संचालनालय स्वास्थ्य सेवायें. मध्यप्रदेश

महत्वपूर्ण

क्रमांक / कोविड—19 नियंत्रण / आई.डी.एस.पी / 2020 / 9.28

भोपाल, दिनांक २५/०६/२०२०

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विषयः— कोविड—19 के परिदृश्य में बच्चों का संस्थागत प्रबंधन।

विषयांतर्गत लेख है कि प्रदेश में कोविड–19 की स्थिति को दृष्टिगत रखते हुए यह अत्यन्त आवश्यक है कि बच्चों की देखभाल हेत् स्थापित विभिन्न संस्थागत इकाईयों जैसे Newborn High Dependency Unit (NHDU), बीमार नवजात शिशु गहन चिकित्सा इकाई (SNCU), नवजात शिशु स्थिरिकरण इकाई (NBSU), नवजात शिशू देखभाल कॉर्नर (NBCC), पोषण पूर्नवास केन्द्र (NRC), गंभीर कृपोषण उपचार इकाई (SMTU) आदि में भर्ती बच्चों का मानक प्रबंधन सुनिष्टिचत हो।

इस संबंध में राज्य स्तरीय Child Health Treatment and Protocol Advisory Committee द्वारा Standard Operating Protocol for Facility based Pediatric Care During COVID-19 का निर्माण किया गया है। बच्चों के संस्थागत प्रबंधन संबंधी इस मानक मार्गदर्शिका में निम्न विषयों का समावेश किया गया है:--

1. Perinatal-Neonatal Management of COVID-19	6. Management of Hypoxemic Respiratory Failure and ARDS
2. Facility based care of Newborn and Child during COVID-19 infection	7. Management of Septic shock
3. Feeding practices	8. Practical Management in Critical Care
4. Early recognition of patients with suspected COVID-19 infection	9. Specific anti-COVId-19 treatments and Clinical research
5. Early supportive therapy and monitoring	10. Special considerations for pregnant patients.

कोविड—19 के परिदृश्य में बच्चों के संस्थागत प्रबंधन हेतू प्रदेश के तकनीकि विशेषज्ञों द्वारा निर्मित मार्गदर्शिका Standard Operating Protocol for Facility based Pediatric Care During COVID-19 मार्गदर्शिका पालन हेतू संलग्न प्रेषित है।

प्रमुख सचिव, स्वास्थ्य"द्वारा अनुमोदित

(डॉ. संजय गोयल)

आयुक्त स्वास्थ्य, मध्यप्रदेश भोपाल, दिनांक २४ / ०६ / २०२०

क्रमांक / कोविड—19 नियंत्रण / आई.डी.एस.पी / 2020 / 929 प्रतिलिपिः- सूचनार्थ।

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मध्यप्रदेश

FACILITY BASED PAEDIATRIC CARE DURING COVID-19

MADHYA PRADESH

DEPARTMENT OF HEALTH AND FAMILY WELFARE, MADHYA PRADESH

Acronym /abbreviations

BMV	Bag and Mask Ventilation	
BMW	Bio-Medical Waste Management	
BSL	Biosafety Level	
CAPR	Controlled Air Purifying Respirators.	
CCC	Covid Care Centre	
СН	Civil Hospital	
СНС	Community Health Centre	
COVID-19	Corona Virus Infectious Diseases	
СРАР	Continuous Positive Airway Pressure	
DCH	Dedicated Covid Hospital	
DCHC	Dedicated Covid Health Centre	
FBNC	Facility Based NewbornCare	
HFNC	High Flow Nasal Cannula	
HSC	Sub-Health Centre	
INAP	India Newborn Action Plan	
IPC	Infection Prevention Control	
MPAPPD	Madhya Pradesh Action Plan For Pneumonia And Diarrhoea	
N-HDU	NewbornHigh Dependency Unit	
NBCC	NewbornCare Corner	
NBSU	NewbornStabilization Unit	
NRC	Nutrition Rehabilitation Centre	
nCOV	Novel Coronavirus	
NICU	Neonatal Intensive Care Unit	
NP	Nasopharyngeal	
OP	Oropharyngeal	
PAPR	Powered Air Purifying Respirators.	
РНС	Primary Health Centre	
PIP	Program Implementation Plan	
PW	Pregnant Women	
RDS	Respiratory Distress Syndrome	
RT-PCR	Real-Time Fluorescence Polymerase Chain Reaction	
SARI	Severe Acute Respiratory Infection	
SNCU	Special Newborn Care Unit	
VTM	Viral Transport Media	
SMTU	Severe Malnutrition Treatment Unit	
SMART Unit	Severe Acute Malnutrition Advanced Referral And Treatment Unit	

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Disclaimer-The guideline in this document based on limited evidence as available now. As new evidences accumulate, some of the recommendations may change. Users should use this guideline in accordance with the latest government directives.

Background:

Madhya Pradesh has one of the Highest Infant Mortality Rates (IMR) with 48 per 1000 live births as per SRS 2018. Neonatal mortality (33 per 1000 Live births) contributes to over 68% of the Infant mortality. Thus, overall both contribute to Under five mortality with 55 per 1000 live births. An estimated 58,000 Newborns are lost within 28 days of life. As per India Newborn Action Plan (INAP) launched in 2015, it is essential to continue the efforts for Facility and Community based newborn care, to reduce the Newborn mortality to single digits. With COVID-19 pandemic in Madhya Pradesh and numbers of cases rising with 9000 plus cases till date, it is essential to provide and plan critical care services for COVID exposed Newborns, as well as focus on continuation of essential RMNCH+A services, with focus on maternal, perinatal health of newborns. Severely anaemic and severe acute malnourished children. Malnourished children, particularly those with severe acute malnutrition, have a higher mortality risk from common childhood illnesses such as diarrhoea, pneumonia, and malaria. During the COVID-19 pandemic it is expected that there would be increase in child wasting due to various reasons related to food and nutrition security and common childhood illnesses as the access to services is hampered.

Hence, it becomes imperative to actively, triage and segregate COVID-19 exposed newborns/Children, suspect cases from confirmed cases and plan for Health facilities at all levels to provide the necessary hospital planning, for the same. Government of Madhya Pradesh, has revised and updated all key guidelines, with regards to Levels of care and facilitiesfor mild, moderate and severe cases of COVID-19 at COVID Care Centre(CCC), Dedicated COVID Health Care Centres (DCHC) and Dedicated COVID hospitals (DCH) with Intensive Care Units (ICUs) and ventilator beds. At 52 districts of MP, GoMP has over 54 SNCUS, functional-5 at Medical colleges and 49 at District Hospitals, and 62 NBSUs are functionalat sub district level, 55 NBSUs are newly sanctioned in PIP 2020-2021. Similarly 1515 Newborn Care Corners (NBCCs) are functional at delivery points at 24x7 delivery points at Health Sub Centres (HSCs) /Primary Health Care Centres (PHCs) designated in Labor rooms as well as at CHC and DH.For clinical management of medically complicated U5 children with severe wasting, the State has 315 functional Nutrition Rehabilitation Centres (NRCs) at district and sub-district level, tertiary level Severe Malnutrition Treatment units (SMTUs) at 5 Medical Colleges and Severe Acute Malnutrition Advance Referral and Treatment (SMART) Unit at AIIMS Bhopal. The SMTUs are the up-referral units located in Medical colleges, whereas SMART unit under Regional Centre of Excellence for Nutrition Rehabilitation, Resource and Training (RCoENRRT) at Department of Pediatrics, AIMS Bhopal is the apex centre for advanced management of critical and nonresponder cases of SAM. The State has also developed the Standard Operating Procedures defining an integrated framework linkage between NRCs, SMTU and SMART unit and a structured approach that will guide clinicians in management of non-responders and critical cases of SAM based on chief complaints.

MP has also developed the MP Action plan for Pneumonia Diarrhoea Management (MPAPPD) based on the global Action plan guidelines, through skills based trainings, by setting up IMNCI guidelines based skill stations at Regional Health and Family welfare Training Centres (RHFWTCs), with more than 6,000 facility and frontline workers training on Pneumonia and Diarrhoea management and is planning to integrate and roll out the updated, the Govt of India SAANS module developed by GoI, in December 2019, for skills based management of pneumonia management. The integrated action plan, highlights the roll of Prevention, Protection and Treatment (PPT), which includes focus on key Vaccines like OPV, Pentavalent,

Measles Rubella (MR), Pneumococcal Vaccine rolled out in Madhya Pradesh, prevention of HIV, continued feeding during Illness, Hand washing with soap nd improved health seeking referral of danger signs and case management of pneumonia diarrhoea, with availability of Nebulizers, Oxygen therapy and adequate antibiotics, where needed (Refer to GAPPD 2016). It is essential that COVID-19 management, is integrated as part of the MPAPPD action plan for the state.

Additionally MP has also operationalized Newborn High dependency Units (NHDUs) 10 bedded in same complex attached to SNCUs 10 are functional and 15 more are sanctioned in PIP 2020-2021.

The foremost message is-

- All SNCUs are functional as per previous guidelines of State.
- All relevant services are given, there is no change in services.
- Sick and critical Newborns are cared as per protocols
- Isolation facility has become a part now
- All sick newborns are managed as per FBNC Protocols
- Referral Transport is managed at district level adequately

SNCU staff and Facility -In-charges need to be aware of following challenges during COVID-19 for Essential and Sick Newborn Care-

- Rational Deployment of HR, equipment, drugs adequacy
- Infection prevention control IPC and Bio-waste management (BMW)
- Supply chain is maintained and monitored, with efficient collaboration based on GoMP directives- None of the SNCU / NBSU staff will be deployed for CCC, DCHC and DCH as per MP directives.
- Training of SNCU staff is provided through SNCU and paediatric care webinars to all a staff regularly as well as case discussions and meetings are held with support of GoMP, UNICEF and partners, and medical college experts on Case management
- Follow up of discharged newborns is assured through SNCU follow up system as per guidelines and protocols of GOMP and GoI

Level of Covid Care -

- 1. Level-1- CCC- Covid Care Center
- 2. Level-2 DCHC- District CovidHealth Center
- 3. Level-3 DCH- Dedicated Covid Hospital

Level of Newborn Care-

- 1. Level-1- Newborn care corner (NBCC), at all Delivery Points
- 2. Level-2- Newborn Stabilization unit (NBSU) at CHC/CH
- 3. Level-3- Special Newborn care unit (SNCU) at District Hospital

General information about COVID-19-

- 80% of cases of COVID are mild.
- Newborn and Children infection rates ; It is known from studies, less than 20% Newborns or children are infected with COVID-19 from other countries . However, Mothers with more than 28 weeks of gestation exposed to COVID may have a higher chance of critical illness.
- Evidence also suggests, that more than 81% of the infections are mild and recover within 14 days. Only few cases 15% get critical illness like pneumonia or breathing difficulty and 5%, who need ventilator support may get fata infection. Some percentage of mild, moderate

Current Covid-19 situation in Madhya Pradesh-

Madhya Pradesh has crossed 10,800 cases of covid-19 as on 14th June 2020, and it became the 8th state in the country to have 10,000 and more such cases, as per the Ministry of Health and family welfare's data released by Madhya Pradesh.The other states include Maharashtra with more than 100,000 cases, Tamil Nadu with more than 44,000 cases, Delhi with more than 41,000, Gujarat with 23,000 Uttar Pradesh with 13,000 and Rajasthan with 12,000 cases, as per the ministry's data.

Though Madhya Pradesh is the 8th state on the chart as far as the highest number of Covid-19 positive cases are concerned, its death rate is the third worst in the country at 4.25% that is only next to Gujarat and West Bengal which has 6.24% & 4.33% death rate respectively. The death rates of other states with 10,000 and more cases are 0.93% in Tamil Nadu, 2.27% in Rajasthan, 2.93% in Uttar Pradesh, 2.89% in Delhi and 3.62% in Maharashtra, as per the ministry's data.

The national death rate among Covid-19 patients is 2.87%. Thus, in Madhya Pradesh the death rate is about 1.5 times more than the national death rate.As far as the geographical spread of coronavirus in the state is concerned out of the total 51 districts all district have covid-19 cases. Six districts have Covid-19 patients in single digits while 31 districts' tally is in double digits.Indore tops the chart of Covid-19 patients with the figure of 3,881. Of them, 161 have died.



Madhya Pradesh- Trend of Active Cases & Recovery Rate

Recovery rate of Madhya Pradesh is the second in the country which is 71.1% (as on 14th June 2020).

General guiding principal-

- All COVID suspect and positive cases should preferably be provided services at dedicated COVID facility.
- COVID testing is not mandatory for routine newborn and child health service. ICMR testing guidelines need to be followed.
- Teleconsultation services to be promoted at all levels to prevent overcrowding and reduce cross infection.
- Drugs, commodities needed for continuing RMNCAH+N services, should be treated as essential commodities.
- Capacity building of all healthcare providers, review meetings etc. should preferably be carried out using digital health platforms.
- It is safe to continue and child health services with due precautions.
- There should not be mixing of staff, equipment, drugs and consumables between covid and non covid area.
- Reassure parents and involve them in caring for their child, keep up-to-date using the evidence, and communicate well with colleagues.
- Be extra-vigilant in children with pre-existing conditions but reassure parents that the risks of co-morbidities are much greater in adults than children.
- Chest x-rays (CXR), bloods, and blood gases are not routinely indicated in all children. However, these should be monitored in children with persistent fever, altered fluid balance, signs of liver dysfunction, or respiratory failure.
- Guideline is useful and applicable to private sector also
- -

The guideline covers:

- Perinatal-Neonatal management of covid-19
- Facility based care of Newborn and Child during covid-19
- Feeding practices
- Early recognition of patients with suspected COVID-19 infection
- Early supportive therapy and monitoring
- Management of hypoxaemic respiratory failure and ARDS;
- Management of septic shock
- Practical management in critical care
- Specific anti-COVID-19 treatments and clinical research
- Special considerations for pregnant patients.

Perinatal -Neonatal Guidelines for Covid -19

For Pregnant women and Newborns Susceptibility to COVID-19 -

- Pregnant women do not appear more likely to contract the infection than the general population¹
- Pregnant women may elicit severe symptoms as pregnancy itself alters the body's immune system and response to viral infection
- Reported cases of COVID-19 pneumonia in pregnancy are milder and with good recovery.
- Pregnant women with heart disease are at highest risk (congenital or acquired)
- Increased risk of perinatal anxiety and depression, as well as domestic violence.

*<u>Bassed on evidence – PW_28 weeks onwards- confirmed with COVID-19 more at risk of</u> <u>critical illness or severe symptoms</u>

COVID-19 Transmission -

- Vertical Transmission is possible as per emerging evidence. (Reference to be added)
- At present, there are no recorded cases of vaginal secretions and breast milk tested positive for COVID-19.

Effects on Foetus-

- No data suggesting increased risk of pregnancy loss or teratogenicity
- COVID-19 infection is currently not an indication for Medical Termination of Pregnancy.

Need for Tracking line listing of all Pregnant women for ANC. Telephonic consultations for ANC for red zones, other zones to continue ANC OPD with social distancing and triaging at all levels. For High risk pregnant women- focus on line

Perinatal Management.

- Separate delivery room and operation theatres are required for management of suspected or confirmed COVID-19 mothers. Both should have neonatal resuscitation corners located at least 2 meter away from the delivery table. Resources required include space, equipment, supplies and trained healthcare providers for delivery, caesarean section and neonatal resuscitation¹.
- The standards and facilities required for infection control in these areas should be same as that for other adults with suspected or confirmed COVID-19 infection².
- Asymptomatic neonate (Positive or Negative) with mother can be admitted in Covid Care Centre(CCC).
- Symptomatic neonate should be admitted in Dedicated Covid Hospital (DCH).
- 2-4 warmers along with neonatal ventilator (1) should be earmarked and kept in DCH. Warmer and ventilators should be 2 meter apart from each other.

Preparation of OPD and IPD services – General

 There is aneed for preparing the facility in general to segregate COVID-19 and non COVID essential RMNCH+A services, with proper triaging, separating queues, OPD and IPD planning areas with designated responsible staff.

Triaging at OPD, IPD and at SNCU- A Separate Area for Triaging, to be prepared at each level of care for Newborns – at medical college and DH SNCU, and similarly at CHCNBSU. For CCC, DCHC and DCH also new-born care warmers to be arranged in single room- next to mothers bed



2 meters away. In of case ward, Newborn warmers can be segregated in a separate area/ step down unitonly in cases where mother is critical and newborn needs be separated. to Masks to be provided to mother, father and anv other attendant. Limit the attendants at the facility based on guidelines.

Definition of suspected neonatal Covid 19 infection

The definition for new-borns suspected of 2019-nCoV (novel coronavirus) infection are those new-borns-

- Born to the mothers with a history of 2019-nCoV infection between 14 days before delivery and 28 days after delivery
- Newborn born to a mother suspected infection or to a mother from containment area.
- Newborns directly exposed to those infected with 2019-nCoV (including family members, caregivers, medical staff, and visitors).
- Presenting with respiratory distress with or without fever, cough onset beyond 48-72 hrs of age and no other alternative explanation for the illness
- Suspected infants are under consideration regardless of whether they present symptoms.

Definition of confirmed 2019-nCoV infection

Diagnosis of 2019-nCoV infection can be confirmed if 1 of the following etiological criteria is met: Respiratory tract specimens tested by real-time fluorescence polymerase chain reaction (RT-PCR) are positive for 2019-nCoV nucleic acid.

Symptoms in confirmed covid-19 positive newborn- Fever, respiratory distress, cough, loose motion and vomiting (Neonatal management will be same as per FBNC Protocol.

Facility Based care

Facility based care can be divided into two sub groups-

- 1. Essential Care
- 2. Special Care
- 1. Essential care: Provided to all newborns.
- Care at birth .
- Resuscitation if needed.
- Initiation of Breast feeding.
- Maintaining Temperature.
- Prevention of Sepsis.

Care At birth and Resuscitation

Place of Delivery:

- Pregnant Women (PW) who is suspect of Covid or is Covid positive and has no other pregnancy related risk factors or comorbidities can be delivered at District hospital.
- Separate labour room /OT should be reserved for delivery of such PW.
- Resuscitation corner (radiant warmer) should be made outside labour room /OT so as to decrease exposure to Health care workers. If there is limitation of space Resuscitation corner can be made 2 meters away from OT table or labour table.
- The Resuscitation team should be ready in PPE and baby should be handed over to resuscitation team. One person in low risk and two in high risk delivery should be available for resuscitation.
- NRP guidelines for resuscitation should be followed with use of disposable equipment as far as possible.
- Self-inflating bag and mask should be preferred for resuscitation over T piece resuscitator as self-inflating bag and mask can be autoclaved and sterilized in cidex after cleaning with soap and water.
- Routine care at birth is to be given to babies who don't need resuscitation with delayed cord clamping and skin to skin contact. Mother should wear triple layer mask and perform hand hygiene



Figure 1- T-Piece resuscitator



Figure 2- Ambu bag

Recommendation For Neonatal Resuscitation:-

- If possible, resuscitation of neonate can be done in a physically separate adjacent room earmarked for this purpose. If not feasible, the resuscitation warmer should be physically separated from the mother's delivery area by a distance of at least 2 meters. A curtain can be used between the two areas to minimize opportunities for close contact.
- Minimum number of personnel should attend (one person in low risk cases and two in high risk cases where extensive resuscitation may be anticipated) and wear a full set of personal protective equipment including N95 mask.
- Mother should perform hand hygiene and wear triple layer mask.
- Delayed cord clamping and skin to skin contact can be advised.
- Delivery team member should bring over the neonate to the resuscitation area for assessment by the neonatal team.
- Neonatal resuscitation should follow standard guidelines. If positive-pressure ventilation is needed, self-inflating bag and mask may be preferred over T-piece resuscitator³.

Neonatal Management Algorithm



*Resource limited settings. If resources are there and no community spread then baby should be cared by relatives and given expressed breast milk.

Breast Feeding Guidelines

For stable Neonates : Exclusive breast feeding& rooming in with mother.

If rooming-in is not possible because of the sickness in the neonate or the mother, the neonate should be fed expressed breast milk of the mother by a nurse or family member who has not been in contact with the mother or other suspected/proven case, provided the neonate can tolerate enteral feeding.

Conditions to be met

- Mothers should perform hand hygiene frequently, including before and after breastfeeding and touching the baby.
- Mothers should practice respiratory hygiene and wear a mask while breastfeeding and providing other care to the baby; they should routinely clean and disinfect the surfaces.
- Mothers can express milk after washing hands and breasts and while wearing a mask. If possible, a dedicated breast pump should be provided. If not, it should be decontaminated as per protocol. This expressed milk can be fed to the baby without pasteurization. The collection and transport of EBM to the baby should be done very carefully to avoid contamination.



Which neonates?	1. History of exposure of covid19 positive adult (irrespective of symptoms):
	 Neonates born to mothers with COVID-19 infection within 14 days before birth or
	 History of contact with Covid19 positive persons (including mother,family members in household ,health care worker)in the post-natal period.
	2. Irrespective of history of Exposure:
	 Presenting with Pneumonia or SARI which requires hospitalization with onset after 48-72 hours of age unless there is another underlying illness which explains respiratory signs and symptoms. Features suggestive of acute respiratory illness in neonates are Respiratory distress with or without cough ,with or without fever.
When?	1. At birth(if mother is positive) or at detection of history of contact with
	(If sample is not collected at birth due to logistic reasons, collect as soon as possible. If the 1 st test is negative the test should be repeated at 5-14 days of birth/exposure but should be done immediately if symptoms occur.)
	2. Testing Immediate in category of neonates who presents with acute respiratory illness.
What sample?	1. Not mechanically ventilated
	 Upper respiratory nasopharyngeal swab (NP). Collection of oropharyngeal swabs (OP) is a lower priority and if collected should be combined in the same tube as the NP. Mash might constituted
	 Mechanically ventilated Tracheal aspirate sample should be collected and tested as a lower
How to collect?	Upper nasopharyngeal swab
	 Use only synthetic fibre swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing. Insert a swab into nostril parallel to the palate. Swab should reach depth equal to distance from nostrils to outer opening of the ear. Leave swab in place for several seconds to absorb secretions. Slowly remove swab while rotating it. Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media.
	Oropharyngeal swab (e.g., throat swab): Swab the posterior pharynx, avoiding the tongue.
	Nasopharyngeal wash/aspirate or nasal aspirate
	Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup

	or sterile dry container.	
	Other samples : Currently not advised; stool, urine and blood specimens, since the isolation is less reliable than from respiratory specimens. Do not take these specimens for testing (based on current advisory recommendations ⁴)	
What PPE is needed for sample collection?	Clinicians should wear appropriate personal protective equipment during sampling. Nasopharyngeal swab	
	 Hand Hygiene (refer moment of Hand Hygiene poster annexed) Disposable single use glove Disposable Plastic Apron Surgical facemask 	
	 Eye Protection (surgical mask with integrated visor or full-face shield or visor or goggles / safety spectacles) For any sampling from lower respiratory tract in intubated neonates a full set of PPE is a MUST 	
	 Hand Hygiene disposable single use glove Long sleeved disposable gown N95 mask or another respirator mask Eye Protection 	
Labelling the sample	 Label each specimen container with the patient's name, hospital ID number, specimen type and the date the sample was collected. Handle the sample with precautions under biosafety level 3 (BSL-3) conditions until is rendered non-infectious by laboratory. 	
How to store?	Samples should be collected in viral transport media procured from microbiology laboratory and transported immediately in icepacks. One can use disposable thermocol cartons or plastic bags with ice cubes for in- house transport. If sending to another laboratory, store specimens at 2-8°C for up to 72 hours after collection. Storage can be done in a refrigerator dedicated for this purpose. If a delay in testing or shipping is expected, store specimens at -70°C or below. This requires deep freezers.	
How to send?	If transporting by shipping, the samples need to be packed as per instructions Guidance for sample Collection, Packaging and Transportation for Novel Coronavirus (Refer annexed poster of transportation)	
Where to send Which Test	Authorized laboratories (See MOHFW website for latest list) Reverse Transcriptase PCR is a rapid test for detecting COVID-19	





Figure 3-Neonatal Nasopharyngeal sample Technique

Management of Symptomatic Neonates .

- Neonates who are symptomatic/ sick and are born to a mother with suspected or proven COVID-19 infection should be managed in separate isolation facility.
- This area should be separate from the NICU/SNCU with a transitional area in-between. These single rooms can be single closed rooms.
- In case if enough single rooms are not available, closed incubators (preferred) or radiant warmers could be placed in a common isolation ward for neonates. The neonatal beds should be at a distance of at least 1 meter from one another. Suspected COVID-19 cases and confirmed COVID-19 cases should ideally be managed in separate isolations.
- The isolation ward should have a separate double door entry with changing room and nursing station. It should be away from routine NICU/SNCU/labor room/postnatal ward in a segregated

area which is not frequented by other personnel. The access to isolation ward should be through dedicated lift or guarded stairs.

- negative pressure could also be created by 2-4 exhaust fans driving air out of the room.
- Isolation rooms should have adequate ventilation. These areas should not be a part of the central air-conditioning.
- The doctors, nursing and other support staff working in these isolation rooms should be separate from the ones who are working in regular NICU/SNCU. The staff should be provided with adequate supplies of PPE. The staff also needs to be trained for safe use and disposal of PPE.

If the facilities of isolation intensive care are not available in the hospital where symptomatic or sick newborn is born or referred with COVID 19 infections, the newborn should be immediately shifted to State designated closest hospital where such facilities are available. Complete safety and PPE policies and precautions must be followed during transport.



Figure 4- Management algorithm

Respiratory Management of Suspected symptomatic Neonates:-

Personnel performing aerosol generating medical procedures (AGMPs) must wear full PPE with N95 masks and eye and face protection. The AGMPs include endotracheal intubation, extubation, non-invasive ventilation, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, suction etc.

- Non-invasive ventilation especially NIPPV and High Flow Nasal cannulas should be avoided because of propensity for aerosol generation. CPAP may also generate aerosols but on the other hand has numerous well-proven advantages over intubation for neonate's esp. preterm. Hence, CPAP may be used with lowest possible flows and neonates may be intubated only as per indication.
- If intubating, cuffed endotracheal tubes may offer advantage and In-line suction devices should be preferred.

 Viral filters are recommended to prevent cross-contamination of pathogens between different patients.

Specific Therapy for Covid -19

- > There is no specific antiviral therapy.
- > Hydroxychloroquine is not recommended for newborns.
- Immunoglobulins are not recommended.

Continue Kangaroo Mother Care (KMC) for stable babies at Neonatal High Dependency Units (NHDUs) – Mothers with mild symptoms or asymptomatic and stable babies can be encouraged to provide Kangaroo Mother Care (KMC) with mask in a separate room in facility or where they are admitted at CCC/ DCHC. Only critical mothers where they are sick with symptoms to be separated and their healthy family members – father, grand parents or parents siblings, healthy with practice of hand and respiratory hygiene and mask can provide KMC. Discharge and transport of Newborns from SNCU or from DCHC, CCC< DCH should be done in KMC position, specifically in Low Birth Weight LBW)/ Preterm Newborns .

Discharge Policy for Neonates.

- Asymptomatic mother and baby can be discharged after 3 days with telephonic follow up ensured.
- Asymptomatic baby can be discharged with in 3 days if a care giver is available to take care at home in case of mother being sick due to Covid 19, Telephonic follow up should be done at day 5.
- *If baby of Covid positive mother has tested negative a repeat sample should be sent at 5 -14 days after birth.
- Danger signs should be explained to mother /caregiver at time of discharge. Baby should be admitted if symptoms of respiratory distress with or without fever or cough develops and RTPCR for Covid 19 should be immediately done.

Immunization

- Asymptomatic neonates should be immunized as per UIP.
- Neonates with confirmed/suspected infection should be immunised before discharge

- All symptomatic babies and babies <34 weeks born to Covid suspect or positive mothers should be managed in a separate Isolation room from SNCU/NICU.
- It should have its separate entry and exit. The sick newborns should be cared in incubator ideally but if not available, radiant warmer can be used but there should be distance of 2 meters in between 2 warmers.
- The global evidence till now of pandemic reveals that the incidence of critical illness is very low, close to 0.1% (ref). The newborns mainly present with respiratory distress; therefore, respiratory management is the mainstay. Below are recommendations for respiratory management of sick newborns.

Respiratory Management of sick Newborn

Sr.No	Respiratory Support	Area	Use
1	Bang and Mask	Labour room/OT	Use as per NRP with full PPE.A small bacterial/viral filter can be placed in the outlet of self-inflatingbag. It creates dead space so used smallest possible Do not use when resuscitating less ELBW babies
2	Suction Oropharyngeal	Labour room/OT /SNCU	Continuous suction preferred over intermittent
3	Suction Endotracheal Tube	SNCU	Use inline suction
4	C PAP	SNCU	Use with viral filter at expiratory limb which should be replaced every 12 hours
5	Endo tracheal Intubation	Labour room/OT/SNCU Video laryngoscope is preferred as it help to maintain distance from patient while intubating	
6	Mechanical Ventilation	SNCU	Should be used as per indication with full protection .A viral filter should be used at the expiratory limb of ventilator .Inline suction should be used.

Practical approach to neonates with suspected or conformed COVID-19



BMV : Bag and Mask ventilation

HFNC ; High flow nasal cannula

CPAP : Continuous positive airway pressure

PAPR: Powered air purifying respirators.

CAPR: Controlled air purifying respirators.



The respiratory and all other morbidity management will be on the line of facility based Neonatal care (FBNC).

Post discharge Follow-up

- SNCU Facility Follow up Only for Critical Cases- Routine Follow up 1st, 7th, 28th day, and
 3, 6, 9 and 12 months at facility To be done at nearest PHC/CHC
- Only critical and danger signs to be brought back to facility SNCU for Follow up, rest to be followed by telephonic counseling by DEO and Staff nurse to reduce exposure-Milestones and routine checklist for danger signs up at PHC/CHC nearby
- Community Follow up- Continue Home Based care by ASHA, weight, critical signs, nose,eyes, umbilical cord after proper hand washing, use of mask and respiratory hygiene and social distancing
- Continue breast feeding for all
- For COVID-19 exposed mothers use mask, hand hygiene and respiratory hygiene continue Breast feeding, KMC at home

Disinfection:-

Disinfection of surfaces in confirmed Coronavirus infection are not different from those for

- 1. Wear personal protective equipment before disinfecting.
- 2. If equipment or surface is visibly soiled first clean with soap and water solution or soaked cloth as appropriate before applying the disinfectant.
- 3. 0.5% sodium hypochlorite (equivalent to 5000 ppm) can be used to disinfect large surfaces like floors and walls at least once per shift and for cleaning after a patient is transferred out of the area.
- 4. 70% ethyl alcohol can be used to disinfect small areas between uses, such as reusable dedicated equipment.
- 5. Hydrogen peroxide (dilute 100 ml of H_2O_2 10% v/v solution with 900 ml of distilled water) can be used for surface cleaning of incubators, open care systems, infusion pumps, weighing scales, standby equipment-ventilators, monitors, phototherapy units, and shelves. Use H2O2 only when equipment is not being used for the patient. Contact period of 1 hour is needed for efficacy of H_2O_2 .

usual Labor room/OT/NICU/SNCU areas and include the following:

Personal Protective Equipment-

- The CDC recommends that all health care personnel who enter the room of a patient with known or suspected COVID-19 (persons under investigation) should adhere to Standard, Contact, and Droplet precautions.
- PPE prevent contact with the infectious agent, or body fluid that may contain the infectious agent, by creating a barrier between the worker and the infectious material.
 - Gloves protect the hands.
 - o Gowns or aprons protect the skin and/or clothing
 - Masks and respirators protect the mouth and nose. The respirator has been designed to also protect the respiratory tract from airborne transmission of infectious agents
 - Goggles protect the eyes
 - Face shields protect the entire face.

Sequence of donning-

Before wearing the PPE for managing a suspected or confirmed COVID-19 case, proper hand hygiene should be performed. The gown should be donned first. The mask or respirator should be put on next and properly adjusted to fit; remember to fit check the respirator. The goggles or face shield should be donned next and the gloves are donned last. Keep in mind, the combination of PPE used, and therefore the sequence for donning, will be determined by the precautions that need to be taken.

Steps in removing PPE (Doffing)

Wearing the PPE correctly will protect the healthcare worker from contamination. After the patient has been examined or desired procedure is performed, the removal of the PPE is a critical and important step that needs to be carefully carried out in order to avoid self-contamination because the PPE could by now be contaminated.

- 1. The gloves are removed first because they are considered a heavily contaminated item. Use of alcohol-based hand disinfectant should be considered before removing the gloves. Dispose of the gloves in a biohazard bin.
- 2. After the removal of gloves, hand hygiene should be performed, and a new pair of gloves should be worn to further continue the doffing procedure. Unbuttoning of the backside of the gown, performed by an assistant. Removal of gown to be performed by grabbing the back side of the gown and pulling it away from the body. Single-use gowns can now be disposed of.
- 3. After the gown, the goggles should be removed and either disposed if they are singleuse, or placed in a bag or container for disinfection. In order to remove the goggles, a finger should be placed under the textile elastic strap in the back of the head and the goggles taken off. Touching the front part of the goggles, which can be contaminated, should be avoided.
- 4. The respirator/ mask should be removed next. In order to remove the respirator/mask, a finger or thumb should be placed under the straps in the back and the respirator taken off. The respirator (or the surgical mask) should be disposed of after removal. It is important to avoid touching the respirator/mask with the gloves (except for the straps) during its removal.
- 5. The last PPE items that should be removed are the new set of gloves that were worn after disposal of the contaminated gloves. Use of alcohol-based solution should be considered before removing the gloves.
- 6. After glove removal, hand hygiene should be performed.



Suggested PPE:

Suggested PPE	Protection
Triple layered surgical mask N95 facemasks are needed	Respiratory Protection
only when performing an aerosol-generating procedure or	
in an area where neonates are being provided respiratory	
support by CPAP device/ventilator.	
Goggle or face shield	Eye protection
Long sleeves impervious gown.	Body protection
Gloves	Hand protection

Case definition-

Suspect case-

- All symptomatic Children Who Came from Containment area.
- All symptomatic contacts of laboratory confirmed cases
- All symptomatic Contact of healthcare personnel (HCP)
- All hospitalized children with severe acute respiratory illness (SARI) (fever AND cough and/or shortness of breath)
- Asymptomatic direct and high-risk contacts of a confirmed case (should be tested once between day 5 and day 14 after contact)

Confirm case- A Child with laboratory confirmation of COVID-19 infection

Uncomplicated illness (No Pneumonia) ^	 Child with Cough and Cold with no danger signs *
Pneumonia #	 Fast breathing with no signs of severe pneumonia: <2 months - ≥60; 2-12 months - ≥50 1- 5 years - ≥40
Severe pneumonia @	 Child with cough or difficulty in breathing, plus at least one of the danger signs *

Clinical feature in Paediatric age group-

*Danger Signs –		
1. Not able to feed or continuous vomiting	2.Severe Chest In drawing	3. Fast Breathing
4. High Temperature – More than 97.6 F 5 o	5. Hypothermia	
6. Central cyanosis or SpO2<90%,)	7. Lethargic or unconscious	
Note : If cases are negative they should be tre	ated in pediatric ward/ PICU.	
Suspect or confirm cases should be treated	in ^ Covid care center (CCC)	# District Covid Health
Center (DCHC) @ Dedicated Covid Hospital (D	OCH)	

Acute Respiratory Distress Syndrome (Fast Breathing, Chest in drawing, grunting)-

- Onset: new or worsening respiratory symptoms within one week of known clinical insult.

- Chest imaging (radiograph, CT scan, or lung ultrasound): bilateral opacities, not fully explained by effusions, lobar or lung collapse, or nodules.
- Origin of oedema: respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of oedema if no risk factor present.
- Oxygenation need

Sepsis-

 Children: suspected or proven infection and ≥2 SIRS (Systemic inflammatory response syndrome)criteria, of which one must be abnormal temperature or white blood cell count

Septic Shock-

Any hypotension (SBP <5th centile or >2 SD below normal for age) or 2-3 of the following:

- Altered mental state; bradycardia or tachycardia (HR <90 bpm or >160 bpm in infants and HR <70 bpm or >150 bpm in children);
- Prolonged capillary refill (>2 sec) or warm vasodilation with bounding pulses; tachypnea;
- Mottled skin or petechial or purpuric rash; increased lactate;
- Oliguria;
- Hyperthermia or hypothermia

Testing in Paediatric age group

General Guidelines

- Trained health care professionals to wear appropriate PPE with latex free purple nitrile gloves while collecting the sample from the patient. Maintain proper infection control when collecting specimens Restricted entry to visitors or attendants during sample collection
- Complete the requisition form for each specimen submitted
- Proper disposal of all waste generated

Sample collection

- Preferred sample: Throat and nasal swab in viral transport media (VTM) and transported on ice
- Alternate: Nasopharyngeal swab, BAL or endotracheal aspirate which has to be mixed with the viral transport medium and transported on ice

Combined nasal & throat swab:

- Tilt patient's head back 70 degrees.
- While gently rotating the swab, insert swab less than one inch into nostril (until resistance is met at turbinates).
- Rotate the swab several times against nasal wall and repeat in other nostril using the same swab.
- Place tip of the swab into sterile viral transport media tube and cut off the applicator stick.
- For throat swab, take a second dry polyester swab, insert into mouth, and swab the posterior pharynx and tonsillar areas (avoid the tongue).
- Place tip of swab into the same tube and cut off the applicator tip.

Oropharyngeal swab (e.g. throat swab):

- Tilt patient's head back 70 degrees.
- Rub swab over both tonsillar pillars and posterior oropharynx and avoid touching the tongue, teeth, and gums.
- Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts.
- Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media.

Nasopharyngeal swab:

- Tilt patient's head back 70 degrees.
- Insert flexible swab through the nares parallel to the palate (not upwards) until resistance is encountered or the distance is equivalent to that from the ear to the nostril of the patient.
- Gently, rub and roll the swab.
- Leave the swab in place for several seconds to absorb secretions before removing.

Early supportive therapy and monitoring-

Supplemental oxygen therapy immediately to patients with SARI and respiratory distress, hypoxemia, or shock

- Children with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, shock, coma or convulsions) should receive oxygen therapy during resuscitation to target SpO₂ ≥94%
- All areas where patients with SARI are cared for should be equipped with pulse oximeters, functioning oxygen systems and disposable, single- use, oxygen-delivering interfaces (nasal cannula, simple face mask, and mask with reservoir bag)
- Use contact precautions when handling contaminated oxygen interfaces of patients with COVID – 19.
- Use conservative fluid management in patients with SARI if no evidence of shock
- Empirical antimicrobials to treat all likely pathogens causing SARI Administer appropriate empiric antimicrobials within ONE hour of identification of sepsis
- Do not routinely give systemic corticosteroids for treatment of viral pneumonia or ARDS unless they are indicated for another reason
- Conduct appropriate investigations
- Closely monitor patients with SARI for signs of clinical deterioration, such as rapidly progressive respiratory failure and sepsis, and apply supportive care interventions immediately (Temp, GC, Pulse oximetry, BP, RR, I/O chart, chest auscultation)
- Understand the patient's co-morbid condition(s) to tailor the management of critical illness and appreciate the prognosis
- Communicate early with patient and family

Management of hypoxemic respiratory failure and ARDS

- Severe hypoxemic respiratory failure patient with respiratory distress is failing standard oxygen therapy
- Increased work of breathing or hypoxemia even when oxygen is delivered via a face mask with reservoir bag (flow rates of 10-15 L/min).
- Results from intrapulmonary ventilation-perfusion mismatch or shunt and usually requires mechanical ventilation

- Try High Flow Nasal catheter Oxygenation (HFNO) or non-invasive mechanical ventilation (NIV)
- Patients with hypercapnia (exacerbation of obstructive lung disease, cardiogenic pulmonary oedema), hemodynamic instability, multi-organ failure, or abnormal mental status should generally not receive HFNO
- If doesn't improve in 1-2 hours or deteriorates endotracheal intubation and mechanical ventilation (detailed guidelines available)

Management of septic shock-

- Any hypotension (SBP <5th centile or >2 SD below normal for age) OR 2-3 of the following: Altered mental state, Tachycardia or bradycardia (HR <90 bpm or >160 bpm in infants and HR <70 bpm or >150 bpm in children), Prolonged capillary refill (>2 sec) or Warm vasodilation with bounding pulses; tachypnoea; mottled skin or petechial or purpuric rash, Increased lactate, Oliguria, Hyperthermia or hypothermia
- Early recognition and treatments within 1 hour antimicrobial therapy, fluid loading and vasopressors for hypotension

In the absence of a lactate measurement, use MAP and clinical signs of perfusion to define shock Mean Arterial Pressure (MAP)= $1/3^{rd}$ of Pulse Pressure (SBP-DBP)+DBP

- Give 20 ml/kg as a rapid bolus and up to 40-60 ml/kg in the first 1 hr.
- Do not use hypotonic crystalloids, starches, or gelatines for resuscitation.
- Beware of signs of volume overload
- Determine need for additional fluid boluses (250-1000 ml in adults or 10-20 ml/kg in children) based on clinical response and improvement of perfusion targets.
- Perfusion targets include MAP (>65 mmHg or age-appropriate targets in children), Urine output (>0.5 ml/kg/hr in adults, 1 ml/kg/hr in children), Improvement of skin mottling, capillary refill, level of consciousness, and lactate.
- Administer vasopressors when shock persists during or after fluid resuscitation
- If central venous catheters are not available, vasopressors can be given through a peripheral IV, but use a large vein and closely monitor for signs of extravasation and local tissue necrosis

Case Definitions

Suspected case

All symptomatic children who have undertaken international travel in the last 14 d or from Red Zone cities

All hospitalized children with severe acute respiratory illness (fever and cough and/or shortness of breath)

OR

OR

Asymptomatic direct & high risk contacts of a confirmed case (should be tested once between day 5 & day 14 after contact)

Symptomatic refers to children with any symptoms of fever, cough, &/or shortness of breath(features suggestive of ILI).

Direct and high-risk contacts include those who live in the same household with a confirmed case or area (designated hot spot); and health care workers (HCW) engaged in management of a confirmed case.

Confirmed Case

A person with laboratory confirmation of SARS-CoV-2 infection, irrespective of clinical signs and symptoms.

Patients with ILI- Influenza Like Illness (ILI) is defined as Any child with

- An acute respiratory infection (sudden cough and sore throat)
- Measured fever of >38 degree Celsius or 100.4 degree Farenheit
- Onset within last 10 days

Severe Acute Respiratory Infection (SARI)- It is defined as

Any child with

- An acute respiratory infection (sudden cough and sore throat)
- Measured fever of >38 degree Celsius or 100.4 degree Farenheit
- Onset within last 10 days

Clinical classification of illness-

Symptoms	Uncomplicated	Mild	Severe pneumonia

	illness	pneumonia	
Respiratory tract infection Yes		Yes	Yes
Fever	May or may not	Yes	Yes
Cough	May or may not	Yes	Yes
Shortness of breathe	No	Yes	Yes
Fast breathing	No	≥40 breaths/min	RR >30/min
		S _P O₂<94 on room air	$S_PO_2 < 90$ on room air
Nasal congestion	May or may not		-
Headache	May or may not	-	-
Muscle pain	May or may not	-	-
Malaise	May or may not	-	-
Dehydration	No	No	May or may not
Sepsis	No	No	May or may not
Pneumonia	No	Mild	Yes
Sign of severe pneumonia	No	No	Yes
Severe respiratory distress	No	No	Yes
Unconsciousness	No	No	Yes

Assessment of severity of Pneumonia-

CURB 65 Criteria		
Confusion	Altered mental status	
Blood urea	7 mmol/l, (40mg/dl)	
Respiratory rate	>30 breath/ mints	
SBP	<90 mmhg	
DBP	<60 mmhg	

Testing and admission protocol for Paediatric age group

Children with cough/cold/fever of less than



*Testing

Respiratory sample: Nasopharyngeal and oropharyngeal swab together sent in viral transport medium, posterior-pharyngeal swab, endotracheal aspirate, or bronchoalveolar lavage.

Clinical features and management of Covid positive cases

	Fever, Cough, Shortness of Breath,
Cat A Pre-symptomatic but positive for COVID-19	Myalgia, <u>GI symptoms*</u> , Cat D LRTI without Respiratory failure



Cat B URTI without comorbidity

Cat C URTI with comorbidity**

*GI symptoms- abdominal pain, vomiting, diarrhoea

**Immunocompromised, SAM, Congenital heart disease, chronic lung/ liver/kidney disease, hemato-oncological diseases, diabetes, tuberculosis

- If clinical suspicion is strong and swab is negative (Cat. D/E), clinician can continue to treat as if child is COVID positive.
- All cases with severe pneumonia and history of contact with a positive case should be treated as positive, pending results of testing.

Category	Investigations
А	CBC
В	CBC, Chest X-ray
C	CBC,ECG, LFT, RFT, BSL, Chest X-Ray
D & E	CBC, ECG, LFT, RFT, Electrolytes, BSL, Chest X- Ray, CT chest (cat E), 2DEcho, troponin-I, ABG, CRP, Blood culture, Ferritin, D-dimer, Procalcitonin, IL-6 (wherever applicable)

Swab : Only symptomatic cases to be tested - As per ICMR/GOI guidelines

Isolation :

Category A & B : Home Isolation

Category C : Designated Covid hospitals

Category D & E : Designated COVID HDU and ICU respectively

Specific Treatment :

Category	Drugs	
A	Vit.C, Vit D and Zinc,	
	HCQ	

Vit.C, Vit D and Zinc,
HCQ + Azithromycin
Vit.C, Vit D and Zinc,
HCQ + Azithromycin
Treat for any complications of comorbidity &
adjust doses accordingly
HCQ + Azithromycin +
Inj. Amoxyclav/ Inj.Ceftriaxone/
InjPiperacillin+Tazobactum
-Inj. Methylpred 1-2mg/kg/day BD dose in all
moderately severe cases early for 3-5 days
-Inj. LMW Heparin 1 U/kg/day s.c. OD early in
course of disease
-Inj. Tocilizumab (cytokine storm*) – 4-8
mg/kg day single dose

Vit.C, Vit D and Zinc should be given to all COVID-19 positive children.

Drug	Doses
Vit C	200 mg per OD
Vit D	60000 IU weekly
Zinc	20 mg OD P.O.
Hydroxychloroquine (HCQ)	6.5 mg/kg/dose (maximum: 400 mg/dose) PO BID
	on day 1,
	followed by 3.25 mg/kg/dose (maximum: 200
	mg/dose) PO BID for 5 days
Azithromycin	10 mg/kg/day once daily X 5days

Doses :

Special Considerations :

General:

- Monitor trend of lymphocyte count, lymphocytopenia is a risk factor for progression to severe disease. **Neutrophil to lymphocyte ratio >3.13** is an independent risk factor for severe disease at an early stage.
- Commonly described complications are ARDS, Myocarditis, septic shock, **coagulopathy**, DIC, acute kidney injury.

- Atypical presentations of COVID-19 are likely in children e.g. COVID toes (rash), Kawasaki like multi organ inflammatory syndrome, neurological presentation e.g. Seizures. High index of suspicion is necessary for diagnosis.
- Loss of taste or smell in children above 8 years may be one of the clinical features of Covid-19.

Investigations:

- Chest X Ray
- Characteristic findings are B/L peripheral pneumonia/ consolidation, lobar / multilobar mainly subpleural and involving lower lobes .
- If clinical suspicion is strong and X ray is not suggestive than CT Chest is necessary, characteristic CT findings are multilobe ground glass opacities.

Drugs:

- Rule out a bleeding disorder if LMW Heparin is to be started.
- Symptomatic treatment: Paracetamol for fever (10- 15 mg/kg/ dose SOS / q 4-6 hourly if required).
- Absolute contraindications to HCQ include known hypersensitivity to drug, retinopathy, and QTc more than 500 msec.
- Once patient becomes asymptomatic, is afebrile for 3 days and completed drug course, to be kept under observation for 48 hours in hospital as sudden cardiac deaths in adults have been reported.
- Need for Methylprednisolone :
 - a. Progressive deterioration of oxygenation indicators.
 - b. Rapid worsening on imaging
 - c. Excessive activation of the body's inflammatory response
 Duration: 3 to 5 days

Dosage : 1-2 mg/kg/day

- If patient in MODS, adjust doses of all drugs as per creatinine clearance calculation.
- Inj. Tocilizumab (IL6 inhibitor; in cases of cytokine storm*) may be considered in > 2 years at the dose of 4-8 mg/kg (1 dose).

***CYTOKINE STORM:** CRP> ten times; D-dimer levels > ten times; Ser. Ferritin > 1000 ng/ml ; IL-6> ten times of the observed value; LDH high

MANAGEMENT OF HYPOXEMIC RESPIRATORY FAILURE & ARDS:

Category D/E Management:

- Early supportive therapy and monitoring
- <u>Treatment : Respiratory Support</u>

Oxygen therapy - is necessary for patients with oxygen saturation (SpO2) less than 94% and/or with signs of respiratory distress. **Proning is advocated.**

Oxygen delivery devices - Nasal cannula at flow of 2-4 L/min is a good choice for milder forms of SARI. A triple layer mask should be used to cover the mouth and nose of the patient over the nasal cannula.

-In case of small children, head box may be used (flow 10 to 12 litres/min)

Oxygen by Non-Rebreathing Mask (NRM)-To be used in children needing high concentration of oxygen to maintain SpO2>94% (flow: 10-12 litres/min).

Non-Invasive Ventilation:

Indications- not maintaining saturation > 90% on NRBM

Options- CPAP (Indigenous or Machine) or HHHFNC (Heated Humidified High Flow Nasal Cannula) to be initiated as soon as possible. Proning is advocated.

HHHFNC–Flow- 0.5-2 lit/kg- Minimize flow. FiO2-0.6. Use surgical mask over prongs.

In infants, while HFNC is being given they can be placed in an oxygen hood to minimize dispersion. HFNC should be tried for a maximum of 1-2 hours and continued if there is improvement in SPO2 and signs of respiratory distress.

NIV- (Indigenous CPAP, ventilator NIV, Standalone NIV machine)

- Routine use of NIV is not recommended in COVID-19. It should be used only in selected patients with hypoxemic respiratory failure. Preferred interfaces are helmet, total face mask and oronasal non-vented masks.
- Start with PEEP of 5, add Pressure support if CO2 is elevated.
- Antiviral/Antibacterial filters should be attached to the exhalation limb of the circuit to reduce environmental contamination.

Bubble CPAP– In situations where both non-invasive and invasive mechanical ventilation are not available, bubble nasal CPAP (commercial or indigenous) may be used for newborns and children with severe hypoxemia as these are readily available alternative in resource-limited settings. To minimize environmental contamination the infant could be placed in an oxygen hood to reduce droplets.

Monitor closely for hypercapnia, hemodynamic instability, mental status changes, multi organ failure (monitor urine output carefully). If these are present, mechanical ventilation must be initiated.

Invasive ventilation:

Indications :

- Persistent or worsening respiratory distress, SpO2, 88-90% on HFNC/NIV with FiO2-0.6
- Contraindications for NIV (eg. hemodynamic instability, altered mental status)
- Moderate/severe ARDS with PaO2/FiO2 < 200, hemodynamic instability, multi-organ failure, or abnormal mental status should receive invasive ventilation from the very beginning.
- Refractory shock
- Worsening hypercapnea
- Multiorgan failure
- 1. Suggested Initial ventilator settings: Most paediatricians are comfortable using pressure control mode (Pressure AC). Unless you are comfortable with volume control ventilation, use pressure control modes. Monitor VTe (Exhaled Tidal volume)

Rate	Age appropriate e.g. Infants:30-40/min, 2	
	years : 30/min, 5 years: 25/min, 8 years :	
	20/min	
PIP	12 to20 cm H20	
PEEP	6 to 15 cm H20, usually >10 cm H20 required	
	for severe ARDS	
	(Titrate depending on lung compliance)	
Tidal volume (exhaled tidal volume)	5 to 8 ml/kg	
FiO2	100% initially, titrate as per PaO2/SPO2	

Patient position	30 degree head elevation Prone position if severe ARDS, early proning beneficial in severe disease
PaCO2 (on ABG)	Permissive hypercapnea if pH>7.30
Neuromuscular Block	Sedation preferred, minimal yet effective NMB with sedation if sedation alone is not effective
Suction	As required, inline suction preferred
Infection control	Standard VAP/CLABSI prevention bundles to be followed
Nutrition	Early enteral nutrition Avoid PPIs
Mobilization	Early mobilization and position change to avoid bed sores

*ARDS management: the principles of management include lung protective ventilation: appropriate high PEEP and low tidal volume (4-6 ml/kg)

2. Monitoring:

Vitals continuous monitoring, SPO2 Monitoring, ABG atleast twice daily if ventilated PaO2 goal: 55 to 80mmHg

3. Antibiotics: Collect blood culture before first dose of antibiotic, but do not delay antibiotic if this facility is not available. Give first dose of antibiotic within one hour of admission.

Antibiotics used are:

Ceftriaxone (first line)	50 to 75 mg/kg/day OD IV
Amikacin (first line)	15 mg/kg/day OD IV (Avoid if evidence of Renal Failure present, renal dose adjustment may be necessary if given)
Piperacillin + Tazobactum (second line)	300 mg/kg/day in three divided doses IV
Vancomycin (second line)	40 mg/kg/day in four divided doses IV, dose adjustment if kidney injury present

4. IV Fluids (Maintenance 0.45% DNS)

According to Holiday Segar formula 100 ml/kg for first 10 kg 50 ml/kg for next 10 kg 20 ml/kg above 20 kg In children with ARDS, two third restriction of fluids is recommended, keep close watch on kidney function. If the child has shock, aggressive fluid resuscitation may be required.

5. **Avoid nebulization** (Aerosol Generating Procedure). Use MDI wherever possible; may nebulize if absolutely necessary and all team members using full PPE

6. **Closely monitor** patients in Category D/E for signs of clinical deterioration, such as rapidly progressive respiratory failure and sepsis, and apply supportive care interventions immediately.

7. Communicate early with patient and family, treat any comorbid conditions appropriately (e.g. Congenital Heart Disease)

Management of septic Shock: SHOCK PROTOCOL (PALS/ACCM)

Shock: Any hypotension (SBP 2 SD below normal for age) or 2-3 of the following: altered mental state; tachycardia or bradycardia (HR 160 bpm in infants and HR 150 bpm in children); prolonged capillary refill (>2 sec) or warm vasodilation with bounding pulses; tachypnea; mottled skin or petechial or purpuric rash; increased lactate; oliguria; hyperthermia or hypothermia

Drug doses in Shock:

Sr. No	Name of drug	Dose	Dilute in 50 ml NS/ D5(for infusion)	1 ml/hour will deliver	Strength
1.	Adrenaline	0.01-1 mcg/kg/min	0.3 mg/kg	0.1 mcg/kg/min	1ml-1mg
2.	Noradrenaline	0.01-0.5 mcg/kg/min	0.3 mg/kg (only in D5)	0.1 mcg/kg/min	1ml-2 mg
3.	Dobutamine	5-20 mcg/kg/min	30 mg/kg	10 mcg/kg/min	5ml-250mg
4.	Dopamine	5-20 mcg/kg/min	30mg/kg	10 mcg/kg/min	5ml-200mg
5.	Atropine	0.01-0.02 mg/kg/dose	Only stat		1ml-0.5mg
6.	Hydrocortisone	1mg/kg	Only stat		1ml-10mg (in powdered form)
7.	Glucose	2 ml/kg	Only stat		10% Dextrose
8.	Calcium gluconate	100mg/kg/d ose	Stat dose is given iv slowly diluted with dextrose(1:1)	Max dose- 3g/dose	1ml- 100mg
9.	Ketamine	0.2- 1 mg/kg	stat		1ml-50 mg





Standard operating procedure for Resuscitation in Suspected and Confirmed COVID-19 Patients

Introduction :

- It is essential that caregivers giving resuscitation in children with suspected and confirm COVID 19 protect themselves and their colleagues from unnecessary exposure.
- Due to increased risk of aerosol formation during resuscitation there is increased risk of contracting COVID infection hence proper steps need to be followed.

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Purpose:

- Reduce provider exposure to COVID-19.
- Prioritize oxygenation and ventilation strategies with lower aerosolization risk.
- Appropriateness of starting and continuing resuscitation.

Scope :

This SOP covers following categories of health care workers :

- Peditric ICU doctors
- NICU doctors
- Doctors attending delivery

Definitions:

- Cardiac arrest –
- CPR

Planning and procedures:

- 1. Prearrest:
 - With any significant change in clinical status, increase in level of care.
 - Closely monitor for signs and symptoms of clinical deterioration to minimize the need for emergent intubations that put patients and providers at higher risk.
 - If the patient is at risk for cardiac arrest, consider proactively moving the patient to a negative pressure room/unit, if available, to minimize risk of exposure to rescuers during a resuscitation.

Before entering the scene, all rescuers should don PPE to guard against contact with both airborne and droplet particles.

2. L

imit personnel in the room or on the scene (maximum 4 personel).

- **3.** Consider replacing manual chest compressions with mechanical CPR devices to reduce the number of rescuers required for adults and adolescents who meet the manufacturers height and weight criteria.
- **4.** Clearly communicate COVID-19 status to any new providers before their arrival on the scene
- 5. Attach a HEPA filter securely, if available, to any manual or mechanical ventilation device in the path of exhaled gas before administering any breaths. Consider leaving the patient on a mechanical ventilator with HEPA filter to maintain a closed circuit and reduce aerosolization. Adjust the ventilator settings to allow for asynchronous ventilation (time chest compressions with ventilation in newborns).

Consider the following suggestions:

- Increase the FIO2 to 1.0.
- Change mode to Pressure Control Ventilation (Assist Control) and limit pressure as needed to generate adequate chest rise (6 mL/kg ideal body weight is often targeted, 4-6 mL/kg for neonates,
- Adjust the trigger to Off to prevent the ventilator from auto-triggering with chest compressions and possibly prevent hyperventilation and air trapping.
- Adjust respiratory rate to 10/min for pediatrics and 30/min for neonates.
- Assess the need to adjust positive end-expiratory pressure level to balance lung volumes and venous return.
- Adjust alarms to prevent alarm fatigue.
- g. Ensure endotracheal tube/tracheostomy and ventilator circuit security to prevent unplanned extubation.
- If return of spontaneous circulation is achieved, set ventilator settings as appropriate to patients' clinical condition.
- **6.** After healthcare providers assess the rhythm and defibrillate any ventricular arrhythmias, patients in cardiac arrest should be intubated with a cuffed tube, at the earliest feasible opportunity. Connect the endotracheal tube to a ventilator with a HEPA filter, when available.
- 7. Minimize the likelihood of failed intubation attempts by

- Assigning the provider and approach with the best chance of first-pass success to intubate
- Pausing chest compressions to intubate
- Video laryngoscopy may reduce intubator's exposure to aerosolized particles and should be considered if available
- Before intubation, use a bag-mask device (or T-piece in neonates) with a HEPA filter and a tight seal
- If intubation is delayed, consider manual ventilation with a supraglottic airway or bagmask device with a HEPA filter.
- Once on a closed circuit, minimize disconnections to reduce aerosolization.
- **8.** Post-arrest patients : Consult local infection control practices regarding transport after resuscitation.

Summary of adjustments to CPR algorithms in suspected or confirmed COVID-19 patients.

Reduce provider exposure

- 1. Don PPE before entering the room/scene
- 2. Limit personnel
- **3.** Consider using mechanical CPR devices for adults and adolescents who meet height and weight criteria
- 4. Communicate COVID-19 status to any new providers

Prioritize oxygenation and ventilation strategies with lower aerosolization risk

- 5. Use a HEPA filter, if available, for all ventilation
- **6.** Intubate early with a cuffed tube, if possible, and connect to mechanical ventilator, when able
- 7. Engage the intubator with highest chance of first-pass success
- 8. Pause chest compressions to intubate
- **9.** Consider use of video laryngoscopy, if available
- **10.** Before intubation, use a bag-mask device (or T-piece in neonates) with a HEPA filter and a tight seal
- 1 For adults consider passive oxygenation with nonrehreathing face mask as

Pediatric Cardiac Arrest Algorithm



Case definition- All children under five years of age (29 days old-60 months old) with Severe Acute Malnutrition and co-morbid conditions¹³.

It will be a standard practice to triage all referred children with SAM on the basis of emergency signs, detailed history and examination. In addition, anthropometric screening for SAM (adhering to infection prevention protocols) shall be conducted for all children (under five) attending the health facility for any illness. Based on history and clinical examination, these children shall be broadly divided into three categories:

- <u>Category 1:</u>Children with SAM with no medical complications (Check for History of Contact with COVID positive or suspect case and decide)
- <u>Category 2:</u>Children with SAM with medical complications (Check for influenza like symptoms fever, dry cough, breathlessness or history of contact with COVID positive / suspect case)
- <u>Category 3:</u> Children with SAM with Medical Complications with No H/o contact with COVID positive / suspect case

Only Children with SAM with co-morbid conditions (Category 3) shall be only admitted in NRC and medical and therapeutic management shall be given as per MoHFW F-SAM Operational Guidelines. For secondary care, the PHC/CHC – Medical Officer may refer the sick SAM children to the tertiary care SMTUs or SMART unit at AIIMS Bhopal as per need. Category 2 patients will be managed in the COVID isolation area of health facility and Category 1 patients will be managed at home, as outlined in the algorithm below.

Admission Criteria for NRC	
For children age <6 months****	For children age 6-59 months
Any of the following	Any of the following
 Infant is too weak or feeble to suckle effectively (independently of his/her weight-for-length) WfL (weight-for-length) <-3SD (in infants >45 cm) Visible severe wasting in infants <45 cm Presence of oedema both feet WITH Medical Complications* 	 MUAC <11.5cm with or without any grade of oedema WFH < -3 SD with or without any grade of oedema *** Bilateral pitting oedema +/++/ +++ ** WITH Medical Complications

*Med. Comp like high Fever>102^oF, Hypothermia <95^oF, Persistent vomiting, Severe Dehydration, Severe Anaemia, Severe Pneumonia, Hypoglycemia, Loss of Appetite, Extensive skin infections, Lethargy, etc

** Other causes of oedema e.g. nephrotic syndrome, congenital heart disease should be excluded

*** for children with length less than 49cm, visible wasting is used to identify SAM

**** Children <28 days of age with low birth weight or those who are non-breast fed should be admitted in Special New born Care Units (SNCU)

A detailed algorithm for triaging and managing children with SAM with COVID-19 is detailed



Safety Protocols to be adhered to in Facility¹⁴-

- Admissions of only children with SAM with medical complications in NRC
- Adherence to appropriate infection protocols to be maintained during screening, admission and during stay in NRC
- Withheld of Group Counselling, Play Therapy, Recipe Demonstration involving group activities; only individual counselling to be conducted
- Children who are stable and entered rehabilitation phase may be discharged early with appropriate feeding advice, and provided oral antibiotics, supplements except Potassium Chloride (Potklor) and Magnesium.
- List of SAM children (discharged from NRC) to be shared with Anganwadi centres for prioritizing home-based delivery of Take Home Ration.
- Follow up to be done telephonically and only children with medical complications to be called for physical follow up.

Criteria of Discharge from NRC	
Admitted Child with SAM	Mother/caregiver of admitted child with SAM
 Absence of infections and medical complications Oedema (if present) has resolved Satisfactory weight gain for 3 consecutive days (>5 gm/kg/day) Child is eating an adequate amount of nutritious food Child is provided with micronutrients Immunization is updated 	 Knows how to prepare appropriate food and is able to feed the child Knows how to give prescribed medications, Vitamins, Folic Acid and Iron at home Knows how to give home treatment for diarrhea, fever and acute respiratory infections Recognizes the signs for which medical assistance must be sought Understands the follow-up plan

Psychological and Mental Aspects of Children during covid-19

This is indeed an unprecedented time for all of us, especially for children who face an enormous disruption to their lives. Children are likely to be experiencing worry, anxiety and fear, and this can include the types of fears that are very similar to those experienced by adults, such as a fear of dying, a fear of their relatives dying, or a fear of what it means to receive medical treatment. If schools have closed as part of necessary measures, then children may no longer have that sense of structure and stimulation that is provided by that environment, and now they have less opportunity to be with their friends and get that social support that is essential for good mental well-being¹¹.

Being at home can place some children at increased risk of, or increased exposure to, child protection incidents or make them witness to interpersonal violence if their home is not a safe place. This is something that is very concerning.

Although all children are perceptive to change, young children may find the changes that have taken place difficult to understand, and both young and older children may express irritability and anger. Children may find that they want to be closer to their parents, make more demands on them, and, in turn, some parents or caregivers may be under undue pressure themselves.Simple strategies that can address this can include giving young people the love and attention that they need to resolve their fears, and being honest with children, explaining what is happening in a way that they can understand, even if they are young. Children are very perceptive and will model how to respond from their careers. Parents also need to be supported in managing their own stressors so that they can be models for their children. Helping children to find ways to express themselves through creative activities, and providing structure in the day – if that is possible – through establishing routines, particularly if they are not going to school anymore, can be beneficial¹¹.

Mental health and psychosocial support services should be in place, and child protection services need to adapt to ensure that the care is still available for the children of families who need it.

There are some suggestive steps to take care of their psychological and mental health during covid¹²-

- 1. Provide assurance whenever needed-
 - It is important to reassure your children
 - Listen to their concerns and try answering their queries related to outbreak
 - Spend quality time with them and give them the they attention they need
 - Reading them stories to put them to sleep will make them feel loved
- 2. Manage child anxiety-
 - It is normal to a child to become anxious at this time
 - Look out for the emotional cues in your child and talk to them regarding same
 - Avoid being judgemental when they express their feeling
 - Do not avoid their question related to covid-19, or speak to them harshly

- 3. Engage them in indoor activities:-
 - During this time children may get easily bored, involve them in indoor games to cut down the boredom.
 - Make their learning fun by giving them puzzles, to solve them and teaching them crafts.
 - Encourage them to pick-up a hobby
 - Involve children in some stretching exercises, yoga or dancing which they will enjoy.
 - Involve them in simple doing household activities to keep them engaged.
- 4. Keep them in contact with their friends-
 - Physical distancing from a friend can be cause of distress for children. Encourage them to talk to their friends, relatives and loved ones by calling them up or through video calls.
 - Involve child and their friends in some fun activities which they can do together by staying connected virtually
- 5. Give them clear information-
 - It is not advisable to provide children with lots of report and news related to outbreak.
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Annexure 1-

Instruments :

- 1. Weighing scale (1)
- 2. Infanto meter (1)
- 3. Measuring tape (1)
- 4. Neonatal Radiant warmer /Incubator :2-4 as per number of deliveries.
- 5. Syringe Infusion Pump (as requirement)
- 6. Neonatal Ventilator (1)
- 7. CPAP machine(2)
- 8. Phototherapy machine (2)
- 9. Pulse Oxymeter.(2)
- 10. Glucometer with stripes(1)
- 11. Digital Thermometer(2)
- 12. Oxygen Hood(2)
- 13. Laryngoscope(2)
- 14. Resucitation Kit (self infating bag and mask, reservoir)(2)
- 15. Suction machine if central suction unavailable.(2)

Consumables

- 1. Nasal prongs (0,1 number)
- 2. Infant feeding Tubes (6,7,8)
- 3. Endotracheal Tubes (2.5,3,3.5)
- 4. Micro drip set
- 5. Cannula (24.,26)
- 6. Diapers
- 7. Ventilator /CPAP tubings
- 8. Distilled water
- 9. PPE
- 10. N95 masks
- 11. Neonatal face shields

Drugs :

- 1. IV fluid : D10% D25%, Isolyte P, Normal saline
- 2. Iv Antibiotics
- 3. Injection Adrenaline
- 4. Surfactant
- 5. Inj.Dopamine
- 6. InjDobutamine
- 7. Inj Noradrenaline.
- 8. Inj. Phenobarbitone
- 9. Inj Phenytoin.
- 10. Inj Calcium gluconate
- 11. Inj .Aminophylline
- 12. Inj. Caffiene
- 13. Drops Iron
- 14. Drops Vitamin D
- 15. Calcium phosphate syrup.

- 16. Cidex
- 17. Hypochlorite solution

Human resources :

- 1. Paediatrician / shift(1)
- 2. Nursing staff / shift (1)
- 3. Ward boy /shift (1)
- 4. Aayabai /shift (1)