

Learn from neonates with COVID-19

What we do in China

Wuhan children's Hospital

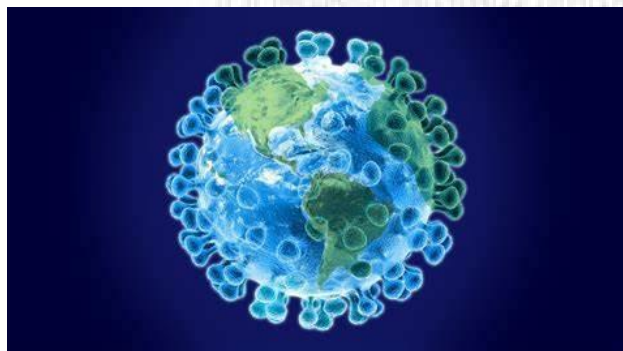
Lingkong Zeng



COVID-19

11/3/2020 WHO

Pandemic



Wuhan children's Hospital

湖北省儿童医疗中心 | 华中科技大学
HUBEI CHILDREN'S MEDICAL CENTER | 同济医学院附属
武汉儿童医院 | WUHAN CHILDREN'S HOSPITAL | TONGJI MEDICAL COLLEGE | HUAZHONG UNIVERSITY OF SCIENCE & TECHNOLOGY
武汉市妇幼保健院 | 武汉市妇女儿童医疗保健中心

Designated treatment center of
neonatal COVID-19

30/1/2020



中国首例新生儿新型冠状病毒肺炎

曾凌空,陶旭炜,袁文浩,王劲,刘欣,刘智胜

中华儿科杂志, 2020,58(00): E009-E009.

1例以“打喷嚏，伴间断吐奶1周”为主诉的17日龄新生儿于2020年2月5日就诊于武汉儿童医院新生儿内科隔离病房，其父母于入院前3 d出现发热伴咳嗽，确诊新型冠状病毒肺炎（NCP）患者。患儿早期临床症状轻，病程中出现一过性发热及腹泻，无严重并发症，反复咽拭子和肛拭子2019新型冠状病毒(2019-nCoV)核酸检测阳性，肺部影像学提示炎性改变，诊断为新生儿NCP，提示感染后新生儿呼吸道及消化道中均可存在病毒。需要关注新生儿作为感染者和传播者的可能性，同时也提出针对新生儿NCP的医疗及家庭看护问题。

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患儿 男，17日龄，因“打喷嚏，伴间断吐奶1

提纲

作者信息

Abstract

评论

First case of infected neonate

First case of cured and discharged

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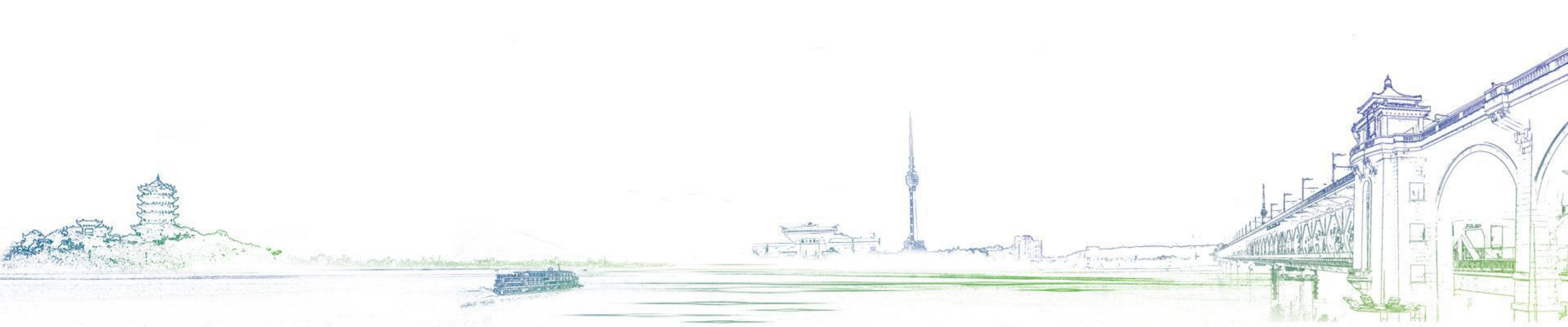
03 The management of neonates with COVID-19

04 How to manage the neonates born to mothers with COVID-19



Part 1

The routes of transmission in the newborns



Routes of transmission

Familial aggregation infection

3 late-onset infected newborns familial aggregation infection

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中华儿科杂志®

新型冠状病毒感染专题·病例报告

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Vertical transmission ?

Two studies

All samples negative for SARS-CoV-2.

nasopharyngeal ,rectal swabs ,amniotic fluid, cord blood, breastmilk

More evidence are needed

THE LANCET

ARTICLES | [ONLINE FIRST](#)

Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records

[Huijun Chen, PhD](#) * • [Juanjuan Guo, MS](#) * • [Chen Wang, PhD](#) * • [Fan Luo, PhD](#) • [Xuechen Yu, MD](#) • [Prof Wei Zhang, PhD](#) • et al. [Show all authors](#) • [Show footnotes](#)

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Part 2

The clinical characteristics and diagnosis of neonates with COVID-19



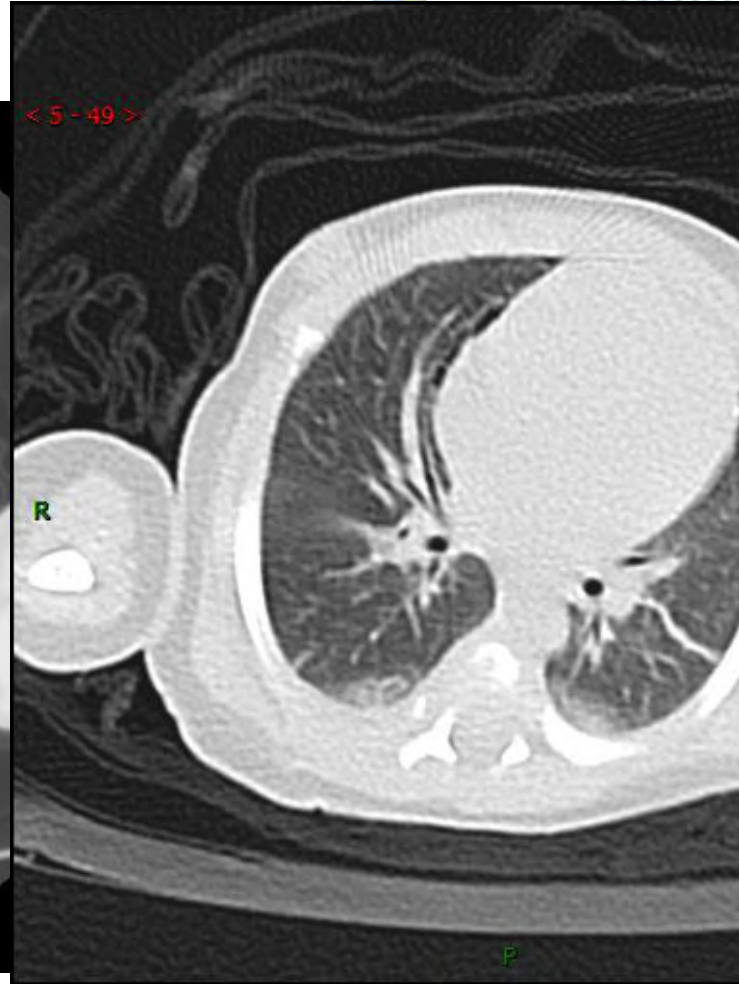
Clinical characteristics

Two or three systems (respiratory, gastrointestinal, cardiovascular) involved in neonates with COVID-19.

Table. General Information and Clinical Features of 33 Neonates With Mothers With COVID-19 Pneumonia

Variable	Neonates with SARS-CoV-2, No. (%)		Patients with SARS-CoV-2		
	No (n = 30)	Yes (n = 3)	Patient 1	Patient 2	Patient 3
Male	16 (53)	3 (100)	Yes	Yes	Yes
Preterm	3 (10)	1 (33)	GA: 40 wk	GA: 40 wk + 4 d	GA: 31 wk + 2 d
Small for gestational age	2 (7)	1 (33)	No; 3250 g	No; 3360 g	No; 1580 g
Asphyxia	1 (3)	1 (33)	No	No	Yes
Symptoms and complications					
Fever	0	2 (67)	Yes	Yes	No
Pneumonia	0	3 (100)	Yes	Yes	Yes
Respiratory distress syndrome	3 (10)	1 (33)	No	No	Yes
Shortness of breath	3 (10)	1 (33)	No	No	Yes
Cyanosis	2 (7)	1 (33)	No	No	Yes
Feeding intolerance	2 (7)	1 (33)	No	No	Yes
Laboratory test, median (range)					
White blood cell count, cells/ μ L	9800 (6100-22 700)	19 200 (8600-20 400)	8600	19 200	20 400
Lymphocyte count, cells/ μ L	4300 (1500-10 700)	2600 (800-3100)	3100	2600	800
Platelets, $\times 10^3$ / μ L	184 (116-303)	245 (230-265)	245	265	230
Creatine kinase isoenzymes, U/L	13 (22.5-43)	31 (18-39)	18	31	39
Aspartate aminotransferase	27.5 (12-45)	24 (8-63)	8	24	63
Alanine aminotransferase	21 (9-95)	17 (11-88)	11	17	88
Treatment					
Mechanical ventilation	0	1 (33)	No	No	Yes
Antibiotic	6 (20)	1 (33)	No	No	Yes
Duration of neonatal intensive care unit, median (range), d	0 (0-6)	4 (2-11)	2	4	11
Death	0	0	No	No	No
Maternal features					
Fever on admission	7 (23)	1 (33)	Yes	No	No
Postpartum fever	4 (13)	1 (33)	Yes	No	No
Cough	9 (30)	1 (33)	No	Yes	No
Intensive care unit admission	0	0	No	No	No
Pneumonia per computed tomography diagnosis	30 (100)	3 (100)	Yes	Yes	Yes
Nasopharyngeal swab	30 (100)	3 (100)	Yes	Yes	Yes
Delivered by cesarean delivery	23 (77)	3 (100)	Yes	Yes	Yes
Premature rupture of membranes	2 (7)	1 (33)	Yes	No	No

Non-specific finding CT CXR



Neonatal case

Radiation exposure?

Monitor by CXR



Suspected Cases

Patients who
Have one of the epidemiological history
Meet any two of the clinical manifestations

Epidemiological History

In the 14 days before the onset

(1) have visited or lived in communities with case reports in the country, or foreign countries

(2) have contact with coronavirus infected people

(3) have contact with patients with fevers or respiratory symptoms from communities with case reports in the country, or foreign countries



(4) Cluster onset

2 or more cases of fever and/or respiratory symptoms within 14 days in small areas like homes, offices, classes in schools and other places

Clinical Manifestations

- (1) Fever, dry cough, other respiratory symptoms
some children may have low or no fever
- (2) Shows the lung imaging features
- (3) In the early stage of onset, the total number of WBC was normal or decreased, or the lymphocyte count decreased;



Confirmed Cases

Suspected cases with one of the pathogenic evidence:

(1) Coronavirus nucleic acid is positive in rRT-PCR test

(2) Viral gene sequencing is highly homologous to the known novel coronaviruses

(3) Double positive results for IgM and IgG;

(4) The IgG changes from negative to positive or the recovery period is 4 times and more than that in the acute phase.

- (1) RR increase: 2-12 months $RR > 50$: 1 - 5 years $RR > 40$ > 5 years $RR > 30$ except for fever and crying
- (2) In resting state, $SpO_2 \leq 95\%$;
- (3) Assisted breathing (moaning, nasal faring, three concave sign), cyanosis, intermittent apnea;
- (4) Disturbance of consciousness: lethargy, and convulsions;
- (5) Food refusal or feeding difficulty, with signs of dehydration

Critical Cases

- (1) Respiratory failure requiring mechanical ventilation
- (2) Shock
- (3) Combined with other organ failures



- (1) contact with severe coronavirus infected patients
- (2) Baby with underlying diseases (congenital heart, lung and airway diseases, chronic heart and kidney diseases) immunodeficiency, genetic metabolic diseases
- (3) Baby with long-term users of immunosuppressants
- (4) Babies under 3 months old.

Warning Indexes

- (1) Tachypnea
- (2) Poor mental response, drowsiness
- (3) Lactate increased progressively;
- (4) CT showed bilateral or multi lobed infiltration, pleural effusion or rapid progress of lesions in a short period of time;
- (5) Babies under 3 m . with underlying diseases, immunodeficiency

Part 3

The management of neonates with COVID-19



- (1) Suspected patients should be quarantined in a one ward per patient manner
- (2) Confirmed cases can be admitted in the same ward;
- (3) Critically ill children should be admitted to ICU as soon as possible.

Standard precautions

Hand hygiene

Personal protective equipment (gloves, masks, eyewear)

Cough etiquette

Sharps safety

Sterile instrument and devices

Clean and disinfected environmental surface

Additional precautions

Signage at the entrance

Limited parents' visit

Using special masks or N95 respirator, gown and glove
change after the procedure

Maintaining windows open (no negative pressure room)

Incubator for every baby

Disposal of the medical waste from the isolated room
in the same way as infectious medical waste

Discarding all disposable supplies if unable to
appropriately clean and disinfect

Terminal disinfection of the patient' s room
chlorine-containing preparation spray

Monitor and follow-up

Close monitoring of cardiorespiratory status
apnea, bradycardia, hypotension
Cyanosis should be of great concern

Close follow-up of the chest radiography in case of
clinical deterioration

Initialization of respiratory support if necessary
Ncpap NIPPV
invasive ventilation

Newborns with mild symptomatic
were managed with routine care



Newborns with underlying diseases
presented severe respiratory illness

Premature
Asphyxia
Sepsis



Preterm baby with
Asphyxia RDS,Sepsis,DIC
Improved with

Ventilate
Inotropic drugs,
Fluid management
Surfactant therapy



Antiviral agent

The efficacy of antiviral agents against SARS-CoV-2 remains controversial

We do not use antiviral agents except nebulized alpha-interferon

Antimicrobial agents

Appropriate antimicrobial agents should only be prescribed to the patients with the probable or confirmed bacterial infection according to the antimicrobial stewardship.

Empiric use or overuse of antimicrobial agents should be avoided.

Respiratory Support

non-invasive ventilation 2 hours without improvements /cannot tolerate

Invasive mechanical ventilation

prone position ventilation, lung recruitment, ECMO

Circulation Support

On the basis of full fluid resuscitation, improve microcirculation, use vasoactive drugs, and monitor hemodynamics if necessary.

Immunoglobulin

Immunoglobulin can be used in severe cases

Blood Purification Treatment

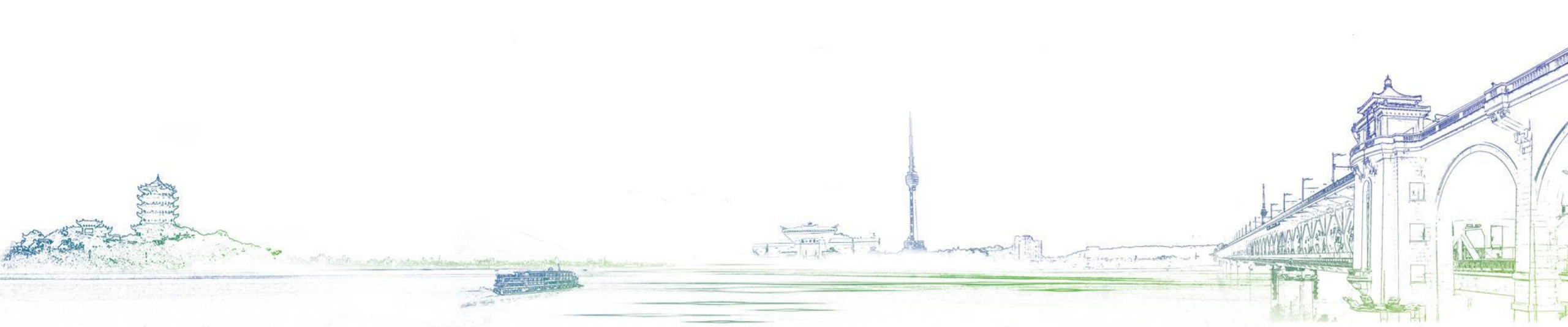
plasma replacement, adsorption, perfusion, blood/plasma filtration
block the "cytokine storm".

Corticosteroids (controversial)

Methylprednisolone in a short period (3–5 days), dose < 1–2 mg/kg/day

Part 4

How to manage the neonates born to mothers with COVID-19?



The neonates born to affected mother are at risk of COVID-19

Baby isolated and fed by formula initially until the affected mothers test negative for SARS-CoV-2

In the delivery room

Negative pressure ward / isolation ward

Neonatal resuscitation

Additional precautions (gown ,gloves, masks,
eyewear)

intubate Positive pressure mask

Discharge criterion

It is critical to decide the discharge time

Current criterion

Stable with normal temperature for more than 3 days and normal CXR

2 consecutive results show negative for SARS-CoV-2 using upper airway specimen (with at least a 24-hour interval).

Discharge plan

14-day isolation

2-4w follow-up

Offered the appropriate education to parents
hand hygiene/disinfection of the children waste at home.

Thank you for your
attention!

