LANCET COVID-19 COMMISSION INDIA TASK FORCE COMMISSIONED PAPER

JUNE 2021

PREPARING FOR COVID-19 PART III: PLANNING, PROTOCOLS, AND POLICY GUIDELINES FOR PAEDIATRICS



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INDIA TASK FORCE

The Lancet COVID-19 Commission India Task Force convened an experts group comprising leading paediatricians from India to examine the issue of paediatric COVID-19 in India. The India Task Force hosted two virtual round tables with leading paediatricians in the United Kingdom and the United States. Following these discussions, and sharing of resources, the experts group was commissioned to produce a paper outlining the state of paediatric COVID-19 in India, emerging lessons, protocols for clinical care, and recommendations for policy makers.

The India Task Force is grateful to the National Health Service (United Kingdom) and to the American Academy of Pediatrics (United States) for their support and co-operation. Special thanks go to the following individuals:

Prerana Issar, Naeem Ahmed, Juliet Brown, Vin Diwakar, Simon Hope, Bob Klaber, and Vijith Puthi for convening experts from the National Health Service (UK)

Sonia Ehrlich Sachs, Janna Patterson, Humia Samad, and Kristin Ingstrup for convening experts from the American Academy of Pediatrics

Kavita Narayan for convening and coordinating experts from across India, many of whom authored this paper.

The India Task Force is pleased to place this paper in the public domain in the hope that it will inform the policy and practice of paediatric COVID-19 care in India in the coming months. This paper is intended to be a living document, to be updated regularly based on new evidence and data. It is an independent output of the expert group authors listed below and should not be seen as representative of the collective views or opinions of the India Task Force.

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A: BACKGROUND AND **METHODOLOGY**

BACKGROUND

In India children and young adults under 20 years of age account for 34.8 percent of the total population, with ~50 percent soon to enter the working-age group in the next decade.¹ Concerns have been raised that the next wave of COVID-19 in India may impact children more, with global experience indicating the importance of preparedness by developing specific paediatric treatment protocols. Although the vast majority of infections in children are mild, reported cases of Multisystem Inflammatory Syndrome in Children (MIS-C) following SARS CoV-2 infection require planning and readiness of the health system.

The Lancet COVID-19 Commission India Task Force convened paediatric experts from across the country comprising clinicians representing eminent government medical colleges and large private or charitable hospitals to examine evidence and emerging data from both sectors across the country with the task of recommending practical clinical tools and strategies for providers and guidance for policy makers and the public to effectively address COVID-19 in children. (Annex I)

METHODOLOGY

Starting mid-May 2021, the experts group undertook an extensive literature review comprising more than 80 paediatric studies, protocols, and trials conducted in different parts of the world between April 2020 and May 2021. The India Task Force hosted round tables with a select group of leading paediatric specialists from the National Health Services (NHS) in the United Kingdom and American Academy of Pediatrics (AAP) in the United States of America. The discussions provided valuable inputs as experts shared their respective strategies on clinical case management, particularly for post-COVID conditions like MIS-C and other complications. A series of Indo-UK webinars are also underway with experts from both countries, and information from these were also documented as applicable. State-specific best practices within India were evaluated in the context of recent cases. A detailed clinical management architecture was derived through email drafts that were further discussed and debated in depth via conference calls, modified multiple times and finalized on a consensus basis.

The Ministry of Health and Family Welfare's clinical paediatric protocol released in April 2021 was taken as the base template that was enhanced using these new learnings to formulate a set of guidelines applicable at the primary, secondary, or tertiary care level facilities.² The experts group focused on the need to provide a living document that could be updated periodically and that could be readily used for planning of resources and implementation of protocols, both of which have been provided as separate checklists annexed to this paper.

Further, the National Human Rights Commission issued an Advisory for protection of the rights of children in the context of COVID-19 on June 2, 2021, that has been considered carefully in formulating the policy recommendations.³

B: EVIDENCE ON CASE INCIDENCE AND MORBIDITY RATES IN INDIA'S PAEDIATRIC POPULATION

B1: BURDEN OF COVID-19 IN CHILDREN IN INDIA

Among the confirmed cases of COVID-19 in India, less than 12 percent were children and young adults under the age of 20 years and only 3-4 percent were children under the age of 10 years.⁴ However, data is only available on the proportion of paediatric cases in the total confirmed cases and needs to be strengthened with specifications on clinical presentations, hospitalization rates, severity of disease, outcomes, MIS-C cases, sero-surveillance/outbreaks in children, long-COVID cases in children and so on.

In the absence of a national database on clinical presentation and outcomes of infected children during the two surges noted thus far, data of approximately 2600 hospitalized children below the age of 10 years (excluding neonates) from ten hospitals (both public and private) in Tamil Nadu, Kerala, Maharashtra, and Delhi-NCR region was collected and analyzed. The data was also evaluated separately for the time periods corresponding to the two surges – March 2020-December 2020 and January 2021-April 2021.

The key observations are summarized below:

- Mortality rates amongst hospitalized COVID-19 positive children below the age of 10 years (excluding neonates) was 2.4 percent
- About 40 percent of children who died had comorbidities
- Nine percent of all hospitalized COVID positive children presented with severe illness, under 10 years of age.
- The above observations were similar during the two surges of COVID-19 infections India has experienced.

Comparable observations were recorded in a multicentric study (in press) which examined 402 children hospitalized in Indian hospitals of which 90 percent were asymptomatic to mildly symptomatic and of 318 cases 44 percent had underlying co-morbidities. The mortality rates were as high as 3.2 percent, as the study focused solely on hospitalized children and all children (deceased) were reported to have comorbidities.⁵

However, it may be pertinent to note that during the first surge, many children who were asymptomatic/ those with mild disease were also admitted, while during the second surge predominantly children with moderate-severe disease were admitted.

B2: GLOBAL EVIDENCE ON LOW PAEDIATRIC CASE INCIDENCE, MORBIDITY, AND MORTALITY

As of early June 2021, SARS-CoV-2 has caused 175 million cases and 3.7 million deaths across 220 countries.⁶ Children under 20 years of age comprise 1-2 percent all cases worldwide. **The majority of infections are asymptomatic and mild and can be managed with standard home isolation protocols.** Increasing incidence has been correlated with increasing age.⁷

Key observations are summarized below:

- Children under the age of 18 years account for
 12.4 percent of all cases in the United States (n=26.6 million), which is similar to India. As reported in May 2021, of all COVID-19 positive cases in children, 0.1-1.9 percent resulted in hospitalization. Children comprised 1.3-3.2 percent of total reported hospital admissions.⁸ Mortality is also significantly low at 0.1 percent of total 0.47 million deaths, according to the data.⁹ The mortality rate has also remained same in the two years at 0.05 percent of the total annual COVID-19 deaths.¹⁰
- Data analyzed for **30 European countries** (n=23.5 million) indicate children **under the age of 15** account for **9 percent of all the cases**. New COVID-19 positive cases in children had marginally increased from 7.4 percent in 2020 to 10.8 percent in 2021.¹¹ A study in May 2020 in Italy indicated that children constituted 1.8 percent of the total confirmed cases of whom 13.3 percent were hospitalized, 3.5 percent needed Intensive Care Units (ICU) and 5.4 percent had underlying illness.¹²
- UK in its initial paediatric surveillance reported children accounting for **1.1 percent** (n=129,704) of SARS-CoV-2 positive cases.¹³ As

reported by experts' positive cases in children have consistently been in the range of 1-5 percent of the total cases and there is negligible change during the second wave. Teenagers were more prone to acquire the illness. UK government data indicates 5.8 percent cases in children amongst the total reported positive cases (n=3.8 million) up to December 2020.¹⁴

- Other South East Asian Region (SEAR) countries had comparable incidence figures:
 - Nepal reported low incidence of infection in children under 20 years of age accounting for 8.89 percent of total cases (n=566,587)¹⁵
 - Bangladesh reported last year that children and young adults under 20 constituted 10 percent of all cases (n=150,000), and the mortality rate was 2.38 percent.¹⁶ In 2021 there has not been a significant change with low mortality reported for children (under 20 years of age) at 1.16 percent.¹⁷

Based on data available, <u>there appears to be no</u> <u>substantial evidence to suggest that children</u> <u>would be more affected or would have greater</u> <u>illness severity due to COVID-19 infection in the</u> <u>anticipated third wave</u>. Studies also indicate that children have milder disease, better prognosis, and low mortality in comparison to adults. However, infants and children with underlying illness may be at higher risk and will require greater monitoring.^{18,19,20}

Further, we have insufficient information currently to estimate risk in children due to the new variants and the consequences in children due to increased adult vaccination rates.

B3: UNDERSTANDING EMERGING SYMPTOMOLOGY IN PAEDIATRIC COVID-19 AND ASSOCIATED PSYCHOSOCIAL ISSUES IN THE PAEDIATRIC POPULATION

Emerging research on SARS CoV-2 in children indicates that newborns may be affected in multiple ways including indirect impact of maternal infection, postnatal acquired infection, rare possibilities of transplacental transmission and MIS-C.^{21,22} Active surveillance system in UK for indirect impact of maternal infection indicates symptomatic women had more preterm births of which one out of 5 (~21 percent) babies needed NICU care.²³ Further transplacental transmission has not been fully established and may occur but very rarely. Perinatal transmission and early postnatal transmission are rare which suggest that mother and baby can be roomedin together. UK National Surveillance Study showed an incidence rate of approx. 5.6 per 10,000 live births. **Most neonates at and immediately after birth are asymptomatic. Clinical presentation during later part of neonatal period is mild including hypothermia, poor feeding, and vomiting.**

Symptomatology in India appears to be globally comparable. Most children with COVID-19 are asymptomatic, and amongst those symptomatic mild infections are predominant.²⁰ Most children have fever with respiratory symptoms, and often present with gastrointestinal symptoms (such as diarrhea, vomiting, pain abdomen) and atypical manifestation compared to adults.²⁴ The proportion of symptomatic children increases as age increases as does the severity in such age groups.²⁵ Similar observation has been recorded in Italy where higher hospitalization, disease severity, ICU admission and number of days with symptoms were associated with increasing age.¹² Visible signs like previously absent skin lesions in adolescents and young adults are also early identifiers.^{26,27,28} Risk factors for hospital admission include, preterm birth, obesity, underlying illness or comorbidities (including pulmonary, gastrointestinal, endocrine, neurologic, and psychiatric disease), as well as immunocompromised conditions.²⁹

MIS-C is increasingly being explained as a post-viral condition following initial exposure to the SARS CoV-2 infection and in a tropical country the manifestations mimic viral, bacterial and rickettsial infections. The early signs of MIS-C include atypical Kawasaki disease (KD) like presentations in younger children and gastrointestinal manifestations with abdominal pain mimicking appendicitis, diarrhoea, and features resembling toxic shock syndrome, rather than acute pneumonia with respiratory symptoms in older children.

In certain tuberculosis case presentations in Maharashtra with positive COVID-19 antibodies, early signs of MIS-C such as nausea and hypotension, extremely high inflammatory markers, only gastrointestinal manifestations, fever, hypoxia (post-COVID fibrosis), and postural orthostatic tachycardia syndrome (POTS) were also recorded.

Risk factors for MIS-C include obesity, asthma, compromised breathing, developmental disorders, cardiac disease, cancers, or immunocompromised children as well as those who have undergone surgeries. Although figures indicate low mortality rates from acute COVID-19 in older teens, it appears to be higher in those who are obese. **Most published data suggest mild to moderate predisposition in most cases and low mortality linked with MIS-C.**^{30,31,32,33,34,35,36}

In a recent meta-analysis of 15 studies across 10 countries describing 22,996 children/adolescents, it was reported that behaviour/psychological state of a total of 79.4 percent of children was affected negatively by the pandemic and quarantine, at least 22.5 percent of children had a significant fear of COVID-19, 35.2 percent complained of boredom and 21.3 percent had sleep disturbances. Among care givers 52.3 percent had anxiety and clinical depression was observed in 27.4 percent, while being in isolation with children. Behaviors worsened in children with special needs like Autism Spectrum Disorder (ASD).³⁷

B4: KEY LEARNINGS FOR POLICY CONSIDERATION AND PLANNING

- Based on the evidence available to date, regarding the proportion of total COVID-19 positive cases in children; and symptomatology and severity of COVID-19 in children; the two waves of the pandemic have been similar. We do anticipate an increase in paediatric cases, corresponding to the expected increase in absolute numbers and the wave. The proportion of children of all confirmed cases may also be expected to increase because a substantial proportion of adult population is expected to be completely vaccinated. However, only a small minority of children are expected to require critical care. The importance of rational adherence to protocols by providers and cooperative parental supportive care cannot be overstated to achieve intended clinical outcomes.
 - In India, during the second wave, majority of the positive adult cases were home isolated with possibly a poor adherence to isolation protocols, causing whole families to get infected. Vigilance around the younger population, effective monitoring and timely care helps avert severe disease.
 - The **role of nutrition and exercise** to keep children active and healthy even during restricted movements, cannot be overstated. Obesity is directly associated with disease severity and sometimes adverse outcomes as stated above.

- Basic immunisation schedule and routine checkups for children with comorbidities, juvenile diabetes, special needs and those on immune modulators or autoimmune disorders need to be tracked and managed to prevent increased risk of disease severity.
- The unavailability of accurate, dynamic data in India has posed a challenge in putting together the quantitative and qualitative metrics which drives the overall clinical and policy decisions. There is an urgent need for a comprehensive, integrated, and standardized paediatric repository.
- Educational and socio-cultural inputs are verily the building blocks of children's overall development as productive adults in society. The cost of unacknowledged, unaddressed psychosocial health issues due to their disruption is perhaps of much greater long-term concern in children and communities as a whole.^{38,39} We need to recognize the societal cost of psychological trauma in a generation of children and address it head on, without flinching away from it in denial or undermining its impact.

C: RECOMMENDATIONS

C1: CLINICAL MANAGEMENT

1. Identification, stratification, and clinical management of Acute COVID-19 in children

SARS-CoV-2 infection in children is often milder than in adults, and a significant number of children have an asymptomatic infection and get incidentally detected when the adults of the family are tested positive, or children are screened before admission for another illness.

Children with suspected COVID-19 must be kept together with caregivers where possible and confirmatory tests must be done (RT-PCR/ CBNAAT; positive RAT is acceptable; if RAT is negative, confirm with RT-PCR). For children with negative tests but with mild symptoms, clinicians must assess the child for other possible causes based on the symptoms– URTI, LRTI, other causes of pneumonia, and tropical infections.

Triaging of children based on severity must be done on confirmation of test positivity. It may be noted that some children may also present with acute abdomen, other gastrointestinal symptoms or rarely, Central Nervous System (CNS) symptoms.

a. For mild cases of SARS-CoV-2 infection in children, we recommend management in home isolation, if feasible, and symptomatic treatment with paracetamol. In case of mild illness in a child with comorbidities or any condition where the child is immune-compromised or is on immune-modulators, the child may be treated at home after discussing with parents and the paediatrician who is taking care of the primary disease must ensure proper monitoring. If home monitoring is not feasible due to any reason or access to facility during an emergency is difficult, the child (accompanied by one of the caregivers) may be managed in a COVID-19 care facility. For recommended management protocol, refer to *Annex II*.

- ✓ In case of diarrhoea or vomiting, proper hydration should be ensured with oral rehydrating solutions and symptomatic treatment after assessment by the clinician.
- ✓ For respiratory symptoms, symptomatic treatment such as warm saline gargles (in older children) and soothing agents for throat irritation may be given. Children known to have asthma should continue their medications including inhaled steroids.
- ✓ Antibiotics are not indicated in mild COVID-19 illness. Antibiotics may be indicated only if there is a co-existing condition where antibiotics are indicated, such as, dysentery, otitis media and skin and soft tissue bacterial infections.
- No investigations are recommended for mild cases.
- b. For moderate illness, we recommend hospitalization in a dedicated COVID facility for supportive care and symptomatic management. For detailed management protocol, refer to *Annex II.*
- ✓ No laboratory investigations are recommended routinely except those required for associated comorbid conditions. Clinicians may do complete blood count (CBC) and c-reactive protein (CRP) and may repeat after 48 hours in case of deterioration.
- ✓ Supplemental oxygen therapy must be provided in case SpO2 falls below 94%. If hypoxia and/or respiratory distress are not improved with the nasal prongs or mask, step-up the management as for severe category.
- Oral antibiotics are recommended in case of suspicion of bacterial infections.
- Children must be monitored for red flags – persistent fever, not able to feed/ drink, or persisting vomiting, fast breathing, lethargy or unconsciousness and worsening hypoxia.
- ✓ Steroids may be considered if there is rapid deterioration and other causes of fever are ruled out, or oxygen saturation is below 94% with supplemental oxygen therapy beyond 5 days. We recommend preferable usage of Dexamethasone [0.15 mg/kg per dose (maximum dose 6 mg) 1-2 times a day, for 5 days which can be extended up to 10 days based on clinical response.

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- c. In case of severe or critical illness, the child must be admitted in a dedicated COVID high dependency unit (HDU) or paediatric intensive care unit (PICU), as per the requirement and condition. Investigative procedures and treatment as per the protocol in *Annex II*.
- ✓ In case of a suspected bacterial infection, empiric antibiotic may be chosen based on the prevalent pathogens, and their antibiotic susceptibility pattern. Ceftriaxone may be considered.
- ✓ We recommend preferable usage of Dexamethasone [0.15 mg/kg per dose (maximum dose 6 mg) 1-2 times a day, for 5 days which can be extended up to 10 days based on clinical response.
- ✓ Remdesivir is not recommended routinely since there is no trial data in children and evidence is limited.⁴⁰
- ✓ Management of ARDS or Shock to be as per the protocol.
- ✓ Acute Respiratory Distress Syndrome (as defined by the PARDS criteria: Pediatric Acute Lung Injury Consensus Conference Group)⁴¹ – Use conservative fluid management in patients with ARDS if no evidence of shock and progressive oxygen therapy as per the condition. Maintain euvolemia, avoid over hydration.
- ✓ In case of Shock early recognition and treatment within 1 hour - Conventional fluid resuscitation with vasopressor for hypotension may be considered.
 - As per the evidence and guidelines, it is recommended to not use hypotonic crystalloids, starches, or gelatins for resuscitation.
 - Epinephrine first-line treatment, while norepinephrine can be added if shock persists despite optimal dose of epinephrine [Peripheral Adrenaline 0.1-0.2 mcg/kg/min, Peripheral Noradrenaline 0.1-0.2 mcg/kg/ min. LV dysfunction may be treated with low dose adrenaline if child has hypotension or Dobutamine (10- 20 mcg/kg/min) if child is normotensive].

2. Identification, stratification, and clinical management of Multisystem Inflammatory Syndrome in Children (MIS-C) cases

Some children may also develop MIS-C, a post infection (after 2-6 weeks of COVID-19 infection) inflammatory syndrome related to SARS-CoV-2 with multiple organ involvement. If diagnosed early, this uncommon condition has a good outcome. Clinical identification of MIS-C includes unremitting (>=3 days) fever >38°C, epidemiological link to SARS-CoV-2 and clinical features such as abdominal pain, rash, chest pain, confusion, shock, excessive lethargy and fatigue, conjunctivitis, and mucus membrane changes; this must be supported by elevated inflammatory marker(s) and ruling out other possible explanations for the presentation.

Suspected MIS-C patient must also be evaluated for other infectious and non-infectious conditions.

- a. MIS-C patients differ from Acute pneumonia
 - because of fewer incidence of respiratory symptoms. However, children with MIS-C may have respiratory abnormalities secondary to shock or cardiac dysfunction. Also, gastrointestinal and muco-cutaneous findings are more common in MIS-C.
- b. Differentiate MIS-C from Kawasaki Disease (KD): (a) MIS-C seen relatively more in older children or may have a broader age range compared to KD which is more common in young children. (b) MIS-C patients more often have gastrointestinal and neurological symptoms, shock and are more likely to manifest cardiac dysfunction than children with KD.⁴²
- c. Other conditions which need to be considered in the differential diagnosis include bacterial sepsis, toxic shock syndrome, appendicitis, other viral infections, Hemophagocytic lymphohistiocytosis (HLH), urinary tract infection (UTI), etc.⁴³ Common tropical infections such as Malaria, Dengue, Enteric fever, Rickettsial illness (scrub typhus), etc. should also be considered. Such conditions can also have similar manifestations such as rash, abdominal pain, hypotension (fulfill more than 2 clinical criteria). With high IgG positivity in public, this would become important.

MIS-C may be diagnosed as per the established diagnostic criteria indicated in *Annex II*.

	MILD MIS-C	Severe MIS-C		
Severity	Non-life-threatening condition	Life threatening condition		
	Fever and stable vital signs. Absence of shock or organ threatening disease. Level 1 investiga- tions must be initiated. Children fulfilling the criteria for MIS-C must be hospitalised and recommended treatment may be initiated.	Abnormal vital signs (tachycardia, tachypnea), respiratory distress of any severity, shock, neurologic deficits or change in mental status (including subtle manifestations), multiple organ dysfunction syndrome (MODS), cardiac manifestations (myocardial dysfunction/ coronary abnormality), evidence of even mild renal or hepatic injury, markedly elevated inflammatory markers (C-reactive protein ≥10.00 mg/dl) and abnormal ECG, B-type natriuretic peptide (BNP), or troponin T. ⁴⁰ The child should preferably be managed in an ICU.		
Recommended treatment	Patients with MIS-C should undergo diagnostic evaluation for other possible infectious and non-infectious diseases before immunomodu- latory treatment is initiated.	A combination of immunomodulator IVIG (2 g/kg within 24 hours) and low-dose steroids (Methylprednisolone 1-2 mg/kg per day) is recommended in all cases of life-threatening MIS-C. Details in Annex I.		
	Low-dose steroids (IV MPS 1-2 mg/kg per day) must be given as first line therapy in all cases of non-critical MIS-C. For thromboprophylaxis - Low dose aspi- rin 3 - 5 mg/kg/day: may 75 mg/day (Contrain-	Studies conducted to evaluate the effectiveness of IVIG treat- ment against IVIG + Methylprednisolone showed that the combination therapy gave a lower rate of treatment failure, less requirement of second-line treatment, and shorter PICU stays. ^{30,34,44}		
	dicated in case of active bleeding or significant bleeding risk or platelets $< 80,000/ \mu$ L). ⁴⁰ In case of refractory disease (persistent fevers	In case of refractory disease (persistent fevers and/or ongoing and significant end-organ involvement.), high dose Methylpred- nisolone 10-30 mg/kg/day for 3-5 days, max 1 gm / day is rec- ommended.		
	and/or ongoing and significant end-organ in- volvement.), consider Intravenous immuno- globulin (IVIG) after ruling out alternative diag- noses. High dose of Methylprednisolone may	Taper steroids over 2-3 weeks while monitoring inflammatory markers (CRP).		
	the above and progression as per the Annex I.	inotropic medications for supportive treatment.		
	In children with the Kawasaki disease pheno- type, IVIG is preferred. Cardiac function and flu- id status should be assessed in MIS-C patients before IVIG treatment is provided.	Early vasoactive medication/ vasopressors - Peripheral Adrenaline 0.1-0.2 mcg/kg/min, Peripheral Noradrenaline 0.1-0.2 mcg/kg/min, left ventricle (LV) dysfunction may be treated with low dose adrenaline if child has hypotension or Dobutamine (10- 20 mcg/kg/min) if child is normotensive.		
		MIS-C with cardiac abnormalities- patients with abnormal BNP and/or troponin T at diagnosis should have these labora- tory parameters trended over time until they normalize, ECG should be performed every 48 hours or earlier if required . Echocardiogram should be repeated at least 7-14 days and 4-6 weeks after presentation.		
Discharge and follow up	Discharge when child is afebrile and, CRP, ferritin, and d-dimer improving or below the MIS-C thresholds, Blo cultures sterile, if applicable; ECG without arrhythmia, tolerating oral feeds, and not requiring supplemental or ygen.			
	Ensure adequate follow ups:			
	 a. Paediatric review: one week (repeat CBC, CRP, and others, if not normalized prior to discharge) b. Paediatric cardiology review: one to two weeks after discharge (repeat ECG and Echo with KD, another E at four to six weeks or frequent monitoring, if needed) 			
	c. Long term: for resolving cardiac abnormalities and occurrence of any new symptoms. Patients with MIS-C and documented thrombosis or an EF of <35% should receive therapeutic antico with enoxaparin until at least 2 weeks after discharge from the hospital. Low dose aspirin 3 - 5 mg/kg/da mg/day should also be used in MIS-C patients with KD like feature; coronary artery Z score>=2.5; throm contraindication- platelets <80,000/ μL. ⁴⁰			

3. Formulate and disseminate living guidelines for paediatric age groups through the National and Regional Task Forces on Paediatrics

India has released a protocol for the management of COVID-19 in the paediatric age group. We further suggest leveraging the existing expertise of the various taskforces at the national and regional levels to guide the fraternity and develop standardized protocols and tools for effective management of SARS CoV-2 infection by incorporating country-specific resources and evidence. We propose that the task forces be multidisciplinary, with representatives from immunology, haematology, hepatology/ gastroenterology, cardiology, infectious disease, intensive care, neurologist/ neurodevelopmental paediatrics and paediatric and adolescent psychiatry. Regional collaboration between Centres of Excellence and institutions may be considered to generate real-time evidence on case presentation, early identification, and effective treatment mechanisms.

C2: MINIMIZING DEVELOPMENTAL AND PSYCHOSOCIAL IMPACT OF THE PANDEMIC

1. Accelerate interventions to investigate and address neuro-behavioural and mental health challenges in children

We recommend establishing protocols to assess and manage the mental health impact of COVID-19 among children (for both those are infected and those affected indirectly). There is a need for formulation of clear guidelines and establishing modalities for paediatric counselling through teleconsultations. A licensed counselor must undertake a comprehensive assessment deemed susceptible through several risk factors such as the severity of infection, hospital stay, psychological issues, including poor mental health before the crisis, injury to self or family members, and life-threatening circumstances.⁵⁷ The health professionals must ensure adequate followup and overall support for such children.⁵⁸ We also recommend constructing a mechanism for continuous social support at times of bereavement and extending long term educational and financial support for children who might have lost parents and guardians and remain unaided. Encouraging parents to seek an evaluation for their children goes a long way in identifying the magnitude of the problem.⁵⁹ Further, early interventions may prevent long term mental

health consequences from the COVID-19 pandemic.60

We also recommend that paediatricians or other healthcare providers receive brief online training to screen vulnerable children for signs of mental health distress, assess psychosocial factors, provide inputs relevant to the management of mild stress and anxiety in affected children, and refer to mental health care professionals as needed.^{61,62}

2. Enabling strategic re-opening of schools

We recommend reopening schools in a phased manner as the COVID-19 cases decline, to enhance in- person learning, social, mental, and physical development of children, with adequate mitigating measures in place. The opening of schools however should be dependent on the transmission rates in the local community and compliance to the mitigation measures, especially in older children.^{63,64} We also urge adequate investments in appropriate multi-layered safeguards in all schools before re-opening.⁶⁵

C3: ADDRESSING BIG FEAR OF THE THIRD WAVE AND POLICY INTERVENTIONS

1. Expanding / augmenting paediatric care health facilities and telemedicine services

We recommend earmarking select facilities with the capacity to manage paediatric cases in collaboration with an existing network of Paediatric facilities and centres of excellence, in the event of a paediatric surge. It is strongly recommended that paediatric beds and ICUs should not be converted for use for managing adults so that children can be managed effectively by their specialists. It is also essential to ensure overall strengthening of paediatric facilities in various hospitals and not just in COVID care facilities.

We urge the government to earmark at least 10 per cent of the adult COVID ICU beds for children, 20 per cent in covid wards, with sufficient isolation rooms so that healthy parents can stay with their children as needed. We recommend adding ICU and HDU beds in the non-covid paediatric ward as it is anticipated that some cases of MIS-C may be observed in future waves. Facilities have been categorized at different levels based on the availability of services and as a referral chain for progressive ailment, preferably within the same district as per *Annex III*. There is an urgent need to upscale paediatric cardiac care facilities in larger hospitals while also building the capacity of cardiologists handling adults to manage paediatric cases effectively. Peripheral Flu clinics may be set up for the early detection of potential cases and to prevent patients from deteriorating and needing ICU care. State examples such as Kerala may be considered for scale-up where appropriate, and modified measures can be identified for children.⁴⁵

Kerala has adopted a unique model to limit the escalation of paediatric cases by ensuring strong community surveillance. A line listing of all positive cases is maintained by Public Health Nurse (PHN) and teleconsultation is regularly provided. The cases are then also followed up for a period of six weeks for any potential MIS-C manifestations and referral is established if needed. In addition, two Taluk hospitals in each district, are also earmarked for catering to paediatric COVID-19 cases with a dedicated ward for isolating mild cases. Tertiary care is also strengthened by management of non-covid (stable) patients in existing / partially erect tertiary care facilities and dedicated facilities for COVID-19 cases.

With the increase in bed strength and facilities, proportional availability of paediatric equipment must also be ensured through central procurement as also ensuring adequate availability of medications such as corticosteroids, IVIG, heparin, biologics etc., indicated for the use of management and treatment of paediatric cases. In addition, stringent home isolation and community surveillance must be implemented encouraging the use of community COVID isolation centres where home isolation is difficult.

The Government's national telemedicine service (eSanjeevani) as already illustrated the reach of telemedicine having reached over 6 million patients through teleconsultations.⁴⁶ We recommend replicating similar services at the district level and strengthening mobile medical units aligned to paediatric requirements with ease and prompt access to the healthcare facility.

2. Rapid scale-up of clinical trials, strengthening data and vital registries

India has been a pioneer in large-scale surveys and has robust data collection methods in place. We, thus, recommend taking an immediate stock of data on details of bed strength at each level of facility, oxygen availability, specialized paediatric equipment such as ambu bags, nasal prongs and cannulae, respiratory therapy devices, and a trained workforce at all levels.

We recommend setting up an online registry for paediatric COVID-19 cases with a uniform data format driven through a combination of live inputs from ICMR and possibly a collaborative network of regional centres of excellence (hub and spoke model) channeling data to a national repository. This will help both, effective and dynamic case management, and effective policy formulation across the health system continuum.

Further, we recommend increased investment in clinical trials and studies to improve access, affordability, and better outcomes in this emerging area of study. We also recommend a long term follow up study with MIS-C (focused on long term implications of SARS CoV-2 infection in children).

3. Urgent prioritization for vaccination

As of June 11, 2021, India has administered 24.6 million doses of vaccines and we applaud the judicious approval of Covaxin clinical trials (Phase II/III) in children of 2 to 18 years.^{47,48} Countries like USA and UK have also initiated vaccination in their respective populations. The United States has vaccinated more than 6.5 million adolescents between 12-17 years with at least one dose and about 3 million with both doses.⁴⁹ Similarly, as reported in the roundtable, UK has prioritized vaccinating adolescents with neuro-disabilities and children at risk.

Timely completion of the vaccine trials in children will substantially accelerate the efforts for ensuring protection, generate data, and guide immediate policy actions. Risk stratification may prioritize children with high risk, followed by a group at lesser risk but significant contributor to transmission of infection followed by the low-risk group. We recommend a more 'at-risk' approach for consideration and adoption, prioritizing adolescent age groups including children with comorbidities (immunosuppression, neurodisabilities, asthma, gastrointestinal conditions, or diabetes), obesity, and young adults who become more susceptible to worsening the disease and need for critical care.^{50,51}

4. Expedited knowledge dissemination and capacity building of health workforce

A key variable to determine the success in flattening the COVID-19 curve, is the availability and competence of the health workforce. We strongly recommend preemptive measures to build the capacity of attendants and caretakers, to manage paediatric cases.

Specific training based on role mapping to the various professionals in the health system will enable task shifting and help extend the reach of the paediatric specialist. Training and capacity building on Emergency Triage Assessment and Training (ETAT) – assessment for emergency signs without delay, HDU/ICU management including use of oxygen and ventilators, shifting and transportation protocols, accurate triaging of patients into mild, moderate, and severe cases for adherence to treatment protocols, management of MIS-C cases appropriately, as well as psychosocial counselling, among others must be prioritized. Technology must be leveraged including virtual and simulated training. Existing Government platforms such as Integrated Government Online Training (iGoT) must be further enhanced to allow for rapid scale up and accurate evaluation of skills and competencies. Clinically safe task-shifting to leverage front line health-workers, especially for effective community surveillance should be evaluated. Inter-sectoral and inter-agency coordination to maximize learning and expedite knowledge transfer is paramount.

We advocate enhancing peripheral care by dedicating additional nurses and physicians to paediatric and neonatal care in all peripheral hospitals, allowing for planning time and reducing the strain on the health system. Effective rotational staffing schedules to efficiently manage available health personnel in resource-constrained environments and pooling of resources between states where necessary, should be explored. Centrally coordinated multidisciplinary mobile Rapid Response Teams need to be identified and subjected to training, as is the usual practice in disaster management and response.

5. Ensuring the continuation of essential and routine neonatal and paediatric services including vaccinations

We strongly recommend the continued equitable provision of essential healthcare services, particularly in rural and semi-urban regions, such as antenatal care (ANC), institutional delivery, newborn care, postnatal care, routine immunisation, family planning services, tackling malnutrition, among others, to reduce the risk of negative health outcomes among COVID-19 positive children. Children with chronic disease and those with disabilities or developmental delays, autism spectrum disorders, and behavioural issues must be identified and monitored closely. Newborn screening is an important program vertical whose operations must be monitored, given the probability of COVID-19 in the mother or the new born or both and completed at the earliest possible time after the infectious period.

6. Enhancing and assessing the impact of nutritional status of the paediatric patients

The nutritional status of paediatric COVID-19 patient suffers a great deal due to the increased energy demands of the body and can potentially risk the outcome of the treatment.⁵² A renewed emphasis on precise calculation of energy demands and attention to optimising protein intake is required. Nutritional status is also associated with lung function and plays a critical role in managing the paediatric patient with COVID-19 who depends on ventilatory support. Insufficient nutritional status, such as malnutrition, can significantly impact lung function, hence giving enough nutritional assistance, enteral or parenteral, is critical in improving prognosis and lung function in young patients.^{53,54} Again, there is a significant link between malnutrition, illness, and infant mortality because inadequate nutrition causes children to be underweight, fragile, and sensitive to infections, primarily due to epithelial integrity and inflammation.55,56 We recommend preemptive measures to avoid any disruption in the essential services, including addressing the nutritional requirements of the children, with a particular focus in rural and semi-urban areas. We emphasise the crucial need for dietary interventions in affected children to aid in their recovery and protection against detrimental effects of malnourishment post-infection.

7. Launch and support public education campaigns and effective risk communication

Awareness generation among the masses and active involvement as volunteers may prove to be the best public health tools in managing the anticipated situation. It is a fitting time to address the raging concerns and fear propagating across media platforms on the plausible third wave and its catastrophic effects on children. We recommend wider dissemination of facts and myth busters. Some important facts include: negligible vertical transmission from a pregnant mother to the foetus; breastfeeding as being safe and essential for a newborn; the efficacy of simple precautionary measures to keep the expecting and new mothers infection free, as much as possible, among others. We also recommend a strategic public education and risk communication campaign highlighting the safety of children via adherence to the safety protocols, wellventilated rooms in public settings, seeking help for both physical and psychological issues as necessary and appropriate consumption and processing of news media. Training programs for families, caregivers, and children on all the issues above could be conducted in parallel virtually, similar to that of healthcare providers. D: CONCLUSION

To summarize, current statistics indicate a larger number of children with COVID-19 during the second wave in India than the first wave, owing to an overall increase in cases during the second wave, while the proportion of children affected nearly remained unchanged. MIS-C is a rare complication of COVID-19 with a potential for severe morbidity and mortality. Preliminary review of cases within representative facilities further corroborates the low case severity and low overall mortality rates in children.

That said, the health system needs to gear up for a paediatric case load with adequate infrastructure, earmarked facilities at primary, secondary and tertiary levels of care, oxygen availability, appropriate equipment, trained manpower, drugs and injectables among others, all of which are specific to children. The national-level clinical protocols must be adhered to at all levels of facilities and all providers adequately trained, similar to adult protocols. The health system must maintain its routine programs like immunisation and nutrition and identify high risk patients in advance for better management.

Vaccines will form an important part of the preventive strategy for adults and also eventually for children

and this must be evaluated and implemented expeditiously. Behaviour change communication and media management must be prioritized to help alleviate panic and anxiety. Schools must be reopened cautiously in person, with options for online access as needed, but with a firm resolve to bring normalcy back as quickly as possible in children's lives.

India's youth 10 to 15 years from now will perhaps be known as the COVID-generation similar to children around the world; those children that lived through the most devastating pandemic in over a century. It is imperative to recognize as a society that in our well-meaning attempt to protect our young ones from disease and keep them physically safe, we do not inadvertently impair their minds by curtailing access of expression for their inherent curiosity, creativity, and joy.

Our greatest victory as a society and as an economy will be in following through and supporting our children effectively today, with tools to build resilience and handle this crisis collectively to reap a successful tomorrow.

Declaration of Competing Interest

The authors have declared that no conflict of interest exists.

Author contributions and acknowledgments

- AS, ASK, HC, IS, JM, NS, RL, SB, SKK, SR, SG, SG, SN, and WR: all authors provided scientific input, read, edited, and approved the various drafts.
- Siddarth Ramji led the data curation and analysis and provided overall technical inputs and project guidance.
- **Rakesh Lodha** and **S Kabra** led the formulation of the algorithm for clinical protocols.
- Anupam Sachdeva and Harish Chellani formulated the resource list by levels of facilities.
- **Kavita Narayan** conceptualized the content, drafted, and coordinated the inputs with the panel of experts and was the primary reviewer and editor.
- Shivangini Kar Dave contributed to a major part of the literature and data review, drafting, sorting and analysis of comments from the panel of experts.
- The authors acknowledge the contributions of Nitin Dhochak in review and edits of the clinical protocols and Vivek Bhatnagar and Chhavi Madaan for research and literature review.

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