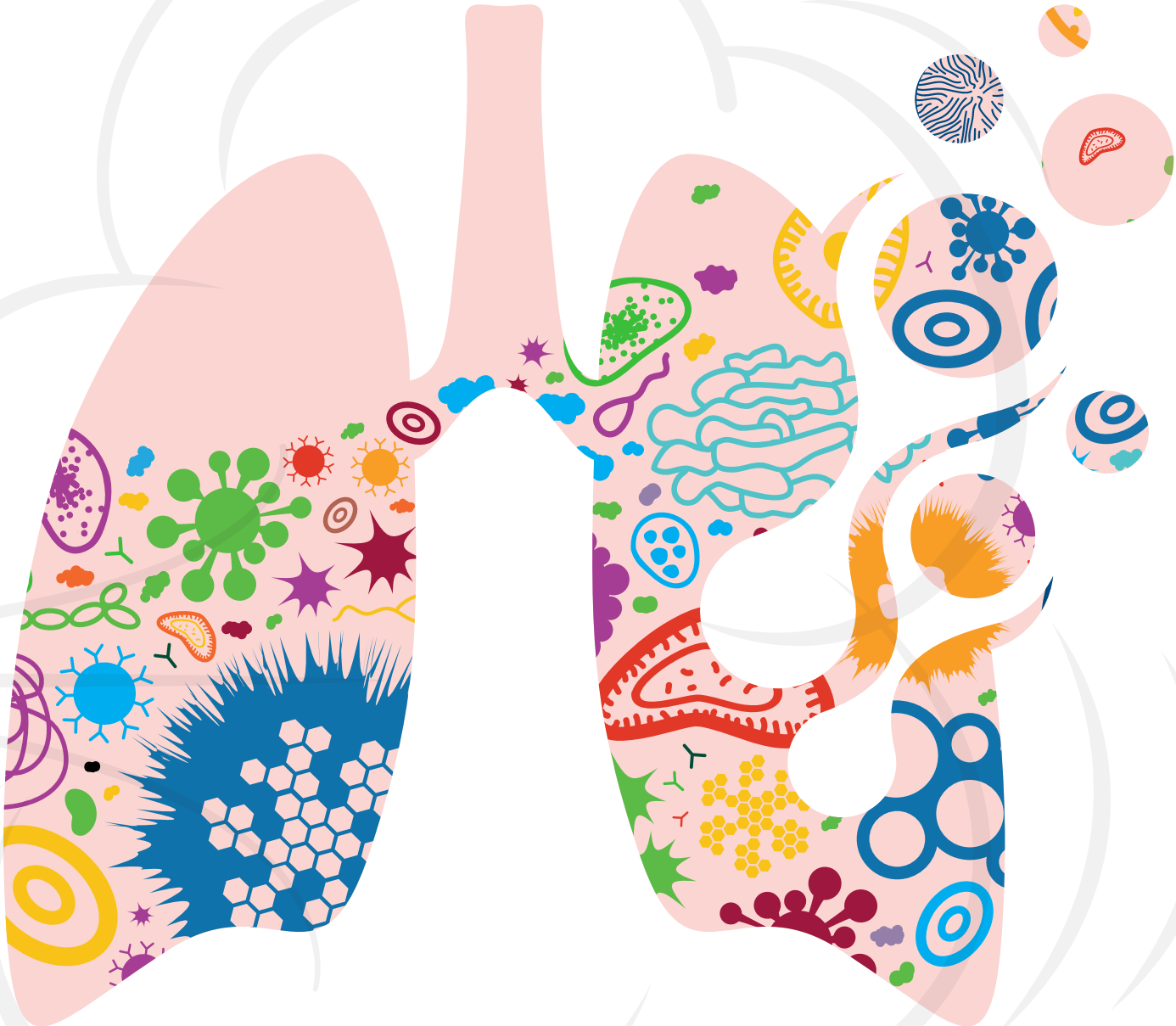
Clinical Care for Severe Acute Respiratory Infection | Toolkit



COVID-19 Adaptation

World Health Organization

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Contents

Foreword

This toolkit is intended for clinicians working in intensive care units in low- and middle-income countries, managing adult and paediatric patients with severe forms of acute respiratory infection, including severe pneumonia, acute respiratory distress syndrome, sepsis and septic shock.

Its main objective is to provide some of the necessary tools that can be used to care for the critically ill patient from hospital entry to hospital discharge. It is a hands-on practical guide to be used by health care professionals involved in critical care management during the COVID-19 pandemic and outbreaks of influenza (seasonal or avian influenza), Middle East respiratory syndrome coronavirus (MERS-CoV) or other emerging respiratory viral epidemics.

The toolkit is structured by topic. Each topic starts with a summary and follows with the list of the available tools and complementary references and resources. The tools provide a framework for users and are to be adapted to local conditions.

The child icon identifies tools to be used and adapted when caring for paediatric patients.

The adult icon identifies tools to be used and adapted when caring for adult patients.

Tools without an icon can be used and adapted when caring for adults and paediatric patients.

Accompanying the toolkit are PowerPoint slide sets – short lectures designed to reinforce the major concepts covered in the toolkit.

Acknowledgements

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In 2020, the toolkit was adapted for the COVID-19 pandemic by Janet Diaz (Unit Head, Clinical Care, World Health Emergency Programme, WHO, Geneva, Switzerland), Pryanka Relan (Technical Officer, Clinical Services and Systems, WHO, Geneva, Switzerland), and Teresa Kortz (Consultant, WHO, Geneva, Switzerland). Special thanks as well go to our copyeditor Vivien Stone (Etchingham, UK) and for the design by L'IV Com Sàrl (Villars-sous-Yens, Switzerland).

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Abbreviations

ABCDE	airway, breathing, circulation, disability, exposure
AHQR	Agency for Healthcare Research and Quality (United States of America)
AMS	altered mental state
ARDS	acute respiratory distress syndrome
ARI	acute respiratory infection
ART	arterial pressure
ASE	attention screening exam
AVPU	alert, verbal, pain, unresponsive (scale for assessing level of consciousness)
bCPAP	bubble continuous positive airway pressure
BEC	basic emergency care
BEE	basal energy expenditure
BPM	beats per minute
BPS	Behavioural Pain Scale
BSI	blood stream infection
CAM-ICU	confusion assessment method for the intensive care unit for adults
CDC	Centers for Disease Control and Prevention (United States of America)
CFR	case fatality ratio
CNS	central nervous system
CO	cardiac output
CO_2	carbon dioxide
COPD	chronic obstructive pulmonary disease
CPAP	continuous positive airway pressure
CPOT	Critical-Care Pain Observation Tool
CR	capillary refill
CVC	central venous catheter
CVP	central venous pressure
DBP	diastolic blood pressure
DVT	deep venous thrombosis
ECG	electrocardiogram
ECMO	extracorporeal membrane oxygenation
EN	enteral nutrition
ESBL	extended spectrum beta-lactamase
ESI	emergency severity index
ETAT	emergency triage assessment and treatment

ETT	endotracheal tube
FiO_2	fraction of inspired oxygen
FLACC	face, legs, activity, cry, consolability
Hb	haemoglobin
HFNC	high-flow nasal cannula
HR	heart rate
ICP	intracranial pressure
ICRC	International Committee of the Red Cross
ICU	intensive care unit
ILI	influenza-like illness
IM	intramuscular
IMAI	integrated management of adolescent and adult illness
IMV	invasive mechanical ventilation
IO	intraosseous
IPC	infection prevention and control
IV	intravenous
JVP	jugular venous pressure
LPV	lung protective ventilation
LR	lactated Ringer's
LRT	lower respiratory tract
MAP	mean arterial pressure
MERS-CoV	Middle East respiratory syndrome coronavirus
MEWS	Modified Early Warning Score
MRSA	methicillin-resistance *Staphylococcus aureus*
NEWS	National Early Warning Score (adults)
NG	nasogastric
NIV	non-invasive ventilation
NMB	neuromuscular blockers
NS	normal saline
NYHA	New York Heart Association
OG	orogastric
PALS	paediatric advanced life support
PaO_2	partial pressure arterial oxygen
pARDS	paediatric acute respiratory distress syndrome
PBW	predicted body weight
pCAM-ICU	confusion assessment method for the intensive care unit for children
PCR	polymerase chain reaction
PEEP	positive end-expiratory pressure
PEWS	Paediatric Early Warning Score

PLR	passive leg raising
po	per os
PPE	personal protective equipment
Pplat	plateau airway pressure
pr	per rectum
PRBC	packed red blood cells
RASS	Richmond Agitation-Sedation Scale
RM	recruitment manoeuvre
ROM	range of motion
RR	respiratory rate
RSI	rapid sequence intubation
RSV	respiratory syncytial virus
RT-PCR	reverse transcription polymerase chain reaction
SARI	severe acute respiratory infection
SAT	spontaneous awakening trial
SBP	systolic blood pressure
SBT	spontaneous breathing trial
$ScvO_2$	saturation of central venous blood
SIRS	systemic inflammatory response syndrome
SOFA	sequential organ failure assessment
SpO_2	oxygen saturation
TV	tidal volume
URT	upper respiratory tract
UTI	urinary tract infection
VAP	ventilator-associated pneumonia
VAS	visual analogue scale
VTE	venous thromboembolism
WHO	World Health Organization

1 Epidemiology

1 Epidemiology

Summary

Coronavirus disease 2019 (COVID-19) is a respiratory tract infection caused by a newly emergent coronavirus, that was first recognized in Wuhan, China, in December 2019. While most people with COVID-19 develop only mild or uncomplicated illness, approximately 14% develop severe disease that requires hospitalization and oxygen support, and 5% require admission to an intensive care unit. In severe cases, COVID-19 can be complicated by acute respiratory distress syndrome (ARDS), sepsis and septic shock, multi-organ failure, including acute kidney injury, and cardiac injury.

Tools

1.1 COVID-19 fact sheet
1.2 Other viruses with pandemic potential

References and resources

Critical preparedness, readiness and response actions for COVID-19: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/critical-preparedness-readiness-and-response-actions-for-covid-19

Country-level coordination, planning and monitoring: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/country-readiness

Surveillance, rapid response teams and case investigation: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/surveillance-and-case-definitions

National laboratories: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/laboratory-guidance

Clinical care: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/patient-management

Infection protections and control/WASH: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control

Risk communication and community engagement: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/risk-communication-and-community-engagement

Operational support and logistics: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/covid-19-critical-items

Guidance for schools, workplaces and institutions: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/guidance-for-schools-workplaces-institutions

Early investigation protocols: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/early-investigations

Virus origin/reducing animal-human transmission: https://www.who.int/health-topics/coronavirus/who-recommendations-to-reduce-risk-of-transmission-of-emerging-pathogens-from-animals-to-humans-in-live-animal-markets

Points of entry/mass gatherings: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/points-of-entry-and-mass-gatherings

Naming the coronavirus disease (COVID-19): https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it

Humanitarian operations, camps and other fragile settings: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/humanitarian-operations-camps-and-other-fragile-settings

Health workers: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/health-workers

Maintaining essential health services and systems: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/maintaining-essential-health-services-and-systems

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1.1 COVID–19 fact sheet

COVID-19

Zoonotic infection

Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus (SARS-CoV-2 or the COVID-19 virus), most similar genetically to the SARS coronavirus and is thought to originate bats, with other reservoir hosts unknown.

Cases

- The first cases were reported in December 2019 in China, with SARS-CoV-2 identified in early January.
- Since then cases have been reported in virtually all countries, and a pandemic and Public Health Emergency of International Concern has been declared by WHO on 30 January.
- The latest epidemiology and case counts are available in COVID-19 WHO situation reports (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports).
- The latest technical guidance can be found at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance

Transmission

- The COVID-19 virus is a zoonotic virus, meaning that it can be transmitted between animals and humans. The intermediary animal host has not yet been identified.
- The COVID-19 virus is spread between people mainly via inhalation of respiratory droplets from coughing or sneezing, but can also be passed through fomite/contact.
- Nosocomial transmission can occur where there is inadequate infection prevention and control (IPC) measures including personal protective equipment (PPE) use during close contact with infected individuals.
- The median incubation period is about 5–6 days (range: 1–14 days). The infectious period is unclear but may be 24–48 hours before symptoms appear, with high virus levels being detected in the upper respiratory tract early in the disease course. Virus is still detected in the upper and lower respiratory tract by PCR for several days after symptoms have resolved.
- The role of asymptomatic infection in transmission is unclear, but it has been identified in case reports and is thought to represent a minority of overall human to human transmission events.
- Aerosol-generating procedures present additional risk in health care settings, requiring higher levels of respiratory protection.

Clinical features

- Clinical features range from mild ARI and in some cases, SARI with progressive organ failure, sepsis (10–20%) and ARDS (3–5%). Overall case fatality ratios (CFR) of 1–6% have been reported from some countries.
- According to data from China, approximately 80% of people will have mild (40%) to moderate (40%) disease and recover. Moderate disease will include a mild form of pneumonia.
- More severe disease and higher CFRs have been seen in the elderly (over 60 years old) and those with chronic medical conditions, with clinical deterioration occurring at around day 7 of illness. Children appear to mainly have mild disease.
- The most common clinical features include fever, cough, malaise and shortness of breath.
- Bilateral infiltrates and ground-glass changes are the most commonly reported signs on chest-X-ray and CT imaging, with lymphopenia frequently seen in blood tests.

Prevention

- For all individuals, proper hand washing techniques, respiratory hygiene, social distancing and limiting contact with symptomatic individuals are the main preventative measures.
- In health care settings, enhanced IPC measures are required including appropriate use of PPE (gown, gloves, medical mask eye protection), and addition of airborne precautions (N95/FFP2/3 if AGP) when performing aerosol-generating procedures.

Treatment

- No specific vaccine or treatment is available for COVID-19 but clinical trials are ongoing.
- Optimized supportive care delivery is the mainstay of treatment, with supplemental oxygen therapy required by up to 20% of infections (severe disease).
- Early recognition of those with (or at risk of) severe disease, and access to critical care interventions is key.
- Diagnosis and treatment of co-infections (e.g. respiratory viral and secondary bacterial infections) are important, as is testing for other endemic diseases that can cause undifferentiated febrile illness such as malaria.
- Discharge from hospitals is generally after clinical recovery and two negative PCR swabs > 24 hours apart.

1.2 Other viruses with pandemic potential

Pandemic influenza

- Unpredictable
- Disease and death worldwide
- Pandemic waves
- Little or no immunity
- No vaccine available until months after pandemic begins

Seasonal influenza

- Yearly
- Epidemics
- Some immunity already
- Young children and the elderly are most often at risk
- Vaccine available in some countries

Human infection

Seasonal influenza viruses include A(H1N1), A(H3N2), B, C.

- These circulate worldwide and spread easily from person to person.
- Can cause annual epidemics that peak during winter in temperate climates or cause irregular outbreaks in tropical regions.
- The burden of infection takes a toll on public health through lost workforce productivity and strain on health services.
- Estimated 3–5 million people affected during annual epidemics, resulting in 250 000–500 000 deaths.
- In developed countries, more deaths observed in the elderly while in lesser developed countries there is a higher burden of death from influenza virus infection in children.

Transmission

- Via inhalation of respiratory droplets from coughing or sneezing. Droplets travel ≤ 1 m through the air.
- Close contacts of infected individuals can inhale these droplets and become infected.
- The incubation period is about 2 days. Infectious 1 day before symptoms appear and up to 1 day after symptoms go away.
- Children shed virus longer than adults.
- The estimated attack rate is 5–20% and higher in densely populated communities and schools.

Clinical features

- Uncomplicated acute respiratory infection (ARI) with high fever, cough and viral syndrome that commonly lasts for 1 week and does not require medical attention.
- Can also cause severe illness with pneumonia, sepsis, acute respiratory distress syndrome (ARDS); seen more in patients at high risk (children less than 2 years of age, the elderly, pregnant woman and those with chronic medical conditions).

Experiences from p(H1N1) influenza 2009

- Higher hospitalization rate, especially in young children aged < 5 years (2–3 times that of other age groups). 7–10% hospitalized cases were pregnant women in second/third trimester. Higher proportion of hospitalized patients required intensive care (range 10–39%). Mortality rates were highest in those aged 50–60 years.

Prevention

- Annual vaccination recommended for pregnant women, children aged 6 months to 5 years, elderly (≥ 65 years), individuals with chronic medical conditions and health care workers.

Treatment

- Neuraminidase inhibitors (i.e. oseltamivir) are active against all circulating strains of seasonal influenza and should be given as soon as possible to patients with severe acute respiratory infection (SARI), and those high-risk patients with uncomplicated ARI.

Avian influenza

Zoonotic infection

Avian influenza viruses infect birds, mostly geese and ducks, but also infect poultry and have potential to cause serious disease in humans.

Highly pathogenic avian influenza (H5N1)

- First human outbreak in1997 (Hong Kong SAR, China) and since then there have been 861 cases with 455 deaths (June 2019).
- Since 2010, cases have been reported in: Cambodia, China, Egypt, Indonesia, Thailand, Turkey and Viet Nam; and small numbers in Azerbaijan, Bangladesh, Canada, Djibouti, Iraq, Lao People's Democratic Republic, Myanmar, Nepal, Nigeria and Pakistan.

Low pathogenic avian influenza (H7N9)

- First human outbreak in 2013 (China) and there have been 1562 laboratory-proven cases (September 2017); current number of deaths uncertain but in 2015 there had been 212 deaths out of 571 cases.
- Most cases are in mainland China, and some in Hong Kong SAR and Taipei, Taiwan, China; in addition, travellers returning from China have been detected with the virus in Canada and Malaysia.

Transmission

- Mostly sporadic cases with direct or indirect contact with infected live or dead poultry or contaminated environments.
- Limited human-to-human transmission in blood relatives.

Clinical features

- Asymptomatic infection is rare, based on serological studies.
- SARI and rapid progression to ARDS and multi-organ failure.
- Avian influenza (H7N9) particularly affects people with underlying medical conditions.

Prevention

- Disease control in animals, avoid direct and prolonged exposure to infected animals.

Treatment

- No vaccine is available. Early treatment with neuraminidase inhibitor, as soon as possible.

MERS-CoV

Zoonotic infection

Coronavirus whose primary reservoir is dromedary camels, with origination in bats. Similar strains isolated from camels in Egypt, Oman, Qatar and Saudi Arabia.

Cases

- First case reported in March 2012 (Saudi Arabia). Since, cases have been reported in 27 countries. 83% of cases have been in Saudi Arabia. There was a large outbreak in the Republic of Korea in 2015; and moderate numbers have occurred in Jordan, Oman, Qatar and the United Arab Emirates.
- To date, there are 2449 laboratory-confirmed cases and 845 deaths (August 2019).

Transmission

- Camel-human transmission route is unknown.
- Human-human transmission has been limited to health care settings when inadequate infection prevention and control (IPC) measures during close contact with infected individual.
- No sustained community transmission reported.

Clinical features

- Ranges from asymptomatic to mild ARI and, in some cases, SARI with progressive organ failure, sepsis and ARDS.
- More severe disease seen in the elderly, immunosuppressed and those with chronic medical conditions.

Prevention

- When visiting areas where camels are present, use proper hand washing techniques. Avoid contact with sick camels. Avoid eating raw meat or unpasteurized milk.

Treatment

- No specific vaccine or treatment is available. Experimental protocols are available.

2 Screening, triage and initial approach

2 Screening, triage and initial approach

Summary

Screen and triage at all points of access to the health system, including primary health centres, clinics, hospital emergency units, and ad hoc community settings.

Set up a COVID-19 telephone hotline and referral system to refer patients to the appropriate destination for clinical assessment and/or testing as per local protocol.

Care for all COVID-19 patients in the designated treatment area, according to disease severity and acute care needs. For example, patients with mild or moderate disease (no risk factors) should be instructed to self-isolate and contact the COVID-19 information line for advice on testing and referral. These patients can be isolated (cohorted) at a health facility (if resources allow), community facility with rapid access to health advice or at home according to WHO guidance. Patients with moderate (high-risk group) or severe disease, should be instructed to call the COVID-19 hotline for emergency referral as soon as possible and be isolated and transferred to hospital for inpatient care.

At all first points of access to the health system, apply appropriate infection prevention and control (IPC) precautions at triage to prevent the spread of illness to health care workers or other patients.

For triage use a validated acuity-based triage tool to prioritize patients that need immediate care.

Patients with severe acute respiratory infection (SARI) associated with COVID-19 need acute care in hospital because of complications such as severe pneumonia, sepsis, organ dysfunction, and exacerbation of chronic disease or co-infection.

Patients with SARI associated with COVID-19 can progress to acute organ failure that requires critical care and admission to the intensive care unit (ICU) for intensive monitoring and supportive therapies that cannot be delivered on a general ward. Do not delay ICU admission.

Tools

2.1 Screening and triage
2.2 Interagency Integrated Triage Tool
2.3 Basic emergency care (BEC): ABCDE approach to the acutely ill
2.4 Memory aid: key criteria used to assess nutrition and vital signs in children
2.5 Memory aid for pregnant women: key physiological aspects
2.6 Decision-making algorithm for patient presenting with acute respiratory infection (influenza or COVID-19 suspected or known to be circulating)
2.7 Decision-making algorithm for hospitalization of patient with pneumonia (influenza or COVID-19 known to be circulating)
2.8 Decision-making support tool for hospitalization and ICU admission for patients with severe acute respiratory infection and severe pneumonia
2.9 Checklist for admission
2.10 Checklist for transfer

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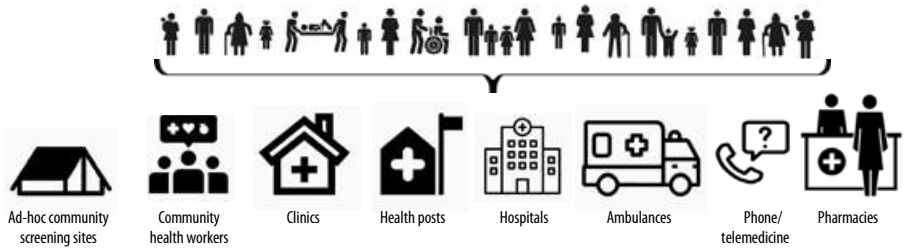
2.1 Screening and triage

Triage refers to the sorting of patients based on specific criteria and can be performed at any point of access to the health care system, including in both pre-hospital and facility-based settings. **Acuity-based triage** is the sorting of patients based on the estimation of their severity. This is used as the basis for identifying those patients who require immediate medical intervention and those who can safely wait, or those who may need to be transported to a specific destination based on their condition. **Acuity-based triage is the standard method of sorting patients in the medical setting.**

The concept of triage has been around for a long time and has led to many different triage tools being created over the years. The **Interagency Integrated Triage Tool** is one that can be utilized for facility-based routine triage, facility-based mass casualty triage (for any situation in which there is a surge of patients coming to a facility) and pre-hospital triage. See www.who.int/emergencycare or contact emergencycare@who.int for more information.

SCREEN FOR COVID-19 AT FIRST POINT OF ACCESS TO THE HEALTH SYSTEM

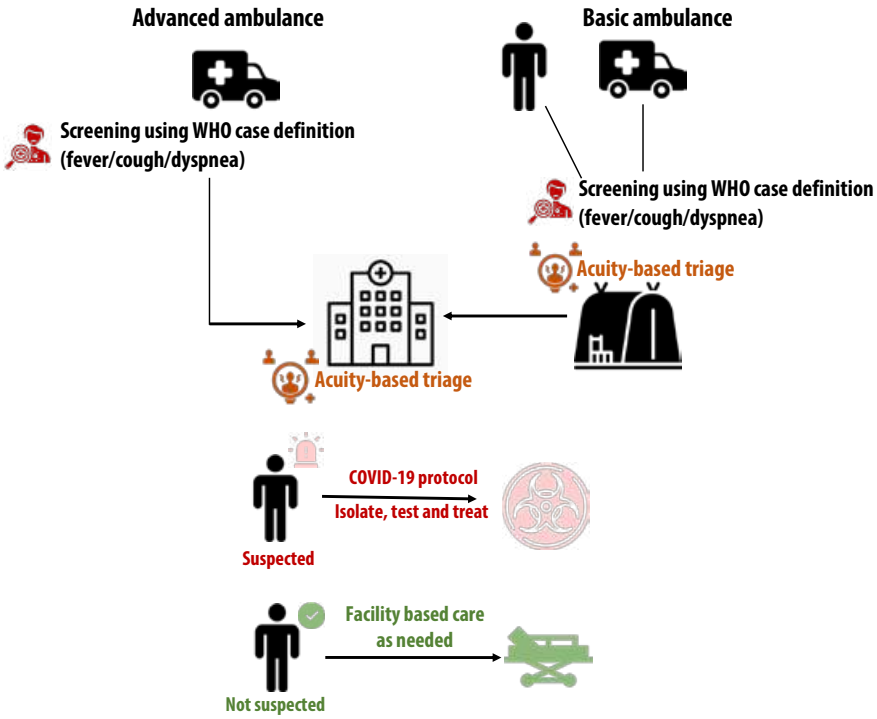


APPLY WHO CASE DEFINITION
(fever, cough, dyspnea)

Patients suspected to have COVID-19	Patients NOT suspected to have COVID-19
Refer to appropriate facility or testing site as per local protocol	Management as per local protocol (routine management or referral as per reorganization of service delivery)

***All patients should be screened for COVID-19 using WHO Case Definitions at the first point they access the health system.**

TRIAGE AT FACILITY



Source: https://apps.who.int/iris/bitstream/handle/10665/331492/WHO-2019-nCoV-HCF_operations-2020.1-eng.pdf

Interagency Integrated Triage Tool: ≥12 years

1 CHECK FOR RED CRITERIA

- Unresponsive

AIRWAY & BREATHING
- Stridor
- Respiratory distress* or central cyanosis

CIRCULATION
- Capillary refill >3 sec
- Weak and fast pulse
- Heavy bleeding
- HR <50 or >150

DISABILITY
- Active convulsions
- Any two of:
  - Altered mental status
  - Hypothermia or fever
  - Stiff neck
  - Headache
- Hypoglycaemia

OTHER
- High-risk trauma*
- Poisoning/ingestion or dangerous chemical exposure*
- Threatened limb*
- Snake bite
- Acute chest or abdominal pain (>50 years old)
- ECG with acute ischaemia (if done)
- Violent or aggressive

PREGNANT WITH ANY OF:
- Heavy bleeding
- Severe abdominal pain
- Seizures or altered mental status
- Severe headache
- Visual changes
- SBP ≥160 or DBP ≥110
- Active labour
- Trauma

YES

MOVE TO HIGH ACUITY RESUSCITATION AREA IMMEDIATELY

*See Reference Card

NO

2 CHECK FOR YELLOW CRITERIA

AIRWAY & BREATHING
- Any swelling/mass of mouth, throat or neck
- Wheezing (no red criteria)

CIRCULATION
- Vomits everything or ongoing diarrhoea
- Unable to feed or drink
- Severe pallor (no red criteria)
- Ongoing bleeding (no red criteria)
- Recent fainting

DISABILITY
- Altered mental status or agitation (no red criteria)
- Acute general weakness
- Acute focal neurologic complaint
- Acute visual disturbance
- Severe pain (no red criteria)

OTHER
- New rash worsening over hours or peeling (no red criteria)
- Visible acute limb deformity
- Open fracture
- Suspected dislocation
- Other trauma/burns (no red criteria)
- Known diagnosis requiring urgent surgical intervention
- Sexual assault
- Acute testicular/scrotal pain or priapism
- Unable to pass urine
- Exposure requiring time-sensitive prophylaxis (eg. animal bite, needlestick)
- Pregnancy, referred for complications

YES

MOVE TO CLINICAL TREATMENT AREA

NO

Patients with high-risk vital signs or clinical concern need up-triage or immediate review by supervising clinician

YES

3 CHECK FOR HIGH-RISK VITAL SIGNS

- HR <60 or >130
- RR <10 or >30
- Temp <36° or >39°
- SpO2 <92%
- AVPU other than A

NO

MOVE TO LOW ACUITY OR WAITING AREA

Developed by World Health Organization, The International Committee of the Red Cross, Médecins Sans Frontières

Interagency Integrated Triage Tool: < 12 years

1 CHECK FOR RED CRITERIA

- Unresponsive

AIRWAY & BREATHING
- Stridor
- Respiratory distress* or central cyanosis

CIRCULATION
- Capillary refill >3 sec
- Weak and fast pulse
- Heavy bleeding
- Cold extremities
- Any two of:
  - Lethargy
  - Sunken eyes
  - Very slow skin pinch
  - Drinks poorly

DISABILITY
- Active convulsions
- Altered mental status (confused, restless, continuously irritable or lethargic) with stiff neck, hypothermia or fever
- Hypoglycaemia (if known)

OTHER
- Any infant <8 days old
- Age <2 months and temp <36 or >39°C
- High-risk trauma*
- Threatened limb*
- Acute testicular/scrotal pain or priapism
- Snake bite
- Poisoning/ingestion or dangerous chemical exposure*
- Pregnant with adult red criteria

YES

MOVE TO HIGH ACUITY RESUSCITATION AREA IMMEDIATELY

NO

2 CHECK FOR YELLOW CRITERIA

AIRWAY & BREATHING
- Any swelling/mass of mouth, throat or neck
- Wheezing (no red criteria)

CIRCULATION
- Unable to feed or drink
- Vomits everything
- Ongoing diarrhoea
- Dehydration
- Severe pallor (no red criteria)

DISABILITY
- Restless, continuously irritable or lethargy
- Severe pain

OTHER
- Any infant 8 days to 6 months old
- Malnutrition with visible severe wasting OR oedema of both feet
- Trauma/burn (no red criteria)
- Sexual assault
- Known diagnosis requiring urgent surgical intervention
- New rash worsening over hours or peeling (no red criteria)
- Exposure requiring time-sensitive prophylaxis (e.g. animal bite)
- Pregnancy (no red criteria)
- Headache (no red criteria)

YES

MOVE TO CLINICAL TREATMENT AREA

NO

Patients with high-risk vital signs or clinical concern need up-triage or immediate review by supervising clinician

YES

3 CHECK FOR HIGH-RISK VITAL SIGNS

Temp <36° or >39°

SpO2 < 92%

AVPU other than A

RR	< 1 year	1-4 years	5-12 years
High	50	40	30
Low	25	20	10
HR	**< 1 year**	**1-4 years**	**5-12 years**
High	180	160	140
Low	< 90	< 80	< 70

NO

MOVE TO LOW ACUITY OR WAITING AREA

*See Reference Card

Developed by World Health Organization, International Committee of the Red Cross, Médecins Sans Frontières

High-Risk Trauma Criteria

General Trauma	Road Traffic
Fall from twice person's height	High speed motor vehicle crash
Penetrating trauma excluding distal to knee/ elbow with bleeding controlled	Pedestrian or cyclist hit by vehicle
Crush injury	Other person in same vehicle died at scene
Polytrauma (injuries in multiple body areas)	Motor vehicle crash without a seatbelt
Patient with bleeding disorder or on anticoagulation	Trapped or thrown from vehicle (including motorcycle)
Pregnant	

Major Burns

(the below criteria refer to partial or full thickness burns)	
Greater than 15% body surface area	Inhalation injury
Circumferential or involving face or neck	Any burn in age < 2 or age > 70

Threatened Limb

A patient presenting with a limb that is:

- Pulseless OR
- Painful and one of the following: pale, weak, numb, or with massive swelling after trauma.

Other High-Risk Criteria

Signs of Respiratory Distress

Adult	Child
Very fast or very slow breathing	Very fast breathing
Inability to talk or walk unaided	Inability to talk, eat or breastfeed
Confused, sleepy or agitated	Nasal flaring, grunting
Accessory muscle use (neck, intercostal, abdominal)	Accessory muscle use (e.g., head nodding, chest indrawing)

Ingestion/exposure

Use of clinical signs alone may not identify all those who need time-dependent intervention. Patients with high risk ingestion or exposure should initially be up-triaged to Red for early clinical assessment.

2.3 Basic emergency care (BEC): ABCDE approach to the acutely ill

WHO/ICRC/IFEM ***Basic emergency care (BEC): approach to the acutely ill and injured*** is an open-access training course for front-line health care providers who manage acute illness and injury with limited resources, including students, nurses, pre-hospital technicians, clinical officers and doctors who are working in field (pre-hospital) or hospital settings. BEC integrates guidance from WHO *Emergency triage assessment and treatment (ETAT)* and the *Integrated management of adolescent and adult illness (IMAI) district clinician manual* and teaches a systematic approach to the initial assessment and management of four time-sensitive conditions – difficulty in breathing, shock, altered mental status and injury – where early intervention saves lives.

Because emergency care providers must respond to "undifferentiated" patients, those with acute symptoms for which the cause may not be known, BEC teaches a simple, systematic ABCDE approach to managing acute, potentially life-threatening conditions even before a diagnosis is known.

Patients who are acutely ill due to a severe acute respiratory infection may present with any of three life-threatening conditions: difficulty in breathing, shock or altered mental status. The following "quick cards" from BEC summarize the initial approach to assessment and management of key findings from the ABCDE approach. See www.who.int/emergencycare or contact emergencycare@who.int for more information.

ABCDE APPROACH

	ASSESSMENT FINDINGS	IMMEDIATE MANAGEMENT
Airway 	Unconscious with limited or no air movement	If **NO TRAUMA**: head-tilt and chin-lift, use OPA or NPA to keep airway open, place in recovery position or position of comfort. If possible **TRAUMA**: use jaw thrust with c-spine protection and place OPA to keep the airway open (no NPA if facial trauma).
	Foreign body in airway	Remove visible foreign body. Encourage coughing. • If **unable** to cough: chest/abdominal thrusts/back blows as indicated • If patient becomes unconscious: CPR
	Gurgling	Open airway as above, suction (avoid gagging).
	Stridor	Keep patient calm and allow position of comfort. • For signs of anaphylaxis: give IM adrenaline • For hypoxia: give oxygen
Breathing 	Signs of abnormal breathing or hypoxia	Give oxygen. Assist ventilation with BVM if breathing NOT adequate.
	Wheeze	Give salbutamol. For signs of anaphylaxis: give IM adrenaline.
	Signs of tension pneumothorax (absent sounds / hyperresonance on one side WITH hypotension, distended neck veins)	Perform needle decompression, give oxygen and IV fluids. Will need chest tube
	Signs of opiate overdose (AMS and slow breathing with small pupils)	Give naloxone.
Circulation 	Signs of poor perfusion/shock	If **no pulse**, follow relevant CPR protocols. Give oxygen and IV fluids.
	Signs of internal or external bleeding	Control external bleeding. Give IV fluids.
	Signs of pericardial tamponade (poor perfusion with distended neck veins and muffled heart sounds)	Give IV fluids, oxygen. Will need rapid pericardial drainage
Disability 	Altered mental status (AMS)	If NO TRAUMA, place in recovery position.
	Seizure	Give benzodiazepine.
	Seizure in pregnancy (or after recent delivery)	Give magnesium sulphate.
	Hypoglycaemia	Give glucose if <3.5 mmol/L or unknown.
	Signs of opiate overdose (AMS with slow breathing with small pupils)	Give naloxone.
	Signs of life-threatening brain mass or bleed (AMS with unequal pupils)	Raise head of bed, monitor airway. Will need rapid transfer for neurosurgical services
Exposure 	Remove wet clothing and dry skin thoroughly.	
	Remove jewelry, watches and constrictive clothing	
	Prevent hypothermia and protect modesty.	
	Snake bite	Immobilize extremity. Send picture of snake with patient. Call for anti-venom if relevant.

If cause unknown, remember trauma: Examine the entire body and always consider hidden injuries [see also TRAUMA card]

REMEMBER: PATIENTS WITH ABNORMAL ABCDE FINDINGS MAY NEED RAPID HANDOVER/TRANSFER. PLAN EARLY.

NORMAL ADULT VITAL SIGNS

Pulse rate: 60–100 beats per minute
Respiratory rate: 10–20 breaths per minute
Systolic blood pressure >90 mmHg
Oxygen Saturation > 92%

Estimating systolic blood pressure
(not reliable in children and the elderly):
Carotid (neck) pulse → SBP ≥ 60 mmHg
Femoral (groin) pulse → SBP ≥ 70 mmHg
Radial (wrist) pulse → SBP ≥80 mmHg

SAMPLE History

Signs & Symptoms
Allergies
Medications
PMH
Last oral intake
Events

SPECIAL CONSIDERATIONS IN THE ASSESSMENT OF CHILDREN

- Children have bigger heads and tongues, and shorter, softer necks than adults. Position airway as appropriate for age.
- Always consider foreign bodies.

- Look for signs of increased work of breathing (e.g. chest indrawing, retractions, nasal flaring).
- Listen for abnormal breath sounds (e.g. grunting, stridor, or silent chest).

AGE	RESPIRATORY RATE (breaths per minute)
<2 months	40–60
2–12 months	25–50
1–5 years	20–40

- Signs of poor perfusion in children include: slow capillary refill, decreased urine output, lethargy, sunken fontanelle, poor skin pinch
- Look for signs of anaemia and malnourishment (adjust fluids).
- Remember that children may not always report trauma and may have serious internal injury with few external signs.

AGE (in years)	NORMAL HEART RATE (beats per minute)
<1	100–160
1–3	90–150
4–5	80–140

- Always check AVPU
- Hypoglycaemia is common in ill children.
- Check for tone and response to stimulus.
- Look for lethargy or irritability.

INFANTS AND CHILDREN HAVE DIFFICULTY MAINTAINING TEMPERATURE

- Remove wet clothing and dry skin thoroughly. Place infants skin-to-skin when possible.
- For hypothermia, cover the head (but be sure mouth and nose are clear).
- For hyperthermia, unbundle tightly wrapped babies.

DANGER SIGNS IN CHILDREN

- Signs of airway obstruction (unable to swallow saliva/ drooling or stridor)
- Increased breathing effort (fast breathing, nasal flaring , grunting, chest indrawing or retractions)
- Cyanosis (blue colour of the skin, especially at the lips and fingertips)
- Altered mental status (including lethargy or unusual sleepiness, confusion, disorientation)
- Moves only when stimulated or no movement at all (AVPU other than "A")
- Not feeding well, cannot drink or breastfeed or vomiting everything
- Seizures/convulsions
- Low body temperature (hypothermia)

ESTIMATED WEIGHT in KILOGRAMS for CHILDREN 1–10 YEARS OLD:

[age in years + 4] x 2

APPROACH TO THE PATIENT WITH DIFFICULTY IN BREATHING

Key ABCDE Findings (Always perform a complete ABCDE approach first!)

IF YOU FIND...	REMEMBER...
Choking, coughing	Foreign body
Stridor	Partial airway obstruction due to foreign body or inflammation (from infection, chemical exposure or burn)
Facial swelling	Severe allergic reaction, medication effect
Drooling	Indicates a blockage to swallowing
Soot around the mouth or nose, burned facial hair, facial burns	Smoke inhalation and airway burns – rapid swelling can block the airway
Signs of chest wall trauma	Rib fracture, flail chest, pneumothorax, contusion, tamponade
Decreased breath sounds on one side	Pneumothorax (consider tension pneumothorax if with hypotension and hyperresonance to percussion), haemothorax, large pleural effusion/pneumonia
Decreased breath sounds and crackles on both sides	Pulmonary oedema, heart failure
Wheezing	Asthma, allergic reaction, COPD
Fast or deep breathing	DKA
Low blood pressure, tachycardia, muffled heart sounds	Pericardial tamponade
Altered mental status with small pupils and slow breathing	Opioid overdose

Key Findings from the SAMPLE History and Secondary Exam

IF YOU FIND...	REMEMBER...
DIB worse with exertion or activity	Heart failure, heart attack
DIB that began with choking or during eating	Foreign body, allergic reaction
History of fever, cough	Pneumonia, infection
Pesticide exposure	Poisoning
Recent fall or other trauma	Rib fracture, flail chest, pneumothorax, contusion, tamponade
Known allergies, allergen exposure, bite or sting	Allergic reaction
Recent medication or dose change	Allergic reaction or side effect
History of opioid or sedative drug use	Overdose
History of wheezing	Asthma or COPD
History of diabetes	DKA
History of tuberculosis or malignancy	Pericardial tamponade, pleural effusion
History of heart failure	Pulmonary oedema
History of sickle cell disease	Acute chest syndrome

CRITICAL ACTIONS FOR HIGH-RISK CONDITIONS				
CHOKING ***unable to cough, not making sounds***	**STRIDOR** ***high pitched sounds on breathing IN***	**WHEEZING** ***high pitched sounds on breathing OUT***	**SEVERE INFECTION**	**TRAUMA**
Remove any visible foreign body Perform age-appropriate chest/abdominal thrusts or back blows CPR if becomes unconscious	Keep patient calm and allow position of comfort IM adrenaline for suspected allergic reaction Oxygen if concern for hypoxia Early handover/transfer for advanced airway management	Give salbutamol IM adrenaline for suspected allergic reaction Oxygen if concern for hypoxia	Oxygen Antibiotics Oral/IV fluids as appropriate	Oxygen Needle decompression and IV fluids for tension pneumothorax Three-sided dressing for sucking chest wound Rapid transfer to surgical service

SPECIAL CONSIDERATIONS IN CHILDREN	
THE FOLLOWING ARE DANGER SIGNS IN CHILDREN WITH BREATHING COMPLAINTS:	
• Fast breathing • Increased breathing effort (chest indrawing/retractions) • Cyanosis • Altered mental status (including lethargy)	• Poor feeding or drinking, or vomits everything • Seizures/convulsions, current or recent • Drooling or stridor when calm • Hypothermia
Wheezing in children is often caused by an object inhaled into the airway, viral infection or asthma.	
Stridor in children is often caused by an object stuck in the airway or airway swelling from infection.	
Fast or deep breathing can indicate diabetic crisis (DKA), which may be the first sign of diabetes in a child.	
FAST BREATHING MAY BE THE ONLY SIGN OF A SERIOUS BREATHING PROBLEM IN A CHILD.	

DISPOSITION
Salbutamol and IM adrenaline effects last for about 3 hours, and life-threatening symptoms may recur. Monitor closely, always have repeat dose available during transport and caution new providers at handover.
Naloxone lasts approximately 1 hour, and most opioids last longer. Monitor closely, always have repeat dose available during transport and caution new providers.
Following immersion in water (drowning), a person may develop delayed breathing problems after several hours. Monitor closely and caution new providers.
Never leave patients with difficulty in breathing unmonitored during handover/transfer.
Make transfer arrangements as early as possible for any patient who may require intubation or assisted ventilation.

APPROACH TO THE PATIENT WITH SHOCK

Key ABCDE Findings (Always perform a complete ABCDE approach first!)

IF YOU FIND...	REMEMBER...
Difficulty breathing, stridor/wheezing, skin rash, swelling of mouth	Severe allergic reaction
Hypotension with absent breath sounds and hyperresonance on one side, distended neck veins	Tension pneumothorax
Distended neck veins, muffled heart sounds, tachycardia, hypotension	Pericardial tamponade
Sweet smelling breath, deep or rapid breathing	DKA
History of trauma or no known cause	Hidden sources of significant blood loss (stomach, intestines, intra-abdominal, chest, long-bone trauma) or spinal injury

Key Findings from the SAMPLE History and Secondary Exam

IF YOU FIND...	REMEMBER...
Vomiting and diarrhoea	Ask about contacts and report cases per protocol.
Black or bloody vomit or stool	Stomach or intestinal bleeding
Rapid or deep breathing, dehydration, high glucose, sweet-smelling breath, history of frequent urination or known diabetes	Diabetic ketoacidosis
Burns	Severe fluid loss (calculate fluid needs based on burn size)
Fever or HIV	Infection
Recent fall or other trauma	Internal AND external bleeding
Pale conjunctiva or malnutrition	Severe anemia (adjust fluids)
Chest pain	Heart attack (give aspirin if indicated)
Vaginal bleeding	Pregnancy and non-pregnancy related bleeding
Numbness, weakness or shock that does not improve with fluids	Spinal shock (immobilize spine if indicated)

CRITICAL ACTIONS FOR HIGH-RISK CONDITIONS

For all shock:

- **Give oxygen**
- **Give IV fluids**
  - ADULTS: 1 liter RL or NS bolus
  - CHILDREN with NO severe anaemia, NO malnutrition, NO fluid overload: 10–20 ml/kg bolus
  - CHILDREN with malnutrition or severe anaemia: give 10–15 ml/kg dextrose-containing fluid **over 1 hour** and assess for fluid overload every 5 minutes.
  - For suspected heart attack with shock, give smaller boluses, and monitor closely for fluid overload.
- **Monitor vital signs, mental status, breathing and urine output**

AND for specific conditions:

SEVERE ALLERGIC REACTION	TENSION PNEUMOTHORAX	TAMPONADE	FEVER	WATERY DIARRHOEA	POSTPARTUM BLEEDING	DKA	TRAUMA
IM adrenaline Monitor for recurrence, may need repeat doses	Rapid needle decompression Transfer for chest tube	Rapid transfer to advanced provider for drainage	Antibiotics (and anti-malarials if indicated) Assess for source of infection	Full contact precautions Monitor output and continue fluids Assess for cholera and notify public health authorities	Oxytocin and uterine massage Direct pressure for perineal and vaginal tears Rapid transfer to advanced obstetric care	Close monitoring for fluid overload in children Handover/transfer for insulin	Control external haemorrhage with direct pressure, wound packing, tourniquet if indicated Calculate fluid needs based on burn size Rapid transfer for surgery/transfusion as needed

SPECIAL CONSIDERATIONS IN CHILDREN

ASSESSING SHOCK IN CHILDREN

The 2016 WHO guidelines for the care of critically ill children use the presence of three clinical features to define shock:

- Cold extremities
- Weak and fast pulse
- Capillary refill greater than 3 seconds

Additional important considerations include:

- Young children may not be able to drink enough fluid on their own.
- Children have larger surface area to volume ratio and can lose fluids more quickly than adults.
- For a child in shock WITH severe malnutrition or fluid overload, add dextrose and reduce fluids to 10–15 ml/kg over 1 hour.

In children *without* severe malnutrition, severe anaemia or fluid overload, give fluid resuscitation over 30 minutes.

WEIGHT (kg)	FLUID VOLUME (15ml/kg)
4	60
6	90
10	150
14	210
20	300
30	450

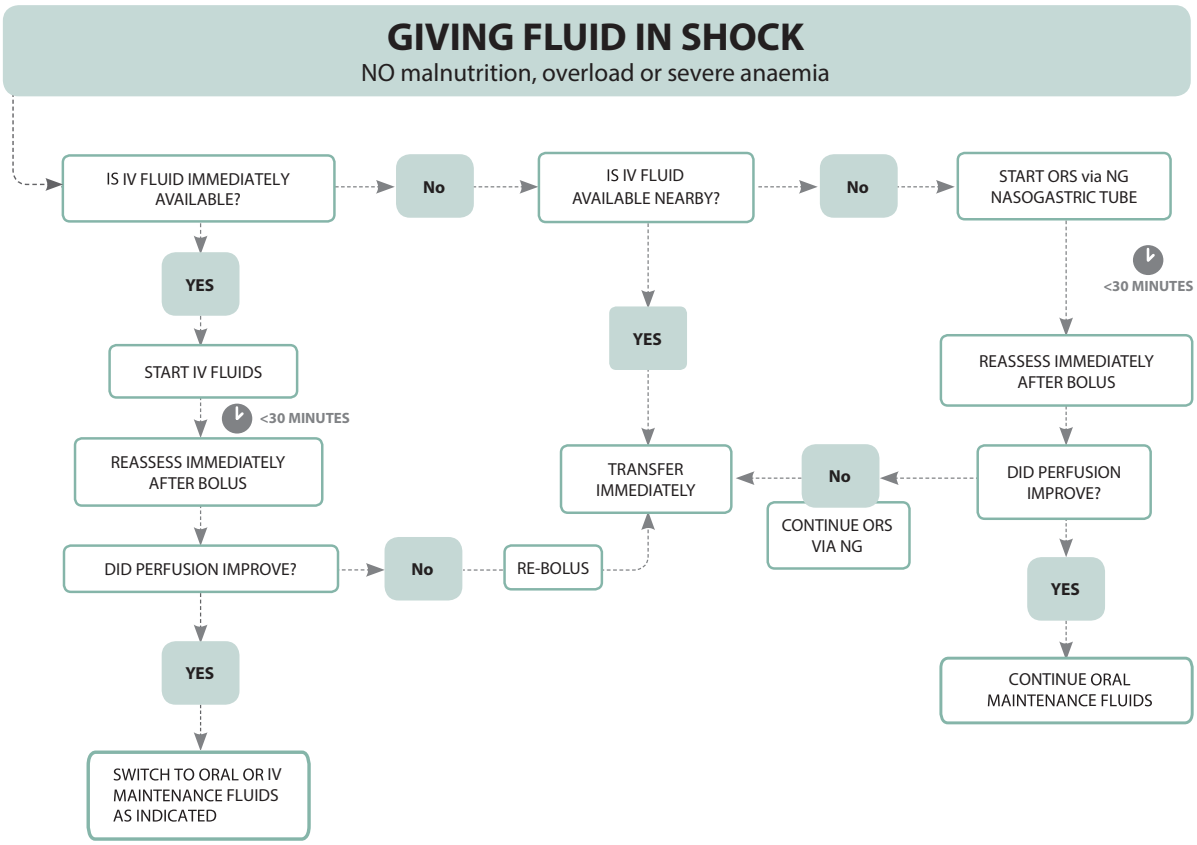
Other important signs of poor perfusion include:

- Sunken eyes; sunken fontanelles in infants
- Abnormal skin pinch test
- Pallor (dehydration with anaemia is more difficult to treat)
- Decreased and dark urine (number of nappies for infants)
- Low blood pressure
- Fast breathing
- Altered mental status
- Very dry mouth and lips
- Lethargy (excessive drowsiness, slow to respond, not interactive)

DISPOSITION

Patients with shock should be at a unit capable of providing IV fluid resuscitation, blood transfusion, and/or surgery, depending on the type of shock.

Maintain fluids during transport. Repeat ABCDE approach and monitor perfusion and breathing closely at all times.



APPROACH TO THE PATIENT WITH ALTERED MENTAL STATUS (AMS)

Key ABCDE Findings (Always perform a complete ABCDE approach first!)

IF YOU FIND...	REMEMBER...
Tachypnoea	Hypoxia, DKA, toxic ingestion
Poor perfusion/shock	Infection, internal bleeding
Tachycardia with normal perfusion	Alcohol withdrawal
Coma	Hypoxia, high or low blood glucose, DKA and toxic ingestion
Hypoglycaemia	Infection, medication side effect (eg, diabetes medications, quinine)
Very small pupils with slow breathing	Opioid overdose
Seizure/convulsion	Abnormal glucose, infection, toxic ingestion (eg, TB meds) or withdrawal (eg, alcohol). Consider eclampsia if current pregnancy or recent delivery.
Weakness on one side or unequal pupil size	Brain mass or bleed
Signs of trauma or unknown cause of AMS	Consider brain injury (with possible spine injury)

Key Findings from SAMPLE History and Secondary Exam

IF YOU FIND...	REMEMBER...
History of wheezing	Severe COPD crisis can cause AMS
History of diabetes	High or low blood sugar, DKA
History of epilepsy	Post-seizure confusion and sleepiness should improve over minutes to hours. Prolonged AMS or multiple convulsions without waking up in between require further workup.
History of agricultural work or known pesticide exposure	Organophosphate poisoning
History of regular alcohol use	Alcohol withdrawal
History of substance use or depression	Acute intoxication, accidental or intentional overdose
History of HIV	Infection, medication side effect
Rash on the lower abdomen or legs or bulging fontanelle in infants	Brain infection (meningitis)
Fever/Hyperthermia	Infectious, toxic, and environmental causes

CRITICAL ACTIONS FOR HIGH-RISK CONDITIONS (Always check blood glucose in AMS, or give glucose if unable to check.)				
HYPOGLYCAEMIA	**OPIOID OVERDOSE**	**LIFE-THREATENING INFECTIONS**	**SEVERE DEHYDRATION**	**TOXIC EXPOSURE OR WITHDRAWAL**
Give glucose Evaluate for infection Monitor for return of hypoglycaemia	Naloxone Monitor need for repeat doses (many opioids last longer than naloxone)	IV fluids Antibiotics For AMS with fever or rash, consider brain infection (meningitis) – isolate patient and wear mask. Cool if indicated for very high fever (avoid shivering).	IV fluids Assess for infection Consider DKA	Gather history and consult advanced provider for locally-appropriate antidotes. Treat alcohol withdrawal with benzodiazepine. Decontaminate for chemical exposures (eg, pesticides).

PAEDIATRIC CONSIDERATIONS	
ALWAYS consider unwitnessed toxic ingestion	Ask about any medications in the household, and any chemicals (eg cleaning products, antifreeze) in or near the house.
Check and regularly re-check blood glucose	Low blood glucose is common in ill young children. High blood glucose can present with AMS and dehydration.
AVOID hypothermia	Keep skin-to-skin with mother, cover child's head. Uncover only the parts you need to see, one at a time, during exam.
Danger signs with ingestions • Stridor • Oral chemical burns	Monitor closely and arrange handover/transfer for advanced airway management.
Monitor fluid status closely	Paediatric patients are more susceptible to both fluid losses and fluid overload.

DISPOSITION CONSIDERATIONS
Patients with AMS who may not be able to protect the airway should never be left alone. Monitor closely and give direct handover to new provider.
Naloxone lasts approximately 1 hour. Most opioids last longer-- always alert new providers that patients may need repeat doses.
Hypoglycaemia often recurs. Alert new providers to monitor blood glucose frequently in any patient who has been treated for hypoglycaemia.

Source: WHO/ICRC/IFEM *Basic emergency care (BEC): approach to the acutely ill and injured,* quick cards (2018).

2.4 Memory aid: key criteria used to assess nutrition and vital signs in children

	Age				
	< 1 month	1 month – 1 year	1–5 years	5–12 years	> 12 years
Normal RR/min	30–40	30–40	20–30	20–25	12–20
RR/min in severe distress	> 60 or < 20	> 50 or < 10	> 40	> 40	> 40
Normal heart rate (HR)/min	120–180	120–180	100–140	90–140	90–140
Normal SBP (mmHg)	60	80	90 + (2 × age)		120
Lower limit SBP (mmHg)	50	70	70 + (2 × age)		90
Normal urine output	1–2 mL/kg/hr		1 mL/kg/hr		0.5–1 mL/kg/hr

Key tips for assessing a sick child

Blood pressure measurement in children
- Cuff should cover ⅔ to ¾ of the upper arm, calf or thigh.
- Cuffs that are too small give falsely high readings.
- Cuffs that are too large give falsely low readings.
- Child should be at rest and not distressed as this will falsely elevate the reading.

To perform capillary refill (CR) assessment
- Press the nail bed of finger or thumb (peripheral CR) or over the sternum (central CR) for 3 seconds.
- Release and count in seconds the time taken for the return of colour (perfusion).

Weight estimates in children
It is always best to weigh children rather than estimate their weight. In an emergency, weight can be estimated in visibly well-nourished children.
- Term infants: 2.5–4.5 kg.
- Estimate at 6 months of age: 5–7 kg.
- Estimate after 1 year of age – (age in years + 4) × 2 kg.

Criteria to define severe malnutrition
- Clinical signs of severe malnutrition: visible ribs and no fat on the buttocks, thighs, arms or shoulders.
- Mid-upper arm circumference < 11.5 cm.
- Bilateral pedal oedema.
- Severe wasting: < 70% weight-for-length or -3SD on charts – *Pocket book of hospital care for children* (WHO, 2013).

Signs of respiratory distress
- Fast RR (normal ranges in table above).
- Nasal flaring, grunting.
- Intercostal recession and tracheal tug.
- Indrawing of the lower chest wall (very severe).
- Central cyanosis of the lips and tongue (very severe).
- Inability to breastfeed, drink (very severe).
- Lethargy (very severe).

2.5 Memory aid for pregnant women: key physiological aspects

Immune system

- May increase susceptibility to intracellular pathogens such as viruses.
- Changes persist following the end of pregnancy.

Cardiovascular

- Blood volume increases by 40–50% causing dilutional anaemia and decreased oncotic pressure.
- Cardiac output increases by 30–50%.
- Heart rate increases by 10–20 beats per minute (bpm).
- Blood pressure decreases by 5–10 mmHg systolic and 10–15 mmHg diastolic. But after 24 weeks' gestation, gradually increases to non-pregnant level by term.
- Systemic vascular resistance decreases by 20%.

Respiratory

- Increased tidal volume (TV) and minute ventilation. Chronic compensated respiratory alkalosis.
- **No change** in RR, tachypnea is **not** a normal variant of pregnancy!
- Vital capacity is unchanged.
- Increased oxygen consumption to 20–40% above non-pregnant levels.
- Decreased oxygen reserve makes pregnant patient more susceptible to effects of respiratory compromise.

Maternal–fetal dyad

- Fetus completely dependent on placenta for oxygen, nutrition and waste removal.
- Placenta is dependent on maternal blood cardiac output (500–800 mL of blood or 17% cardiac output goes to uterus every minute).
- With maternal compromise, blood flow will shunt away from uterus and this can occur before discernible maternal haemodynamic changes.
- If maternal oxygen or blood pressure decreases, the placenta will not be able to maintain adequate perfusion or oxygenation and the fetus will become distressed.

Tips for managing respiratory distress

- Keep SpO_2 > 92–95%.
- Do not delay intubation for worsening respiratory distress. Be prepared for difficult airway!

Tips for managing hypotension

- Ensure adequate resuscitation but avoid fluid overload.
- Do not lay flat. Position with lateral tilt (elevate either hip 10–12 cm) to augment venous return to heart.
- Cautious vasopressor use as risk of reducing uterine perfusion, must monitor fetus.

Tips regarding antimicrobial therapy

- For suspected influenza virus infection, it is **safe** to treat with oseltamivir and give as soon as possible.
- Also give antibiotics – penicillins, cephalosporins and macrolides are appropriate in pregnancy.
- Avoid flouroquinolones and doxycycline if possible.

Tips regarding preterm labour

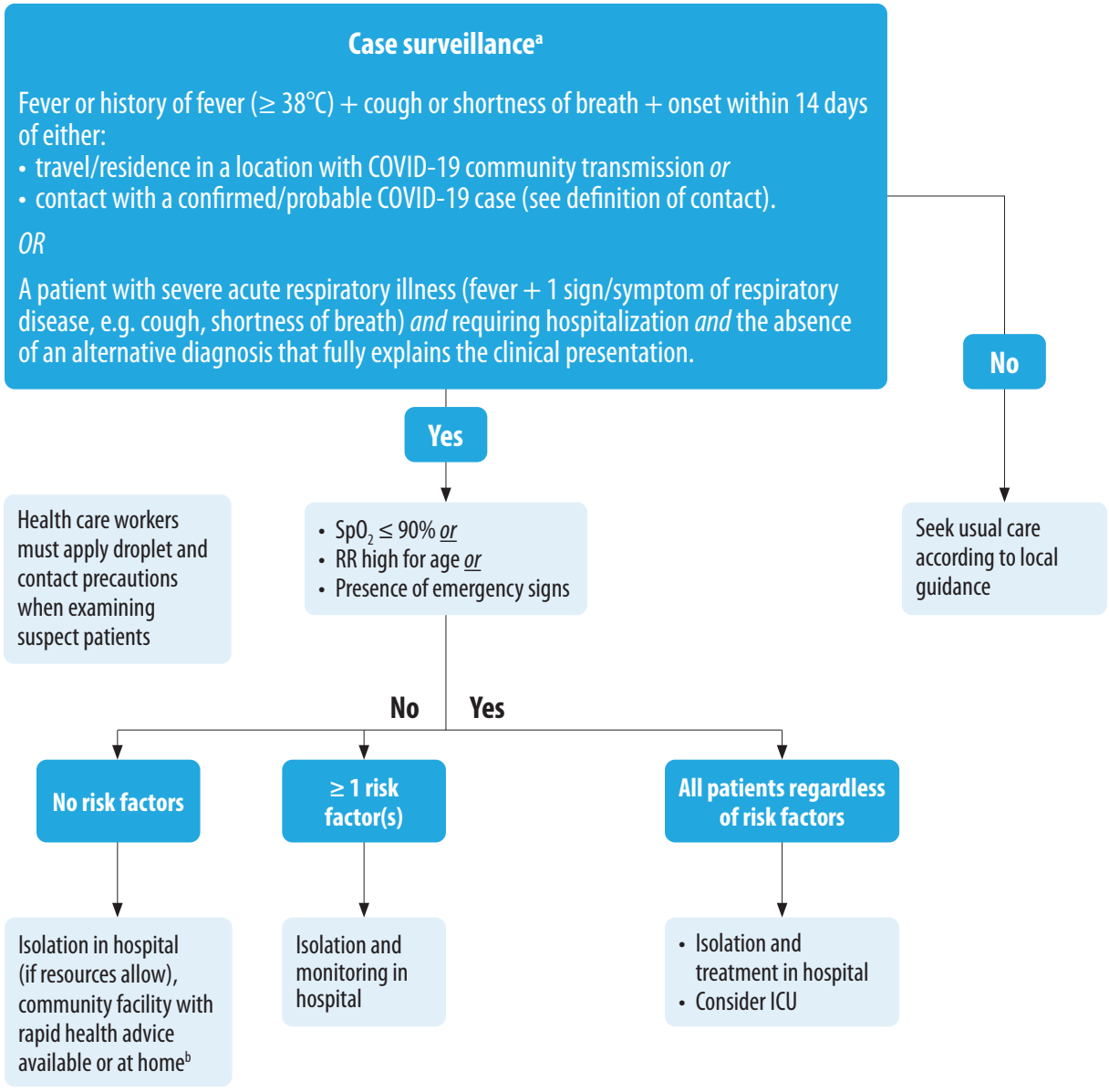
- Tocolytics may worsen maternal status by decreasing blood pressure, tachycardia, arrhythmias or causing pulmonary oedema.
- Antenatal corticosteroids promote fetal lung maturation if there is need to deliver fetus preterm (weeks 24–34). Can use betamethasone 12 mg IM every 24 hours for two doses or dexamethasone 6 mg IM every 12 hours for four doses.

Haemodynamic changes in pregnancy

	Change with pregnancy	
Measurement	% change	(absolute change)
Cardiac output	30–50% ↑	(2 L/min)
Heart rate	15–20% ↑	(12 bpm)
Stroke volume	20–30% ↑	(18 mL)
Mean arterial pressure	0–5% ↓	
Central venous pressure	No change	
Systemic vascular resistance	20–30% ↓	(320 dynes/cm^5)
Left ventricular stroke work index	No change	
Mean pulmonary artery pressure	No change	
Pulmonary capillary wedge pressure	No change	
Pulmonary vascular resistance	30% ↓	(40 dynes/cm^5)

Source: Adapted from Hegewald and Crapo (2011).

2.6 Decision-making algorithm for patient presenting with acute respiratory infection (influenza or COVID-19 suspected or known to be circulating)



Notes:
[a] *Global surveillance for COVID-19 caused by human infection with COVID-19 virus: interim guidance* (https://apps.who.int/iris/handle/10665/331506).
[b] For guidance see: https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus-(ncov)-infection-presenting-with-mild-symptoms-and-management-of-contacts

Uncomplicated influenza-like illness (ILI) symptoms

- Fever
- Cough
- Sore throat
- Rhinorrhoea or nasal congestion
- Headache
- Muscle pain or malaise
- Gastrointestinal illness such as diarrhoea or vomiting, but **no** evidence of dehydration
- **No** shortness of breath
- *Note:* The elderly and immunosuppressed may present with atypical symptoms. Symptoms due to physiologic adaptations of pregnancy and adverse pregnancy events, such as dyspnea, fever, gastrointestinal symptoms or fatigue, may overlap with COVID-19 symptoms.

Signs and symptoms of complications of ARI (SARI)

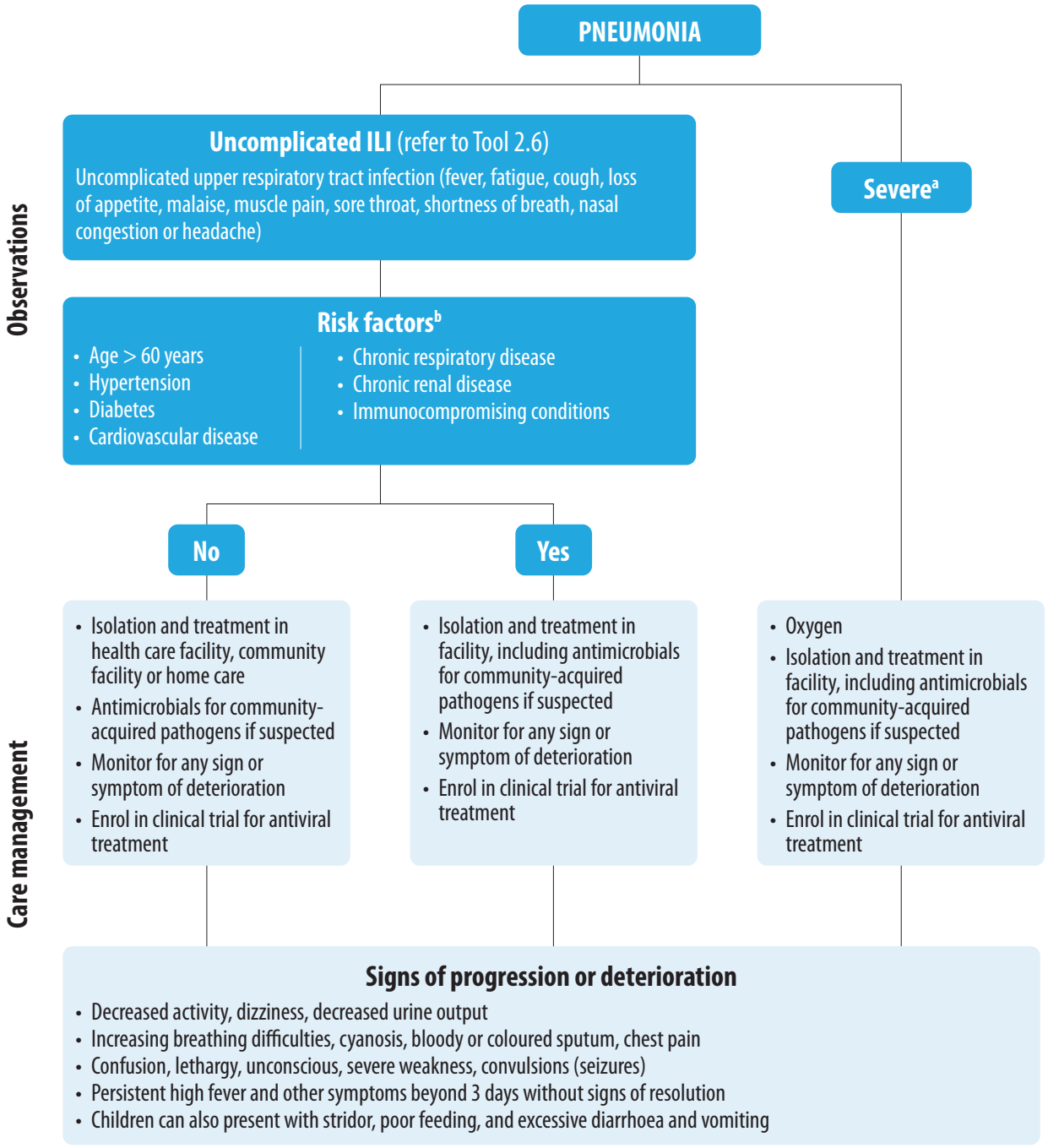
- Respiratory distress: fast breathing, shortness of breath, accessory muscle use, cyanosis. In children – central cyanosis, severe distress, grunting, severe chest indrawing or danger signs of lethargy, convulsions or inability to breastfeed or drink.
- Cardiovascular distress:
  - **Adult:** low blood pressure (SBP < 100); delayed capillary refill (> 3 seconds < 65 years or > 4.5 seconds in the elderly); fast and weak pulse.
  - **Child:** delayed capillary refill (> 3 seconds); fast and weak pulse; or cool extremities or hypotension.
- Neurologic distress: alteration in mental status such as coma, lethargy, confusion, seizures, agitation.
- Dehydration: in children – diarrhoea plus any two of the following signs: lethargy, sunken eyes, very slow skin pinch, unable to drink or drinks poorly.
- Persistent fever that is not responding after 3 days.

Emergency signs

- Obstructed or absent breathing
- Severe respiratory distress
- Central cyanosis
- Shock
- Coma
- Convulsions.

2.7 Decision-making algorithm for hospitalization of patient with pneumonia (influenza or COVID-19 known to be circulating)

This is an algorithm to assist in the decision-making for hospitalization of the patient presenting with suspected COVID-19 pneumonia. It takes into account the severity of the pneumonia and the presence or absence of risk factors for severe disease and the progression of disease. Clinical judgement is essential in disease severity assessment.



[a] Severe pneumonia

Pocket book of hospital care for children (WHO, 2013).

- Cough or difficulty breathing with at least one of the following:
  - central cyanosis or oxygen saturation (SpO_2) < 90%
  - severe respiratory distress (e.g. grunting, very severe chest indrawing)
  - general danger sign (e.g. inability to breastfeed or drink, lethargy or unconscious, convulsions)
- Any or all of the following may also be present:
  - fast breathing (e.g. 2–11 months ≥ 50/min; 1–5 years ≥ 40/min.
  - chest indrawing

IMAI district clinician manual: hospital care for adults and adolescents (WHO, 2011).

- RR > 30/min
- SpO_2 < 90%
- Signs of severe respiratory distress (e.g. inability to speak, use of accessory muscles)

[b] Defining risk factors for poor outcomes associated with COVID-19 infection is an evolving field of research. As more studies are conducted and published, our collective understanding of what places individuals at increased risk may evolve.

2.8 Decision-making support tool for hospitalization and ICU admission for patient with severe acute respiratory infection and severe pneumonia

Patients should be admitted to ICU based on severity of clinical condition and resource availability. In hospitals where oxygen therapy is only available in the ICU, admit all SARI patients to the ICU. In hospitals where oxygen therapy can also be delivered on ward, admit less severe SARI patients to the ward but with increased monitoring. During outbreaks, a surge of patients may exhaust resources; less severe cases may need to be managed outside the ICU.

In adults, the CURB-65 score is a validated tool that, when combined with clinical judgement, can be used to predict mortality and aid in determining admission for adult patients with pneumonia. This is adapted from the *British Thoracic Society guidelines for the management of community acquired pneumonia in adults* (BTS, 2009).

CURB-65 score One point for each feature present:
Confusion
Urea > 7 mmol/L
RR ≥ 30/min
Blood pressure (SPB < 90 or DPB ≤ 60 mmHg)
age ≥ **65** years

Score 0–1: low severity (risk of death is < 3%)
Score 2–3: moderate severity (risk of death 3–15%)
Score 3–5: high severity (risk of death > 15%)

If score is 0–1, consider home-based care
If score is 2 or more, consider hospitalization
If score is 3 or more, consider ICU

2.9 Checklist for admission

☑ Once you have decided to admit a patient with severe influenza virus infection to the hospital, consider using this checklist to ensure the following have been done in preparation for admission. This is adapted from the *IMAI district clinician manual: hospital care for adults and adolescents* (WHO, 2011).

☐ Essential diagnostic tests obtained:
e.g. complete blood cell count, chemistry panel, glucose, chest radiograph, upper respiratory tract specimens for viral testing (during influenza season), blood sample for culture (when possible, before first dose of antimicrobials), but do not delay antimicrobials.

☐ Emergency treatments given, patient's response checked:
e.g. oxygen therapy, insertion of peripheral IV (use appropriate antisepsis for the skin to prevent catheter-related infections), initial fluid therapy (and vasopressors if in shock).

☐ First dose of antibiotics and oseltamivir (during influenza season).

☐ Documentation completed.

☐ Determined the level of care the patient needs:
e.g. ICU, high dependency unit, ward.

☐ Determined infection prevention and control measures the patient needs.

☐ Verbal communication with ward staff completed to ensure continuity of care.

☐ Patient prepared for safe transfer.

2.10 Checklist for transfer

Transport of the critically ill patient can be risky as complications during this process can be life threatening and may be related to clinical, organizational, or equipment issues.

☑ Consider using this checklist to ensure the safe transport of the patient to the designated unit. This is adapted from the *IMAI district clinician manual: hospital care for adults and adolescents* (WHO, 2011).

☐ Patient stabilized.

☐ Appropriate infection prevention and control measures in place:
e.g. medical mask for patients with ARI.

☐ Everything secured: airway, NG tube, IV, monitors, endotracheal tubes, ventilator.

☐ Enough drugs: vasopressors, sedatives.

☐ Enough oxygen: adequate oxygen saturation (SpO_2).

☐ Enough IV fluids: blood pressure adequate.

☐ Health care workers (e.g. transporters, receiving staff) and receiving unit/ward prepared.