially treatable.
Influenza treatment

• Consider empiric oseltamivir (Tamiflu) or zanamivir treatment in patients with an influenza-like illness who:
  • Are severely ill
  • Are at high risk for complications (pregnant women, HIV patients, patients with asthma/COPD, etc.)

• Treatment should be started as soon as possible (best chance of benefit within 48 hours of symptom onset)

  Oseltamivir 75mg po 12-hourly for 5 days

For more information, see 2019 NICD Influenza Guidelines
**Pneumocystis pneumonia**

- Consider if:
  1. Patient significantly immunocompromised: HIV positive with CD4 < 200, chronic systemic steroid use, chemotherapy, transplant patients, etc.)
  2. Diffuse bilateral infiltrates (often with a mid- to lower-zone predominance)
  3. Hypoxaemia at rest (or in mild cases, with exertion)

<table>
<thead>
<tr>
<th>Cotrimoxazole (Bactrim)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLUS</td>
</tr>
<tr>
<td>Prednisone if severe disease</td>
</tr>
</tbody>
</table>

(pO₂ < 70 mmHg, or alveolar-arterial gradient > 35)

- Consider empiric treatment if the above criteria are met:
Basic work-up of patients with SARI

• Chest X-ray
• Blood cultures
• If productive of sputum: sputum MCS
• Samples for 2019-nCoV testing

• If available (private sector > public sector)
  • Nasopharyngeal and oropharyngeal swabs for respiratory viruses and atypical pathogens
  • Urine *Legionella* antigen

• If PCP suspected:
  • Serum beta-D-glucan
  • Sputum sample / bronchoalveolar lavage (not always possible) for PCP
Supportive management of SARI

• Oxygen if required (titrate to SpO₂ ≥ 90%, or 92-95% in pregnant patients)

• Ventilatory support if required
  • If ARDS develops, consider neuromuscular prone position, and use lung-protective ventilation:
    • Low tidal volumes of 6 mL/kg or less
    • Low plateau airway pressure of 30 cm H₂O or less
    • Moderate-high PEEP levels to recruit lung

• Restrictive fluid management (unless shock or acute kidney injury)

• ... and other standard supportive measures in critically ill patients (consider thromboprophylaxis, neuromuscular blockade, prone position, and lung protective ventilation.)
Co-ordinating a public health response
Actions to support a public health response

• Activate provincial and district outbreak response teams
  • Ensure representation from all stakeholders especially CDC, hospitals, PHC, NHLS lab rep, NICD provincial epidemiologist and NMC nurse trainer, environmental health, EPI, EMS, port health, procurement and finance
  • Provide an overview of nCoV status globally and in RSA
  • Give an overview of RSA nCoV guidelines
  • Go through ‘patient flow diagrams’
  • Emphasise importance of
    • Screening using case definitions (incl
    • Facility readiness – all facilities incl PHC can use ‘Facility readiness checklist’
    • Communication re suspected cases to NICD, and rapid transport of specimen for confirmation
• Identify gaps and develop an action plan. Set date for next meeting
Resources for training

• 2-page summary document for facilities
• Specimen request form, and case investigation form (both MUST be completed when a specimen is submitted)
• Training slide set from NICD
• Training videos from NICD
• Facility readiness checklist
• NDoH / NICD nCoV guidelines
• WHO IPC for nCoV 2-page document
• NDoH communications
NDoH and NICD response structures