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MANAGEMENT OF INFANTS WITH SUSPECTED OR CONFIRMED COVID-19 INFECTION- Guidance

Infants with Covid-19 infection are mostly asymptomatic or suffer only mild symptoms, including mild fever, respiratory symptoms (polypnoea, dispnea, apnea, cough) eating difficulties, lethargy, and gastrointestinal symptoms (diarrhea, vomiting and abdominal distension). The incubation period described so far is 14 days.

With regards to Covid-19 infection in newborn babies, the following conditions can occur, which require the identification of different management paths, to be adapted based on the logistics of the diverse centers:

- ◆ Infant with suspected Covid-19 infection, symptomatic or asymptomatic
- ◆ Infant with confirmed Covid-19 infection, symptomatic or asymptomatic
- ◆ Infant for whom covid infection is excluded or healed

Babies with the mentioned conditions may arrive at the neonatology of the University Teaching Hospital Sant'Orsola through the following paths:

- 1) Infants born to a mother with suspected or confirmed Covid-19 infection
- 2) Infants suspected or confirmed positive to Covid-19 admitted to the Pediatric Emergency Room from home or transferred from other healthcare facilities
- 3) Infants transferred from other hospitals by activating the neonatal emergency transport system (NETS)
- 4) Infants born to a Covid-19 positive mother with unstable conditions or in respiratory assistance and not transferable

For each of the above scenarios, the appropriate pathways need to be identified so as to facilitate correct management and minimize the risk of mother-to-child transmission and transmission from the newborn to other patients or healthcare workers.

SCENARIO N.1 - INFANTS BORN TO A MOTHER WITH SUSPECTED OR CONFIRMED COVID-19 INFECTION

As of date, vertical transmission of COVID-19 infections appears unlikely, but peripartum transmission through contact with maternal secretions cannot be excluded and is a cause of concern. This is the reason why the CDC (Interim Considerations for Infection Prevention and

Control of Coronavirus Disease 2019 -COVID-19 -18.02.2020-in Inpatient Obstetric Healthcare) suggests a prudent management of the mother-infant couple and sometimes recommending temporary separation of a mother with known (Patient Under Investigation- PUI) or suspected COVID-19 and her infant to reduce risk of transmission to infant. Therefore, until neonatal infection is excluded, the newborn should be considered as PUI and managed with the necessary precautions.

The pregnant woman to be tested for suspected COVID-19 infection is identified if the following conditions are present:

1. Pregnant woman with acute respiratory infection (sudden onset of one of the following symptoms: fever, cough, shortness of breath) with no other etiology that fully explains the clinical presentation
2. Pregnant woman with residence in a location reporting high community transmission
3. Pregnant woman who has had close contact with a suspected or confirmed COVID-19 case in the 14 days before the symptoms onset.

In the mentioned cases, the swab test will be carried out as soon as possible (surgery, delivery room, during hospitalization), according to the following procedures:

- Phone contact with the infectious disease specialist to confirm the swab test is to be carried out
- Contact with the Hospital Hygiene Service coordinator to organize swab testing

Undertaking mother-infant separation in case of suspected or known COVID-19 infection depends on logistic conditions, and on clinical and infectious state of the mother and the newborn. Separation must be discussed with family members and, in specific cases, a joint evaluation from the hygienist and the infectious disease specialist might be carried out. The newborn management should preferably take place in a negative-pressure room where access is allowed to a healthy caregiver (with appropriate PPE- surgical mask, disposable gown and gloves as laid down in the organization document titled "Guidance for management of patient with suspected or confirmed COVID-19")

The S.Orsola Policlinico has a negative-pressure room located at the Neonatal intensive care unit on the 2nd floor, equipped with a dressing/undressing area and PPE as laid down in the mentioned document. One complete intensive care station can be placed in this room (with the possibility to place a second one in case of emergency). The room has negative pressure and air filtration system. A second isolation room not equipped for intensive care with no air filtration system nor may be set up in case of extreme need, where the newborn should be assisted by a healthy caregiver. Furthermore, given the current epidemiology, in accordance with the colleagues from the Pediatrics department, the newborn can be admitted to the pediatric Covid-19 department.

In case mother-child separation is not undertaken, rooming-in practice is followed and breastfeeding is preferred, measures aimed at preventing airborne transmission should be implemented such as: avoid kissing the baby, protecting from cough and respiratory secretions (using face mask during feedings and intimate contact with the baby), hand washing at every contact, allowing no visits.

If the rooming-in practice is followed, the baby will be put to sleep in his cradle at a distance of at least 2 meters from the mother. The baby can be taken care by the father (if asymptomatic) with

surgical mask, disposable gown, gloves and adequate hand hygiene, as laid down by the organization Guidance. Details about management of infants born to a mother with suspected or confirmed Covid-19 infection are in Table 1.

NEWBORN CARE AT BIRTH

Preferably a neonatologist should be present in the delivery room in case of birth considered at risk (confirmed or suspected COVID-19 mother).

- In case of infant born to a mother with suspected or known COVID-19 infection, baby should be taken care of in the delivery room dedicated to infected women by a neonatologist and an midwife both equipped with appropriate PPE- FFP2/FFP3 face mask, long-sleeved water-repellent disposable gown, face shield.
- In case of C-section, it will be performed in urgency C-room equipped with dressing/undressing with appropriate PPE and the newborn will be taken care of in a close room, with the same dressing/undressing area with PPE as the operating room. Midwife and neonatologist wear the same PPE as per the spontaneous childbirth. Delayed clamping of the umbilical cord will not be performed.

Patient allocation and transfer will be decided once first care is provided to the newborn, depending on the clinical and infectious conditions of mother and child (see table 1). Possible scenarios regarding infants with suspected/confirmed COVID-19 infection are reported in Table 1.

SCENARIO N. 2- INFANTS SUSPECTED OR CONFIRMED POSITIVE TO COVID-19 ADMITTED TO THE PEDIATRIC EMERGENCY ROOM

Infants admitted to the pediatric ER because of suspected COVID-19 infection are initially assessed by the ER doctor following the appropriate procedure. In case the child considered at risk presents symptoms, he will be transferred to the neonatal ICU. If clinically stable, the pediatric ER doctor and the available neonatologist will agree on the best mode of transfer. If not clinically stable, the newborn is stabilized by the pediatric anesthesiologist and then moved to the NICU. Here, a doctor and a nurse with appropriate PPE – FFP2/FFP3 face mask, water-repellent long sleeved disposable gown, face shield, will made the swab test following the appropriate procedures.

In case the infant shows no symptoms or mild symptoms (transfer to NICU is not required), he will be admitted in neonatology.

MANAGEMENT OF HOSPITALIZED INFANTS (see table 3):

The asymptomatic parent can take care of the newborn in the hospitalization wards, in accordance with the rules of the different wards, with appropriate PPE- surgical mask, disposable gowns and gloves, as laid down in the organization document titled “Guidance for suspected or known COVID-19 patient”. Considering the need to perform manoeuvres at risk of transmission (airway aspiration, non-invasive ventilation, etc), special caution is recommended to healthcare workers while managing infants with acute respiratory symptoms (fever, dyspnoea, cough, etc.).

As set out by Guidance issued at national level (circolare ministeriale “Richiamo in ordine a indicazioni fornite con la circolare del 22 febbraio 2020”), “healthcare workers must wear appropriate PPE in case of contact with suspected or known COVID-19 case”.

Specifically, while waiting for testing results, healthcare workers should wear:

- Surgical mask, disposable gown and gloves when carrying out ordinary manoeuvres (meal and oral therapies administration, diaper change, etc.)
- FFP2/FFP3 facemask, long sleeved water repellent disposable gown, gloves and face shield in case of aerosol generating procedures.

Details on management of the hospitalized patients are reported in Table 3.

SCENARIO 3 - INFANTS TRANSFERRED FROM OTHER HOSPITALS BY ACTIVATING THE NEONATAL EMERGENCY TRANSPORT SYSTEM (NETS)

When NETS is required for a newborn with suspected or confirmed COVID-19 infection, transport should be carried out by the neonatologist and the NETS nurse, observing some particular precautions:

- The neonatologist or the nurse asking for the NETS to be activated should specify the request is for a newborn with suspected or confirmed COVID-19 infection.
- The NETS team wears PPE (FFP2/FFP3 face mask, long sleeved water repellent disposable gown, gloves, face shield) throughout the transport and removes it once they are back to the COVID-19 NICU area after assisting the newborn.
- The ambulance must be equipped with alcohol-based handrub gel dispenser readily available
- At the end of the transport, the ambulance containing all the used devices must be disinfected before going back to the department.

SCENARIO N.4 - INFANTS BORN TO A COVID-19 POSITIVE MOTHER WITH UNSTABLE CONDITIONS OR IN RESPIRATORY ASSISTANCE AND NOT TRANSFERABLE

COVID-19 pregnant women needing breathing support are concentrated in the COVID department of the S. Orsola Hospital. If childbirth is likely to occur in a department other from Obstetrics, the (available) neonatologist will reach the department bringing the necessary equipment for neonatal resuscitation and will take care of the newborn wearing PPE as described in scenario n.1

When a pregnant woman in gestational age compatible with the survival of the newborn (≥ 23 weeks) is admitted to the COVID-19 department, a NICU station will be brought to the department if not already available.

ACTIVATION OF AVAILABLE NEONATOLOGIST

The Neonatologist will be activated for the initial management of scenarios number 2 (in accordance with the Doctor on-call of the Pediatric ED), 3 and 4. As per scenario number 1, the Neonatologist will be activated in case the baby with suspected or confirmed Covid-19 infection is unstable.

Whatever the case, the neonatologist remains on duty until the baby is stabilized in the neonatal intensive care unit.

BREASTFEEDING

Based on the current scientific knowledge, and considering the insignificant role of breastmilk in the transmission of other respiratory viruses, transmission via breastfeeding of COVID-19 infection is unlikely. However, breastfeeding should be carried out applying all necessary precautions, to avoid airborne transmission or transmission by contact with respiratory secretions of infected patients. For this reason, decision about breastfeeding should be carefully considered and agreed with the family, and clinical conditions of the mother and the newborn should be taken into account as well as epidemiological and organizational conditions in which the case is handled.

In case the positive mother has symptoms (with fever, cough and respiratory secretions), and temporary mother-child separation is undertaken, even though breastfeeding is not contraindicated, logistical and organizational difficulties may arise, which do not allow use of expressed breastmilk. Considering the mother's clinical conditions, it would be recommended to express breast milk in order to facilitate milk production so as to foster breastfeeding once the clinical, epidemiological and organizational conditions makes it possible. Meanwhile, use of donated milk – if available and if deemed beneficial for the baby – and milk substitutes may be considered.

When use of breastmilk is preferred, all the recommended steps to prevent mother-to-child transmission should be taken: using a curtain, surgical face mask when breastfeeding or in direct contact with the baby, accurate hand washing, placing baby cradle at 2 metres distance from the mother's head, banning visits from family and friends. When using expressed breast milk, it should be expressed through a manual or electric breast pump. The mother should make should to wash her hands before touching the bottle or any other element of the breast pump and implement the recommendations for an appropriate pump washing. Pasteurization is not necessary.

TABLE 1: INFANT BORN TO A MOTHER WITH SUSPECTED OR CONFIRMED COVID-19 INFECTION HOSPITALIZED IN OBSTETRIC CLINIC

CASE	CLINICAL CONDITIONS MOTHER	COVID-19 TEST MOTHER	CLINICAL CONDITIONS NEWBORN	COVID-19 TEST NEWBORN	NEWBORN MANAGEMENT		PPE FOR ALL HC WORKERS INVOLVED
1	Symptomatic (fever, cough, dyspnea)	Positive	Not relevant	To be tested ALWAYS*	To be placed in a negative-pressure room in NICU to be tested for COVID-19 For newborn transfer modes, see legend § case b	If positive, he/she is hospitalized (hospitalization criteria are in Table 3 case 8) If negative, he/she is hospitalized in NICU, Neonatology or pediatric COVID department, depending on whether he/she is symptomatic or not For COVID-19 discharge criteria of a negative infant born to a positive mother, see legend §.	During all ateps: from childbirth to negative COVID results: FFP2/FFP3 face mask, Long-sleeved water-repellent disposable gown Gloves Face shield
2	Asymptomatic	Positive	Asymptomatic	To be tested ALWAYS*	While waiting for the test results, the newborn stays in the same room as the mother following distancing measures^ (legend^)^ taken care of by a healthy caregiver of hc worers	If positive, he/she is hospitalized (hospitalization criteria are in Table 3 case 8) If negative, upon request, rooming in practice is followed according to distancing measures^; or the newborn may be	During all ateps: from childbirth to negative COVID results: Same PPE as case 1

						admitted to neonatology unit For COVID-19 discharge criteria of a negative infant born to a positive mother, see legend §.	
3	Asymptomatic	Positive	Symptomatic	To be tested ALWAYS*	To be placed in a negative-pressure room in NICU to be tested for COVID-19 For newborn transfer modes, see legend § case b	Admission to NICU/neonatology unit to be tested for Covid-19 and be appropriately assisted	During all ateps: from childbirth to negative COVID results: Same PPE as case 1
4	Symptomatic or Asymptomatic	Pending	Asymptomatic	To be tested based on the results of the mother's test	While waiting for the (mother's or newborn's) test results, the newborn stays in the same room as the mother following distancing measures^ (legend^) taken care of by a healthy caregiver of hc worers		During all ateps: from childbirth to negative COVID results: Same PPE as case 1

TABLE 2: INFANT BORN TO A MOTHER WITH SYMPTOMS, SUSPECTED OR CONFIRMED COVID-19 HOSPITALIZED IN A DEP. OTHER OBSTETRICS

CASE	CLINICAL CONDITIONS MOTHER	COVID-19 TEST MOTHER	CLINICAL CONDITIONS NEWBORN	COVID-19 TEST NEWBORN	NEWBORN MANAGEMENT		PPE FOR ALL HC WORKERS INVOLVED
5	Symptomatic unstable	Positive or pending	Aysmptomatic/symptomatic	To be tested baed on the results of the mother’s test	<p>To be placed in a negative-pressure room in NICU to be tested for COVID-19</p> <p>For newborn transfer modes, see legend § case b</p>	<p>If positive, he/she is hospitalized (hospitalization criteria are in Table 3 case 8)</p> <p>If negative, he/she is hospitalized in NICU, Neonatology or pediatric COVID department, depending on whether he/she is symptomatic or not</p> <p>For COVID-19 discharge criteria of a negative infant born to a positive mother, see legend §.</p>	<p>During all ateps: from childbirth to negative COVID results:</p> <p>FFP2/FFP3 face mask,</p> <p>Long-sleeved water-repellent disposable gown</p> <p>Gloves</p> <p>Face shield</p>

TABLE 3: MANAGEMENT OF HOSPITALIZED INFANT

CASE	CLINICAL CONDITIONS MOTHER	COVID-19 TEST MOTHER	NEWBORN MANAGEMENT	PPE FOR ALL HC WORKERS INVOLVED
6	Symptomatic/mild symptoms	Pending*	Hospitalized in NEONATOLOGY or Pediatric COVID department	<p>- Ordinary manoeuvres (meal and oral therapies administration, diaper change, etc.): Surgical mask, disposable gown and gloves</p> <p>- Aerosol generating procedures: FFP2/FFP3 facemask, long sleeved water repellent disposable gown, gloves and face shield</p>
7	Severe symptoms	Pending*	Hospitalized in NICU in negative pressure room	<p>- Ordinary manoeuvres (meal and oral therapies administration, diaper change, etc.): Surgical mask, disposable gown and gloves</p> <p>- Aerosol generating procedures: FFP2/FFP3 facemask, long sleeved water repellent disposable gown, gloves and face shield</p>
8	Not relevant	POSITIVE	<p>COVID19 positive infant should be admitted to NICU (negative pressure room); if asymptomatic, the newborn may be isolated in Neonatology or in the Pediatric COVID-19 department, based on the needs due to the current epidemiological situation</p> <p>For newborn transfer mode, see legend \$</p> <p>For parents' visits, see legend %</p>	<p>FFP2/FFP3 face mask,</p> <p>Long-sleeved water-repellent disposable gown</p> <p>Gloves</p> <p>Face shield</p>
9	Worsening clinical situation, transfer to another	POSITIVE or pending	The newborn already admitted to Neonatology/Pediatric COVID Department with Suspected COVID-19 infection is	FFP2/FFP3 face mask,

	department needed		moved in NICU (negative pressure room) and is tested as soon as possible	Long-sleeved disposable gown	water-repellent
			For newborn transfer mode, see legend \$	Gloves	
			For parents' visits, see legend %	Face shield	

Tables 1, 2, 3: LEGEND

***newborn must be tested** (or repeated) for COVID-19 preferably within 24 hours of age. Results to be received within 24 hours

\$ newborn transfer modes:

- **Case a:** newborn is transferred from the delivery room to the same room as the mother. In case a temporary adaptation is needed, this will occur in a close room. Care will be provided by the healthcare workers deemed suitable for the case (es. pediatrics resident)
- **Case b:** newborn with suspected or confirmed COVID-19 infection is transferred from the delivery room or other department to the NICU or other department in a neonatal incubator by healthcare workers protected with appropriate PPE.

^ Distancing measures to be adopted in Rooming in:

When joint management of the mother-child couple and breastfeeding are possible, all the recommended steps to prevent the potential spread of the virus need to be taken, such as: avoid kissing the baby, protecting the newborn from cough and respiratory secretions (mask while breastfeeding and in case of mother-child contact), hand washing before breastfeeding and ban family visits. If rooming-in is applicable, the cradle will be placed at a 2-metres distance from the mother. The asymptomatic father can take care of the child with appropriate PPE- surgical mask, disposable gown, gloves- and after adequate hand washing.

§ Discharge of the asymptomatic newborn tested negative born to an asymptomatic or with mild symptoms mother tested positive:

Early discharge even at 48 hours after birth may be necessary in case the hospital is overloaded. However a monitoring of at least one week is recommended, with COVID test repeated at discharge.

In some cases, newborn tested negative may be discharged at 48 hours of age and isolated at home assisted by an asymptomatic family member: in this case, the phone number of the NICU will be reported in the discharge letter, and notification will be given to the local hygiene service and to the pediatrician. Pediatric check-ups will be scheduled at 7, 14 and 28 days of age at the Pediatric COVID department, where swab test will be repeated, as laid down in the Guidance of the Italian Society of Neonatology.

Further check-ups will not be necessary if tested negative at 28 days of age

% Family visits to positive newborn

Parents can visit the newborn paying special attention to hand hygiene and wearing appropriate PPE considering the patient's clinical condition (minimum PPE required: surgical mask, disposable gown and gloves)