



EVIDENCE-BASED

# Comprehensive Guidelines for Management of COVID-19 in **CHILDREN** (below 18 years)

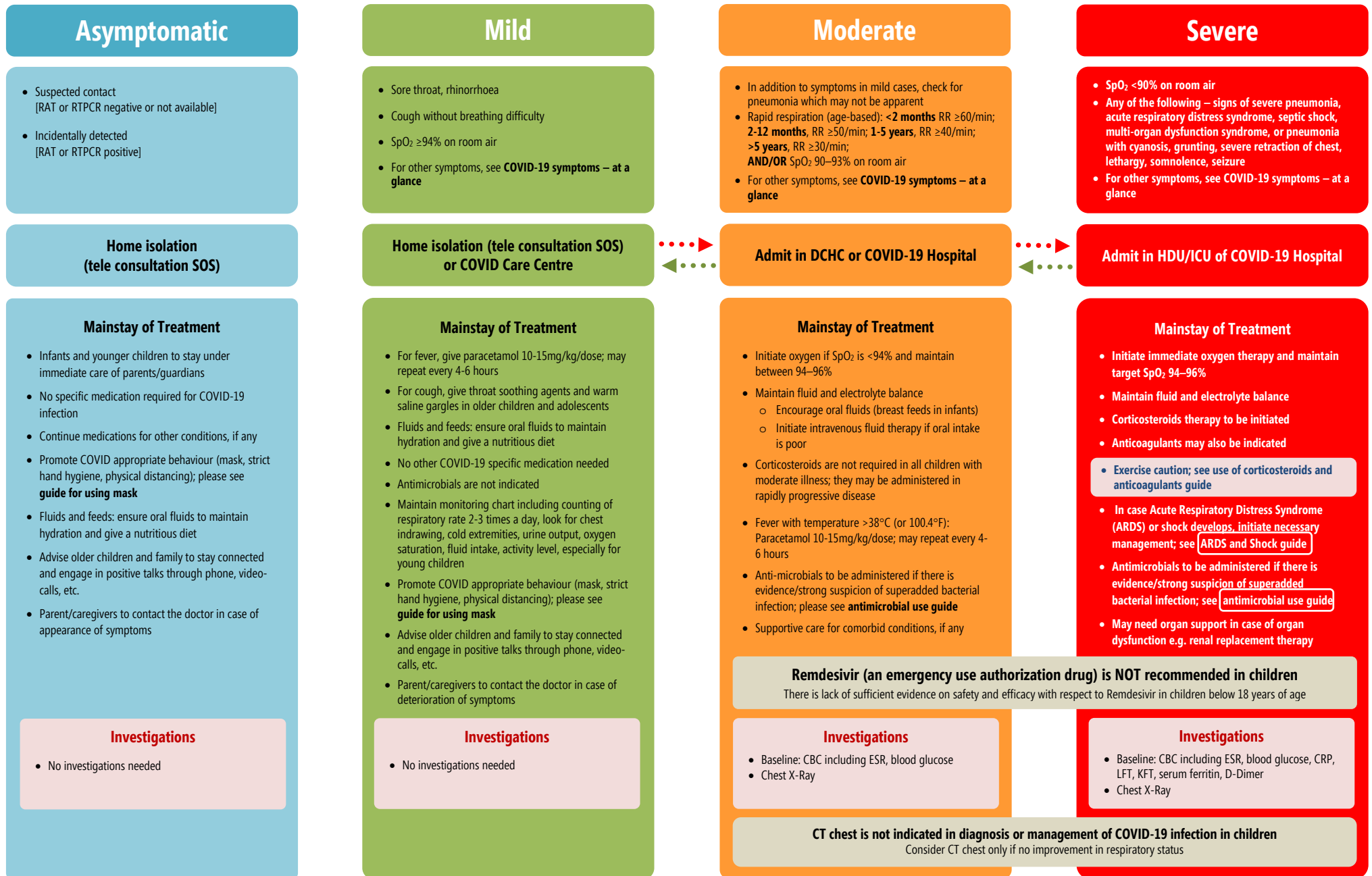
First revision **16 June 2021**

Supersedes previous version issued on 9 June 2021; kindly check [www.dghs.gov.in](http://www.dghs.gov.in) for latest version

**Directorate General of Health Services**

Ministry of Health and Family Welfare, Government of India

Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India  
**Comprehensive Guidelines for Management of COVID-19 in CHILDREN (below 18 years)**





### COVID-19 symptoms in children – at a glance

Common symptoms				
	<b>Fever</b>	<b>Sore throat/throat irritation</b>	<b>Diarrhoea</b>	
	<b>Cough</b>	<b>Body ache/headache</b>	<b>Anorexia/nausea/vomiting</b>	
	<b>Rhinorrhoea</b>	<b>Malaise/weakness</b>	<b>Loss of sense of smell and/or taste</b>	
Differentiating symptoms/signs	Asymptomatic	Mild	Moderate	Severe
Respiratory rate/min	<b>Normal</b> with age dependent variation	<b>Normal</b> with age dependent variation	<b>Rapid respiration</b> (age based) <2 months ≥60/min 2-12 months ≥50/min 1-5 years ≥40/min >5 years ≥30/min	<b>Rapid respiration</b> (age based) <2 months ≥60/min 2-12 months ≥50/min 1-5 years ≥40/min >5 years ≥30/min
SpO <sub>2</sub> on room air	<b>≥94%</b>	<b>≥94%</b>	<b>≥90%</b>	<b>&lt;90%</b>
Grunting, severe retraction of chest	<b>×</b>	<b>×</b>	<b>×</b>	<b>+/-</b>
Lethargy, somnolence	<b>×</b>	<b>×</b>	<b>×</b>	<b>+/-</b>
Seizure	<b>×</b>	<b>×</b>	<b>×</b>	<b>+/-</b>



## Management of Acute Respiratory Distress Syndrome (ARDS) and Shock guide

### Management/treatment of ARDS

ARDS may be classified based on Pediatric Acute Lung Injury Consensus Conference (PALICC) definition into mild, moderate and severe

#### Mild ARDS

- High flow nasal oxygen (start with 0.5 L/kg/min to begin with and increase to 2 L/kg/min with monitoring) or non-invasive ventilation (BiPAP or CPAP) may be given

#### Moderate – Severe ARDS

- Lung protective mechanical ventilation may be initiated; low tidal volume (4-8 ml/kg); plateau pressure <28-30 cmH<sub>2</sub>O; MAP <18-20 cmH<sub>2</sub>O; driving pressure <15 cmH<sub>2</sub>O; PEEP 6-10 cmH<sub>2</sub>O (or higher if severe ARDS); FiO<sub>2</sub> <60%; sedoanalgesia ± neuromuscular blockers; cuffed ETT, inline suction, heat and moisture exchange filters (HMEF)
- Avoid frequent disconnection of ventilator circuit, nebulization or metered dose inhaler
- Restrict fluids; calculate fluid overload percentage, keeping it <10%
- Prone position may be considered in hypoxemic children if they are able to tolerate it
- Daily assessment for weaning and early extubation; enteral nutrition within 24 hours, achieve full feeds by 48 hours
- Transfusion trigger Hb <7g/dL if stable oxygenation and haemodynamics and <10 g/dL if refractory hypoxemia or shock

### Management of shock

- Consider crystalloid fluid bolus 10-20 ml/kg cautiously over 30-60 minutes with early vasoactive support (epinephrine)
- Start antimicrobials within the first hour, after taking blood cultures, according to hospital antibiogram or treatment guidelines
- Consider inotropes (milrinone or dobutamine) if poor perfusion and myocardial dysfunction persists despite fluid boluses, vasoactive drugs and achievement of target mean arterial pressure
- Hydrocortisone may be added if there is fluid refractory catecholamine resistant shock (avoid if already on dexamethasone or methylprednisolone)
- Once stabilized, restrict IV fluids to avoid fluid overload
- Initiate enteral nutrition – sooner the better
- Transfusion trigger Hb <7g/dL if stable oxygenation and haemodynamics, and <10 g/dL if refractory hypoxemia or shock



## Management of Multisystem Inflammatory Syndrome (MIS-C) in children and adolescents temporally related to COVID-19

Multi System Inflammatory Syndrome in Children (MIS-C) is a new syndrome in children characterized by unremitting fever  $>38^{\circ}\text{C}$  and epidemiological linkage with SARS-CoV-2

### Diagnostic criteria (WHO)

- Children and adolescents 0–18 years of age with fever  $\geq 3$  days
- **And any two** of the following:
  - Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet)
  - Hypotension or shock
  - Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NT-proBNP)
  - Evidence of coagulopathy (PT, PTT, elevated D-Dimers)
  - Acute gastrointestinal problems (diarrhoea, vomiting, or abdominal pain)
- **And** elevated markers of inflammation such as ESR ( $>40$  mm), C-reactive protein ( $>5$  mg/L), or procalcitonin
- **And** no other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes
- **And** evidence of recent COVID-19 infection (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19

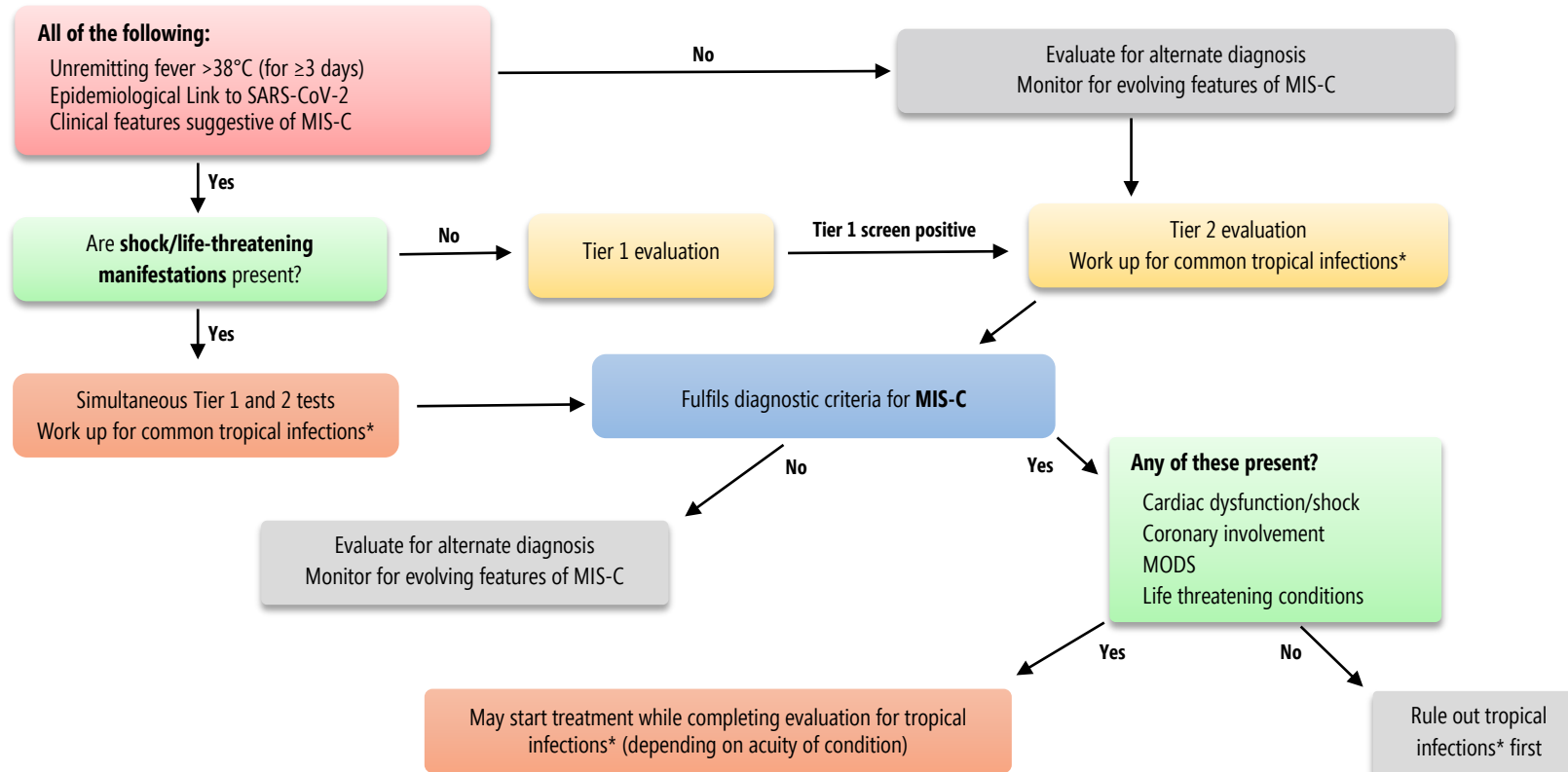
Alternative diagnoses that must be excluded before making a diagnosis of MIS-C

- Tropical fevers (malaria, dengue, scrub typhus, enteric fever)
- Toxic shock syndrome (staphylococcal or streptococcal)
- Bacterial sepsis

MIS-C with Kawasaki Disease (KD) phenotype is characterised by fever, conjunctival redness, oropharyngeal findings (red and/or cracked lips, strawberry tongue), rash, swollen and/or erythematous hands and feet and cervical lymphadenopathy



**Stepwise investigations in a patient with MIS-C**



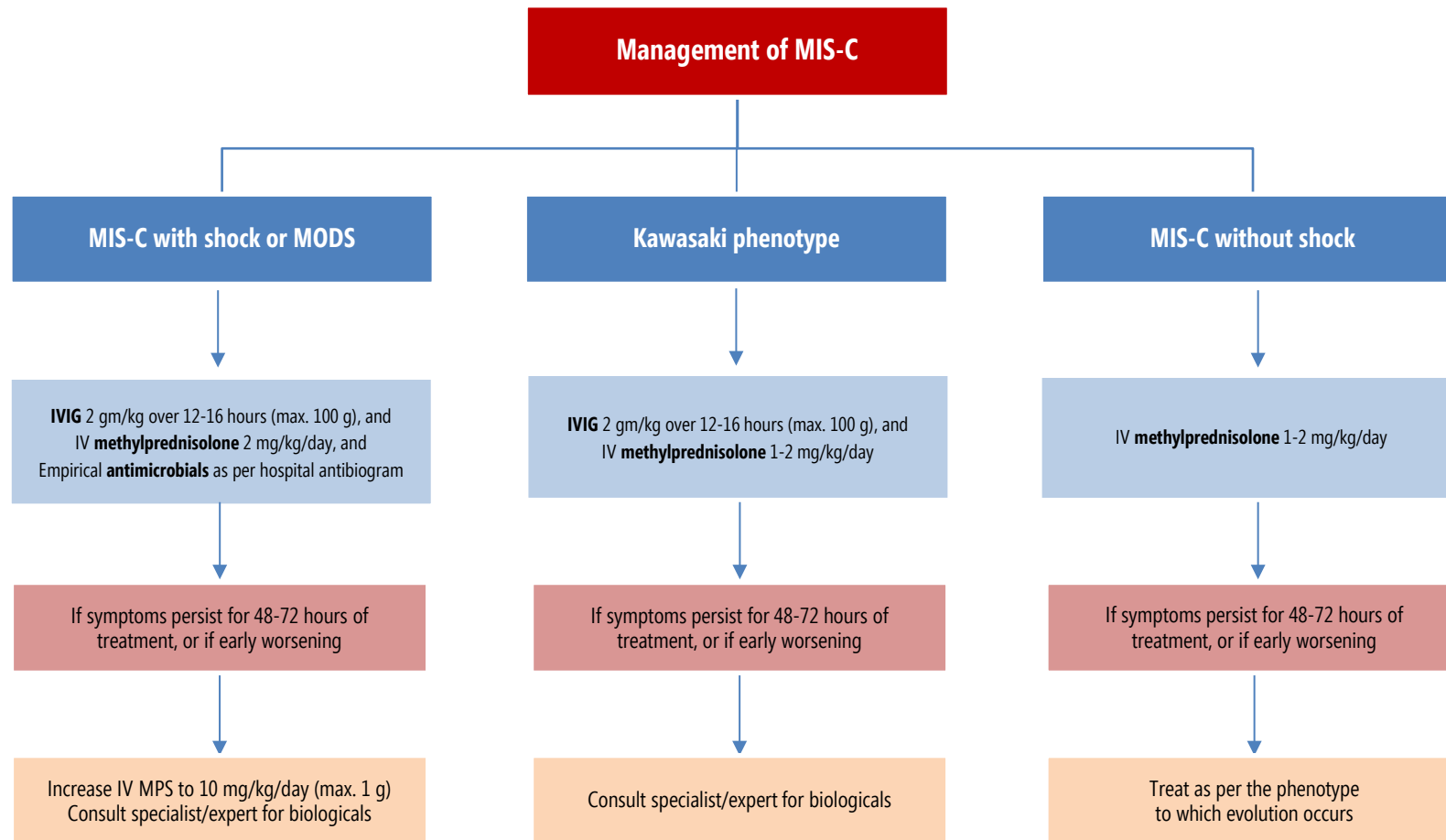
**Tier 1 tests** (may be done at Covid Care Centre, Dedicated Covid Health Centre): CBC, complete metabolic profile (LFT/KFT/blood gas/glucose), CRP and/or ESR, SARS-CoV-2 serology and/or RT-PCR, blood culture

**Positive Tier 1 screen** (*both* of these should be present):

1. CRP >5 mg/L *and/or* ESR >40 mm/hour;
2. At least *one* of these: ALC <1000/ $\mu$ L, platelet count <150,000/ $\mu$ L, Na <135 mEq/L, neutrophilia, hypoalbuminemia

**Tier 2 tests** (may be done at Dedicated Covid Hospital): Cardiac (ECG, echocardiogram, BNP, troponin T); inflammatory markers (procalcitonin, ferritin, PT, PTT, D-Dimer, fibrinogen, LDH, triglyceride, cytokine panel); blood smear; SARS-CoV-2 serology

\* Common tropical infections include malaria, dengue, enteric fever, rickettsial illness (scrub typhus), etc.



- Appropriate supportive care is needed preferably in ICU for treatment of cardiac dysfunction, coronary involvement, shock or multi-organ dysfunction syndrome (MODS)
- IVIG to be given slower (over up to 48 hours) in children with cardiac failure/ fluid overload
- Taper steroids over 2-3 weeks with clinical and CRP monitoring
- Aspirin 3-5 mg/kg/day, maximum 75 mg/day in all children for 4-6 weeks (with platelet count >80,000/ $\mu$ L) for at least 4-6 weeks or longer for those with coronary aneurysms
- Low molecular weight heparin (Enoxaparin) 1 mg/kg/dose twice daily s/c in >2 months (0.75mg/kg/dose in <2 months) if patient has thrombosis or giant aneurysm with absolute coronary diameter  $\geq$ 8 mm or Z score  $\geq$ 10 or LVEF <30%
- For children with cardiac involvement, repeat ECG 48 hourly & repeat ECHO at 7-14 days and between 4 to 6 weeks, and after 1 year if initial ECHO was abnormal

**Use biologicals only after expert consultation  
and at tertiary care only**



### Suggested proforma for monitoring in children

Name: ..... Age: ..... Sex: ..... Date: .....

#	Co-morbid conditions (if any)	Controlled (yes/no)	Drugs being taken
1			
2			
3			

**Template for recording of symptoms and signs** (may be done more frequently for sicker children)

Time	Lethargy/malaise*	SoB**	Temperature	BP#	Respiratory rate##	Chest indrawing	SpO <sub>2</sub> *** & pulse rate	Physical activity
	(yes/no)	(yes/no)	(record)	(record)	(record)	(yes/no)	(record)	(normal/low)
06:00 am								
12:00 noon								
06:00 pm								
12:00 am								

\*Malaise: feeling of unwellness; \*\*SoB: shortness of breath/breathing difficulty/breathlessness \*\*\*SpO<sub>2</sub>: oxygen levels to be measured by pulse oximeter

# measure BP if age appropriate BP cuffs are available; ## record respiratory rate in a calm or sleeping child





### Infection Prevention and Control (IPC)

Every COVID care facility should have a multidisciplinary hospital infection control committee; key components of infection control strategy are:

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• Standard precautions</li> <li>• Droplet precautions</li> <li>• Airborne precautions</li> <li>• Contact precautions and hand hygiene</li> <li>• Physical distancing</li> </ul> | <ul style="list-style-type: none"> <li>• Cough etiquette/respiratory hygiene</li> <li>• Well ventilated rooms</li> <li>• Monitor healthcare associated infections</li> <li>• Train all health care workers to develop IPC skills</li> <li>• Environment cleaning, disinfection and sanitation</li> </ul> | <ul style="list-style-type: none"> <li>• Cleaning/disinfection of frequently touched surfaces/equipment</li> <li>• Cleaning and disinfection of linen</li> <li>• Safe management of bio-medical waste</li> <li>• Triple layer mask to be worn by patient, as per guidance below</li> <li>• Masks for care givers (home/hospital)</li> </ul> |
|--|--|---|

### Guide for using mask

- Masks are not recommended for children aged **5 years and under**
- Children aged **6-11 years** may wear a mask depending on the ability of child to use a mask safely and appropriately under direct supervision of parents/guardians
- Children aged **12 years and over** should wear a mask under the same conditions as adults
- Ensure hands are kept clean with soap and water, or an alcohol-based hand rub, while handling masks

### Antimicrobial use guide

COVID-19 is a viral infection, and antimicrobials have no role in the management of uncomplicated COVID-19 infection

**Asymptomatic and mild cases:** antimicrobials are not recommended for therapy or prophylaxis

**Moderate and severe cases:** antimicrobials should not be prescribed unless there is clinical suspicion of a superadded infection

**Septic shock:** empirical antimicrobials (according to body weight) are frequently added to cover all likely pathogens based on clinical judgement, patient host factors, local epidemiology and antimicrobial policy of the hospital



## Use of steroids and anticoagulants

### Steroids

- **Steroids are not indicated and are harmful in asymptomatic and mild cases of COVID-19**
- Indicated only in hospitalized severe and critically ill COVID-19 cases **under strict supervision**
- Steroids should be used at the **right time**, in **right dose** and for the **right duration**
- Indications and recommended dose of corticosteroids – may be used in rapidly progressive moderate and all severe cases
  - Dexamethasone 0.15 mg/kg, maximum dose 6 mg once a day **OR**
  - Methylprednisolone 0.75 mg/kg, maximum dose 30 mg once a day
- Continue for 5-7 days and taper, up to 14 days, depending on clinical assessment on daily basis
- Avoid steroids in first 3-5 days since onset of symptoms as it prolongs viral shedding

Self-medication of steroids  
must be avoided

### Anticoagulants

- Not indicated routinely
- All hospitalized children should be monitored for thrombosis; on suspicion, confirm by appropriate investigations and start on low molecular weight heparin in therapeutic doses for period of 12 weeks with monitoring
- Predisposing risk factors for development of thrombosis – personal history of venous thrombotic events (VTE), family history of first-degree relative with VTE, presence of central venous line, decreased mobility from baseline, burns, active malignancy, estrogen therapy, flare of inflammatory disease, morbid obesity, severe dehydration, recent surgery or trauma
- Prophylactic anticoagulant is indicated in following circumstances (a) strong personal or family history of VTE, or (b) an indwelling central venous line and two or more additional risk factors, or (c) four or more risk factors
- The decision to administer prophylactic anticoagulation must be balanced with the child's bleeding risk
- Children already on anticoagulation therapy may continue same unless they develop active bleeding
- Dose of low molecular weight heparin (Enoxaparin), if indicated in severe cases
  - Prophylactic dose 0.5 mg/kg twice daily, till child is discharged from hospital
  - Therapeutic dose 1 mg/kg twice daily

**The Director General of Health Services, Prof. (Dr) Sunil Kumar**  
gratefully acknowledges the contributions of the following in developing the  
**Comprehensive Guidelines for Management of COVID-19 in Children (below 18 years)**

*List of experts/contributors*

**Prof. Ashok Deorari**, HoD Paediatrics, AIIMS New Delhi; **Dr Atul Jindal**, Addl. Prof. Paediatrics, AIIMS Raipur; **Prof. Dheeraj Bahl**, HoD Paediatrics, Dr RML Hospital; **Prof. Harish Chellani**, Deptt. of Paediatrics, Safdarjung Hospital; **Dr Krishna Mohan Gulla**, Addl. Prof. Deptt. of Paediatrics, AIIMS Bhubaneswar; **Prof. M. Jayashree**, Deptt. of Paediatrics, PGIMER Chandigarh; **Prof. Mahesh Maheshwari**, Deptt. of Paediatrics, AIIMS Bhopal; **Dr Narendra Bagri**, Assoc. Prof. Deptt. of Paediatrics, AIIMS New Delhi; **Prof. P. Narayanan**, HoD Paediatrics, JIPMER Puducherry; **Prof. Rani Gera**, HoD Paediatrics, Safdarjung Hospital; **Prof. Rakesh Lodha**, Deptt. of Paediatrics, AIIMS New Delhi; **Prof. S.K. Kabra**, Deptt. of Paediatrics, AIIMS New Delhi; **Prof. Shikha Malik**, HoD Paediatrics, AIIMS Bhopal; **Prof. Sushma Nangia**, HoD Neonatology, Lady Hardinge Medical College; **Prof. Virendra Kumar**, HoD Paediatrics, Lady Hardinge Medical College; **Prof. Viswas Chhapola**, Deptt. of Paediatrics, Lady Hardinge Medical College

*Secretariat:*

**Dr. L. Swasticharan**, Addl. DDG and Director (EMR), Directorate General of Health Services; **Dr U.B. Das**, Senior Chief Medical Officer (EMR), Directorate General of Health Services; **Dr Anuj Sharma**, Technical Officer (AMR, Labs, IPC), WHO Country Office for India

© Directorate General of Health Services  
Ministry of Health and Family Welfare, Government of India  
[www.dghs.gov.in](http://www.dghs.gov.in)