

Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed

Interim guidance

12 July 2021



Key points

- In the context of SARS-CoV-2 variants of concern, based on the available evidence and expert consensus, WHO advises that the current recommended IPC measures be reinforced and continue to be stringently implemented.
- WHO continues to recommend that the highest priority population for vaccination include health workers, older adults and individuals with underlying medical conditions.
- At the present time, WHO recommends that vaccinated persons should continue to adhere to public health and social measures and IPC measures, including in health facilities.
- Health facilities^a in some locations have been associated with the spread of SARS-CoV-2 between health workers, patients and others.
- Following critical health care IPC strategies and measures are required to prevent or limit SARS-CoV-2 transmission in health facilities, including having the following in place: an IPC programme or at least a dedicated and trained IPC focal point, engineering and environmental controls, administrative controls, standard and transmission based-precautions, screening and triage for early identification of cases and source control, robust surveillance and vaccination of health workers.
- Optimal compliance with appropriate use of personal protective equipment and hand hygiene by health workers is associated with decreased risk of SARS-CoV-2 transmission.
- Infection prevention and control (IPC) training of health workers is associated with decreased risk of occupational acquisition of COVID-19.

- Health facilities should adhere to key WHO-recommended IPC measures, in particular, adhering to respiratory etiquette and hand hygiene best practices, contact, droplet and airborne precautions, adequate environmental cleaning and disinfection; ensuring adequate ventilation; isolation facilities of COVID-19 patients; in addition, where possible, maintaining a physical distance among all individuals in health facilities of at least 1 metre (increasing it whenever feasible), especially in indoor settings.
- Universal masking by all patients, staff, caregivers and visitors within a health facility should be implemented in health facilities in areas where there is known or suspected community or cluster transmission of SARS-CoV-2. Targeted continuous masking should be implemented in clinical areas of health facilities in areas with known or suspected sporadic transmission.
- IPC precautions should be applied for COVID-19 vaccine administration. Mask use by vaccinators and recipients of the vaccine should be according to local or national guidance.

Introduction

This third edition of the World Health Organization (WHO) interim guidance on infection prevention and control (IPC) during health care delivery in the context of COVID-19 provides updated guidance to support safe health care through the rigorous application of IPC procedures for the protection of patients, staff, caregivers and visitors^b in health care settings. It aligns content and recommendations with other recently published WHO IPC guidance documents and includes the following new sections:

- Updated evidence on SARS-CoV-2 transmission, SARS-CoV-2 infections in health workers,^c (1)

^a Health facility (including primary, secondary, tertiary care levels, outpatient care and long-term care facilities)

^b Individuals accessing the healthcare facilities not to directly seek healthcare service, but to physically be present with a patient. Visitors provide various levels of support to patients during the course of treatment (personal, social, psychological, emotional and physical).

^c Health workers are all people engaged in work actions whose primary intent is to improve health. This includes health service providers, such as doctors, nurses, midwives, public health

professionals, technicians (laboratory, health, medical and non-medical), personal care workers, community health workers, healers and practitioners of traditional medicine. It also includes health management and support workers, such as cleaners, drivers, hospital administrators, district health managers and social workers, and other occupational groups in health-related activities. This group includes those who work in acute care facilities and in long-term care, public health, community-based care, social care and home care and other occupations in the health and social work sectors.

nosocomial transmission among patients, and the latest information on SARS-CoV-2 variants of concern (alpha, beta, gamma and delta);

- Guidance on universal and targeted continuous use of masks’;
- Prevention, identification and management of SARS-CoV-2 infections among health workers;
- Implications of variants of concern for IPC practices;
- IPC considerations for COVID-19 vaccination sessions.

This interim guidance is written for health facility managers at national or district/provincial levels, infection prevention and control focal points and health workers. The aim of this interim guidance is to minimize the introduction of SARS-CoV-2 infection into a facility in all resource settings and, if introduced, from spreading within and beyond the facility.

Transmission of infectious pathogens, including SARS-CoV-2, continues to highlight deficiencies in IPC in health facilities worldwide. The rigorous implementation of IPC measures protects health workers from infection from such pathogens and is required to be regularly reviewed and updated. The guidance set out in this document is required to prevent and/or limit transmission of SARS-CoV-2 in health facilities. Health workers or patients infected with SARS-CoV-2 who are not promptly identified, isolated and cared for can transmit it to others including to health workers, caregivers, other patients and visitors (2), causing health care-associated outbreaks and onward transmission to families and the community.(2-5)

The significant burden placed on health workers in health facilities and beyond during the COVID-19 pandemic has forced health workers to adapt to significantly higher patient volumes and longer shifts for extended periods of time; leading to exhaustion, burnout, physical and mental stress,(6) which places health workers at significant risk of potentially reduced compliance with recommended IPC measures.

Evidence on SARS-CoV-2 transmission and physical distancing

How to effectively use IPC measures in health care settings relies on an understanding of the transmissibility of SARS-CoV-2, which depends on multiple factors. These include, but are not limited to, the amount of viable virus shed and expelled by an infected person, the type and duration of contact with an infected person, the setting where exposure takes place and the IPC measures that are in place in that setting. There are numerous studies underway to better understand surface and aerosol persistence; the studies are however challenging to interpret as identifying viral RNA in clinical or environmental specimens (PCR positive samples) is not the same as finding replication- and infection-

competent (viable) virus that could be transmissible and capable of sufficient inoculum to initiate invasive infection.(7)

Available evidence continues to suggest that SARS-CoV-2 can spread from an infected person’s mouth or nose in small liquid particles when the person coughs, sneezes, sings, breathes or talks, by inhalation or inoculation through the mouth, nose or eyes. These liquid particles are different sizes, ranging from larger ‘respiratory droplets’ to smaller ‘aerosols.’ Current evidence suggests that the virus spreads mainly between people who are in close contact with each other, typically within 1 metre (short-range).(8)

The virus can also spread to others through aerosols at longer (beyond the typical 1 metre distance) distances. The risk of long-distance aerosol transmission is higher in poorly ventilated and/or crowded indoor settings where people spend long periods of time (7, 9). In health care settings, aerosol transmission can also occur in specific situations in which procedures that generate aerosols are performed ^d.(7) A recent systematic review found that SARS-CoV-2 RNA can be detected in the air in the presence of COVID-19 patients in various health care settings and can also be detected in community settings, sometimes at low concentrations. Among these studies, only a limited number have isolated viable virus from air samples.(10)

There is currently limited evidence on transmission through fomites (objects or materials that may be contaminated with viable virus, such as utensils and furniture or in health care settings a stethoscope or thermometer) in the immediate environment around the infected person.(11-14) The majority of studies report identification of SARS-CoV-2 RNA on inanimate surfaces; a recent study in a healthcare setting where immunocompromised patients were cared for found extensive contamination with replication- and infection-competent SARS-CoV-2 in discarded nasal tissues, a cell phone, the patient’s hands, and cough specimens(15). However, the evidence demonstrating the recovery of viable virus in clinical and community settings is currently limited.(15, 16)

More details on SARS-CoV-2 modes of transmission can be found in the interim guidance document [Mask use in the context of COVID-19: interim guidance, 1 December 2020](#) (7) and in the WHO [Roadmap to improve and ensure good indoor ventilation in the context of COVID-19, 1 March,2021](#). (17)

Physical distancing of at least 1 metre remains a key IPC and public health and social measure to reduce transmission of SARS-CoV-2. Available evidence was again reviewed by the GDG, and several studies report fewer cases of SARS-CoV-2 infection associated with a physical distance of greater than 1 metre; however, these studies had small sample sizes, and there were methodological concerns.(18-20) A recent study

^d The WHO list of AGP’s includes tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation

before intubation, bronchoscopy, sputum induction using nebulized hypertonic saline and dentistry and autopsy procedures

reporting on the relationship between infection and physical distancing policies in schools found no difference in SARS-CoV-2 case rates among children or staff in schools implementing a 1 metre distancing policy compared to a 2-metre policy.(21, 22)

Evidence on health worker infection and health care-associated infections

Health workers are members of communities and as such can play a role in transmission between health-care settings and the community, and they may play a role in initiating or amplifying outbreaks in settings such as hospitals and long-term care facilities.(3) More information on health worker infections can also be found in the guidance [Prevention, identification and management of health worker infection in the context of COVID-19](#). (23)

Box 1. Evidence on health worker infections and health care-acquired (nosocomial) transmission

At present, there is no systematic documentation or dedicated global reporting system of SARS-CoV-2 infection among health workers and many countries do not have national level surveillance specifically for health workers.

According to the WHO global surveillance system, which is based on Case Report Forms provided by Member States and aggregated data reported weekly by countries, 2.5% of reported COVID-19 cases have occurred in health workers as of 2 February 2021.(24) This is likely an underestimate of the true infections in health workers because of under reporting and under-recognition of cases.

A systematic review of 237 published studies that evaluated epidemiology and risk factors associated with SARS-CoV-2 infection in health workers found a wide variation of seroprevalence of SARS-CoV-2 (ranging from 0.3% to 39.6%) and infection incidence (ranging 0.4% to 49.6%).(25) This review found no differences between professional categories, sex or age, but higher rates were associated among Black, Hispanic and Asian race/ethnicity.(25) Higher infection rates in health workers were associated with unprotected exposures to COVID-19 patients as well as with exposures to certain high-risk procedures, such as intubations and other aerosol generating procedures without PPE,(26) direct patient contact or contact with bodily secretions. Regardless of exposures, availability and correct use of personal protective equipment, hand hygiene and training in IPC are associated with decreased risk of SARS-CoV-2 infection.(25, 26)

Some studies reported that up to 49% of health workers infected with SARS-CoV-2 were either asymptomatic or pauci-symptomatic (having very mild, almost

undetectable symptoms) and still worked while being infected, representing a risk for others.(3, 27) Another study (4) reported that health workers and patients were infected at a similar rate when lapses in the use of personal protective equipment occurred (e.g., health workers not wearing eye protection when interacting with patients who were not masked) or following close contact interactions in break rooms with colleagues.

Several studies have reported healthcare associated SARS-CoV-2 infection among patients ranging from 0-41%.(28-31) Long inpatient stay increase the risk of acquiring SARS-CoV-2 infection for patients, especially patients in geriatric wards, rehabilitation and long-term care facilities(3). Where hospitals restricted or suppressed visits from outsiders, researchers have shown that healthcare-associated SARS-CoV-2 infections were almost exclusively due to patient-to-patient or HCW-to-patient transmission.(3)

The risk of SARS-CoV-2 transmission in health facilities is complicated and increased by additional factors, such as increased demand for hospital beds for patients, a lack of adequate isolation facilities, inadequate ventilation,(17) unavailability of personal protective equipment,(32) and the need to conduct high-risk procedures such as aerosol generating procedures.

SARS-CoV-2 variants of concern

WHO, in collaboration with national authorities, institutions and researchers, continues to monitor the public health events associated with SARS-CoV-2 variants and provides updates as new information becomes available. (33)

As of 8 July 2021, WHO has characterized four variants of concern (VOC): Alpha (B.1.1.7), Beta (B.1.351, B1.351.2, B.351.3), Gamma (P.1, P.1.1, P.1.2) and Delta (B.1.617.2, AY.1, AY.2). The latest information on the monitoring, assessment and naming of variants of concern can be found [here](#). Available evidence for the four VOCs suggests that there is increased transmissibility for all, with the largest increase in transmissibility for the Delta variant.(33, 34) At the present time, there have not been reported changes in the modes of transmission. WHO is actively monitoring all available evidence generated by researchers, public health institutions, and professionals through existing networks and multidisciplinary discussions.

IPC and public health and social measures remain critically important in curbing the spread of SARS-CoV-2, including VOCs. (35) Evidence from multiple countries with extensive transmission of variants of concern has indicated that the implementation IPC measures along with vaccination and public health and social measures in health facilities remain effective in reducing COVID-19 incidence.(36)

Having examined all available evidence and in the context of the circulation of VOCs, WHO recommends vigilant adherence to the current guidance on IPC measures, including personal protective equipment to prevent the transmission and control the spread of SARS-CoV-2.

Infection prevention and control strategies and measures associated with the care for suspected or confirmed cases of COVID-19 in health facilities

To mount an optimal response to the COVID-19 pandemic using the strategies and practices recommended in this document, a facility level IPC programme 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.(37) In countries where IPC programmes are limited or nonexistent, it is critical to ensure that at least basic IPC standards are in place at the national and health facility level to provide minimum protection to patients, health workers, caregivers and visitors and thereby protect the community. These minimum requirements (38) for IPC have been recommended by WHO since 2019 based on a broad consensus among international experts and institutions to facilitate the implementation of the WHO recommendations into the core components of IPC programmes. Achieving the IPC minimum requirements and more robust and comprehensive IPC programmes based on WHO core components (37) across whole health systems is essential to sustaining efforts to control the COVID-19 pandemic, other emerging infectious diseases, health care-associated infections and antimicrobial resistance. This is also key to achieving resilient health systems.

WHO has published guidance on health workforce policy in the context of COVID-19, which includes the IPC interventions needed to support health workers individually.(6) WHO has also developed guidance on the core competencies required of infection prevention and control professional staff, which can be used for assessing the training needs and developing institutional curricula.(39)

1. Screening ^e and triage ^f for early recognition of patients with suspected COVID-19 and rapid implementation of source control measures

WHO continues to recommend to screen all persons for COVID-19 at the first point of contact with the health facility to allow for early recognition, followed by immediate isolation of suspected and confirmed cases. Recommendations for screening strategies for health workers can be found in the

WHO interim guidance [Prevention, identification and management of health worker infection in the context of COVID-19.](#)

Based on available data (18-22) and 83% consensus among the ad hoc COVID-19 Infection Prevention and Control Guidance Development Group, WHO continues to advise that a physical distance of at least 1 metre should be maintained between and among patients, staff and all other persons in health care settings. This distance should be increased wherever feasible, especially in indoor settings.

Screening of patients, visitors and others entering the facility

The following measures will facilitate screening and triage:

- Train staff on the signs and symptoms of COVID-19 and the most recent case definitions,^g
- Display information at the entrance of the facility directing patients with signs and symptoms of COVID-19 to report to the designated area for screening. Staff, patients, visitors or others entering the facility who do not have signs or symptoms of COVID-19, should have clear directions indicating the designated screening area, which should ideally be separate from areas for individuals presenting with symptoms. Where this is not feasible, individualized solutions need to be found to manage the flow of patients to maintain physical distancing of at least 1 metre.
- Implement a monitoring and feedback process to ensure screening is conducted accurately and appropriately. Encourage health workers to be alert to potential SARS-CoV-2 infection in all patients.
- Establish well-ventilated screening stations equipped with the following:
 - screening questionnaires with the most recent WHO^h or national case definitions;
 - a screening algorithm to promptly identify and direct patients with suspected SARS-CoV-2 infection to an isolation room or dedicated SARS-CoV-2 waiting area;
 - access to adequate supplies of personal protective equipment (PPE); (40)
 - additional PPE available for staff use based on a risk assessment^h;(41)
 - adequate access to supplies for hand hygiene (alcohol based hand rub or soap and water) for both health workers and patients; and

^e Screening: refers to prompt identification of patients with signs and symptoms of COVID-19

^f Triage: prioritization of care according to severity using validated tools (e.g., WHO/ICRC/MSF/IFRC Integrated Interagency Triage Tool)

^g WHO global surveillance for COVID-19:

<https://www.who.int/publications/i/item/global-surveillance-for-covid-19-caused-by-human-infection-with-covid-19-virus-interim-guidance>

^h A risk assessment is the health worker's assessment of risk for exposure to body substances or contaminated surfaces before any anticipated health care activity

- ideally, a separation created by a glass/plastic screen between screening personnel and patients. (40)
- Require screening personnel and patients to maintain a distance of at least 1 metre and increase this distance where possible, especially in indoor settings.
- Require screening personnel to wear a medical mask and use additional PPE according to a risk assessment. (41)
- In areas of known or suspected community or cluster transmission of SARS-CoV-2, implement universal masking for all individuals in the facility (see section 3 for details) including within the screening/triage area for all health workers, patients and visitors or individuals accompanying patients.
- When influenza virus is known or suspected to be circulating, ensure that this diagnosis is also considered as part of screening of patients with fever and influenza-like-illness, and that testing is undertaken as per local routine protocols. (42) Other infections such as malaria, tuberculosis and chronic diseases should also be considered within the COVID-19 care pathway.
- All patients suspected of having SARS-CoV-2 infection should wear masks for source control purposes and be positioned at least 1 metre apart from each other in a designated, well-ventilated, waiting area.(7)
- Ensure that a process is in place to reduce the amount of time patients suspected of having SARS-CoV-2 infection wait to be screened.

Triage

- Patients who are suspected of having COVID-19 and have symptoms of respiratory distress and severe underlying conditions should be prioritized for medical evaluation.
- After screening and isolation (if required), triage patients using standardized and validated triage tools (e.g. WHO/ICRC/MSF/IFRC Interagency Integrated Triage Tool) to identify individuals in need of immediate care and those who can safely wait. (43)

Isolation or designated waiting area

- Health facilities without enough single isolation rooms in their emergency departments should designate a separate, well-ventilated area where patients with suspected COVID-19 can wait to be assessed. This area should have benches, stalls or chairs placed at least 1 metre apart.
- The isolation or designated area should have masks, dedicated toilets, hand hygiene stations and trash bins with lids for disposal of paper tissues used for respiratory hygiene or after hand washing.

- Display graphic information for patients (printed or videos on screens, if available) to inform how to perform hand and respiratory hygiene and how to wear a mask appropriately.

Inpatient screening

To prevent transmission of SARS-CoV-2 within health facilities it is critical to promptly detect SARS-CoV-2 infection in inpatients whose illness was missed by screening and triage efforts or who became infected within the facility. Screening can be challenging, given there could be high numbers of acute respiratory infections and atypical clinical presentations of COVID-19 (42), and that infected individuals with and without symptoms can transmit the SARS-CoV-2.

To facilitate inpatient screening health facilities should:

- encourage health workers to perform regular patient assessments and monitoring to identify changes in patients suspected of having SARS-CoV-2 infection;
- encourage the use of validated rapid antigen or PCR testing in accordance with the national testing strategy; (44)
- report on patients who have been identified as having COVID-19 after admission;
- establish refresher clinical training and regular updates on the latest evidence on SARS-CoV-2, especially in areas with community transmission.

2. Applying standard precautions for all patients

Standard precautions aim to reduce the risk of transmission of bloodborne and other pathogens from recognized and unrecognized sources and are the basic level of IPC precautions that should be used at all times in the care of all patients. Standard precautions include, but are not limited to, hand and respiratory hygiene, the use of appropriate personal protective equipment according to risk assessment (41), environmental cleaning, safe waste management, injection safety and decontamination of medical devices.

Hand hygiene

Hand hygiene is one the most effective measures to prevent the spread of infectious pathogens, including SARS-CoV-2.(45) Posters and graphic instructions on hand hygiene should be displayed in the health facility.

For optimal hand hygiene performance, health workers should apply the following principles (46, 47):

- Perform hand hygiene according to the WHO's [My 5 Moments for Hand Hygiene](#) approach: before touching a patient, before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient and after touching a patient's surroundings.(48)
- Clean hands with an alcohol-based hand rub containing between 60-80% alcohol or with soap, water and disposable towels. Alcohol-based hand rub products are

preferred if hands are not visibly soiled. Wash hands with soap and water when they are visibly soiled.(46, 49)

- Use the appropriate technique and duration for performing hand washing or hand rubbing.
- Ensure hands are thoroughly dried before engaging in patient care.
- The need for moisturizing products will vary across health-care settings, geographical locations and respective climate conditions and individuals. Health facilities should promote and facilitate skin care for health workers' hands.

Respiratory hygiene

Ensure that the following respiratory hygiene measures are applied by all individuals in the health facility:(50)

- sneezing or coughing into the elbow or using a tissue and disposing of it immediately in a bin with a lid;
- performing hand hygiene after contact with respiratory secretions or objects that may be potentially contaminated with respiratory secretions.

Staff should perform and promote respiratory hygiene and help individuals who need assistance, such as providing patients with tissues, plastic bags for used tissues and hand hygiene facilities as necessary. Posters and graphic information on respiratory hygiene should be displayed in the health facility.

Use of personal protective equipment

The rational and correct use of personal protective equipment reduces exposure to and infection of SARS-CoV-2. The effectiveness of personal protective equipment depends on:

- staff training on putting on and removing PPE; (51)
- prompt access to sufficient supplies;(40)
- provision of adequate PPE according to technical specifications; (52)
- appropriate hand hygiene; (46, 47)
- health worker compliance;
- supervision and regular monitoring and feedback by IPC personnel.(37, 41, 46)

International standards that meet functional equivalency for each type of personal protective equipment item are included in WHO's Technical specifications of personal protective equipment for COVID-19. (52)

WHO does not advise disinfection of gloved hands. However, if strictly necessary, the disinfection of a gloved hand through validated methods supported by the glove manufacturer should only be performed during a moment for hand hygiene as part of the bundling of care tasks to be performed on a single patient.(46, 53)

Where shortages in personal protective equipment supply are forecasted to affect the safety and sustainability of health care

delivery, the use of PPE in health care settings where patients with COVID-19 are cared for must be optimized. As a temporary strategy during severe PPE shortages, personal protective equipment use can be extended (that is, using PPE items for longer than normal or for multiple patient encounters) or personal protective equipment can be reprocessed.(40)

The following practices are not recommended by WHO:

- reuse of PPE (donning of a used PPE item without decontamination/ reprocessing);
- the use of gloves in settings where they are not needed (e.g., administration of COVID-19 vaccine);
- the use of a medical mask in combination with a respirator to extend the use of a respirator or ensure source control when using a respirator with an unfiltered exhalation valve.(7, 40)

WHO continues to advise the use of a face shield as a rational alternative when it is deemed necessary in the local context to add a protective layer to a respirator during extended use.(40)

Environmental cleaning and disinfection

It is important to ensure that cleaning and disinfection procedures are followed consistently and correctly. Ensure surfaces are easily cleaned and clutter minimized. All surfaces in health facilities, especially frequently touched surfaces and those visibly soiled or contaminated by body fluids, should be routinely cleaned and disinfected.(3, 54) In settings where patients with suspected or confirmed SARS-CoV-2 infections are admitted, frequency of cleaning depends on the type of patient areas and surfaces. Detailed guidance on environmental cleaning and disinfection in the context of COVID-19 is available from WHO.(54)

Disinfectant solutions should always be prepared in well-ventilated areas. Avoid combining disinfectants, both during preparation and usage, as such mixtures cause respiratory irritation and can release potentially fatal gases, in particular when combined with hypochlorite solutions.

Spraying individuals with disinfectants (such as in a tunnel, cabinet, or chamber) is not recommended under any circumstances.

To clean environmental, non-porous, surfaces effectively:

- Clean surfaces thoroughly with water and detergent.
- Apply a disinfectant solution. WHO advises that a concentration of either 0.1% sodium hypochlorite (1000 parts per million), hydrogen peroxide $\geq 0.5\%$, or 70-90% ethanol may be used in health settings, while remaining effective against other clinically relevant pathogens after a minimum contact time of 1 minute.(54)

- However, if there are large spills of blood or body fluids (i.e., more than about 10mL), a concentration of 0.5% (5000 parts per million) sodium hypochlorite should be used after removal of organic material.(54)
- Other disinfectants can be considered, provided the manufacturers recommend them for SARS-CoV-2 and other locally relevant microorganisms. Manufacturer advised contact times should be applied and may vary.(54)
- After appropriate contact time, disinfectant residue may be rinsed off with clean water if required. (54)

Medical devices and equipment, laundry, food service utensils and medical waste should be managed in accordance with safe routine procedures.(54-57)

Waste management

Currently, direct, unprotected human contact during the handling of health-care waste has not been reported to be associated with transmission of SARS-CoV-2. Most of the waste generated in health facilities is general, non-infectious waste (e.g., packing, food waste, disposable hand drying towels). General waste should be segregated from infectious waste in clearly marked bins, bagged and tied and disposed of as general municipal waste. Infectious waste produced during patient care, including waste from those with confirmed SARS-CoV-2 infection (e.g., sharps, bandages, pathological waste), should be collected safely in clearly marked lined containers and sharps boxes.(54, 58)

To safely manage health-care waste, facilities should:

- assign responsibility, adequate human and material resources for the collection, segregation and disposal of waste;
- treat waste preferably on-site, and then safely dispose of it;
- understand where and how waste moved off-site will be treated and disposed of;
- ensure staff use appropriate PPE (boots, long-sleeved gown, heavy-duty gloves, mask, and goggles or a face shield) while managing infectious waste and perform hand hygiene after taking off the PPE;(40, 46, 51)
- prepare for increases in the volume of infectious waste during the COVID 19 outbreak, especially through the use of PPE and in the context of COVID-19 vaccination delivery;(58)
- consider environmentally friendly treatment methodologies and solutions to minimize both general and medical waste at point of use, segregation, disposal and collection.(58)

ⁱ Universal masking in health facilities is defined as the requirement for all persons (staff, patients, visitors, service providers and others) to wear a mask at all times except for when eating or drinking.

3. Transmission-based precautions

3.1 Universal and targeted continuous masking

WHO has issued guidance on mask use in health facilities in the context of the COVID-19 pandemic that includes advice and scientific evidence on universal maskingⁱ and targeted continuous medical mask use^j.(7)

Universal masking

WHO regularly reviews literature on universal masking policies. Four studies, all from the United States of America, found that the implementation of universal masking policies in health workers was associated with a decreased risk of SARS CoV-2 infections in health workers.(59-62) However, all studies used a before-after design and had other limitations, including lack of or limited control for confounders, such as use of other personal protective equipment and exposures. Nonetheless, in areas of known or suspected community or cluster SARS-CoV-2 transmission, universal masking is advised in all health facilities:

- All health workers, including community health workers and caregivers, should wear a medical mask at all times, for any activity (care of COVID-19 or non-COVID-19 patients) and in any common area (e.g., cafeteria, staff rooms).
- Other staff, visitors, outpatients and service providers should also wear a mask (medical or non-medical) at all times when in the health facility.
- Inpatients are not required to wear a mask (medical or non-medical) unless physical distancing of at least 1 metre cannot be maintained (e.g., during examinations or bedside visits) or when outside of their care area (e.g., when being transported), provided the patient is able to tolerate the mask and there are no contraindications.

Targeted continuous masking

In contexts where SARS-CoV-2 transmission is known or suspected to be only sporadic, WHO continues to advise **targeted continuous medical mask use**. This approach requires health workers, including community health workers and caregivers who work in clinical areas, to continuously wear a medical mask during routine activities throughout the entire shift, apart from when eating and drinking and changing their medical masks after caring for a patient who requires droplet/contact or airborne precautions for reasons other than COVID-19. In these transmission settings, staff working in non-patient areas (e.g. administrative staff) are not required to wear a medical mask during routine activities if they have no patient contact.(7)

^j Targeted continuous medical mask use is defined as the practice of wearing a medical mask by all health workers and caregivers working in clinical areas during all routine activities throughout the entire shift.

Whether adopting universal masking or targeted continuous medical mask use within health facilities, the following procedures and practices should be ensured:(7)

- Medical masks use should be combined with other measures including frequent hand hygiene and physical distancing of at least 1 metre among health workers in(63) shared and crowded places such as cafeterias, break rooms and dressing rooms.
- Medical masks must be changed when wet, soiled, or damaged or if the health worker or caregiver removes the mask for any reason (e.g., for eating or drinking or caring for a patient who requires droplet/contact precautions for reasons other than COVID-19).
- Used medical masks should be properly disposed of.
- The medical mask should not be touched to adjust it or if displaced from the face for any reason. If this happens, the mask should be safely removed and replaced, and hand hygiene performed.
- The medical mask (as well as other PPE) should be discarded and changed after caring for any patient who requires contact/droplet precautions for other pathogens, followed by hand hygiene.
- A particulate respirator at least as protective as a National Institute for Occupational Safety and Health-certified N95, N99, US Food and Drug Administration surgical N95, European Union standard FFP2 or FFP3, or equivalent, should be worn instead of a medical mask in settings for COVID-19 patients where aerosol generating procedures are performed (see WHO recommendations below). In these settings, this includes continuous use of respirators by health workers throughout the entire shift.
- Under no circumstances should medical masks or respirators be shared between health workers.
- Masks can become displaced from optimal facial coverage of the mouth and nose (fit) during extended use, which creates gaps for respiratory particles to bypass the filtration layers on inhalation and exhalation.(64) Facial differences can also affect the fit of medical masks and respirators.(65) The use of peripheral items to improve mask fit, including the use of a fabric mask over a medical mask (double masking) has been implemented in several countries. Adding a fabric mask over a medical mask can be expected to improve fit and filtration, at the cost of reducing breathability for the wearer and potential higher risk self-contamination.(66) More evidence is needed on the benefits and risks of double masking. (67)
- Masks with bands or ties worn tightly behind the head (rather than ear loops) can reduce gaps at the sides and improve the consistency of the mask fit. (63, 66, 67) A reusable mask brace (also known as a fitter) worn on top of the outer frame of a mask to enhance fit may also be considered.(63, 67, 68)

3.2. Isolation and cohorting of patients with suspected or confirmed COVID-19

Isolate patients with suspected or confirmed COVID-19 in single rooms or, if unavailable, cohort them in the same room, using the following principles:

- Designate a dedicated team of health workers, where possible, for care of patients with suspected or confirmed COVID-19.
- Restrict the number of health workers in contact with each COVID-19 patient.
- Patients should be placed in well-ventilated (see ventilation requirements in a later section of this document) single rooms, if feasible.(41, 69)
- When single rooms are not available or the bed occupancy rate is anticipated to be 100% or more, suspected, probable or confirmed COVID-19 cases should be grouped together (cohorted) in adequately ventilated areas with beds placed at least 1 metre apart (e.g. suspected cases should be grouped with other suspected cases).
- Avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable medical imaging equipment and/or other designated diagnostic equipment (70), and ensure these are reprocessed after patient use according to the manufacturer's instructions.
- If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and give the patient a medical mask to wear if tolerated.
- Ensure that health workers who are transporting patients perform hand hygiene and wear appropriate PPE as described in the WHO's rational use of PPE guidance.(40)
- Equipment should be either single-use and disposable or dedicated for use with one patient (e.g. stethoscopes, blood pressure cuffs and thermometers). If equipment needs to be shared between patients, clean and disinfect it each time it is used by another patient (e.g. by using ethyl alcohol 70%). (54)
- Maintain a record of all staff entering the patient's room.

The following factors should be considered regarding the isolation of patients infected with a variant of concern (VOC) in single rooms or cohorted together with others infected with the same VOC:

- local detection capacity of the VOC: sufficient real-time SARS-CoV-2 molecular characterization (34) to effectively identify carriers of different variants at the time of SARS CoV-2 diagnosis;
- whether the VOC is already widespread/predominant in the population where the health facility is located;

- availability of information reporting of co-infection with more than one SARS-CoV-2 viral strain, including the variants of concern, to date;
- feasibility of isolation in single rooms and practical implications for PPE use and other IPC measures.

Considering these factors, facilities may decide to isolate patients infected with VOC in single rooms or cohort those infected with the same lineage, depending on a risk assessment based on epidemiological criteria such as the prevalence of a VOC in the country, travel-based risks, whether a contact of a person is known to be infected with a VOC and local detection and isolation capacity. It is recognized that in many health systems it is not feasible or practical to do this. The need to maintain high standards of IPC practice is essential for minimizing any potential risk of cross infection.

3.3. Contact and droplet precautions

In addition to using standard precautions, all individuals should use contact and droplet precautions before entering a room where there is a patient with suspected or confirmed COVID-19. The following principles should be applied:

- Perform hand hygiene before putting on and after removing PPE.
- Use appropriate PPE: medical mask, eye protection (goggles or face shield), long-sleeved gown and medical gloves.(7, 40)
- According to health workers' preferences about having the highest perceived protection possible to prevent SARS-CoV-2 infection, respirators could also be used by health workers instead of medical masks, when providing care to COVID-19 patients in other settings (even if aerosol-generating procedures are not performed) if they are widely available.
- It is not necessary for health workers to wear boots, coveralls and aprons during routine care.(7)
- Extended use of medical masks, respirators, gowns and eye protection can be applied during the care of COVID-19 patients in the context of PPE shortages, as described in the WHO's rational use of personal protective equipment.(40) A new set of gown and gloves are needed after caring for a COVID-19 patient who is additionally colonized or infected with a multi-drug resistant organism.
- Health workers should refrain from touching their eyes, nose or mouth with potentially contaminated gloved or bare hands.
- Notify the unit receiving the patient of any necessary precautions as early as possible before the patient's arrival.
- Frequently clean and disinfect surfaces with which the patient is in contact.(54)

3.4. Airborne precautions

Some aerosol-generating procedures (AGPSs) have been associated with an increased risk of transmission of respiratory viruses, including coronaviruses (SARS-CoV-1, SARS-CoV-2 and MERS-CoV).(71-73) The current WHO list of these AGPSs is tracheal intubation, non-invasive ventilation (e.g. BiLevel positive airway pressure, continuous positive airway pressure), tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction by using nebulized hypertonic saline, dentistry and autopsy procedures. In addition in oral health care the following are considered AGPSs; all clinical procedures that use spray generating equipment such as three-way air/water spray, dental cleaning with ultrasonic scaler and polishing; periodontal treatment with ultrasonic scaler; any kind of dental preparation with high or low-speed hand-pieces; direct and indirect restoration and polishing; definitive cementation of crown or bridge; mechanical endodontic treatment; surgical tooth extraction and implant placement.(74) It remains unclear whether aerosols generated by nebulizer therapy or high-flow oxygen delivery are infectious or whether other procedures (e.g. nasogastric tube insertion, suctioning for airway clearance) involve the risk of aerosol generation, due to lack of evidence or low-quality evidence.(41, 43)

WHO makes the following recommendations for health workers performing AGPS or in settings where AGPS are regularly performed among patients with suspected or confirmed COVID-19 (e.g., intensive care units, semi-intensive care units, emergency departments):

- Perform procedures in an adequately ventilated room (refer to the environmental and engineering control section in this guidance).(41)
- Use appropriate PPE: wear a particulate respirator at least as protective as a USA National Institute for Occupational Safety and Health-certified N95, European Union (EU) standard FFP2 or equivalent.(7, 40, 48) Although initial fit testing is needed prior to the use of a particulate respirator, many countries and health-care facilities do not have a respiratory fit testing programme. Therefore, it is critical for health workers to perform the required seal check to ensure there is no leakage when they put on a disposable particulate respirator.(7, 41, 48) Note that if the wearer has a beard or other thick facial hair, this may prevent a proper respirator fit.
- In areas with community or cluster transmission of SARS-CoV-2, health workers assigned to intensive care units where AGPS are performed should wear a particulate respirator throughout their shift.(7)
- In settings where respirators are worn continuously for extended periods of time, health workers should regularly perform a particulate respirator seal check to ensure there is no air leakage.(48)
- Respirators should be appropriately disposed of whenever removed and not reused unless an appropriate

decontamination or reprocessing method has been performed. Whenever a respirator is decontaminated or reprocessed it should be marked or labelled for quality assurance monitoring, undergo assessment of suitability for reuse and returned to its original wearer as described in the WHO's rational use of personal protective equipment.(40)

- Exhalation valves on respirators and medical/non-medical masks are discouraged as they bypass the filtration function for exhaled air of the respirator/mask, rendering it ineffective for source control.
- Other PPE items required include eye protection (i.e., goggles or a face shield), long-sleeved gown and gloves. Health workers performing AGPS should use a waterproof apron if the procedure is expected to produce a large volume of fluid that might penetrate the gown and fluid resistant gowns are not available. (40, 41)
- Keep the number of persons present in the room or unit to the absolute minimum required for the patient's care and support.

3.6 Dead body management

Health workers should do a preliminary evaluation and risk assessment before undertaking any activity related to the management of suspected or confirmed COVID-19 fatality and follow WHO's [Infection prevention and control guidance for the safe management of a dead body in the context of COVID-19](#). (75)

4. Implementing administrative controls

In addition to ensuring adherence to the measures cited in this document, administrative controls (41) and policies for the prevention and control of transmission of SARS-CoV-2 within the health facility should include the following strategies to minimize the transmission of infection (37, 38, 41):

- provision of adequate training for health workers;
- ensuring adequate patient-to-staff ratio;
- establishing an active syndromic surveillance of health workers at the facility entrance when they arrive at work;
- ensuring that health workers and the public understand the importance of seeking medical care promptly;
- monitoring health workers' compliance with standard precautions and providing mechanisms for improvement as needed;
- applying principles of universal and targeted masking, as described in section 3 of this document in areas of known or suspected community or cluster SARS-CoV-2 transmission;
- reducing traffic to the health facility through actions such as relocating an outpatient pharmacy or other services to a location outside of the main health facility measures;

- planning for the re-purposing of wards for isolating COVID-19 patients.

4.1. Prevention, identification and management of COVID-19 among health workers

The interim technical guidance specifically for the [Prevention, identification and management of health worker infection in the context of COVID-19](#)(23) outlines the importance of early detection of SARS-CoV-2 infection in health workers, through active or passive syndromic surveillance and testing, depending on the local transmission scenario. It provides national and sub-national testing strategies for the detection of SARS-CoV-2 infections in health workers, including in long-term care facilities. It also provides guidance on management of health workers who were exposed to or infected with SARS CoV-2, including safe return to work.

Additional measures to protect health workers from occupational risks amplified by the COVID-19 pandemic are described in the WHO interim guidance COVID-19: [Occupational health and safety for health workers](#)(76) and [WHO/ILO Occupational safety and health in public health emergencies, a manual for protecting health workers and responders](#).(77)

Administrators should encourage health workers to continue following recommended public health and social measures, as well as infection prevention and control measures, in the community and at home in addition to the workplace. They should be supported and monitored for any long-lasting post-SARS-CoV-2 infection effects and any potential psychological implications.(23, 76, 77)

4.2. Administrative measures to manage visitors

In the context of community transmission, health facilities need to implement policies to limit access to visitors to protect them from getting infected and reduce their potential to introduce SARS-CoV-2 into the health facility. This need must be balanced, however, against the importance of visits by family members/next of kin for patients' well-being. Stopping visits can have a negative impact, especially in patients with dementia, who may fail to understand why visiting is not permitted. It is also important to note that compassion in health and promotion of well-being are central to the delivery of quality care, including maintaining essential health services in the context of COVID-19.

If the continuous reinforcement of a strong IPC programme in the health facility and the rigorous implementation of IPC measures can be assured, especially at points of care, then the implementation of safe visiting policies can be considered following a local risk assessment. Visits should be scheduled to allow enough time for screening, education and training of visitors. The potential risks of allowing visiting should be

explained to patients who have the capacity to understand and to their families or next of kin.

A local decision must be taken on whether compassionate visiting /end of life care visit can be permitted when there are high levels of transmission, or whether a visitor with suspected or confirmed COVID-19 can visit a family member who is gravely ill if there are appropriate controls. Such visits need to be carefully planned and informed by a local risk assessment.

The decision to suspend visiting should be reviewed regularly.

Some strategies to manage visitors include:

- identifying alternatives for direct interaction between patients, family members, other visitors and clinical staff, including making remote communications (e.g. telephone, internet connection) available;
- allowing entry only to visitors who are essential, such as the parents of paediatric patients, birthing partners and caregivers,
- restricting movement of visitors within the health facility;
- encouraging family members to assign a single visitor or caregiver who is not at high risk for severe COVID-19 (meaning, the person is less than 60 years of age and has no underlying medical condition) to visit the patient;
- designating an entrance that visitors who are caregivers can use to access the facility;
- maintaining a record of all visitors to the facility;
- educating and supervising visitors or caregivers on hand hygiene, respiratory etiquette, physical distancing of a minimum of 1 metre and other IPC precautions including the use of PPE, and how to recognize the signs and symptoms of COVID-19;
- in areas of known or suspected sporadic transmission of SARS-CoV-2 cases, requiring visitors (including those caring for patients without suspected or confirmed COVID-19) to wear a medical mask in clinical areas;(7)
- conducting active screening of all caregivers and visitors for symptoms of COVID-19 before entering the facility in areas with widespread community transmission;
- prohibiting visitors' presence during AGPS;
- ensuring there is clear signage to remind visitors of IPC measures.

5. Implementing environmental and engineering controls

Environmental and engineering controls are an integral part of infection prevention and control and include standards for adequate ventilation adapted to specific areas in health facilities, appropriate structural design, spatial separation and adequate environmental cleaning.

Spatial separation between patients of at least 1 metre and adequate ventilation can help to reduce the spread of many pathogens in health-care facilities. (20, 78) Use of physical barriers such as glass or plastic windows can also reduce

health workers' exposure to SARS-CoV-2, including in areas where patients first present, such as screening and triage areas, the registration desk at the emergency department and at the pharmacy window.

Ventilation rates within defined spaces in health facilities are generally addressed by national regulations. In health facilities, large quantities of fresh and clean outdoor air are required both for the benefit of occupants and the control of contaminants and odours by dilution and removal. There are three basic criteria for ventilation(79):

- *ventilation rate*: the amount and quality of outdoor air provided into the space;
- *airflow direction*: the overall airflow direction in a building and between spaces, which should be from clean-to-less clean zones;
- *air distribution or airflow pattern*: the supply of air that should be delivered to each part of the space to improve dilution and removal of airborne pollutants generated in the space.

Three methods may be used to ventilate spaces within health facilities: natural, mechanical and hybrid (mixed mode) ventilation.

Environmental and engineering controls play a key role in reducing the concentration of infectious respiratory aerosols in the air and the contamination of surfaces and inanimate objects. WHO has developed a ventilation roadmap (17) on how to improve ventilation in indoor spaces, which takes into account different ventilation systems (mechanical or natural) and includes healthcare settings. The roadmap aims to define the key questions users should consider as they assess indoor ventilation, including in areas where patients are hospitalized, and the major steps needed to reach recommended ventilation levels or simply improve indoor air quality to reduce the risk of SARS-CoV-2 spread.

Any decision on which type of ventilation system to use should take into account climate, prevalent wind direction, floor plan, need, availability of resources and cost. Each ventilation system has its advantages and disadvantages, as described in WHO's [*Acute respiratory infections treatment centre: practical manual to set up and manage a SARI treatment centre and a SARI screening facility in health care facilities.*](#)(79)

When AGPS are not performed, adequate ventilation is considered to be 60 litres/second per patient (L/s/patient) for naturally ventilated areas or 6 air changes per hour (equivalent to 40 L/s/patient for a 4x2x3 m³ room) for mechanically ventilated areas(69, 79, 80)

For areas where AGPS are performed, adequate ventilation rates are indicated below. In this particular context, specific ventilation requirements should be met in patient areas. Ideally, AGPS should be performed in rooms equipped

with negative pressure ventilation systems, in keeping with airborne precautions. (41) However, when there are many admissions of severely ill patients requiring medical interventions that may generate aerosols or isolation room capacity is limited, especially in low-resource settings, this may not be feasible.

Naturally ventilated areas

Health facilities using natural ventilation systems should ensure that contaminated air exhaust is expelled directly outdoors, away from air-intake vents, clinical areas and people. Natural ventilation provides fluctuating airflows; and consequently, higher ventilation rate values than for mechanical ventilation are recommended. The recommended average natural ventilation rate is 160 L/s/patient.(69) The application of natural ventilation depends on favorable climate conditions. When natural ventilation alone cannot satisfy recommended ventilation requirements, alternative ventilation systems, such as a hybrid (mixed mode) should be considered.(17, 79)

Mechanically ventilated areas

In health facilities where a mechanical ventilation system is available, negative pressure should be created to control the direction of airflow. The ventilation rate should be 6-12 air changes per hour (e.g., equivalent to 40-80 L/s/patient for a 4x2x3 m³ room), and ideally 12 air changes per hour for new constructions, with a recommended negative pressure differential of ≥ 2.5 Pa (0.01-inch water gauge) to ensure that air flows from the corridor into patient rooms. (80-82) Airflow direction can be assessed by measuring the pressure difference between the rooms with a differential pressure gauge. If measuring the pressure difference is not feasible, the airflow direction from a clean to a less-clean area can be assessed using cold smoke (smoke test puffer).(83)

For health facilities without adequate natural or mechanical ventilation, the following approaches can be considered in consultation with an environmental engineer:(17, 79, 81)

Installation of exhaust fans. Fans need to be installed so that the air is released directly outdoors. The number and technical specification of exhaust fans will depend on the size of the room and the desired ventilation rate. Positioning the exhaust fan should be done so that it is not close to the ventilation air intake. A reliable electricity supply is required for an exhaust fan. If problems associated with increased or decreased temperature occur, spot cooling or ducted heating systems may be added.

- **Installation of whirlybirds** (e.g., whirligigs, wind turbines). These devices do not require an electrical supply and provide a roof-exhaust system, increasing the airflow in a building.

- **Installation of high-efficiency particulate air filters.** When appropriately selected, deployed and maintained, single-space air cleaners with high-efficiency particulate air filters (either ceiling mounted or portable) can be effective in reducing/lowering concentrations of infectious aerosols in a single space.(84-86) However, the evidence on the effectiveness of high-efficiency particulate air filters in preventing health-care transmission of coronaviruses is currently limited. The effectiveness of portable high-efficiency particulate air filters will depend on the airflow capacity of the unit, the configuration of the room (including furniture and persons in the room), the position of the high-efficiency particulate air filter unit relative to the layout of the room and the location of the supply registers or grilles. Health facilities that choose to use high-efficiency particulate air filters should follow the manufacturer's instructions, including on recommended cleaning and maintenance procedures. Otherwise, uncleaned portable high-efficiency particulate air filters can lead to a false sense of security because filter loading decreases their performance.

Any modifications to health-care ventilation need to be made carefully, taking into consideration the cost, design, maintenance and potential impact on the airflow across the health facility (see above). Poorly designed or maintained ventilation systems can increase the risk of health care-associated infections transmitted by airborne pathogens. Rigorous standards for installation and maintenance of ventilation systems are essential to ensure that they are effective and contribute to a safe environment within the entire health facility.

Ultraviolet germicidal irradiation

Ultraviolet germicidal irradiation has been proposed as a supplemental air-cleaning measure, but there is currently limited evidence for its effectiveness in preventing respiratory pathogen transmission in health facilities.(87) In addition, there are concerns about potential adverse effects because ultraviolet germicidal irradiation may be absorbed by the outer surfaces of the eyes and skin, leading to keratoconjunctivitis and dermatosis.(78, 87, 88)

6. Duration of contact and droplet precautions for patients with COVID-19

Contact and droplet precautions should only be discontinued in consultation with clinicians and should take into consideration resolution of clinical signs and symptoms or the number of days since a positive test was carried out by molecular assay with an upper respiratory specimen. For symptomatic patients, these additional precautions can be discontinued 10 days after symptoms onset AND at least three consecutive days without fever or respiratory symptoms. For asymptomatic patients, isolation can end 10 days after the

initial SARS-CoV-2 positive test. (42, 89) Although some patients have tested positive in molecular assays for SARS-CoV-2 several days after resolution of symptoms, it is still unknown whether they continue to shed the virus, since only RNA viral fragments have been detected. (90) Details can be found in WHO's Scientific Brief on [Criteria for releasing COVID-19 patients from isolation](#).(89) Some patients may experience ongoing symptoms such as post-viral cough beyond the period of infectivity. Further information on management and rehabilitation of patients post SARS-CoV-2 infection can be found in the [COVID-19 Clinical Management Living guidance](#).(42)

7. Collecting and handling laboratory specimens from patients with suspected COVID-19

All specimens collected for laboratory investigations should be regarded as potentially infectious. Facilities should ensure that health workers who collect, handle or transport any clinical specimens adhere to the following measures and biosafety practices to minimize the possibility of exposure to pathogens.(91)

- Ensure that health workers who collect specimens, including nasopharyngeal and oropharyngeal swabs – for PCR or point of care antigen-detection tests – use appropriate personal protective equipment required for droplet precautions (see above). Airborne precautions may be necessary for collection of nasopharyngeal wash/aspirate, sputum, tracheal aspirate, bronchioalveolar lavage fluid and pleural fluid.(92) If the specimen is collected using sputum induction, personnel conducting the procedure should wear a particulate respirator at least as protective as a USA National Institute for Occupational Safety and Health -certified N95 or an EU standard FFP2 instead of a medical mask, where available.
- Follow good microbiological practice and procedure when handling and processing specimens, including blood for serological testing. More specific advice can be found in Annex 1 of the document Laboratory biosafety guidance related to coronavirus disease.(91)
- Ensure that all personnel who transport specimens are trained in safe handling practices and spill decontamination procedures.(54)
- 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.
- Deliver all specimens by hand whenever possible.
- Clearly document the patient's full name, date of birth and clinical diagnosis of suspected COVID-19 on the laboratory request form. Notify the relevant laboratory as soon as possible that the specimen is being transported.

For suspected or confirmed COVID-19 cases, patient specimens should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A, UN2814, "infectious substance, affecting humans".

8. Considerations for surgical procedures

Any decision on whether to operate on a patient should not be based on the patient's SARS-CoV-2 status but on need (e.g., trauma or emergency), the risks and benefits of surgery (e.g., life-threatening outcomes or patient harm if surgery is delayed) and the patient's clinical condition. Available evidence points to a high proportion of post-operative pulmonary complications associated with increased mortality in patients with COVID-19.(93) In the context of the COVID-19 pandemic, every surgical procedure may entail risk for both health workers and patients.(94) As part of routine clinical practice and because it is known that people without symptoms of COVID-19 can transmit the infection, it is important that standard precautions are rigorously implemented to minimize this risk, and that health workers assess potential risks of exposure to infectious material. These precautions should include engineering controls that reduce exposure to infectious material, administrative controls and personal protective equipment use.(40, 41)

General considerations

- Consider whether non-surgical interventions or treatments could be an alternative.
- Postpone elective surgery in areas with community transmission to minimize the risk to the patient and medical staff and increase the number of available patient beds (especially in intensive care units) and ventilators.
- If the surgical procedure cannot be postponed, a careful risk assessment should be done to screen patients for COVID-19 symptoms, signs and exposure history.(94)
- Patients with signs and symptoms of COVID-19 should be tested for the virus using molecular assay on upper respiratory specimens, such as nasopharyngeal or oropharyngeal swab, if available.(95) Antigen testing may help identify patients who are pre-symptomatic for COVID-19. Urgent surgery should not be delayed if this test is not available, but IPC measures should be informed by a careful COVID-19 risk assessment. (94)
- Depending on the local testing capacity and intensity of transmission in the area, some health facilities may consider testing of surgical patients for SARS-CoV-2 before the surgical procedure, regardless of risk assessment for COVID-19. However, there are some limitations with this practice.
- Delays in the results and consequently in surgery may increase morbidity and mortality.

- Negative results may occur during the incubation period, and patients may become infectious later. (96)
- There may be false-negative test results, depending on the test method used.
- A negative test may encourage false reassurance and less stringent adherence to IPC measures.
- A positive molecular assay test, which may remain positive for 6–8 weeks due to viral RNA fragments, can lead to delays in necessary surgeries. An increase in false positive rates may be seen in areas of low prevalence of COVID-19.
- If the urgency of the surgical procedure does not allow sufficient time for testing or if testing is unavailable, patients with signs of COVID-19 should undergo chest-X-ray, chest computerized tomography or chest ultrasound (if available) as an early diagnostic tool and as a baseline to monitor the patient.(70, 97)
- If time permits, surgery staff should apply pre-operative risk stratification tools such as POTTER and NELA to help guide prognosis.(98)

Surgical procedures in suspected or confirmed COVID-19 patients

- When surgical procedures in COVID-19 patients cannot be postponed, surgical staff in the operating room should use contact and droplet precautions that include sterile medical mask, eye protection (i.e. face shield or goggles), gloves and gown (apron may be required if gowns are not fluid resistant and surgical staff will perform a procedure that is expected to generate a high volume of fluid).
- A particulate respirator (i.e. N95, FFP2 or equivalent) should be used instead of a medical mask, if there is potential for an aerosol-generating procedure (see list of AGPS in section 3.4 above) or if the procedure involves anatomic regions where viral loads of the virus may be higher (e.g. nose, oropharynx, respiratory tract).(99, 100) Because the risk of AGPS during surgical procedures may be difficult to anticipate, health workers may use particulate respirators when performing surgical procedures on patients with suspected or confirmed COVID-19, if available. Respirators with exhalation valves should not be used during surgical procedures because they do not filter exhaled breath and will compromise the sterile field.
- COVID-19 patients should wear a medical mask while being transported to the operating room, if tolerated.
- Transport staff should use contact and droplet precautions when transporting patients with suspected or confirmed COVID-19 to the operating room.
- Ideally, a negative pressure room should be used for anaesthesia and intubation (see ventilation section for negative pressure room requirements), and health workers should wear a particulate respirator in addition to eye protection, gown and gloves. However, if a

negative pressure room is not available, intubation should occur in the operating room where the surgical procedure will be performed, and a particulate respirator should be worn by health workers in the room. (99)

- Terminal cleaning should be performed after each surgical procedure, in accordance with cleaning and disinfection recommendations for COVID-19.(54, 55)
- One or more operating rooms for surgical procedures of COVID-19 patients could be identified. These rooms should ideally be in the far corner of the surgery floor to avoid areas with a high flux of staff and can also be used for surgical procedures on other patients, if it cannot be dedicated to COVID-19 patients, after terminal cleaning.(99, 101)
- The surgical staff in the room should be restricted to essential personnel.
- Operating rooms that were built to applicable design code should already have a high ventilation rate (15-20 air changes per hour), and their doors should always remain closed during procedures.(80, 81)
- All surgical instruments should undergo standard transport, cleaning and sterilization procedures. Medical masks, eye protection, gloves and gowns should be worn by personnel responsible for cleaning these instruments prior to sterilization.(37, 57, 101)

Surgical procedures in patients whose COVID-19 status is unknown

- In areas with community transmission, patients who are not intubated should wear a medical or fabric mask, and transport staff should wear a medical mask when transporting patients to the operating room.(7)
- Contact and droplet precaution should be applied by surgical staff. In health facilities located in areas with community transmission that do not have COVID-19 test capacity or where testing could not be done due to the urgency of the procedure, a particulate respirator can be worn instead of a medical mask if there is potential for AGPS (see list of AGPS in section 3.4 above) or if the procedure involves anatomic regions where viral loads of the COVID-19 virus may be high (e.g. nose, oropharynx, respiratory tract).(100)
- Terminal cleaning of operating room should be performed using standard hospital cleaning practices.(54, 55, 81)

9. Considerations for outpatient care

The basic principles of infection prevention and control and standard precautions should be applied in all health facilities, including outpatient settings and primary care. (102) WHO has provided recommendations on the minimum requirements for IPC that need to be in place in all primary care facilities.(38) For SARS-CoV-2, the following measures should be adopted:

- Consider alternatives to face-to-face outpatient visits using telemedicine (e.g. telephone consultations or videoconferences) to provide clinical support without direct contact with the patient.(103)
- Ensure that systems are in place for screening and early recognition of any patients with suspected COVID-19 and set up an area/room for isolation while waiting for transport to a secondary or tertiary care facility or a facility dedicated to COVID-19.
- Place emphasis on hand hygiene, respiratory hygiene and medical masks to be used by patients with respiratory symptoms.
- Ensure appropriate use of contact and droplet precautions when performing clinical exams on patients with suspected COVID-19.
- When symptomatic patients are required to wait, ensure they have a separate waiting area where they can sit at least 1 metre apart, and provide them with masks.
- Educate patients and families about the early recognition of COVID-19 symptoms, basic precautions to be used and to which facility they should refer any family member showing symptoms of COVID-19.

10. Infection prevention and control considerations in the context of COVID-19 vaccination

WHO has published guidance on National Deployment and Vaccination Plans in which countries are advised to base their decision-making on identification of target populations. Health workers are considered a high priority population.(104) Furthermore, according to the WHO Strategic Advisory Group of Experts on Immunization (SAGE) values framework for the allocation and prioritization of COVID-19 vaccination, health workers are listed among the priority groups for vaccination, as a population with significantly elevated risk of being infected.(105)

Even though vaccines approved through the WHO Emergency Use Listing are highly effective to prevent both symptomatic and asymptomatic infection as well as to reduce severe COVID-19 cases, hospital admission rates and deaths, breakthrough infection cases (defined as the detection of SARS-CoV-2 RNA or antigen in a respiratory specimen collected from a person ≥ 14 days after receipt of all recommended doses of an authorized COVID-19 vaccine) are possible, especially before population immunity reaches sufficient levels to further decrease transmission. (106)

A study conducted in US reported 10,262 SARS-CoV-2 vaccine breakthrough infections in the vaccinated general population from 46 states between January and 30 April 2021, with an incidence up to 0.01% (underestimated due to lack of testing for asymptomatic or who experience mild illness). However, 2,725 (27%) vaccine breakthrough infections were asymptomatic, 995 (10%) patients were hospitalized, and 160 (2%) died. Sequence data were available from 5% reported

cases, 64% of which were identified as SARS-CoV-2 variants, including B.1.1.7 (56%), B.1.429 (25%), B.1.427 (8%), P.1 (8%), and B.1.351 (4%).(106)

In cohort studies conducted in England and Israel among health care workers, the incidence of SARS-CoV-2 infection among the vaccinated population was significantly lower than the un-vaccinated population, especially for symptomatic infection.(107-109)

Data are rapidly being generated on the effectiveness of different COVID-19 vaccines in preventing transmission of SARS-CoV-2, in particular in the light of the emergence of variants of concern. It is therefore important that adherence to IPC and public health and social measures be maintained in health care settings and the community.(35) Given the current state of knowledge, WHO advises that all IPC measures for COVID-19 in health facilities be maintained for vaccinated health care workers, as well as unvaccinated workers.

Furthermore, it is critical to rigorously follow IPC principles and procedures for COVID-19 vaccination activities to protect both health workers and individuals to be vaccinated. These are specified in a WHO Aide-memoire (110) and include the following:

- Standard precautions should be applied for COVID-19 vaccine delivery, considering that the population to be vaccinated consists of individuals not presenting signs and symptoms of infection. Gloves are not required for the administration of vaccine unless otherwise indicated (e.g., skin breakdown).
- Functioning hand hygiene stations should be available at the entrance and exit areas and at each vaccination station. Vaccinators should always perform hand hygiene before putting on and removing personal protective equipment (e.g., a mask), before preparing the vaccine and between each vaccine administration, preferably using alcohol-based hand rub. If gloves are used, they do not replace the need for performing hand hygiene between vaccine administrations.
- A clean, hygienic and well-ventilated environment, appropriate waste management (including sharps disposal) and adequate spaces that facilitate best IPC practices (e.g., physical distancing of at least 1 metre between people waiting, those being immunized and amongst staff) are necessary for COVID-19 vaccination activities.
- Additional IPC precautions are necessary in the context of the COVID-19 pandemic to reduce the risk of SARS-CoV-2 transmission (e.g. mask use).(7)
- WHO has developed COVID-19 vaccination training for health workers, including on IPC.(111)
- National guidance and protocols for IPC measures, including those related to COVID-19, should be consulted.

Monitoring and evaluation of infection prevention and control practices

A set of process, output and outcome key performance indicators are recommended in the [Strategic Preparedness and Response Plan Monitoring and Evaluation Framework](#),⁽¹¹²⁾ which sets forth and describes the broad response strategy – from national level to global and regional coordination.

Correct implementation of IPC measures will minimize the spread of the SARS-CoV-2 in health facilities. Several tools have been developed for health facilities and public health stakeholders to assess the extent to which health facilities are ready to identify and safely manage patients with COVID-19 and monitor and evaluate implementation of IPC measures.^(113, 114) Health facilities should consider using these tools to identify IPC gaps and to monitor progress in addressing them.

WHO has developed a standardized protocol for COVID-19 surveillance among health workers that countries can use and is leading an international multi-centre case-control study aimed primarily at identifying risk factors and exposure settings. For more information please contact [early investigations-2019-nCoV@who.int](mailto:early_investigations-2019-nCoV@who.int).

Reporting of infections among health workers has been chosen as an indicator for the Pillar 3 (*Surveillance, Epidemiological Investigation, Contact tracing, and Adjustment of PHSM*) in the [Strategic Preparedness and Response Plan Monitoring and Evaluation Framework](#). This indicator will be calculated using the WHO-HQ surveillance database, to which Member States are recommended to contribute. As part of COVID-19 surveillance, WHO recommends [weekly reporting of selected variables](#), including cases and deaths among health workers.⁽¹¹⁵⁾

Methodology for developing this interim guidance

Guidance and considerations included in this document are based on systematic reviews, WHO rapid evidence reviews, IPC guidance documents, including the [WHO Guidelines on infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care](#),⁽⁴¹⁾ available on the WHO Country and Technical Guidance–Coronavirus Disease (COVID-19) web pages^k.

This interim guidance also draws on ongoing evaluations of available scientific evidence by the WHO ad hoc COVID-19 Infection Prevention and Control Guidance Development Group (see acknowledgement section for list of Guidance Development Group members).

During emergencies WHO publishes interim guidance, the development of which follows a transparent and robust process of evaluation of available evidence on benefits and harms. This evidence is evaluated through expedited systematic reviews together with an assessment of the limitations of the evidence and consensus building through Guidance Development Group consultations and discussions facilitated by a methodologist. This process also considers, as much as possible, potential resource implications, values and preferences, feasibility, equity and ethics. All recommendations were reached through consensus; where this was not possible a survey with a question outlining the specific issue/response was administered to the GDG members and a majority of 70% of votes are required to make a recommendation. Draft guidance documents are reviewed by an external review panel of experts prior to publication.

All external contributors to the guidelines, including members of the Guideline Development Group and the External Review Group, completed a WHO declaration of interests form in accordance with WHO policy for experts. The WHO Guideline Steering Group reviewed the declaration of interest forms and undertook a web-based search to determine if any potential conflicts of interest existed, and a management plan was agreed; if a conflict of interest was considered significant, this was noted at the start of the GDG meeting and the individual was recused from decision-making for the related recommendation, however no conflicts were identified. Funding for this guideline was provided by the WHO COVID-19 emergency funds.

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.