



臺北榮總兒童醫學部

新生兒加護病房主任 曹珮真 醫師

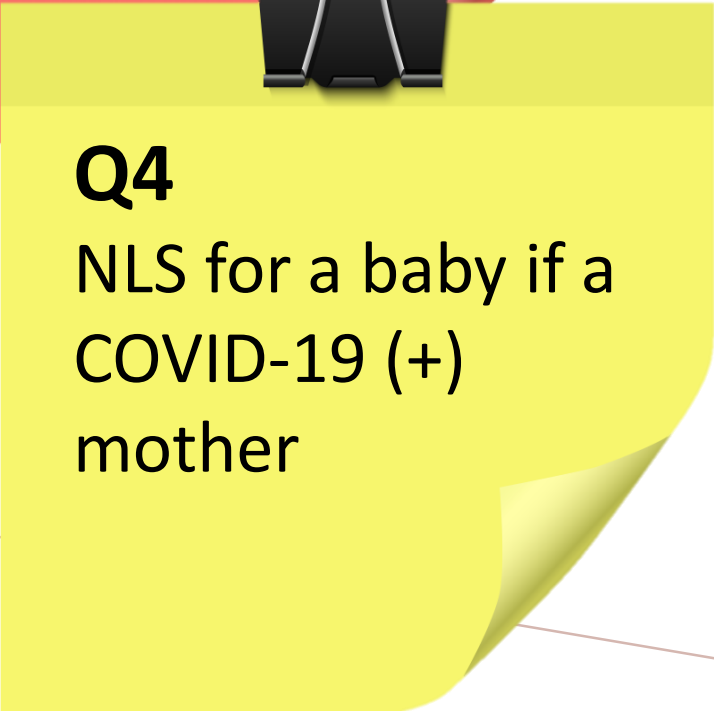
Limited evidence and uncertainty of neonatal care in pandemic COVID-19 infection





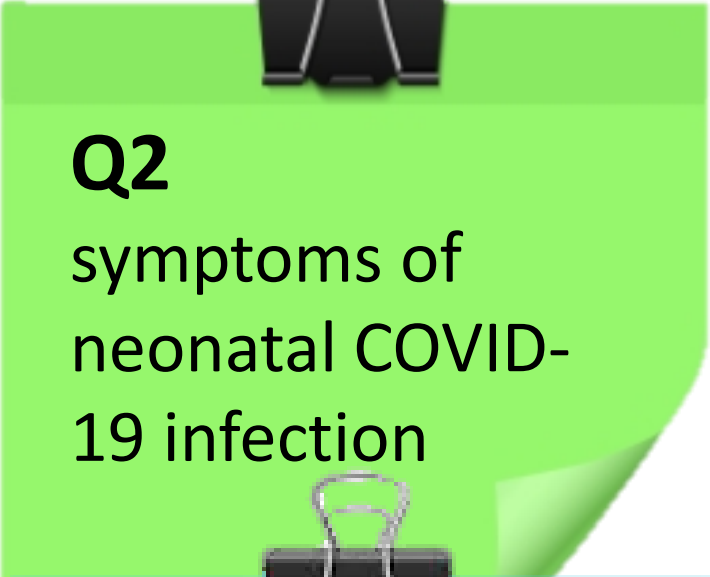
Q1

What's the impact of COVID-19 on neonates — from prenatal to postnatal



Q4

NLS for a baby if a COVID-19 (+) mother



Q2

symptoms of neonatal COVID-19 infection



Q5

special considerations for a baby born from a COVID (+) mother



Q3

special considerations during delivery of a COVID-19 (+)



Q6

Recommendations or guidelines of postnatal care



Q1



2020-11

- Any neonatal positive RT-PCR of SARS-CoV-2: 3.0%
 - Placenta 11.9%; amniotic fluid 1.8%; umbilical cord blood 2.4%
- High level of SARS-CoV-2 IgM in neonatal blood: 0.2%
- 53.9% underwent CS
- Preterm birth: 23.0%
- No virus found in breast milk, but breast-feeding rate <40%
- Neonatal death: 0.57%



2020-11

2021-02

- 3/13-3/21 targeted testing; 3/22~ universal testing for pregnant women
- Vertical transmission: 2.0 %
- Most neonatal tests performed between 25-48h; 70% only one test
- 81.2% in WBN; 90.1% received partial breastfed
- **Earlier discharge: 1 d for NSD, 2 d for CS**

A horizontal timeline consisting of five chevron-shaped arrows pointing right. The first arrow is olive green and contains the text '2020-11'. The second arrow is a darker green and contains '2021-02'. The third and fourth arrows are a medium green, and the fifth arrow is a blue-grey color.A horizontal timeline consisting of five chevron-shaped arrows pointing right. The first arrow is olive green and contains the text '2020-11'. The second arrow is a darker green and contains '2021-02'. The third and fourth arrows are a medium green, and the fifth arrow is a blue-grey color.

Patients	
Room placement	
L&D	Single-patient room
WBN	Single-patient room, infants in isolettes >180 cm from mother
NICU	Single-patient room in isolettes
	When single room unavailable, cohort in isolettes >180 cm apart
Transmission precautions	
L&D	Contact/droplet precautions plus airborne precautions for aerosol-generating procedures (negative pressure room preferred)
	Mothers wear mask at all times
WBN	Contact/droplet precautions for mothers and their infants
	Mothers continue to wear mask when interacting with staff or infant
NICU	Contact/droplet precautions plus airborne precautions for aerosol-generating procedures until DOL-14 (negative pressure room preferred)



2020-11

2021-02

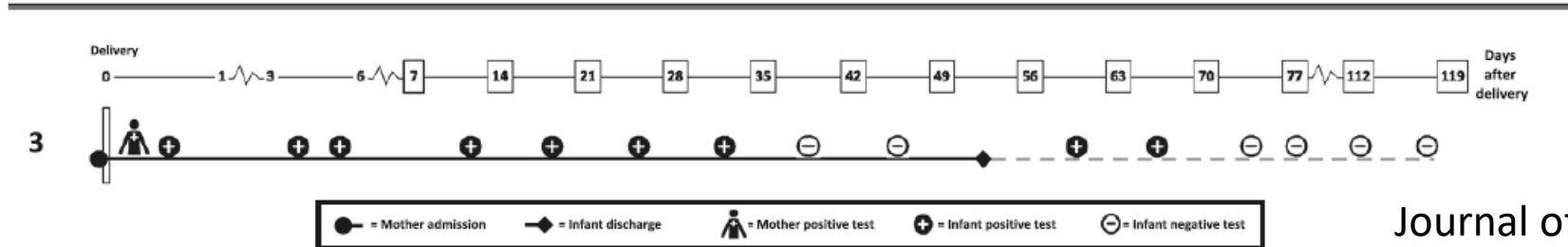
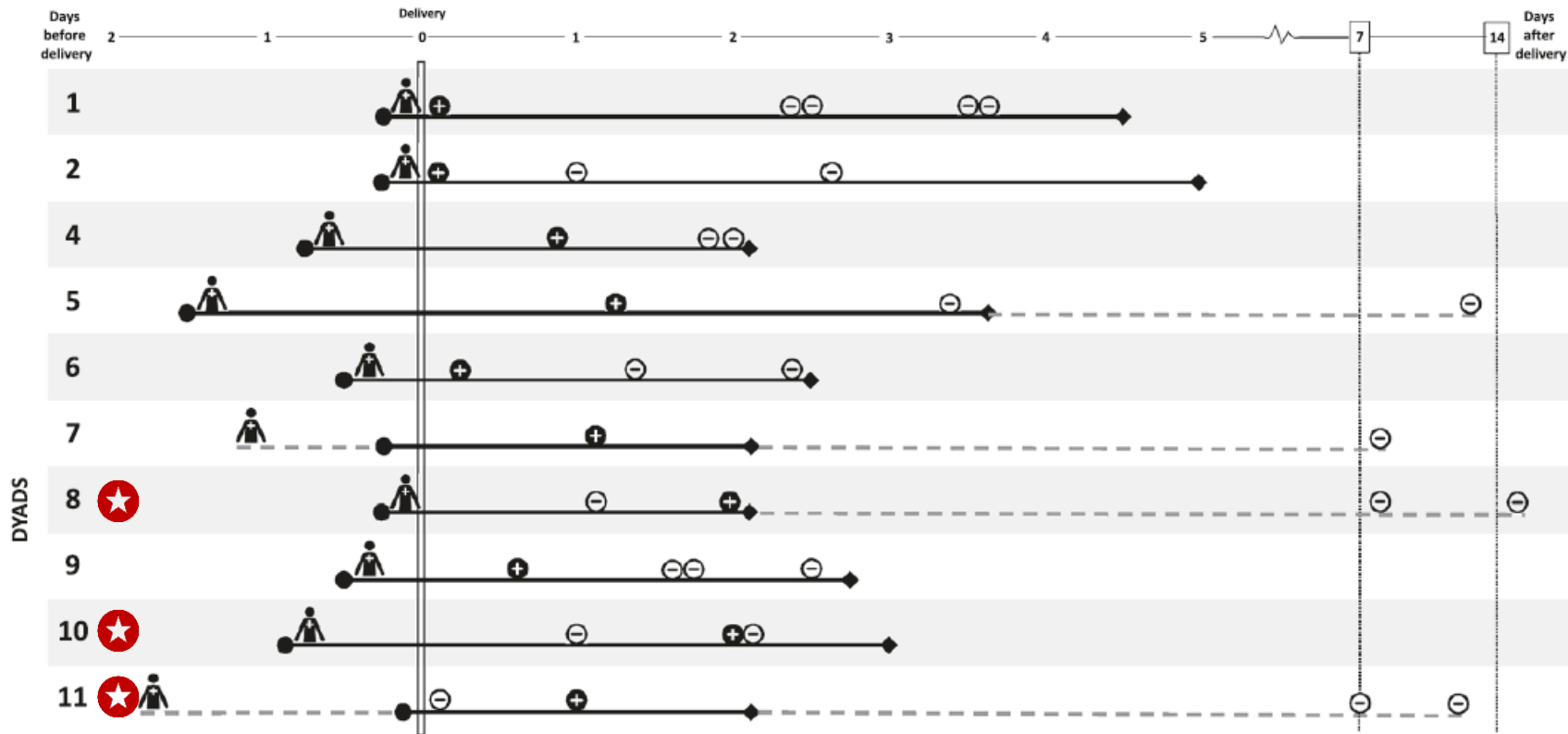
- 55/101 newborns F/U till to DOL-15.
- 4 cases readmitted due to fever or hyperbilirubinemia.
- Six underwent retests and all negative.

Meaning These findings suggest that during the COVID-19 pandemic, separation of affected mothers and newborns may not be warranted, and direct breastfeeding appears to be safe.

2020-11

2021-02

2021-03

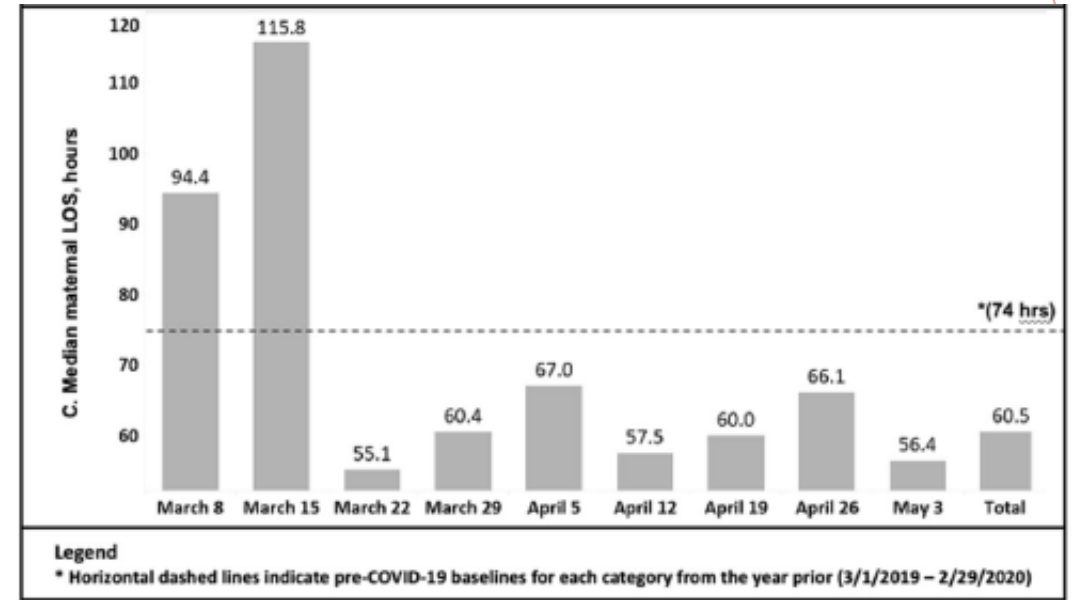
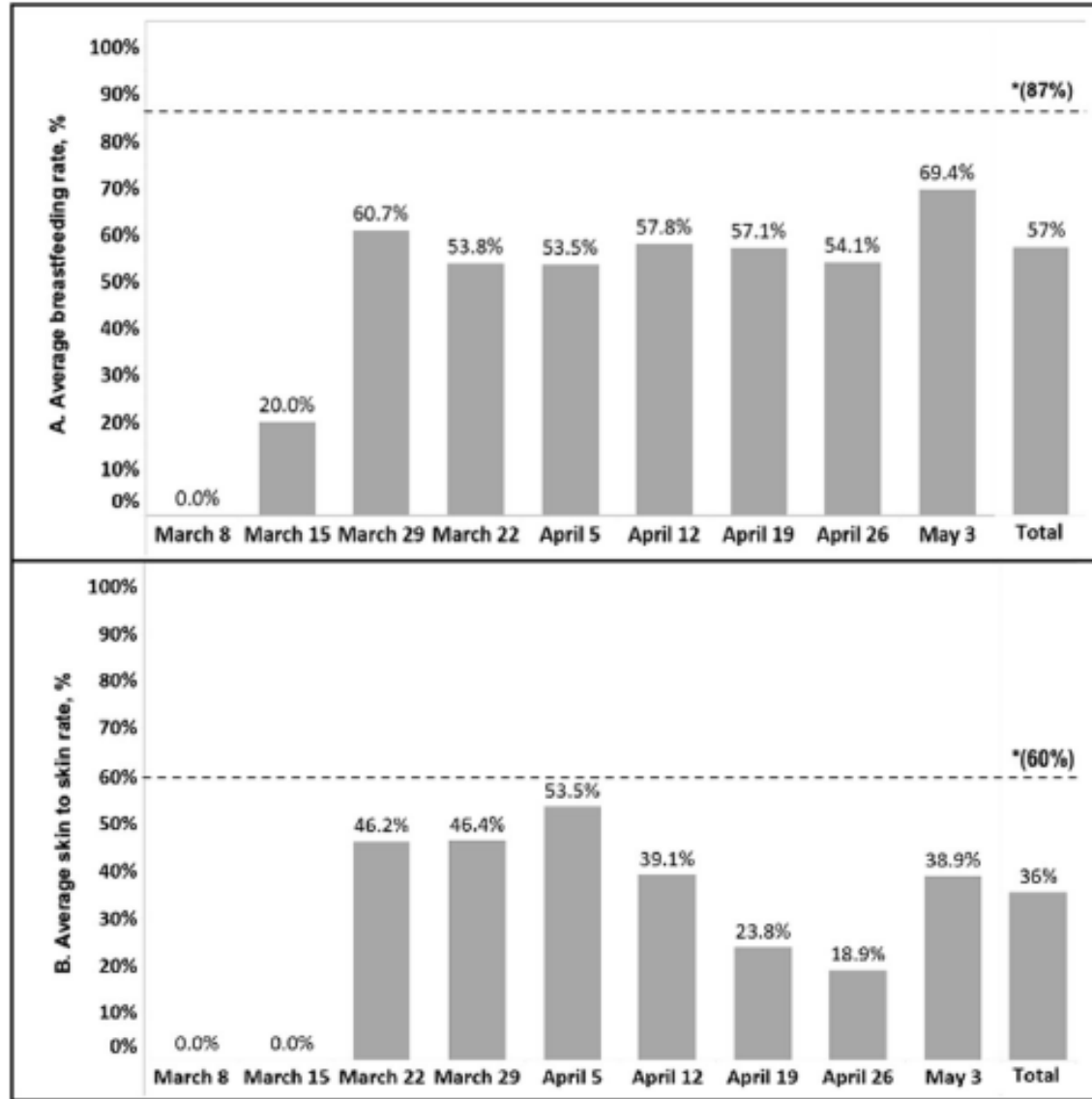


● = Mother admission ◆ = Infant discharge 👤 = Mother positive test ⊕ = Infant positive test ⊖ = Infant negative test

2020-11

2021-02

2021-03





2020-11

2021-02

2021-03

2021-5

- Swedish Pregnancy Registry
- Infants of COVID-19 (+) mothers
 - Higher mortality (0.3 vs 0.11) but no significant
 - Higher very-preterm birth (OR 7.6, 1.2 to 14.0)
 - Higher respiratory disorder and respiratory support
- Vertical transmission rate: 0.9%
 - 2.7% if mothers tested positive during delivery
- 0.33% COVID-19 (+) among infants of COVID-19 (-) mothers

Q2

Neonatal COVID-19 infection

EARLY ONSET NEONATAL COVID:

Often asymptomatic with positive SARS CoV-2 PCR before hospital discharge (1.6% of infants born to positive mothers)

Common: Asymptomatic - detected by routine testing

Perinatal transmission (? vertical - uncommon)

Typical onset
2 to 7 days
after birth

Temperature
instability or
low-grade fever

Loss of
interest
in feeds



Nasal
congestion
Flaring

Blue
discoloration

Lethargy

Diarrhea

Irregular
breathing



LATE-ONSET NEONATAL COVID:

Readmission at 5 - 35 days after birth

Temperature
instability

Lethargy

Non-specific
opacities
on chest X-ray

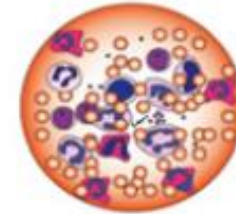
Respiratory
distress

Apnea

Feeding
intolerance



Postnatal
transmission



Leukocytosis
Lymphopenia
Thrombocytopenia



EARLY ONSET NEONATAL COVID:

Often asymptomatic with positive mothers before hospital discharge

Commonly asymptomatic - detected by routine testing

Typical onset 2 to 7 days after birth

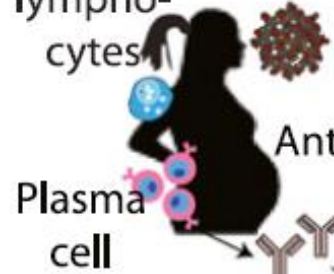
Temperature instability
low-grade fever

Blue discoloration

Lethargy Diarrhea

MULTI-SYSTEM INFLAMMATORY SYNDROME IN NEONATES (MIS-N)

Maternal lymphocytes



Myocarditis, ↑ Troponin, ↑ BNP, Coronary aneurysms

Plasma cell Neonatal hyperimmune response

DIC, ↓ Fibrinogen, ↑ D-dimers, Thrombocytopenia, Neutropenia, Lymphopenia

Maternal COVID-19 (past or present infection)

Hyponatremia, Oliguria, Renal failure, Anasarca

Feeding intolerance, vomiting, "NEC" like presentation

Hypoxemia, Pulmonary infiltrates, PPHN

Response to IVIG therapy

LE COVID: 5-10 days after birth

Non-specific opacities on chest X-ray

Leukocytosis, Lymphopenia, Thrombocytopenia

Feeding intolerance

EARLY ONSET NEONATAL COVID-19
Often asymptomatic with positive PCR before hospital discharge (1.6% positive mothers)

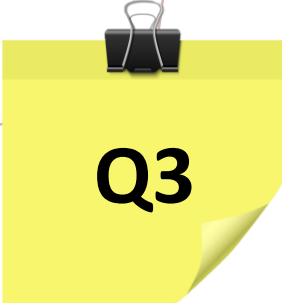
Commonly asymptomatic - detected by routine testing

Typical onset: 2 to 7 days after birth
Temperature instability or low-grade fever

Blue discoloration
Lethargy, Diarrhea, Irritability

新生兒感染COVID-19之症狀

輕症	中重症	重症(Neonatal MIS-C)	實驗室檢查
流鼻水或咳嗽 (40-50%)	呼吸窘迫 (12-40%)	呼吸系統：呼吸暫停、低血氧、胸部X光毛玻璃樣變化、持續性肺高壓	白血球增多
發燒 (15-45%)	昏睡	低體溫	淋巴球減少
	嘔吐與腹瀉 (30%)	心血管系統：心跳過快、休克、左心室功能異常、心肌酵素上升、冠狀動脈異常	血小板減少
		類川崎氏症之粘膜及皮膚症狀	發炎指標 (CRP) 上升
		腸胃道：發炎性腸炎	乳酸上升
		瀰漫性血管凝固症 (DIC)	

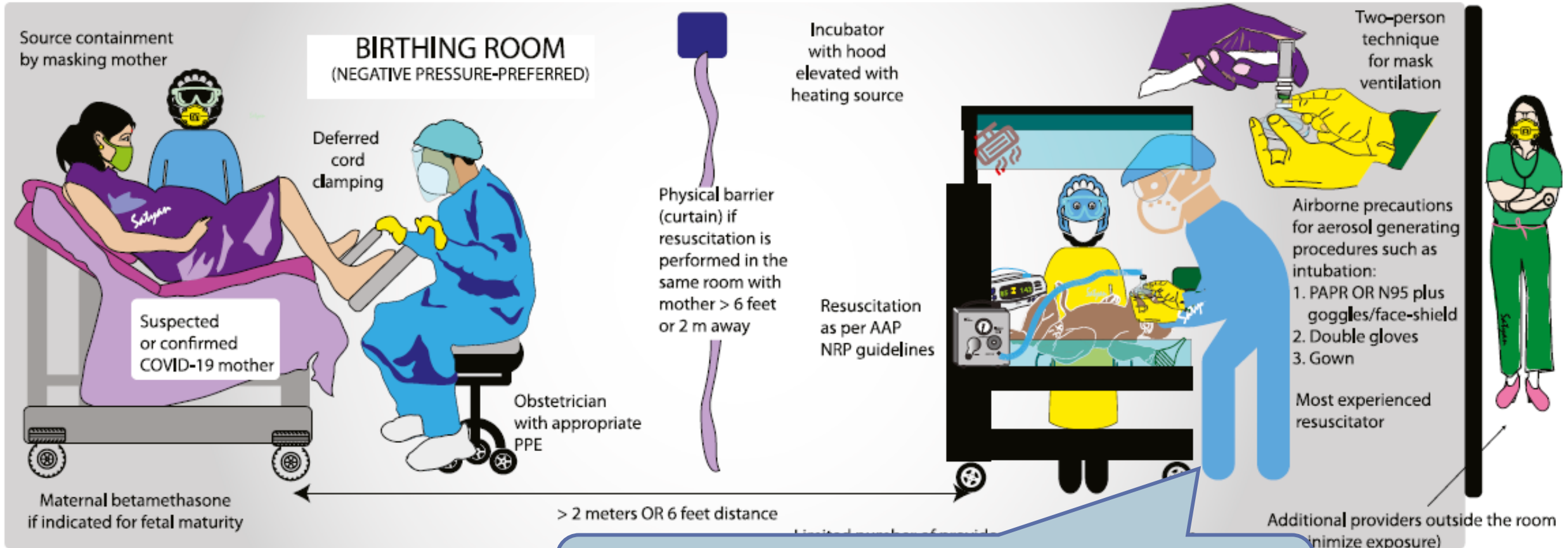


Q3

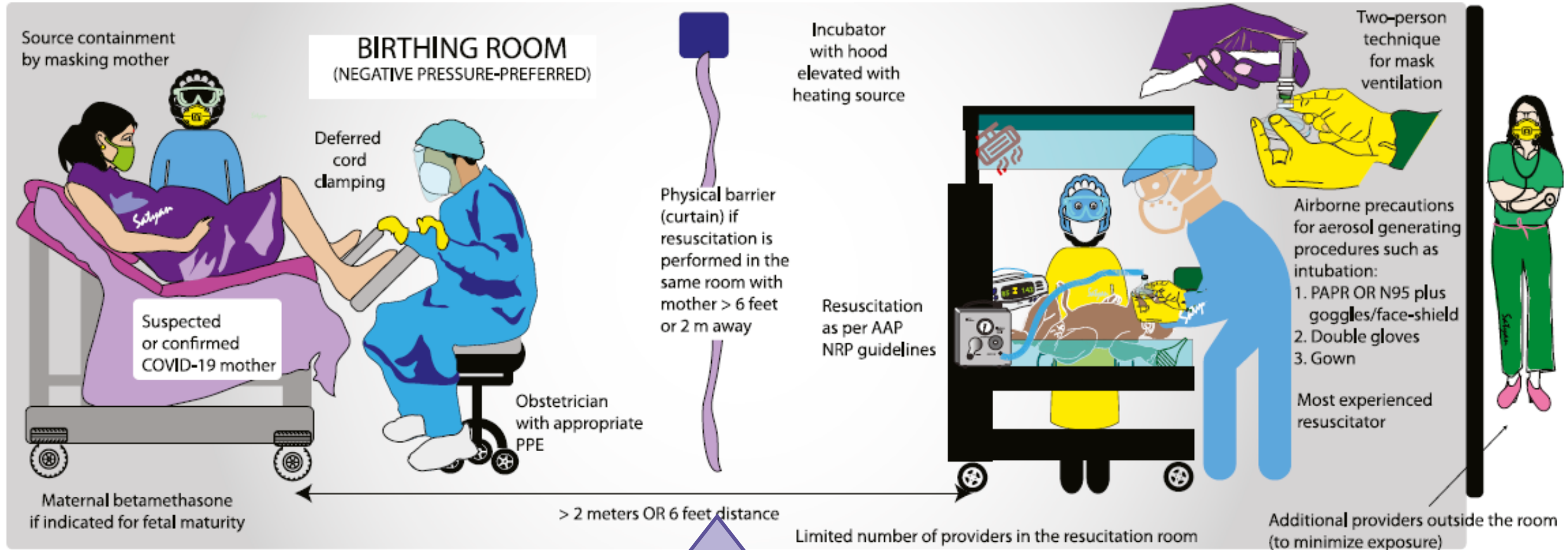
Special considerations during delivery



Mothers with suspected or confirmed COVID-19 positive is **NOT** an indication for neonatal team attendance



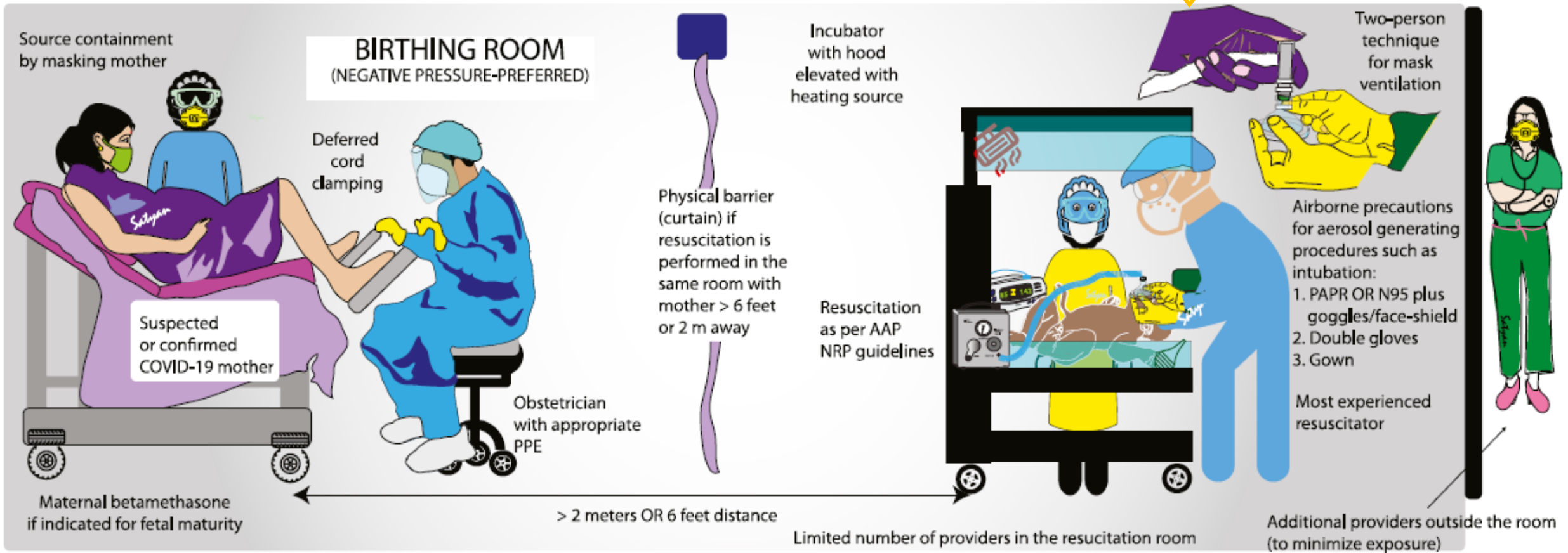
產房參與接生時，所有新生兒科醫師需穿著個人全套防護(PPE)。

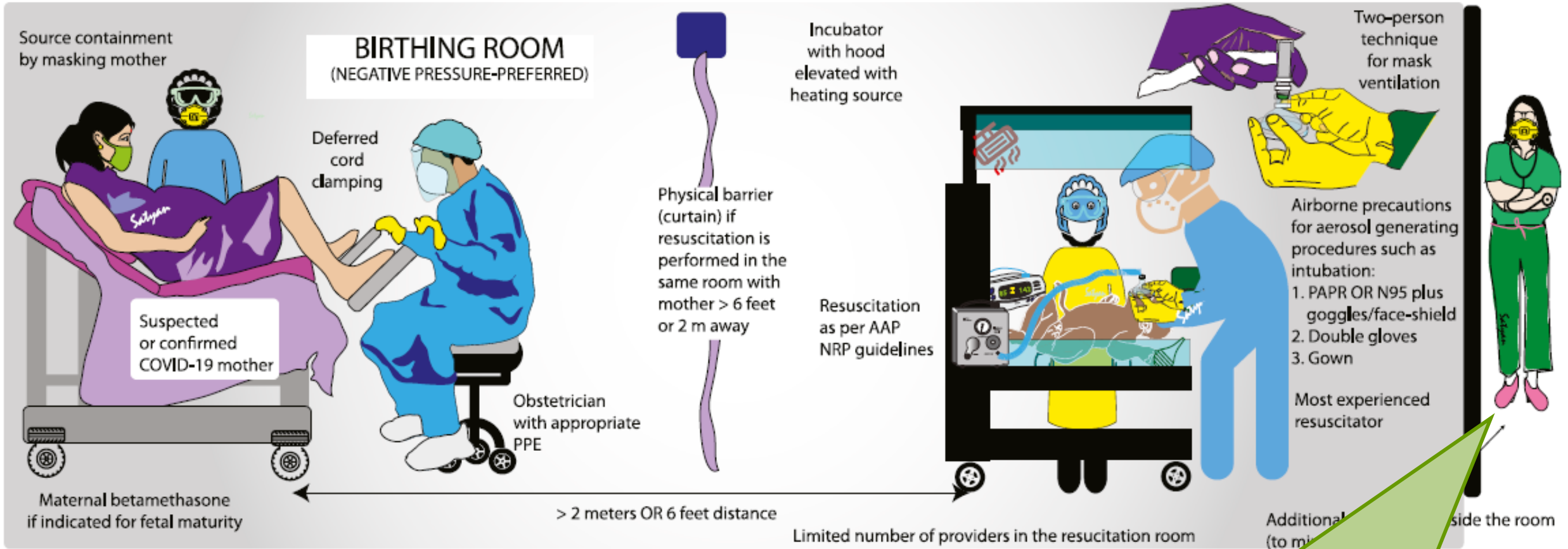


同一空間處置需與母親保持2公尺以上的距離；
或移至另一空間處置。

盡量減少參與standby的人力；
建議1-2人即可

NeoReviews. 2021;22:e284



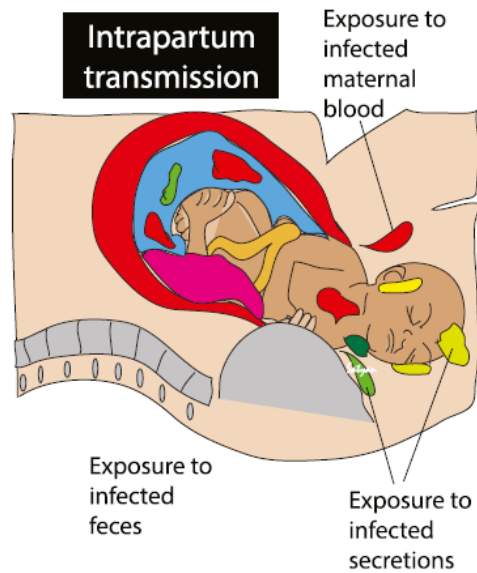


支援或待命人員應於產房外等待

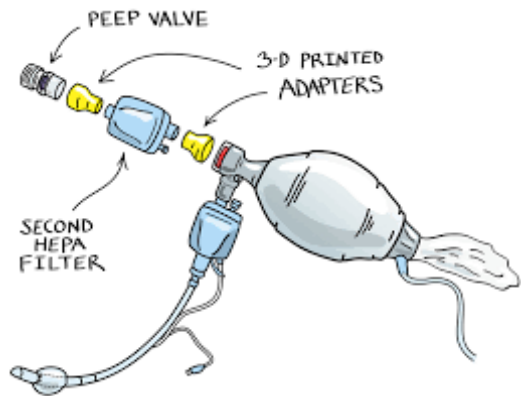
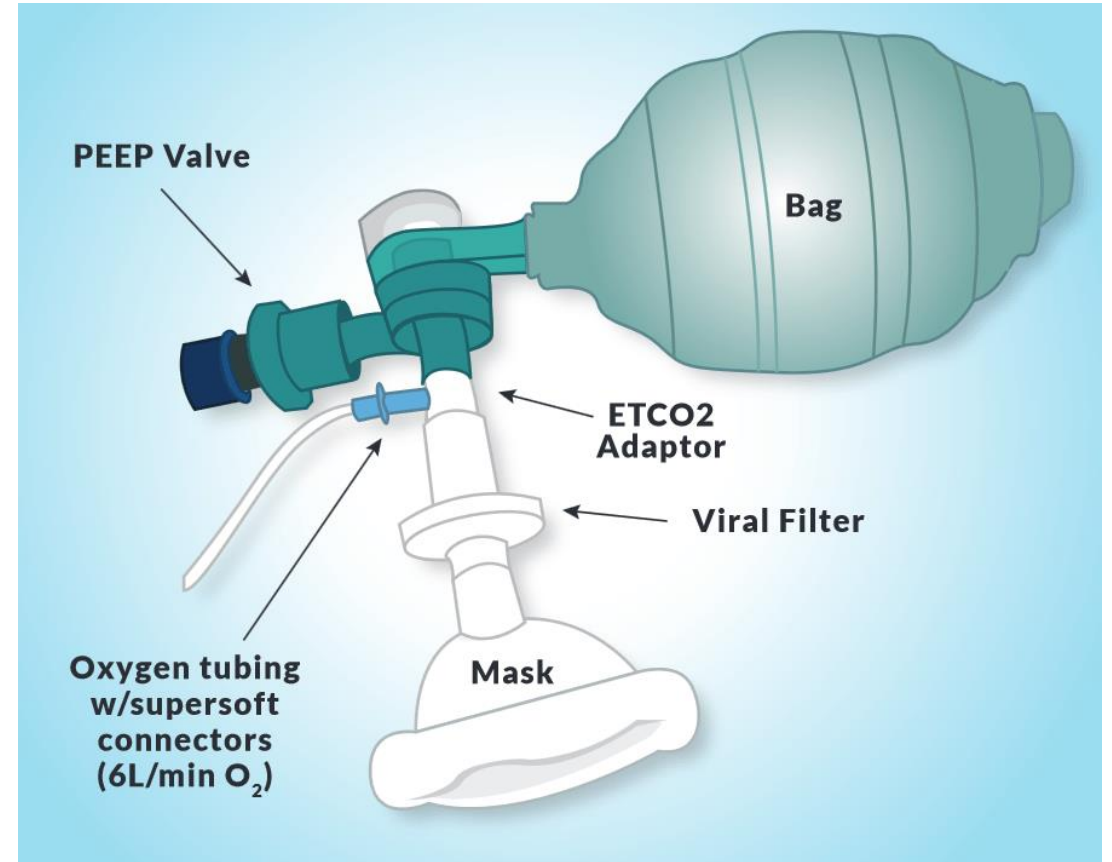
Q4

Special considerations for NLS

- **The standard NLS algorithm should be used.**



NeoReviews. 2021;22:e284
Resuscitation Council UK. August 2020 update
European Resuscitation Council COVID-19 Guideline. April 2020

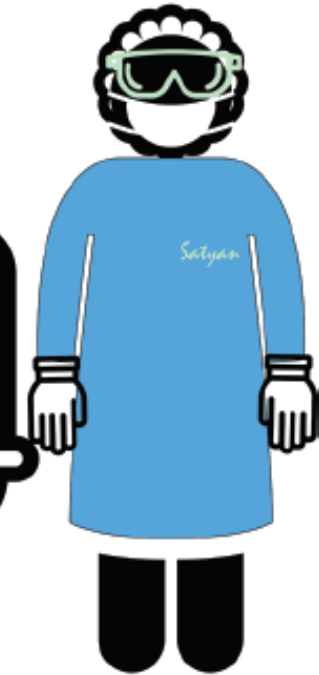
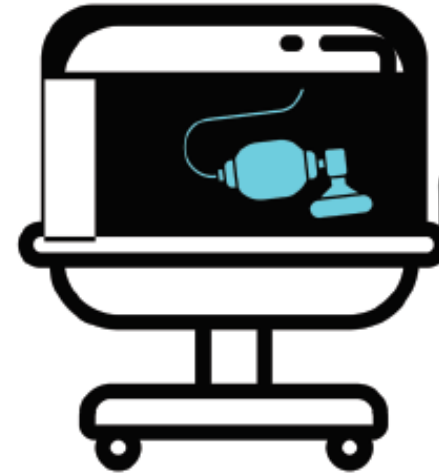




NeoReviews
2021;22:e284
Resuscitation Council
UK. August 2020
European
Resuscitation Council
COVID-19 Guideline.
April 2020

Resuscitation
equipment

Transport
isolette



Additional
providers
outside the
room for
backup



Q5

POSTNATAL CARE — WELL BABY WITH MILD/ASYMPTOMATIC MOTHER

洗手，清潔乳房
戴外科口罩

Rooming in
with mother

Mother & neonate in a designated isolation room

Test at 24, 48, before discharge
First (+), retest on 48-72 h

Hand hygiene
before feeding

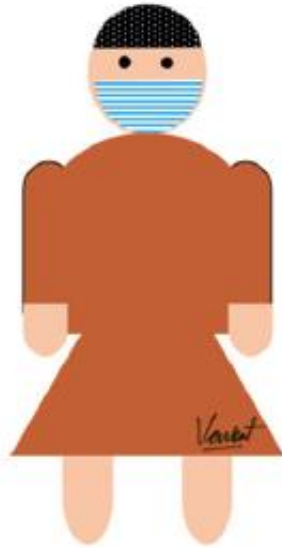


Direct Breast
Feeding

Maintain respiratory
hygiene & cough
etiquette

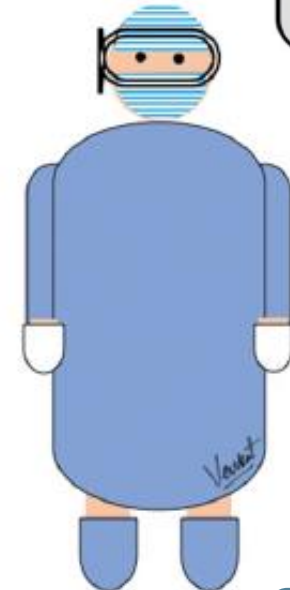
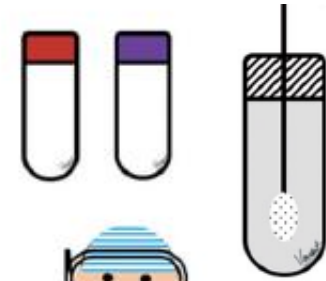
Ensure mask
while feeding

沒事不要靠近小孩
距離 > 2公尺



2-meter separation while
not providing direct care

No Routine labs



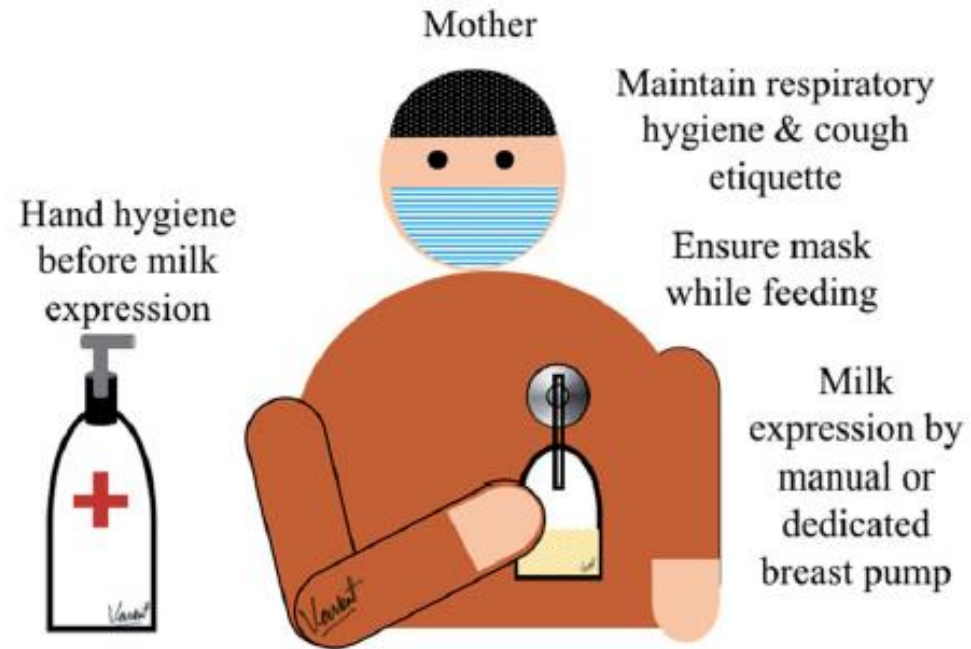
Routine physical exam
monitoring with PP

全套防護

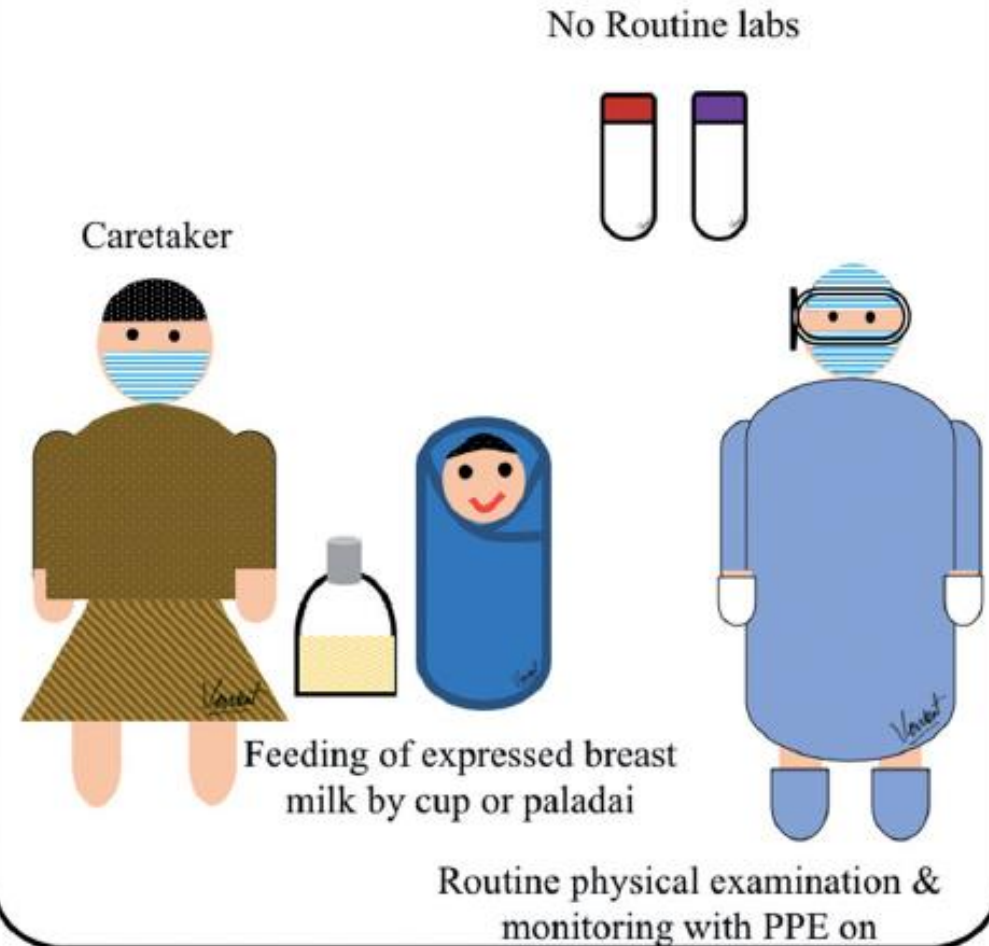
趕快回家??

Isolate the neonate from the mother

Mother's Room



Baby's Room





Women with COVID-19 can **breastfeed** if they wish to do so. They should:



Practice respiratory hygiene and wear a mask



Wash hands before and after touching the baby



Routinely clean and disinfect surfaces

If a woman with **COVID-19** is too unwell to breastfeed, she can be supported to safely provide her baby with breastmilk in other ways, including by:



Expressing milk



Relactation



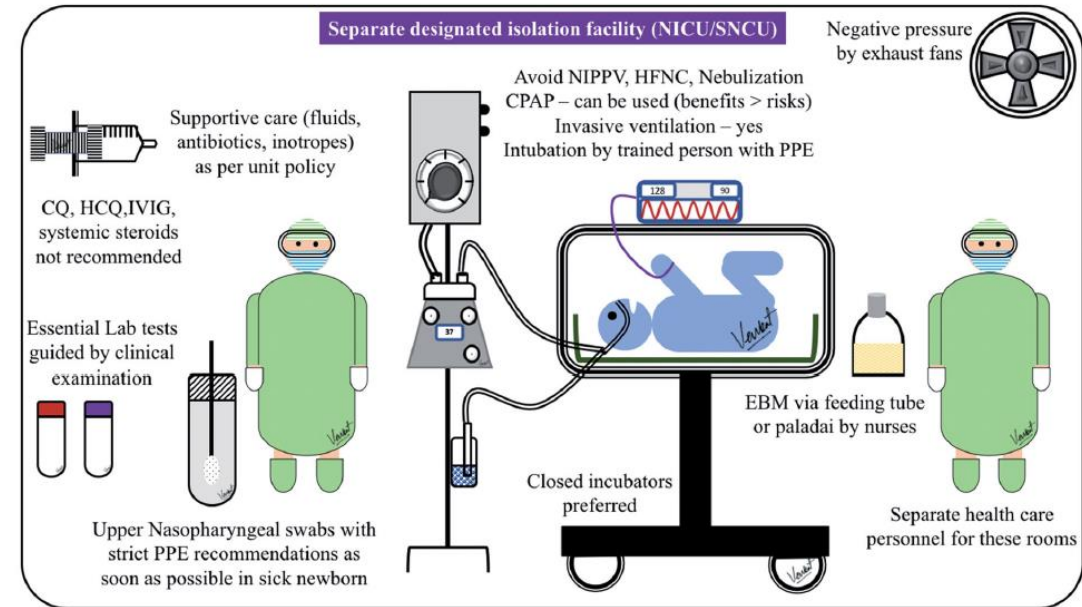
Donor human milk

Testing on 24h, 48h


Isolation for 10-14 days

If admission after room-in or discharge

- Test on admission
- Retest at 5-7 days in hospital



Journal of Maternal-Fetal & Neonatal Medicine 2020
(Figure copyright Dr Venkat Reddy Kallem)
AAP FAQ May, 2021



Q6

AAP FAQ, May 2021	RCPCH guidance for neonatal setting, Jul 2020	Swedish COVID-19 strategy, April 2020
<ul style="list-style-type: none">● ~2% 新生兒在 24-96 小時測到陽性。● 若母親在生產前 14 內檢測陽性，新生兒陽性率增加到 4.3%。● 若狀況允許，應執行延遲夾臍與肌膚接觸；肌膚接觸時媽媽配戴外科口罩。● 親子同室<ul style="list-style-type: none">■ 接觸嬰兒前，母親配戴外科口罩並執行手部清潔。■ 非照顧時保持適當距離。■ 醫護人員需穿戴完整防護。■ 若母親於急性症狀期，暫時母嬰分離是可以考慮的。● 哺餵母乳<ul style="list-style-type: none">■ 接觸嬰兒前，母親配戴外科口罩並執行手部(與乳房)清潔■ 可考慮將母乳擠出由健康照護者哺餵● 新生兒需住院時<ul style="list-style-type: none">■ 優先考慮負壓病房或具備其他空氣過濾系統之隔離室■ 空間不足時可考慮集體隔離，但個案間應相距 1.6 英尺，或置於封閉式保溫箱內。■ 若新生兒於出生後即住院，感控措施應執行至出生後 72 小時且檢測陰性才可考慮解除■ 若新生兒曾親子同室，入院後應隔離至少 10 天；且於入院時檢測，並於入院 5-7 天時二採● 新生兒採檢時機<ul style="list-style-type: none">■ 於 24 與 48 小時各檢測一次，或出院前至少一次■ 若第一次陽性，於 48-72 小時再檢，直到二採陰或出院回家■ 若持續住院者，至少二採陰才可解除感控措施● 不建議提早出院，並應後續追蹤至 14 天大。	<ul style="list-style-type: none">● 有症狀的新生兒才檢測● 照顧者應與新生兒共同隔離 14 天● 對於無症狀之新生兒採取基本清潔衛生措施即可● 住院的無症狀新生兒可於 72 小時後移出隔離室，但須在保溫箱中直至 14 天，或返家後隔離至出生後 14 天● 非預期但有呼吸症狀的新生兒<ul style="list-style-type: none">■ 單獨隔離■ 入院時一採，72 小時二採，第五天三採。● 預期可能有呼吸道症狀的新生兒 (如早產兒)<ul style="list-style-type: none">■ 單獨隔離，至少 14 天■ ~72 小時一採，第 5 天二採■ 若陽性，後續每周追蹤 2 次直到二採陰● 哺餵母乳建議同 AAP	<ul style="list-style-type: none">● 生產方式與 standby 依據原本醫院規定● 親子同室● 所有 COVID 陽性母親的新生兒皆於出生 12-24 小時一採● 需住院之新生兒於 48-96 小時二採● 哺餵母乳或擠出母乳前須確實執行手部清潔衛生● 若與母親接觸後再入院，須單獨隔離至採檢陰性

References

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- Outcomes of Neonates Born to Mothers With Severe Acute Respiratory Syndrome Coronavirus 2 Infection at a Large Medical Center in New York City. JAMA Pediatrics 2021;175:157-67
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- AAP FAQs: Management of Infants Born to Mothers with Suspected or Confirmed COVID-19. <https://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/clinical-guidance/faqs-management-of-infants-born-to-covid-19-mothers/>
- Pregnancy and Breastfeeding During COVID-19 Pandemic: A Systemic Review of Published Pregnancy Cases. Frontiers in Public Health 2020;8:558144
- Impact of evolving practices on SARS-CoV-2 positive mothers and their newborns in the largest public healthcare system in America. Journal of Perinatology 2021;41:970-80
- Perinatal SARS-CoV-2 Infection and Neonatal COVID-19: A 2021 Update. NeoReviews 2021;22:e284-95