Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected.

World Health Organization

Interim guidance
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This is the second edition (version 1.2) of this document for the novel coronavirus SARS-CoV-2, causing COVID-19 disease. It was originally adapted from the publication *Clinical management of severe acute respiratory infection when MERS-CoV infection is suspected* (WHO, 2019).

This document is intended for clinicians involved in the care of adult, pregnant and paediatric patients with or at risk for severe acute respiratory infection (SARI) when a SARS-CoV-2 infection is suspected. Considerations for paediatric patients and pregnant women are highlighted throughout the text. It is not meant to replace clinical judgment or specialist consultation but rather to strengthen clinical management of these patients and to provide up-to-date guidance. Best practices for infection prevention and control (IPC), triage and optimized supportive care are included.

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These symbols are used to flag interventions:

Do: the intervention is beneficial (strong recommendation) **OR** the intervention is a best practice statement.

Don't: the intervention is known to be harmful.

Consider: the intervention may be beneficial in selected patients (conditional recommendation) **OR** be careful when considering this intervention.

This document aims to provide clinicians with updated interim guidance on timely, effective and safe supportive management of patients with suspected and confirmed COVID-19. It is organized by the patient journey. The definitions for mild and severe illness are in Table 2, while those with critical illness are defined as patients with acute respiratory distress syndrome (ARDS) or sepsis with acute organ dysfunction.

The recommendations in this document are derived from WHO publications. Where WHO guidance is not available, we refer to evidence-based guidelines. Members of a WHO global network of clinicians, and clinicians who have treated SARS, MERS or severe influenza patients, have reviewed the recommendations (see Acknowledgements). For queries, please email: outbreak@who.int with "COVID-19 clinical question" in the subject line.

1. Background

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a newly emergent coronavirus, SARS-CoV-2, that was first recognized in Wuhan, China, in December 2019. Genetic sequencing of the virus suggests that SARS-CoV-2 is a betacoronavirus closely linked to the SARS virus *(1)*.

While most people with COVID-19 develop mild or uncomplicated illness, approximately 14% develop severe disease requiring hospitalization and oxygen support and 5% require admission to an intensive care unit *(1)*. In severe cases, COVID-19 can be complicated by acute respiratory disease syndrome (ARDS), sepsis and septic shock, multiorgan failure, including acute kidney injury and cardiac injury *(2)*. Older age and co-morbid disease have been reported as risk factors for death, and recent multivariable analysis confirmed older age, higher SOFA score and d-dimer > 1 µg/L on admission were associated with higher mortality. This study also observed median duration of viral RNA detection was 20.0 days (IQR 17.0–24.0) in survivors, but SARS-CoV-2 virus was detectable until death in non-survivors. The longest observed duration of viral shedding in survivors was 37 days *(3, 4)*.

Building on evidence-informed guidelines developed by a multidisciplinary panel of health care providers with experience in the clinical management of patients with COVID-19 and other viral infections, including SARS and MERS, as well as sepsis and ARDS, this guidance should serve as a foundation for optimized supportive care to ensure both the best possible chance for survival and allow for reliable comparison of investigational therapeutic interventions as part of randomized controlled trials *(5, 6)*. This guideline provides recommendations for the management of adults, pregnant and children with COVID-19.

There is sparse data on clinical presentation of COVID-19 in specific populations, such as children and pregnant women. In children with COVID-19 the symptoms are usually less severe than adults and present mainly with cough and fever, and co-infection has been observed *(7, 8)*. Relatively few cases have been reported of infants confirmed with COVID-19 and they experienced mild illness *(9)*. There is currently no known difference between the clinical manifestations of COVID-19 pregnant and non-pregnant women or adults of reproductive age. Pregnant and recently pregnant women with suspected or confirmed COVID-19 should be treated with supportive and management therapies, as described below, taking into account the immunologic and physiologic adaptations during and after pregnancy.

2. Screening and triage: early recognition of patients with SARI associated with COVID-19 infection.

Screening and triage: Screen and isolate all patients with suspected COVID-19 at first point of contact with health care system (such as the emergency department or outpatient department/clinic). Consider COVID-19 as a possible etiology of patients with ARI under certain conditions (see Table 1). Triage patients using standardized triage tools and start first-line treatments.

Remark 1: While the majority of people with COVID-19 have uncomplicated or mild illness (81%), some will develop severe illness requiring oxygen therapy (14%) and approximately 5% will require intensive care unit treatment. Of those critically ill, most will require mechanical ventilation *(2, 10)*. The most common diagnosis in severe COVID-19 patients is severe pneumonia.

Remark 2: Early recognition of suspected patients allows for timely initiation of appropriate IPC measures (see Table 3). Early identification of those with severe illness, such as severe pneumonia (see Table 2), allows for optimized supportive care treatments and safe, rapid referral and admission to designated hospital ward or intensive care unit according to institutional or national protocols.

Remark 3: Older patients and those with comorbidities, such as cardiovascular disease and diabetes mellitus, have increased risk of severe disease and mortality. They may present with mild symptoms but have high risk of deterioration and should be admitted to a designated unit for close monitoring.

Remark 4: For those with mild illness, hospitalization *may* not be required unless there is concern for rapid deterioration or an inability to promptly return to hospital; but isolation to contain/mitigate virus transmission should be prioritized. All patients cared for outside hospital (i.e. at home or non-traditional settings) should be instructed to manage themselves appropriately as per local/regional public health protocols for home isolation and return to designated COVID-19 hospital if they develop any worsening of illness (https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus-(ncov)-infection-presenting-with-mild-symptoms-and-management-of-contacts).

Table 1. Definitions of SARI and surveillance case definitions for COVID-19*

Surveillance case definitions for COVID-19*	**Suspect case** **See latest WHO case definitions for suspect case of COVID-19***
	Confirmed case A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

* See Global Surveillance for human infection with coronavirus disease (COVID-19) for latest case definitions.
[a] Clinicians should also be alert to the possibility of atypical presentations in patients who are immunocompromised.
[b] Contact is defined as any of the following:

- Providing direct care without proper personal protective equipment (PPE) for COVID-19 patients.
- Staying in the same close environment of a COVID-19 patient (including workplace, classroom, household, gatherings).
- Travelling together in close proximity (1 m) with a COVID-19 patient in any kind of conveyance within a 14-day period after the onset of symptoms in the case under consideration.

Table 2. Clinical syndromes associated with COVID-19

Mild illness	Patients with uncomplicated upper respiratory tract viral infection, may have non-specific symptoms such as fever, fatigue, cough (with or without sputum production), anorexia, malaise, muscle pain, sore throat, dyspnea, nasal congestion, or headache. Rarely, patients may also present with diarrhoea, nausea and vomiting *(3, 11-13).* The elderly and immunosuppressed may present with atypical symptoms. Symptoms due to physiologic adaptations of pregnancy or adverse pregnancy events, such as e.g. dyspnea, fever, GI-symptoms or fatigue, may overlap with COVID-19 symptoms.
Pneumonia	**Adult** with pneumonia but no signs of severe pneumonia and no need for supplemental oxygen. **Child** with non-severe pneumonia who has cough or difficulty breathing + fast breathing: fast breathing (in breaths/min): < 2 months: ≥ 60; 2–11 months: ≥ 50; 1–5 years: ≥ 40, and no signs of severe pneumonia.
Severe pneumonia	**Adolescent or adult:** fever or suspected respiratory infection, plus one of: respiratory rate > 30 breaths/min; severe respiratory distress; or SpO_2 ≤ 93% on room air (adapted from *14)*. **Child** with cough or difficulty in breathing, plus at least one of the following: central cyanosis or SpO_2 < 90%; severe respiratory distress (e.g. grunting, very severe chest indrawing); signs of pneumonia with a general danger sign: inability to breastfeed or drink, lethargy or unconsciousness, or convulsions *(15).* Other signs of pneumonia may be present: chest indrawing, fast breathing (in breaths/min): < 2 months: ≥ 60; 2–11 months: ≥ 50; 1–5 years: ≥ 40 *(16).* While the diagnosis is made on clinical grounds; chest imaging may identify or exclude some pulmonary complications.
Acute respiratory distress syndrome *(17-19)*	**Onset:** within 1 week of a known clinical insult or new or worsening respiratory symptoms. **Chest imaging** (radiograph, CT scan, or lung ultrasound): bilateral opacities, not fully explained by volume overload, lobar or lung collapse, or nodules. **Origin of pulmonary infiltrates**: respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of infiltrates/oedema if no risk factor present. **Oxygenation impairment in adults** *(17, 19)*: • Mild ARDS: 200 mmHg < PaO_2/FiO_2[a] ≤ 300 mmHg (with PEEP or CPAP ≥ 5 cmH_2O, or non-ventilated) • Moderate ARDS: 100 mmHg < PaO_2/FiO_2 ≤ 200 mmHg (with PEEP ≥ 5 cmH_2O, or non-ventilated) • Severe ARDS: PaO_2/FiO_2 ≤ 100 mmHg (with PEEP ≥ 5 cmH_2O, or non-ventilated) • When PaO_2 is not available, SpO_2/FiO_2 ≤ 315 suggests ARDS (including in non-ventilated patients). **Oxygenation impairment in children:** note OI = Oxygenation Index and OSI = Oxygenation Index using SpO_2. Use PaO_2-based metric when available. If PaO_2 not available, wean FiO_2 to maintain SpO_2 ≤ 97% to calculate OSI or SpO_2/FiO_2 ratio: • Bilevel (NIV or CPAP) ≥ 5 cmH_2O via full face mask: PaO_2/FiO_2 ≤ 300 mmHg or SpO_2/FiO_2 ≤ 264 • Mild ARDS (invasively ventilated): 4 ≤ OI < 8 or 5 ≤ OSI < 7.5 • Moderate ARDS (invasively ventilated): 8 ≤ OI < 16 or 7.5 ≤ OSI < 12.3 • Severe ARDS (invasively ventilated): OI ≥ 16 or OSI ≥ 12.3.
Sepsis *(5, 6)*	**Adults:** life-threatening organ dysfunction caused by a dysregulated host response to suspected or proven infection.[b] Signs of organ dysfunction include: altered mental status, difficult or fast breathing, low oxygen saturation, reduced urine *(5, 20)* output, fast heart rate, weak pulse, cold extremities or low blood pressure, skin mottling, or laboratory evidence of coagulopathy, thrombocytopenia, acidosis, high lactate or hyperbilirubinemia. **Children:** suspected or proven infection and ≥ 2 aged based systemic inflammatory response syndrome criteria, of which one must be abnormal temperature or white blood cell count.
Septic shock *(5, 6)*	**Adults:** persisting hypotension despite volume resuscitation, requiring vasopressors to maintain MAP ≥ 65 mmHg and serum lactate level > 2 mmol/L. **Children:** any hypotension (SBP < 5th centile or > 2 SD below normal for age) or two or three of the following: altered mental state; tachycardia or bradycardia (HR < 90 bpm or > 160 bpm in infants and HR < 70 bpm or > 150 bpm in children); prolonged capillary refill (> 2 sec) or feeble pulse; tachypnea; mottled or cool skin or petechial or purpuric rash; increased lactate; oliguria; hyperthermia or hypothermia *(21.)*.

[a] If altitude is higher than 1000 m, then correction factor should be calculated as follows: PaO_2/FiO_2 x barometric pressure/760.

[b] The SOFA score ranges from 0 to 24 and includes points related to six organ systems: respiratory (hypoxemia defined by low PaO_2/FiO_2); coagulation (low platelets); liver (high bilirubin); cardiovascular (hypotension); central nervous system (low level of consciousness defined by Glasgow Coma Scale); and renal (low urine output or high creatinine). Sepsis is defined by an increase in the sepsis-related SOFA score of ≥ 2 points. Assume the baseline score is 0 if data are not available *(22).*

Abbreviations: ARI acute respiratory infection; BP blood pressure; bpm beats/minute; CPAP continuous positive airway pressure; FiO_2 fraction of inspired oxygen; MAP mean arterial pressure; NIV non-invasive ventilation; OI Oxygenation Index; OSI Oxygenation Index using SpO_2; PaO_2 partial pressure of oxygen; PEEP positive end-expiratory pressure; SBP systolic blood pressure; SD standard deviation; SIRS systemic inflammatory response syndrome; SOFA sequential organ failure assessment; SpO_2 oxygen saturation.

3. Immediate implementation of appropriate infection prevention and control (IPC) measures

IPC is a critical and integral part of clinical management of patients and WHO guidance is available (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control).

- **Initiate IPC at the point of entry of the patient to hospital. Screening should be done at first point of contact at the emergency department or outpatient department/clinics. Suspect patients should be given a mask and directed to separate area. Keep at least 1 m distance between suspected patients.**
- **Standard precautions should always be applied in all areas of health care facilities. Standard precautions include hand hygiene and the use of personal protective equipment (PPE) when in indirect and direct contact with patients' blood, body fluids, secretions (including respiratory secretions) and non-intact skin. Standard precautions also include prevention of needle-stick or sharps injury; safe waste management; cleaning and disinfection of equipment; and cleaning of the environment.**
- **In addition to standard precautions, health care workers should do a point-of-care risk assessment at every patient contact to determine whether additional precautions (e.g. droplet, contact, and/or airborne) are required.**

Table 3. How to implement IPC measures for patients with suspected or confirmed COVID-19 infection

Instructions for patients	Give suspect patient a medical mask and direct patient to separate area; an isolation room if available. Keep at least 1 m distance between suspected patients and other patients. Instruct all patients to cover nose and mouth during coughing or sneezing with tissue or flexed elbow and perform hand hygiene after contact with respiratory secretions.
Apply droplet precautions	Droplet precautions prevent large droplet transmission of respiratory viruses. Use a medical mask if working within 1 m of the patient. Place patients in single rooms, or group together those with the same etiological diagnosis. If an etiological diagnosis is not possible, group patients with similar clinical diagnosis and based on epidemiological risk factors, with a spatial separation. When providing care in close contact with a patient with respiratory symptoms (e.g. coughing or sneezing), use eye protection (face mask or goggles), because sprays of secretions may occur. Limit patient movement within the institution and ensure that patients wear medical masks when outside their rooms.
Apply contact precautions	Contact precautions prevent direct or indirect transmission from contact with contaminated surfaces or equipment (i.e. contact with contaminated oxygen tubing/interfaces). Use PPE (medical mask, eye protection, gloves and gown) when entering room and remove PPE when leaving and practice hand hygiene following PPE removal. If possible, use either disposable or dedicated equipment (e.g. stethoscopes, blood pressure cuffs, pulse oximeters and thermometers). If equipment needs to be shared among patients, clean and disinfect between each patient use. Ensure that health care workers refrain from touching their eyes, nose and mouth with potentially contaminated gloved or ungloved hands. Avoid contaminating environmental surfaces that are not directly related to patient care (e.g. door handles and light switches). Avoid medically unnecessary movement of patients or transport. Perform hand hygiene.
Apply airborne precautions when performing an aerosol-generating procedure	
Ensure that health care workers performing aerosol-generating procedures (e.g. open suctioning of respiratory tract, intubation, bronchoscopy, cardiopulmonary resuscitation) use the appropriate PPE, including gloves, long-sleeved gowns, eye protection, and fit-tested particulate respirators (N95 or equivalent, or higher level of protection). A scheduled fit test should not be confused with a users' seal check before each use. Whenever possible, use adequately ventilated single rooms when performing aerosol-generating procedures, meaning negative pressure rooms with a minimum of 12 air changes per hour or at least 160 L/second/patient in facilities with natural ventilation. Avoid the presence of unnecessary individuals in the room. Care for the patient in the same type of room after mechanical ventilation commences.	

Abbreviations: ARI acute respiratory infection; PPE personal protective equipment.

4. Collection of specimens for laboratory diagnosis

WHO guidance on specimen collection, processing and laboratory testing is available (https://www.who.int/publications-detail/laboratory-testing-for-2019-novel-coronavirus-in-suspected-human-cases-20200117). Additionally, guidance on related biosafety procedures is available (https://apps.who.int/iris/bitstream/handle/10665/331138/WHO-WPE-GIH-2020.1-eng.pdf).

Collect blood cultures for bacteria that cause pneumonia and sepsis, ideally before antimicrobial therapy. DO NOT delay antimicrobial therapy to collect blood cultures.

Collect specimens from the upper respiratory tract (URT; nasopharyngeal and oropharyngeal) AND, where clinical suspicion remains and URT specimens are negative, collect specimens from the lower respiratory tract when readily available (LRT; expectorated sputum, endotracheal aspirate, or bronchoalveolar lavage in ventilated patient) for SARS-CoV-2 testing by RT-PCR and bacterial stains/cultures.

In hospitalized patients with confirmed COVID-19, repeat URT and LRT samples can be collected to demonstrate viral clearance. The frequency of specimen collection will depend on local epidemic characteristics and resources. For hospital discharge, in a clinically recovered patient two negative tests, at least 24 hours apart, is recommended.

Remark 1: Use appropriate PPE for specimen collection (droplet and contact precautions for URT specimens; airborne precautions for LRT specimens). When collecting URT samples, use viral swabs (sterile Dacron or rayon, not cotton) and viral transport media. Do not sample the nostrils or tonsils. In a patient with suspected COVID-19, especially with pneumonia or severe illness, a single URT sample does not exclude the diagnosis, and additional URT and LRT samples are recommended. LRT (vs URT) samples are more likely to be positive and for a longer period *(23)*. Clinicians may elect to collect only LRT samples when these are readily available (for example, in mechanically ventilated patients). Sputum induction should be avoided due to increased risk of aerosol transmission.

Remark 2 for pregnant patients: COVID-19 testing of symptomatic pregnant women may need to be prioritized to enable access to specialized care.

Remark 3: Dual infections with other respiratory viral and bacterial infections have been found in SARS, MERS and COVID-19 patients *(8)*. As a result, a positive test for a non-SARS-CoV-2 pathogen does not rule out COVID-19. At this stage, detailed microbiologic studies are needed in all suspected cases. Both URT and LRT specimens can be tested for other respiratory viruses, such as influenza A and B (including zoonotic influenza A), respiratory syncytial virus, parainfluenza viruses, rhinoviruses, adenoviruses, enteroviruses (e.g. EVD68), human metapneumovirus and endemic human coronaviruses (i.e. HKU1, OC43, NL63, and 229E). LRT specimens can also be tested for bacterial pathogens, including *Legionella pneumophila*. In malaria endemic areas, patients with fever should be tested for the presence of malaria or other co-infections with validated rapid diagnostic tests (RDTs) or thick and thin blood films and treated as appropriate. In endemic settings arbovirus infection (dengue/chikungunya) should also be considered in the differential diagnosis of undifferentiated febrile illness, particularly when thrombocytopenia is present. Co-infection with SARS-CoV-2 may also occur and a positive diagnostic test for dengue (e.g. dengue RDTs) does not exclude the testing for COVID-19 *(24)*.

5. Management of mild COVID-19: symptomatic treatment and monitoring

Patients with mild disease do not require hospital interventions; but isolation is necessary to contain virus transmission and will depend on national strategy and resources.

Remark: Though most patients with mild disease may not have indications for hospitalization, there is need to implement appropriate IPC to contain and mitigate transmission. This can be done either in hospital, if there are just sporadic cases or small clusters, or in repurposed, non-traditional settings; or at home.

Provide patient with mild COVID-19 with symptomatic treatment such as antipyretics for fever.

Counsel patients with mild COVID-19 about signs and symptoms of complicated disease. If they develop any of these symptoms, they should seek urgent care through national referral systems.

6. Management of severe COVID-19: oxygen therapy and monitoring

Give supplemental oxygen therapy immediately to patients with SARI and respiratory distress, hypoxaemia or shock and target > 94%.

Remarks for adults: Adults with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, shock, coma or convulsions) should receive airway management and oxygen therapy during resuscitation to target $SpO_2 \geq 94\%$. Initiate oxygen therapy at 5 L/min and titrate flow rates to reach target $SpO_2 \geq 93\%$ during resuscitation; or use face mask with reservoir bag (at 10–15 L/min) if patient in critical condition. Once patient is stable, the target is > 90% SpO_2 in non-pregnant adults and ≥ 92–95% in pregnant patients *(16, 25)*.

Remarks for children: Children with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, shock, coma or convulsions) should receive airway management and oxygen therapy during resuscitation to target $SpO_2 \geq 94\%$; otherwise, the target SpO_2 is ≥ 90% *(25)*. Use of nasal prongs or nasal cannula is preferred in young children, as it may be better tolerated.

Remark 3: All areas where patients with SARI are cared for should be equipped with pulse oximeters, functioning oxygen systems and disposable, single-use, oxygen-delivering interfaces (nasal cannula, nasal prongs, simple face mask and mask with reservoir bag). See Appendix for details of resources.

Closely monitor patients with COVID-19 for signs of clinical deterioration, such as rapidly progressive respiratory failure and sepsis and respond immediately with supportive care interventions.

Remark 1: Patients hospitalized with COVID-19, require regular monitoring of vital signs and, where possible, utilization of medical early warning scores (e.g. NEWS2) that facilitate early recognition and escalation of the deteriorating patient *(26)*.

Remark 2: Haematology and biochemistry laboratory testing, and ECG should be performed at admission and as clinically indicated to monitor for complications, such as acute liver injury, acute kidney injury, acute cardiac injury or shock. Application of timely, effective and safe supportive therapies is the cornerstone of therapy for patients that develop severe manifestations of COVID-19.

Remarks 3: After resuscitation and stabilization of the pregnant patient, then fetal well-being should be monitored.

Understand the patient's co-morbid condition(s) to tailor the management of critical illness.

Remark 1: Determine which chronic therapies should be continued and which therapies should be stopped temporarily. Monitor for drug-drug interactions.

Use conservative fluid management in patients with SARI when there is no evidence of shock.

Remarks: Patients with SARI should be treated cautiously with intravenous fluids, because aggressive fluid resuscitation may worsen oxygenation, especially in settings where there is limited availability of mechanical ventilation *(27)*. This applies for care of children and adults.

7. Management of severe COVID-19: treatment of co-infections

Give empiric antimicrobials to treat all likely pathogens causing SARI and sepsis as soon as possible, within 1 hour of initial patient assessment for patients with sepsis.

Remark 1: Although the patient may be suspected to have COVID-19, administer appropriate empiric antimicrobials within **1 hour** of identification of sepsis (*5*). Empiric antibiotic treatment should be based on the clinical diagnosis (community-acquired pneumonia, health care-associated pneumonia [if infection was acquired in health care setting] or sepsis), local epidemiology and susceptibility data, and national treatment guidelines.

Remark 2: When there is ongoing local circulation of seasonal influenza, empiric therapy with a neuraminidase inhibitor should be considered for the treatment for patients with influenza with or at risk for severe disease *(5)*.

Empiric therapy should be de-escalated on the basis of microbiology results and clinical judgment.

8. Management of critical COVID-19: acute respiratory distress syndrome (ARDS)

Recognize severe hypoxemic respiratory failure when a patient with respiratory distress is failing standard oxygen therapy and prepare to provide advanced oxygen/ventilatory support.

Remarks: Patients may continue to have increased work of breathing or hypoxemia even when oxygen is delivered via a face mask with reservoir bag (flow rates of 10–15 L/min, which is typically the minimum flow required to maintain bag inflation; FiO_2 0.60–0.95). Hypoxemic respiratory failure in ARDS commonly results from intrapulmonary ventilation-perfusion mismatch or shunt and usually requires mechanical ventilation *(5)*.

Endotracheal intubation should be performed by a trained and experienced provider using airborne precautions.

Remarks: Patients with ARDS, especially young children or those who are obese or pregnant, may desaturate quickly during intubation. Pre-oxygenate with 100% FiO_2 for 5 minutes, via a face mask with reservoir bag, bag-valve mask, HFNO or NIV. Rapid sequence intubation is appropriate after an airway assessment that identifies no signs of difficult intubation *(28, 29, 30)*.

***The following recommendations pertain to mechanically ventilated adult and paediatric patients with ARDS** (5, 31).*

Implement mechanical ventilation using lower tidal volumes (4–8 mL/kg predicted body weight, PBW) and lower inspiratory pressures (plateau pressure < 30 cmH_2O).

Remarks for adults: This is a strong recommendation from a clinical guideline for patients with ARDS *(5),* and is suggested for patients with sepsis-induced respiratory failure who do not meet ARDS criteria *(5).* The initial tidal volume is 6 mL/kg PBW; tidal volume up to 8 mL/kg PBW is allowed if undesirable side-effects occur (e.g. dyssynchrony, pH < 7.15). Permissive hypercapnia is permitted. Ventilator protocols are available *(32).* The use of deep sedation may be required to control respiratory drive and achieve tidal volume targets.

Remarks for children: In children, a lower level of plateau pressure (< 28 cmH_2O) is targeted, and lower target of pH is permitted (7.15–7.30). Tidal volumes should be adapted to disease severity: 3–6 mL/kg PBW in the case of poor respiratory system compliance, and 5–8 mL/kg PBW with better preserved compliance *(31)*.

In adult patients with severe ARDS, prone ventilation for 12–16 hours per day is recommended.

Remarks for adults and children: Application of prone ventilation is strongly recommended for adult patients, and may be considered for paediatric patients with severe ARDS but requires sufficient human resources and expertise to be performed safely, protocols (including videos) are available *(33, 34)* (https://www.nejm.org/doi/full/10.1056/NEJMoa1214103).

Remark for pregnant women: There is little evidence on prone positioning in pregnant women. Pregnant women may benefit from being placed in lateral decubitus position.

Use a conservative fluid management strategy for ARDS patients without tissue hypoperfusion.

Remarks for adults and children: This is a strong guideline recommendation *(5);* the main effect is to shorten the duration of ventilation. See reference *(35)* for details of a sample protocol.

In patients with moderate or severe ARDS, higher PEEP instead of lower PEEP is suggested.

Remark 1: PEEP titration requires consideration of benefits (reducing atelectrauma and improving alveolar recruitment) vs risks (end-inspiratory overdistension leading to lung injury and higher pulmonary vascular resistance). Tables are available to guide PEEP titration based on the FiO_2 required to maintain SpO_2 *(32)*. In younger children, maximal PEEP rates are 15 cmH_20. Although high driving pressure (plateau pressure − PEEP) may more accurately predict increased mortality in ARDS compared with high tidal volume or plateau pressure *(36)*. Data from RCTs of ventilation strategies that target driving pressure are not currently available.

Remark 2: A related intervention of recruitment manoeuvres (RMs) is delivered as episodic periods of high continuous positive airway pressure (CPAP) (30–40 cmH_2O), progressive incremental increases in PEEP with constant driving pressure, or high driving pressure; considerations of benefits vs risks are similar. Higher PEEP and RMs were both conditionally recommended in a clinical practice guideline. For PEEP, the guideline considered an individual patient data meta-analysis *(37)* of three RCTs. However, a subsequent RCT of high PEEP and prolonged high-pressure RMs showed harm, suggesting that the protocol in this RCT should be avoided *(38).* Monitoring of patients to identify those who respond to the initial application of higher PEEP or a different RM protocol, and stopping these interventions in non-responders, is suggested *(39).*

In patients with moderate-severe ARDS (PaO_2/FiO_2 < 150), neuromuscular blockade by continuous infusion should not be routinely used.

Remark: A trial found that this strategy improved survival in adult patients with severe ARDS ($PaO_2/FiO_2 < 150$) without causing significant weakness *(40),* but results of a recent larger trial found that use of neuromuscular blockage with high PEEP strategy was not associated with a survival benefit when compared with a light sedation strategy without neuromuscular blockade *(41).* Continuous neuromuscular blockade may still be considered in patients, adult and children, with ARDS in certain situations: ventilator dyssnchrony despite sedation, such that tidal volume limitation cannot be reliably achieved; or refractory hypoxemia or hypercapnia.

Avoid disconnecting the patient from the ventilator, which results in loss of PEEP and atelectasis.

Use in-line catheters for airway suctioning and clamp endotracheal tube when disconnection is required (for example, transfer to a transport ventilator).

The following recommendations pertain to adult and paediatric patients with ARDS that are treated with non-invasive or high-flow oxygen systems.

High-flow nasal oxygen (HFNO) should only be used in selected patients with hypoxemic respiratory failure.

Non-invasive ventilation (NIV) should only be used in selected patients with hypoxemic respiratory failure.

Patients treated with either HFNO or NIV should be closely monitored for clinical deterioration.

Remark 1: Adult HFNO systems can deliver 60 L/min of gas flow and FiO_2 up to 1.0. Paediatric circuits generally only handle up to 25 L/min, and many children will require an adult circuit to deliver adequate flow.

Remark 2: Due to uncertainty around the potential for aerosolization, HFO, NIV, including bubble CPAP, should be used with airborne precautions until further evaluation of the safety can be completed.

Remark 3: Compared with standard oxygen therapy, HFNO reduces the need for intubation *(42).* Patients with hypercapnia (exacerbation of obstructive lung disease, cardiogenic pulmonary oedema), hemodynamic instability, multiorgan failure, or abnormal mental status should generally not receive HFNO, although emerging data suggest that HFNO may be safe in patients with mild-moderate and non-worsening hypercapnia *(42, 43, 44).* Patients receiving HFNO should be in a monitored setting and cared for by experienced personnel capable of endotracheal intubation in case the patient acutely deteriorates or does not improve after a short trial (about 1 hour). Evidence-based guidelines on HFNO do not exist, and reports on HFNO in other coronavirus-infected patients are limited *(44).*

Remark 4: NIV guidelines make no recommendation on use in hypoxemic respiratory failure (apart from cardiogenic pulmonary oedema and post-operative respiratory failure) or pandemic viral illness (referring to studies of SARS and pandemic influenza) *(5).* Risks include delayed intubation, large tidal volumes, and injurious transpulmonary pressures. Limited data suggest a high failure rate in patients with other viral infections such as MERS-CoV who receive NIV *(45).*

Remark 5: Patients receiving a trial of NIV should be in a monitored setting and cared for by experienced personnel capable of endotracheal intubation in case the patient acutely deteriorates or does not improve after a short trial (about 1 hour). Patients with haemodynamic instability, multiorgan failure, or abnormal mental status should likely not receive NIV in place of other options such as invasive ventilation.

Remark 6: In situations where mechanical ventilation might not be available, bubble nasal CPAP may be used for newborns and children with severe hypoxemia, and may be a more readily available alternative in resource limited settings *(46).*

The following recommendations pertain to adult and paediatric patients with ARDS that fail lung protective ventilation strategy.

In settings with access to expertise in extracorporeal membrane oxygenation (ECMO), consider referral of patients with refractory hypoxemia despite lung protective ventilation.

Remarks for adult and children: An RCT of ECMO for adult patients with ARDS was stopped early and found no statistically significant difference in the primary outcome of 60-day mortality between ECMO and standard medical management (including prone positioning and neuromuscular blockade) *(47).* However, ECMO was associated with a reduced risk of the composite outcome of mortality and crossover to ECMO *(47),* and a post hoc Bayesian analysis of this RCT showed that ECMO is very likely to reduce mortality across a range of prior assumptions *(48).* In patients with MERS-CoV infection, ECMO vs conventional treatment was associated with reduced mortality in a cohort study *(49).* ECMO should only be offered in expert centres with a sufficient case volume to maintain expertise and that can apply the IPC measures required for adult and paediatric COVID-19 patients *(50, 51).*

9. Management of critical illness and COVID-19: prevention of complications

Implement the following interventions (Table 4) to prevent complications associated with critical illness. These interventions are based on Surviving Sepsis *(5)* or other guidelines *(52-55)*, and are generally limited to feasible recommendations based on high-quality evidence.

Table 4. Prevention of complications

Anticipated outcome	Interventions
Reduce days of invasive mechanical ventilation	• Use weaning protocols that include daily assessment for readiness to breathe spontaneously • Minimize continuous or intermittent sedation, targeting specific titration endpoints (light sedation unless contraindicated) or with daily interruption of continuous sedative infusions.
Reduce incidence of ventilator-associated pneumonia	• Oral intubation is preferable to nasal intubation in adolescents and adults • Keep patient in semi-recumbent position (head of bed elevation 30–45º) • Use a closed suctioning system; periodically drain and discard condensate in tubing • Use a new ventilator circuit for each patient; once patient is ventilated, change circuit if it is soiled or damaged, but not routinely. • Change heat moisture exchanger when it malfunctions, when soiled, or every 5–7 days
Reduce incidence of venous thromboembolism	• Use pharmacological prophylaxis (low molecular-weight heparin [preferred if available] or heparin 5000 units subcutaneously twice daily) in adolescents and adults without contraindications. For those with contraindications, use mechanical prophylaxis (intermittent pneumatic compression devices).
Reduce incidence of catheter-related bloodstream infection.	• Use a checklist with completion verified by a real-time observer as reminder of each step needed for sterile insertion and as a daily reminder to remove catheter if no longer needed.
Reduce incidence of pressure ulcers.	• Turn patient every 2 hours
Reduce incidence of stress ulcers and gastrointestinal bleeding.	• Give early enteral nutrition (within 24–48 hours of admission) • Administer histamine-2 receptor blockers or proton-pump inhibitors in patients with risk factors for GI bleeding. Risk factors for gastrointestinal bleeding include mechanical ventilation for ≥ 48 hours, coagulopathy, renal replacement therapy, liver disease, multiple comorbidities, and higher organ failure score.
Reduce incidence of ICU-related weakness.	• Actively mobilize the patient early in the course of illness when safe to do so.

10. Management of critical illness and COVID-19: septic shock

- **Recognize septic shock in adults when infection is suspected or confirmed AND vasopressors are needed to maintain mean arterial pressure (MAP) ≥ 65 mmHg AND lactate is ≥ 2 mmol/L, in absence of hypovolemia.**
- **Recognize septic shock in children with any hypotension (systolic blood pressure [SBP] < 5th centile or > 2 SD below normal for age) or two or more of the following: altered mental state; tachycardia or bradycardia (HR < 90 bpm or > 160 bpm in infants and HR < 70 bpm or > 150 bpm in children); prolonged capillary refill (> 2 sec) or feeble pulses; tachypnea; mottled or cold skin or petechial or purpuric rash; increased lactate; oliguria; hyperthermia or hypothermia.**

Remark 1: In the absence of a lactate measurement, use blood pressure (i.e. MAP) and clinical signs of perfusion to define shock.

Remark 2: Standard care includes early recognition and the following treatments within 1 hour of recognition: antimicrobial therapy, and initiation of fluid bolus and vasopressors for hypotension *(5)*. The use of central venous and arterial catheters should be based on resource availability and individual patient needs. Detailed guidelines from the Surviving Sepsis Campaign and WHO are available for the management of septic shock in adults *(5)* and children *(6, 16)*. Alternate fluid regimens are suggested when caring for adults and children in resource-limited settings *(56, 57)*.

The following recommendations pertain to resuscitation strategies for adult and paediatric patients with septic shock.

- **In resuscitation for septic shock in adults, give at 250–500 mL crystalloid fluid as rapid bolus in first 15–30 minutes and reassess for signs of fluid overload after each bolus.**

- **In resuscitation from septic shock in children, give 10–20 mL/kg crystalloid fluid as a bolus in the first 30–60 minutes and reassess for signs of fluid overload after each bolus.**

Fluid resuscitation may lead to volume overload, including respiratory failure, particularly with ARDS. If there is no response to fluid loading or signs of volume overload appear (e.g. jugular venous distension, crackles on lung auscultation, pulmonary oedema on imaging, or hepatomegaly in children), then reduce or discontinue fluid administration. This step is particularly important in patients with hypoxemic respiratory failure.

Remark 1: Crystalloids include normal saline and Ringer's lactate.

Remark 2: Determine need for additional fluid boluses (250–500 mL in adults or 10–20 mL/kg in children) based on clinical response and improvement of perfusion targets. Perfusion targets include MAP (> 65 mmHg or age-appropriate targets in children), urine output (> 0.5 mL/kg/hr in adults, 1 mL/kg/hr in children), and improvement of skin mottling and extremity perfusion, capillary refill, heart rate, level of consciousness, and lactate.

Remark 3: Consider dynamic indices of volume responsiveness to guide volume administration beyond initial resuscitation based on local resources and experience *(5)*. These indices include passive leg raises, fluid challenges with serial stroke volume measurements, or variations in systolic pressure, pulse pressure, inferior vena cava size, or stroke volume in response to changes in intrathoracic pressure during mechanical ventilation.

Remark 4: In pregnant women, compression of the inferior vena cava can cause a decrease in venous return and cardiac preload and may result in hypotension. For this reason, pregnant women with sepsis and or septic shock may need to be placed in a lateral decubitus position to off-load the IVC *(58)*.

Remark 5: Clinical trials conducted in resource-limited studies comparing aggressive versus conservative fluid regimens suggest higher mortality in patients treated with aggressive fluid regimens *(56, 57)*.

Do not use hypotonic crystalloids, starches or gelatins for resuscitation.

Remark 1: Starches are associated with an increased risk of death and acute kidney injury compared to crystalloids. The effects of gelatins are less clear, but they are more expensive than crystalloids *(5, 59)*. Hypotonic (vs isotonic) solutions are less effective at increasing intravascular volume. Surviving Sepsis also suggests albumin for resuscitation when patients require substantial amounts of crystalloids, but this conditional recommendation is based on low-quality evidence *(5)*.

In adults, administer vasopressors when shock persists during or after fluid resuscitation. The initial blood pressure target is MAP ≥ 65 mmHg in adults and improvement of markers of perfusion.

In children administer vasopressors if:

1. **signs of shock such as altered mental state; tachycardia or bradycardia (HR < 90 bpm or > 160 bpm in infants and HR < 70 bpm or > 150 bpm in children); prolonged capillary refill (> 2 seconds) or feeble pulses; tachypnea; mottled or cool skin or petechial or purpuric rash; increased lactate; oliguria persists after two repeat boluses; or**
2. **age-appropriate blood pressure targets are not achieved; or**
3. **signs of fluid overload are apparent *(6)*.**

If central venous catheters are not available, vasopressors can be given through a peripheral IV, but use a large vein and closely monitor for signs of extravasation and local tissue necrosis. If extravasation occurs, stop infusion. Vasopressors can also be administered through intraosseous needles.

If signs of poor perfusion and cardiac dysfunction persist despite achieving MAP target with fluids and vasopressors, consider an inotrope such as dobutamine.

Remark 1: Vasopressors (i.e. norepinephrine, epinephrine, vasopressin, and dopamine) are most safely given through a central venous catheter at a strictly controlled rate, but it is also possible to safely administer them via peripheral vein *(60)* and intraosseous needle. Monitor blood pressure frequently and titrate the vasopressor to the minimum dose necessary to maintain perfusion and prevent side-effects. Recent study suggests that in adults 65 years or older a MAP 60–65 mmHg target is equivalent to ≥ 65 mmHg *(61)*.

Remark 2: Norepinephrine is considered first-line in adult patients; epinephrine or vasopressin can be added to achieve the MAP target. Because of the risk of tachyarrhythmia, reserve dopamine for selected patients with low risk of tachyarrhythmia or those with bradycardia.

Remark 3: In children, epinephrine is considered first-line, while norepinephrine can be added if shock persists despite optimal dose of epinephrine.

Remark 4: No RCTs have compared dobutamine to placebo for clinical outcomes.

Remark 5: See section 11 on adjunctive therapies for remarks on corticosteroids and sepsis.

11. Adjunctive therapies for COVID-19: corticosteroids

Do not routinely give systemic corticosteroids for treatment of viral pneumonia outside of clinical trials.

Remark 1: A systematic review of observational studies of corticosteroids administered to patients with SARS reported no survival benefit and possible harms (avascular necrosis, psychosis, diabetes, and delayed viral clearance) *(62)*. A systematic review of observational studies in influenza found a higher risk of mortality and secondary infections with corticosteroids; the evidence was judged as very low to low quality due to confounding by indication *(63)*. A subsequent study that addressed this limitation by adjusting for time-varying confounders found no effect on mortality *(64)*. Finally, a recent study of patients receiving corticosteroids for MERS used a similar statistical approach and found no effect of corticosteroids on mortality but delayed lower respiratory tract (LRT) clearance of MERS-CoV *(65)*. Given the lack of effectiveness and possible harm, routine corticosteroids should be avoided unless they are indicated for another reason. Other reasons may include exacerbation of asthma or COPD, septic shock, and risk and benefit analysis needs to be conducted for individual patients.

Remark 2: A recent guideline issued by an international panel and based on the findings of two recent large RCTs makes a conditional recommendation for corticosteroids for all patients with sepsis (including septic shock) *(66)*. Surviving Sepsis guidelines, written before these RCTs were reported, recommend corticosteroids only for patients in whom adequate fluids and vasopressor therapy do not restore hemodynamic stability *(5)*. Clinicians considering corticosteroids for a patient with COVID-19 and with sepsis must balance the potential small reduction in mortality with the potential downside of prolonged shedding of coronavirus in the respiratory tract, as has been observed in patients with MERS-CoV *(65)*. If corticosteroids are prescribed, monitor and treat hyperglycaemia, hypernatraemia and hypokalaemia. Monitor for recurrence of inflammation and signs of adrenal insufficiency after stopping corticosteroids, which may have to be tapered. Due to the risk of *stongyloides steracolis* hyper-infection with steroid therapy, diagnosis or empiric treatment should be considered in endemic areas if steroids are utilized *(67)*.

Remark 2 for pregnant women: WHO recommends antenatal corticosteroid therapy for women at risk of preterm birth from 24 to 34 weeks of gestation when there is no clinical evidence of maternal infection, and adequate childbirth and newborn care is available. However, in cases where the woman presents with mild COVID-19, the clinical benefits of antenatal corticosteroid might outweigh the risks of potential harm to the mother. In this situation, the balance of benefits and harms for the woman and the preterm newborn should be discussed with the woman to ensure an informed decision, as this assessment may vary depending on the woman's clinical condition, her wishes and that of her family, and available health care resources (https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/preterm-birth-highlights/en/).

Remark 3: WHO has prioritized the evaluation of corticosteroids in clinical trials to assess safety and efficacy (https://www.who.int/blueprint/priority-diseases/key-action/Global_Research_Forum_FINAL_VERSION_for_web_14_feb_2020.pdf?ua=1).

12. Caring for pregnant women with COVID-19

To date, there is limited data on clinical presentation and perinatal outcomes after COVID-19 infection during pregnancy or the puerperium. There is no evidence that pregnant women present with different signs and/or symptoms or are at higher risk of severe illness. So far, there is no evidence on mother-to-child transmission when infection manifest in the third trimester, based on negative samples from amniotic fluid, cord blood, vaginal discharge, neonatal throat swabs or breastmilk. Similarly, evidence of increased severe maternal or neonatal outcomes is uncertain, and limited to infection in the third trimester, with some cases of premature rupture of membranes, fetal distress and preterm birth reported *(68, 69)*.

This section builds on existing recommendations from WHO on pregnancy and infectious diseases and provides additional remarks for the management of pregnant and recently pregnant women.

Considering asymptomatic transmission of COVID-19 may be possible in pregnant or recently pregnant women, as with the general population all women with epidemiologic history of contact should be carefully monitored.

Pregnant women with a suspected, probable or confirmed COVID-19 infection, including women who may need to spend time in isolation, should have access to woman-centred, respectful skilled care, including obstetric, foetal medicine and neonatal care, as well as mental health and psychosocial support, with readiness to care for maternal and neonatal complications.

Remark 1: Appropriate IPC measures and prevention of complications as described above, also apply to pregnant and recently pregnant women including those with miscarriage, late pregnancy fetal loss and postpartum/postabortion women. These IPC precautions should be applied for all interactions between an infected caregiver and a child.

Remark 2: Mode of birth should be individualized based on obstetric indications and the woman's preferences. WHO recommends that caesarean section should ideally only be undertaken when medically justified (https://apps.who.int/iris/bitstream/handle/10665/161442/WHO_RHR_15.02_eng.pdf?sequence=1).

Emergency delivery and pregnancy termination decisions are challenging and based on many factors such as gestational age, severity of maternal condition, and fetal viability and well-being.

Remark 3: Multidisciplinary consultations from obstetric, perinatal, neonatal and intensive care specialists are essential.

All recently pregnant women with COVID-19 or who have recovered from COVID-19 should be provided with necessary information and counselling on safe infant feeding and appropriate IPC measures to prevent COVID-19 transmission.

At this point, there is no evidence that pregnant women present with increased risk of severe illness or fetal compromise. Pregnant and recently pregnant women who have recovered from COVID-19 should be enabled and encouraged to attend routine antenatal, postpartum or postabortion care as appropriate. Additional care should be provided if there are any complications.

Remark 1: All pregnant women undergoing or recovering from COVID-19 should be provided with counselling and necessary information related to the potential risk of adverse pregnancy outcomes.

Remark 2: Women's choices and rights to sexual and reproductive health care should be respected irrespective of COVID-19 status, including access to contraception and safe abortion to the full extent of the law.

13. Caring for infants and mothers with COVID-19: IPC and breastfeeding

Relatively few cases have been reported of infants confirmed with COVID-19 and they experienced mild illness. No vertical transmission has been documented. Amniotic fluid from six mothers positive for COVID-19 and cord blood and throat swabs from their neonates who were delivered by caesarean section all tested negative for SARS-CoV-2 by RT-PCR. Breastmilk samples from the mothers after the first lactation were also all negative for SARS-CoV-2 *(68, 69)*.

Breastfeeding protects against death and morbidity also in the post-neonatal period and throughout infancy and childhood. The protective effect is particularly strong against infectious diseases that are prevented through both direct transfer of antibodies and other anti-infective factors and long-lasting transfer of immunological competence and memory. See *WHO Essential newborn care and breastfeeding* (https://apps.who.int/iris/bitstream/handle/10665/107481/e79227.pdf). Therefore, standard infant feeding guidelines should be followed with appropriate precautions for IPC.

Infants born to mothers with suspected, probable or confirmed COVID-19 infection, should be fed according to standard infant feeding guidelines, while applying necessary precautions for IPC.

Remarks: Breastfeeding should be initiated within 1 hour of birth. Exclusive breastfeeding should continue for 6 months with timely introduction of adequate, safe and properly fed complementary foods at age 6 months, while continuing breastfeeding up to 2 years of age or beyond. Because there is a dose–response effect, in that earlier initiation of breastfeeding results in greater benefits, mothers who are not able to initiate breastfeeding during the first hour after delivery should still be supported to breastfeed as soon as they are able. This may be relevant to mothers that deliver by caesarean section, after an anaesthetic, or those who have medical instability that precludes initiation of breastfeeding within the first hour after birth. This recommendation is consistent with the *Global strategy for infant and young child feeding* (https://apps.who.int/iris/bitstream/handle/10665/42590/9241562218.pdf), as endorsed by the Fifty-fifth World Health Assembly, in resolution WHA54.2 in 2002, to promote optimal feeding for all infants and young children.

As with all confirmed or suspected COVID-19 cases, symptomatic mothers who are breastfeeding or practising skin-to-skin contact or kangaroo mother care should practise respiratory hygiene, including during feeding (for example, use of a medical mask when near a child if with respiratory symptoms), perform hand hygiene before and after contact with the child, and routinely clean and disinfect surfaces which the symptomatic mother has been in contact with.

Breastfeeding counselling, basic psychosocial support and practical feeding support should be provided to all pregnant women and mothers with infants and young children, whether they or their infants and young children have suspected or confirmed COVID-19.

Remark 1: All mothers should receive practical support to enable them to initiate and establish breastfeeding and manage common breastfeeding difficulties, including IPC measures. This support should be provided by appropriately trained health care professionals and community-based lay and peer breastfeeding counsellors. See *Guideline: counselling of women to improve breastfeeding practices* (https://apps.who.int/iris/bitstream/handle/10665/280133/9789241550468-eng.pdf) and the WHO *Guideline: protection, promoting and supporting breastfeeding in facilities providing maternity and newborn services* (https://apps.who.int/iris/bitstream/handle/10665/259386/9789241550086-eng.pdf).

In situations when severe illness in a mother due to COVID-19 or other complications prevent her from caring for her infant or prevent her from continuing direct breastfeeding, mothers should be encouraged and supported to express milk, and safely provide breastmilk to the infant, while applying appropriate IPC measures.

Remarks: In the event that the mother is too unwell to breastfeed or express breastmilk, explore the viability of relactation, wet nursing, donor human milk or appropriate breastmilk substitutes, informed by cultural context, acceptability to mother and service availability. There should be no promotion of breastmilk substitutes, feeding bottles and teats, pacifiers or dummies in any part of facilities providing maternity and newborn services, or by any of the staff. Health facilities and their staff should not give feeding bottles and teats or other products within the scope of the *International Code of Marketing of Breast-milk Substitutes* and its subsequent related WHA resolutions, to breastfeeding infants. This recommendation is consistent with the WHO guidance *Acceptable medical reasons for use of breast-milk substitutes* (https://apps.who.int/iris/bitstream/handle/10665/69938/WHO_FCH_CAH_09.01_eng.pdf;jsessionid=709AE28402D49263C8DF6D50048A0E58?sequence=1).

Mothers and infants should be enabled to remain together and practise skin-to-skin contact, kangaroo mother care and to remain together and to practise rooming-in throughout the day and night, especially immediately after birth during establishment of breastfeeding, whether they or their infants have suspected, probable or confirmed COVID-19 virus infection.

Remarks: Minimizing disruption to breastfeeding during the stay in the facilities providing maternity and newborn services will require health care practices that enable a mother to breastfeed for as much, as frequently and for as long as she wishes. See WHO *Guideline: protection, promoting and supporting breastfeeding in facilities providing maternity and newborn services* (https://apps.who.int/iris/bitstream/handle/10665/259386/9789241550086-eng.pdf).

Parents and caregivers who may need to be separated from their children, and children who may need to be separated from their primary caregivers, should have access to appropriately trained health or non-health workers for mental health and psychosocial support.

Remarks: Given the high prevalence of common mental disorders among women in the antenatal and postpartum period, and the acceptability of programmes aimed at them, interventions targeted to these women need to be more widely implemented. Prevention services should be available in addition to services that treat mental health difficulties. This recommendation is consistent with the IASC Reference group for Mental Health and Psychosocial Support in Emergency Setting 2020 *Briefing note on addressing mental health and psychosocial aspects of COVID-19 outbreak – version 1.1* (https://interagencystandingcommittee.org/system/files/2020-03/MHPSS%20COVID19%20Briefing%20Note%202%20March%202020-English.pdf) and the *Improving early childhood development: WHO guideline* (https://www.who.int/publications-detail/improving-early-childhood-development-who-guideline).

14. Caring for older persons with COVID-19

Older age and comorbid diseases such as diabetes and hypertension have been reported as a risk factor for death with people with COVID-19 *(4)*. Therefore, older people are at highest risk for fatality and one of the most vulnerable populations. It is important to recognize that older people have the same rights as others to receive high-quality health care including intensive care. Refer to the guidance *Integrated care for older people (ICOPE)* (https://www.who.int/ageing/publications/icope-handbook/en/).

- For older people with probable or suspected COVID-19, provide person-centred assessment, including not only conventional history taking, but a thorough understanding of the person's life, values, priorities and preferences for health management.

- Ensure multidisciplinary collaboration among physicians, nurses, pharmacists, other health care professionals in the decision-making process to address multimorbidity and functional decline.

Remark 1: Physiological changes with age lead to declines in intrinsic capacity such as malnutrition, cognitive decline, depressive symptoms, and those conditions should be managed comprehensively.

- Early detection of inappropriate medication prescriptions is recommended to prevent adverse drug events and drug interactions for those being treated with COVID-19.

Remark 2: Older people are at greater risk of polypharmacy, due to newly prescribed medications, inadequate medication reconciliation and a lack of care coordination which increases the risk of negative health consequences.

- Involve caregivers and family members in decision-making and goal-setting throughout the management of COVID-19.

15. Clinical research and specific anti-COVID-19 treatments

There is no current evidence to recommend any specific anti-COVID-19 treatment for patients with confirmed COVID-19. There are many ongoing clinical trials testing various potential antivirals; these are registered on https://clinicaltrials.gov/ or on the Chinese Clinical Trial Registry (http://www.chictr.org.cn/abouten.aspx).

- **Collect standardized clinical data on all hospitalized patients to improve our understanding of the natural history of disease.**

Remark 1: Contribute anonymized data to the WHO Global COVID-19 Clinical Data Platform, contact EDCARN@who.int to get log-in credentials. Disaggregated data for children and pregnant women are needed.

Remark 2: There is an urgent need to collect standardized data for the clinical characterization of COVID-19 to better understand the natural history of disease with serial biological sampling**.** Clinical characterization research protocols are available (https://isaric.tghn.org/protocols/severe-acute-respiratory-infection-data-tools/).

- **Use of investigational anti-COVID-19 therapeutics should be done under ethically approved, randomized, controlled trials.**

Remark 1: Refer to the WHO R&D Blueprint website for the most up-to-date prioritization of therapeutics (https://www.who.int/blueprint/priority-diseases/key-action/novel-coronavirus/en/).

Remark 2: Refer to the WHO Core Clinical Randomized Controlled Trial protocol for use in evaluating the efficacy and safety of investigational therapeutic agents in combination with standard of care for the treatment of hospitalized patients with novel coronavirus disease (COVID-19) (https://www.who.int/blueprint/priority-diseases/key-action/multicenter-adaptive-RCT-of-investigational-therapeutics-for-COVID-19.pdf?ua=1).

Remark 3: If conducting an RCT is not possible, then use of investigational therapeutics should be done under Monitored Emergency Use of Unregistered Interventions Framework (MEURI), until an RCT can be initiated (https://www.who.int/ethics/publications/infectious-disease-outbreaks/en/).

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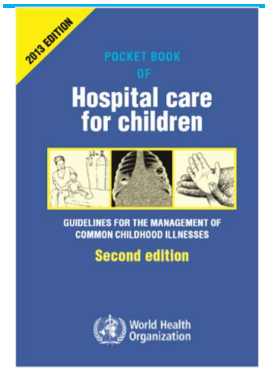
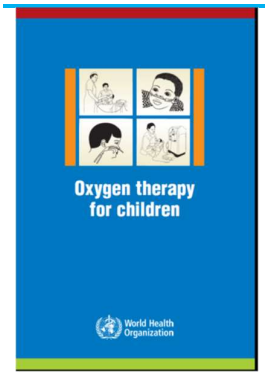
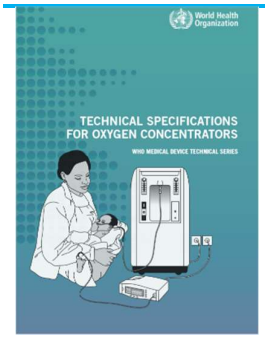
Appendix: resources for supporting management of severe acute respiratory infections in children



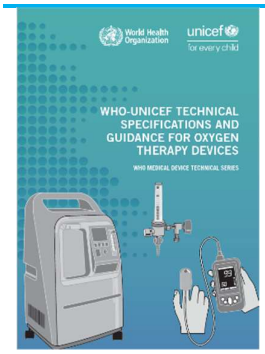
Pocketbook of hospital care for children: guidelines for the management of common illnesses with limited resources (second edition) (2013).
It is for use by doctors, nurses and other health workers caring for children at first level referral hospitals with basic laboratory facilities and essential medicines. These guidelines focus on the management of the major causes of childhood mortality in most developing countries including pneumonia, and also cover common procedures, patient monitoring and supportive care on the wards.
https://www.who.int/maternal_child_adolescent/documents/child_hospital_care/en/



Oxygen therapy for children (2016).
Is a bedside manual for health workers to guide the provision of oxygen therapy for children. The manual focuses on the availability and clinical use of oxygen therapy in children in health facilities to guide health workers, biomedical engineers and administrators. It addresses detection of hypoxaemia, use of pulse oximetry, clinical use of oxygen, delivery systems and monitoring of patients on oxygen therapy. The manual also addresses the practical use of pulse oximetry, and oxygen concentrators and cylinders.
http://www.who.int/maternal_child_adolescent/documents/child-oxygen-therapy/en/.



Technical specifications for oxygen concentrators (2015).
It provides an overview of oxygen concentrators and technical specifications to aid in the selection, procurement and quality assurance. It highlights the minimum performance requirements and technical characteristics for oxygen concentrators and related equipment that are suitable for the use in health facilities.
https://www.who.int/medical_devices/publications/tech_specs_oxygen-concentrators/en/.



WHO-UNICEF technical specifications and guidance for oxygen therapy devices (2019)
The purpose of this document is to increase access to quality products to ensure the supply of oxygen, especially in low- and middle-income countries and low-resource settings within countries from all income groupings. This project is one of many related to improving oxygen supply that other stakeholders are working on. These efforts aim to support ministries of health to ensure oxygen supply is available, as well as raise awareness of the importance of appropriate selection, procurement, maintenance and use of medical devices, both capital equipment and single-use devices.
https://www.who.int/medical_devices/publications/tech_specs_oxygen_therapy_devices/en/

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