Managing Epidemics Handbook

**Sample Collection Diagnosis**

<table>
<thead>
<tr>
<th>Laboratory confirmation of a COVID-19 case will trigger a thorough investigation. Because no PCR test is currently available, testing may take several days or longer. WHO’s recommended strategy is to begin an investigation immediately, thus requiring immediate operational support and supplies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper and lower respiratory samples (nasopharyngeal and sputum samples).</td>
</tr>
<tr>
<td>Polymerase Chain Reaction (PCR)</td>
</tr>
<tr>
<td>No commercial RT-PCR kits are yet available; see interim COVID-19 laboratory guidance below.</td>
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<tr>
<td>Immunoassay</td>
</tr>
<tr>
<td>Not yet available</td>
</tr>
<tr>
<td>Culture</td>
</tr>
<tr>
<td>Viral transport medium</td>
</tr>
</tbody>
</table>

*Note: Many diagnostic supplies are also used for Case Management purposes, but have not been included only in Surveillance.*

**Travel & Trade Vaccine Triage/Screening (PPE)**

- Laboratory testing for COVID-19 is in development
- There is no specific treatment or vaccine for COVID-19; however, R&D efforts for MERS-CoV are ongoing. See current WHO guidance on case management for MERS-CoV. WHO guidance on COVID-19 case management is in development.
- Several candidates are undergoing rapid, continuous development and refinement. For greater clarity, please refer to the most recent applicable WHO technical guidance.

**Surveillance**

**Sample Collection**

- Animal source has not yet been identified
- Several vaccine candidates for MERS-CoV are in development.

**Diagnosis**

- Oxygen therapy with use of pulse oximeter highly recommended.
- Mechanical ventilation of severe cases (40%).
- Invasive ventilation and intensive care of critical cases.

**Prevention & Control**

- Standard precautions with an emphasis on hand and respiratory hygiene, plus additional precautions - specifically droplet and contact precautions. Airborne-related precautions are only required for aerosol-generating procedures. Personal protective equipment (PPE) for screening and for at-risk health care workers at health care facilities.

**Case Management**

**Aetiological**

- PPE for at-risk health care workers at health care facilities.
- Respiratory (standard, droplet IPC), airborne-related precautions for aerosol-generating procedures.
- Possibly Home Care Kits for home isolation of asymptomatic or mildly symptomatic cases (in the event of a large outbreak).

**Supportive**

- Supportive treatment (oxygen, hydration, antibiotics and fever/pain relief) to reduce mortality.
- PPE and other materials for the establishment of IPC supplies and ensuring basic health logistics at responding facilities.

**Intervention**

**Commodity**

- Comply with the CLSI standard M40-A (for the Quality Control of Microbiology Specimen Transport Devices).
- Compatible with molecular and cell culture techniques.
- WHO performance specification E10/1C.1.
- WHO/UNICEF standard E10/IC.2 or equivalent.

**Technical Description**

- Invasive ventilation and intensive care of critical cases.
- PPE for at-risk health care workers at health care facilities.
- Respiratory (standard, droplet IPC), airborne-related precautions for aerosol-generating procedures.
- Possibly Home Care Kits for home isolation of asymptomatic or mildly symptomatic cases (in the event of a large outbreak).

**Surveillance**

**Sample Collection**

- Triple packaging boxes
- Viral transport medium
- Sharps container boxes

**Diagnosis**

- Gloves, examination, non-sterile
- Gloves, examination, nitrile, powder-free, non-sterile, single-use
- Surgical mask, good breathability, internal and external faces should be clearly identified Type II or higher.
- Surgical mask, good breathability, internal and external faces should be clearly identified Type I.

**Prevention & Control**

**Triage/Screening PPE**

- Gloves should have long cuffs, reaching well above the wrist, ideally to mid-forearm.
- Size: small, medium, large
- EU MDD Directive 93/42/EEC Category III
- EU PPE Regulation 2016/425 Category III
- EN 455
- EN 374
- ANSI/ISEA 105
- ASTM D6319 or equivalent set of standards.

**Operational Support & Logistics**

**Disease Commodity Packages**

**OSL | Disease Commodity Packages**

**Last Update: 06 March 2020**
| **Oxygen concentrator** | Device concentrates oxygen from ambient air. Mobile on four anti-slip swivel castors, two with brakes. Flowrate: continuous and adjustable; oxygen purity: 93% ± 3%; output pressure: 0.04–0.07 MPa; noise level < 55 dB. Integrated oxygen concentration and pressure sensors. Four-step filtering of air intake, including a bacterial filter; all filters replaceable; coarse filter is washable/reusable. Display panel with audio/visual alarms for: "low oxygen concentration" (> 82%), "high/low pressure" (0.1/0.23 MPa), "power failure" and "oclusion" (no flow). Accessories and spare parts should be available to ensure at least one year of operation. | WHO; Concentrator, oxygen | [LINK](https://www.who.int/medical_devices) |
| **Pulse oximeter** | Compact portable device to monitor haemoglobin oxygen saturation and calculate the pulse rate of a patient; finger tip or labeletoo; battery powered or line powered. SpO₂ detection to include the range 70–100%. SpO₂ resolution: 1% or less. Pulse rate detection to include the range 30–240 bpm. Pulse rate resolution: 1 bpm or less. | WHO-UNICEF Technical Specifications and Guidance for Oxygen Therapy Devices, 2019 | [LINK](https://www.who.int/medical_devices) |
| **Flow-splitter, for oxygen supply** | Flow splitter for diversification of oxygen delivery. Each outlet with an independent flowmeter for independently controlled oxygen flow rates. Full scale is graduated in litres per minute (L/min). The device is connected to a single oxygen supply (e.g. concentrator). Input pressure: 50–350 kPa. |  | [LINK](https://www.who.int/medical_devices) |
| **Flowmeter, Thorpe tube** | The Thorpe tube flowmeter is composed of inlet and outlet ports, a regulator, a valve and a clear tapered measuring tube. It is suitable for connection to various medical gas sources, such as a centralized system, cylinders, concentrators or compressors; standard (absolute, non-compensated) and pressure-compensated flowmeter variants; suitable for specific flow ranges. |  | [LINK](https://www.who.int/medical_devices) |
| **Humidifier, non-heated** | The humidifier is inserted in the inspiratory line of a breathing circuit to add moisture to the breathing gases for administration to a patient. The bubbling bottle humidifier is a sealed container filled with water and connected inline into the breathing circuit. The medical gas mixture flows through the water inside the bottle and is enriched in humidity. This type of humidifier does not heat the gas. Should be compatible with oxygen concentrator, including necessary hose connectors. |  | [LINK](https://www.who.int/medical_devices) |
| **Nasal prongs** | Oxygen cannulae (nasal prongs) are plastic tubes shaped as two prongs delivering air/oxygen mixture into the nasal cavities and connected to an oxygen administration circuit; cannulae can be designed for low-flow applications (0.5–15 L/min range in general) or high flow (> 15 L/min typically). Oxygen and air/oxygen mixture compatibility, as per ISO 15001; different sizes: adult, paediatric, neonatal. |  | [LINK](https://www.who.int/medical_devices) |
| **Catheter** | Flexible nasal catheter with multiple holes (6 to 12 lateral eyes) at distal end. Oxygen and air/oxygen mixture compatibility, as per ISO 15001. Proximal end with connector. Sterile, single-use. Diameter: 8 Fr. Length: 40 cm with lateral eyes, sterile, single-use. |  | [LINK](https://www.who.int/medical_devices) |
| **Oxygen mask** | Connection tube, reservoir bag and valve, high-concentration, non-sterile, single-use; different sizes: adult, paediatric. |  | [LINK](https://www.who.int/medical_devices) |
| **Venturi mask** | Venturi mask, w/percent O₂ Lock + 2.1 m tubing, non-sterile, single-use; different sizes: adult, paediatric. |  | [LINK](https://www.who.int/medical_devices) |
| **Patient ventilator, for critical care** | Modes of ventilation: • Volume controlled • Pressure controlled • Pressure support • SIMV with pressure support • Assist/control mode & CPAP/PEEP | ISO 80601-2-80 and ISO 80601-2-79 or equivalent | [LINK](https://www.who.int/medical_devices) |
| **Laryngoscope – adult/child** | Instrument used to expose and view the larynx and surrounding areas during orotracheal and nasotracheal intubation. Consists of a large cylindrical, hollow, slightly ribbed handle with a threaded head compatible with different blade types and sizes. Each blade has fibres optics or a single bulb; bulb is at least a 2.7 V halogen light and is removable for cleaning. Handle is 28 mm diameter and battery powered with two standard alkaline dry-cell batteries (1.5 V, type C (LR14)). Bladess, Macintosh type (curved): • No. 2, length 90–110 mm, for child • No. 3, length 115–135 mm, for small adult • No. 4, length 135–155 mm, for adult Bladess, Miller type (straight): • No. 1, length 100 mm Heavy-walled plastic or metal case Instructions for use, troubleshooting and maintenance (English, French, Spanish) Supplied with six compatible batteries in total Four extra halogen bulbs | ISO 7376:2009 or equivalent | [LINK](https://www.who.int/medical_devices) |
## Supportive Treatment

### Laryngoscope – neonate

Instrument used to expose and view the larynx and surrounding areas during orotracheal and nasotracheal intubation. Consists of a large cylindrical, hollow, slightly ribbed handle with a threaded head compatible with different blade types and sizes. Each blade has fibre optics or a single bulb; bulb is at least 2.7 V halogen light and is removable for cleaning. Handle is 19 mm diameter and battery powered with two standard alkaline dry-cell batteries (1.5 V, type AA (LR6)).

- Blades, Macintosh type (curved):
  - No. 0, length 55 mm, for neonate
  - No. 1, length 70 mm, for infant
  - No. 2, length 90 mm, for child

Heavy-walled plastic or metal case

Supplied with six compatible batteries in total

Four extra halogen bulbs

| ISO 7376:2009 or equivalent |

### Endotracheal tube, without cuff

Without cuff, sterile, single-use. Consists of a thin, flexible, transparent and single hollow cylinder, with an anatomical curvature Magill-type of 37.5°, black and legible depth markings and graduation in centimetres, with radio-opaque continuous line mark, with pilot balloon, with a standard connector at the proximal end.

The proximal end of the tube safely fits the connector from which size is selected according to the tube size. The connector is straight and double-ended, with the proximal end being an outer-standard 15 mm internal diameter, conical tip that allows the tube to be connected to the ventilation system (breathing circuit or manual resuscitator).

The distal end of the tube is open and bevelled (obliquely cut), atrumatic, with Murphy’s eye. Endotracheal tubes to be standard in all aspects: dimension, markings and connectors.

| ISO 5361:2016; ISO 10993-1; ISO 11135:2014 or equivalent |

### Endotracheal tube, with cuff

With cuff, sterile, single-use. Consists of a thin, flexible, transparent and single hollow cylinder, with an anatomical curvature Magill-type of 37.5°, black and legible depth markings and graduation in centimetres, with radio-opaque continuous line mark, with cuff and pilot balloon, with a standard connector at the proximal end.

The proximal end of the tube safely fits the connector from which size is selected according to the tube size. The connector is straight and double-ended, with the proximal end being an outer-standard 15 mm internal diameter, conical tip that allows the tube to be connected to the ventilation system (breathing circuit or manual resuscitator).

The distal end of the tube is open and bevelled (obliquely cut), atrumatic, with Murphy’s eye. The cuff, situated at the distal end of the tube, provides an airtight seal between the tube and the tracheal wall. It seals the lungs against the liquid secretions moving around in the upper airway. Also ensures that the environment below the cuff can be pressurized and ventilated with a carefully controlled gas mixture.

The cuff has a low pressure in order to avoid inadequate pressure on the tracheal mucous membrane to prevent damage or even necrosis. It typically has a capacity of 10 mL. The cuff is inflated via a small-bore inflation tube welded to the outside of the tracheal tube or built into its wall.

The pilot balloon indicates the cuff distension. One end is connected to the cuff through a thin inflation tube located close to the proximal end. The other end has a spring-loaded, one-way valve that maintains a pre-set pressure in the circuit, and has a Luer tip connector for syringes.

Endotracheal tubes to be standard in all aspects: dimension, markings and connectors.


#### Endotracheal tube introducer, Bougie

Blue or yellow tube with graduated marking

Cuffed tip with distal rounded smooth tip, sterile, single-use

Diameter: 10 Fr and 15 Fr; length: 60–70 cm

#### Endotracheal tube introducer, Stylet

Flexible and malleable guide (stylet). Soft and round end-tip. Shaped as needed. Graduated marking. Manufacturer name and tube size are indicated on the tube.

Sterile, single-use

Diameter: 10 Fr and 14 Fr; length: 30–45 cm

#### Colorimetric end tidal CO2 detector

Sizes compatible with child and adult endotracheal tube; single-use

Blue or yellow tube with graduated marking

Cuffed tip with distal rounded smooth tip, sterile, single-use

Diameter: 10 Fr and 15 Fr; length: 60–70 cm

### Resuscitator, adult

Compressible self-refilling ventilation bag; capacity: 1475–2000 mL

Oxygen reservoir bag complete

Non-rebreathing patient valve with pressure-limiting valve, patient connector outside/inside diameter: 22/15 mm

Inlet valve with nipple for O2 tubing

Masks, silicon, for child

With cuff, sterile, single-use. Consists of a thin, flexible, transparent and single hollow cylinder, with an anatomical curvature Magill-type of 37.5°, black and legible depth markings and graduation in centimetres, with radio-opaque continuous line mark, with cuff and pilot balloon, with a standard connector at the proximal end.

The proximal end of the tube safely fits the connector from which size is selected according to the tube size. The connector is straight and double-ended, with the proximal end being an outer-standard 15 mm internal diameter, conical tip that allows the tube to be connected to the ventilation system (breathing circuit or manual resuscitator).

The distal end of the tube is open and bevelled (obliquely cut), atrumatic, with Murphy’s eye. The cuff, situated at the distal end of the tube, provides an airtight seal between the tube and the tracheal wall. It seals the lungs against the liquid secretions moving around in the upper airway. Also ensures that the environment below the cuff can be pressurized and ventilated with a carefully controlled gas mixture.

The cuff has a low pressure in order to avoid inadequate pressure on the tracheal mucous membrane to prevent damage or even necrosis. It typically has a capacity of 10 mL. The cuff is inflated via a small-bore inflation tube welded to the outside of the tracheal tube or built into its wall.

The pilot balloon indicates the cuff distension. One end is connected to the cuff through a thin inflation tube located close to the proximal end. The other end has a spring-loaded, one-way valve that maintains a pre-set pressure in the circuit, and has a Luer tip connector for syringes.

Endotracheal tubes to be standard in all aspects: dimension, markings and connectors.


#### Resuscitator, child

Compressible self-refilling ventilation bag, child, capacity: 500–700 mL

Oxygen reservoir bag complete

Non-rebreathing patient valve with pressure-limiting valve, patient connector outside/inside diameter: 22/15 mm

Inlet valve with nipple for O2 tubing

Masks, silicon, for child

### Oropharyngeal airway, Guedel, sterile, single-use

One-piece, semi-rigid, curved plastic tube. To be inserted through the oropharynxes to facilitate airway management. Guedel type.

Flange surface is permanently marked with tube size/length in mm, and the manufacturer or supplier’s name. Bite resistant. Proximal (or buccal) end straight and reinforced Distal end semi-rigid, curved, with atrumatic soft rounded edges

Infant sizes: 00, 0, 1; adult sizes: 2, 3, 4

Sterile, single-use; recommended for use as an airway adjunct in the semi-conscious or unconscious patient with an intact gag reflex.

Individually packaged, sterile, with a conveniently attached surgical lubricant for quick access to facilitate ease of insertion.

Flexible and soft material for maximum patient comfort

Rounded tip allows for gentle insertion

Trumpet design for secure placement

Diameter and size labelled according to standards

Range of sizes from 20 Fr to 36 Fr

| ISO 11135:2014 or equivalent |

### Nasopharyngeal airway

Sterile, single-use; recommended for use as an airway adjunct in the semi-conscious or unconscious patient with an intact gag reflex.

Individually packaged, sterile, with a conveniently attached surgical lubricant for quick access to facilitate ease of insertion.

Flexible and soft material for maximum patient comfort

Rounded tip allows for gentle insertion

Trumpet design for secure placement

Diameter and size labelled according to standards

Range of sizes from 20 Fr to 36 Fr

| ISO 11135:2014 or equivalent |
### Suction devices
Portable suction devices/aspiration pumps used to evacuate secretions and liquids from the nasal cavity or from high airways. Devices capable of resisting high-level disinfection procedures. Aspiration pumps vary in vacuum level and flow capacity. Anti-bacterial filter and containers should be available, if applicable.

<table>
<thead>
<tr>
<th>Compound sodium lactate solution</th>
<th>Suction devices</th>
<th>Infusion giving set</th>
<th>Paracetamol</th>
<th>PPE Health Care Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound solution of sodium lactate (Ringer's lactate), injection solution, w/o IV set and needle, 1000 mL</td>
<td></td>
<td>Infusion giving sets for adult and pediatric use to be considered. IV catheters and scalp vein sets covering all range of sizes to be considered. Stopper/closing cones, 3-way stopcock and other devices needed to complete the infusion line to be considered.</td>
<td>Paracetamol, 500 mg, tablets</td>
<td>Chlorine, Neck, granules, 1 kg, 65–70% + measurement spoon</td>
</tr>
</tbody>
</table>

### Gloves, examination, non-sterile
Gloves, examination, nitrile, powder-free, non-sterile, single-use. Gloves should have long cuffs, reaching well above the wrist, ideally to mid-forearm. Sizes: small, medium, large.

- EU MDD Directive 93/42/EEC Category III
- EU PPE Regulation 2016/425 Category III
- EN 455
- ANSI/ISEA 105, or equivalent
- ASTM D3579, or equivalent

### Gloves, examination or surgical, sterile
Gloves, examination or surgical, nitrile, powder-free, sterile, single-use. Gloves should have long cuffs, reaching well above the wrist, ideally to mid-forearm. Sizes: small, medium, large.

- EU MDD Directive 93/42/EEC Category III
- EU PPE Regulation 2016/425 Category III
- EN 455
- ANSI/ISEA 105, or equivalent
- ASTM D3579, or equivalent

### Goggles, protective
Good seal with the skin of the face, flexible PVC frame to easily fit all face contours with even pressure, enclose eyes and the surrounding areas, accommodate wearers with prescription glasses; clear plastic lens with fog- and scratch-resistant treatments; adjustable band to secure firmly so as not to become loose during clinical activity; indirect venting to avoid fogging. May be re-usable (provided appropriate arrangements for decontamination are in place) or disposable.

- EU PPE Regulation 2016/425
- EN 166
- ANSI/ISEA Z87.1, or equivalent

### Face shield
Made of clear plastic and providing good visibility to both the wearer and the patient. Adjustable band to attach firmly around the head and fit snugly against the forehead, fog-resistant (preferable). Completely covers the sides and length of the face. May be re-usable (made of robust material which can be cleaned and disinfected) or disposable.

- EU PPE Regulation 2016/425
- EN 166
- ANSI/ISEA Z87.1, or equivalent

### Fit test kit
To evaluate effectiveness of seal for tight-fitting respiratory protection devices.

- OSHA 29 CFR 1910.134 Appendix A

### Particulate respirator, grade N95 or higher.
N95 or FFP2 respirator, or higher. Good breathability with a design that does not collapse against the mouth (e.g. duckbill, cup-shaped).

- Minimum "N95" respirator according to FDA Class II, under 21 CFR 878.4040, and CDC NIOSH, or
- Minimum "FFP2" according to EN 149, EU PPE Regulation 2016/425 Category III, or equivalent

### Mask, surgical – health care worker.
Surgical mask, good breathability; internal and external faces should be clearly identified Type II or higher.

- EU MDD Directive 93/42/EEC Category III or equivalent
- EN 14683 Type II, R, IIR
- ASTM F2100 minimum level 1 or equivalent

### Mask, surgical – patient
Surgical mask, good breathability; internal and external faces should be clearly identified Type I.

- EN 14683 any type including Type I
- ASTM F2100 minimum level 1 or equivalent

### Scrubs, tops
Tunic/tops, woven, scrub, reusable or single-use, short-sleeved (tunic/tops), worn underneath the coveralls or gown

### Scrubs, pants
Trousers/pants, woven, scrub, reusable or single-use, worn underneath the coveralls or gown

### Apron, heavy duty
Straight apron with bib. Fabric: 100% polyester with PVC coating, or 100% PVC, or 100% rubber, or other fluid-resistant coated material. Waterproof, sewn strap for neck and back fastening. Minimum weight: 300 g/m². Covering size: 70x90 cm (width) x 120–150 cm (height). Reusable (provided appropriate arrangements for decontamination are in place).

- EN ISO 13688
- EN 14126-8 and partial protection (EN 13034 or EN 14606)
- EN 343 for water and breathability or equivalent

### Gown
Single-use, length mid-calf.

- EU PPE Regulation 2016/425 and EU MDD Directive 93/42/EEC
- FDA Class I or II medical device, or equivalent
- EN 14795 any performance level, or equivalent
- AAMI PB70 all levels acceptable, or equivalent

### Alcohol-based hand rub
100 ml and 500 ml bottles

### Biohazard bag
Disposal bag for biohazardous waste; 30 x 50 cm, with “Biohazard” print, autoclavable polypropylene. Thickness: 50 µ or 70 µ

### Safety box
Safety box for needles/syringes; 5 L capacity; cardboard for incineration, box-25

### Soap
Liquid (preferred); powder and bar

### Gloves, cleaning
Outer glove should have long cuffs, reaching well above the wrist, ideally to mid-forearm. Minimum 280 mm total length. Sizes: small, medium, large. Reusable.

- Puncture-resistant, FDA compliant

### Hand drying tissue
50 to 100 m roll

### Chlorine
Neck, granules, 1 kg, 65–70% + measurement spoon
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