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Breastfeeding during the novel coronavirus (COVID-19) pandemic: guidelines and challenges

Dimitra Dimopoulou^a, Pinelopi Triantafyllidou^b, Anna Daskalaki^b, Garyfallia Syridou^a and Vassiliki Papaevangelou^a

^aPediatric Infectious Diseases Department, Third Department of Pediatrics, National and Kapodistrian University of Athens, Athens, Greece; ^bNeonatal Department, Third Department of Pediatrics, National and Kapodistrian University of Athens, Athens, Greece

ABSTRACT

COVID-19 pandemic has raised questions on pregnant women and newborns' management. Guidelines, issued by most international agencies and national bodies, recommend rooming-in and direct breastfeeding. In the early days of this pandemic, breastfeeding practices have been challenged by fear among both parents and healthcare workers occasionally resulting in mother-newborn separation. We herein review current breastfeeding guidelines and discuss remaining questions and challenges. As we are facing the second wave of this pandemic, more information is gathered, especially regarding possible virus transmissibility through breastfeeding, enabling more definite instructions about breastfeeding practices.

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Introduction

The novel coronavirus disease (COVID-19) caused by SARS-CoV-2 is an urgent and rapidly spreading global public health threat. In December 2019, the first case of pneumonia caused by SARS-CoV-2 was reported in Wuhan, Hubei Province, China. Since then, the disease has spread worldwide, causing a pandemic [1]. There are major concerns about vulnerable populations include elderly, those with comorbidities, immunocompromised people, as well as pregnant women and their offsprings [2]. To date, there have been few published reports of COVID-19 in pregnant women and neonates born to mothers with confirmed COVID-19 [2]. Although SARS-CoV-2 RNA has been detected in placentas of COVID-19 affected mothers suggesting placental infection, many experts doubt vertical transmission [3–6]. Moreover, there has been evidence of horizontal transmission in newborns born to COVID-19 infected women during the perinatal period with a favorable outcome [7].



There is no clear evidence to date, that SARS-CoV-2 virus is transmitted through breast milk to neonates born to mothers with confirmed COVID-19 during the perinatal period [8]. In addition to the broad scientific consensus on the advantages of breastfeeding, some

scientists argue that there may be an added benefit from the transfer of specific protective antibodies and other elements with antiviral properties to the infant through breast milk [9]. Yet in the case of SARS, although antibodies have been detected in the breast milk of a previously SARS-infected mother from birth to even months after illness, mothers with SARS were advised not to breastfeed [10].

In Greece, although more than six months have elapsed since the beginning of the pandemic, still healthcare workers as well as parents fail to implement recommended breastfeeding practices. As we are currently confronting the second wave of COVID-19 globally, we aimed to review current data on the transmissibility of SARS-CoV-2 through breastfeeding, global guidelines on breastfeeding in women with COVID-19 infection and discuss challenges encountered.

Material and methods

A review of the literature was performed through a PubMed search of original articles, case reports, and reviews, using the key words “coronavirus,” “COVID-19,” “breastfeeding,” “neonates,” and “pregnancy,”

CONTACT Vassiliki Papaevangelou  vpapaev@med.uoa.gr  Pediatric Infectious Diseases Department, Third Department of Pediatrics, National and Kapodistrian University of Athens, University General Hospital ATTIKON, Rimini 1, Athens 12462, Greece

Due to the urgent and developing nature of the topic, this paper was accepted after an expedited peer review process. For more information about the process, please refer to the Instructions for Authors.

covering a period from 1 December 2019 to 15 July 2020. References of the articles were individually investigated for related articles. Statements and guidance of known organizations were analyzed. Also, reports and guidelines about breastfeeding during COVID-19 from government bodies and agencies of several countries were collected. All articles were selected systematically for inclusion and critically evaluated.

Results

Initially most studies failed to detect SARS-CoV-2 RNA in breast milk [8]. In the literature, only in very few cases, SARS-CoV-2 has been detected in human breast milk [11]. In the first case, the milk sample was positive from day 10 to day 14 postpartum [12]. In the second and third cases, the virus was detected in the breast milk on the 1st and 2nd day after delivery, respectively, while subsequent milk samples were negative for the virus [13,14]. In the fourth case, SARS-CoV-2 was detected in repeated samples of an 8-month-old infant's maternal milk [15].

All current guidelines issued by agencies and governmental bodies are described in detail in Table 1.

Discussion

All international agencies and most governmental bodies agree that feeding with mothers' own milk should be promoted in all babies including those born to COVID-19 infected mothers [16–39]. More specifically, international agencies explicitly support rooming-in and direct breastfeeding in asymptomatic and pauci-symptomatic mothers using respiratory and hand hygiene measures to prevent horizontal transmission to the offspring through respiratory droplets (Table 1). Many authorities propose that the neonate should remain in a distance of 2 m from the mother separated by a barrier such as a transparent curtain and/or be placed in an isolette and receiving hands on care by an unaffected person. On the other hand, WHO argues for Kangaroo and skin-to-skin care. CDC has altered its position statement using shared decision-making between mother and family in consultation with the healthcare providers about the risks and benefits of cohabitating. Many institutions have adopted this position [40–42]. The advantages of breastfeeding on promoting emotional and mental health are well-known. Therefore, postpartum separation policies interfere with the establishment of breastfeeding and bonding, causing stress to both

mother and child. Restrictions on families cause emotional disturbance and may alter the relationship with the baby, having a long-lasting effect. So, it would be desirable to incorporate parents into decision making to reduce their discomfort, promoting family-centered care, even in the absence of physical presence. Many support that an informed consent should be provided by the mother, when she elects rooming-in and direct breastfeeding [19]. It would be interesting to investigate what percentage of COVID-19 positive mothers will, in fact, choose rooming-in over temporary separation and breastmilk pumping. During coronavirus pandemic outbreak, pregnant women infected with SARS-CoV-2 experience fear, anxiety and uncertainty, regarding the care of their newborn and they are often unable to make decisions especially given the lack of vast experience and scientific evidence on this issue. In one study, half of the COVID-19 positive women (50%) reported that they had not been informed on whether breastfeeding is safe during the outbreak [43]. Therefore, in this era of uncertainty and fear, it becomes evident that healthcare workers face challenges impeding the implementation of rooming-in and direct breastfeeding. As the second wave is evolving and it has become evident that this pandemic will last for at least few more months, discussions on breastfeeding practices and precaution measures should be included in prenatal care.

Separation is proposed, only when the mother is unable to care for her baby due to a COVID-19 associated medical condition. In such cases, expression of breast milk through a dedicated breast pump, using breast and pump hygiene, as well as droplets precautions is proposed. When cessation of breastfeeding has occurred, wet nursing or relactation, once the mother recovers, are advised (Table 1). Donor milk is also considered as a safe alternative, although shortages can occur [44].

Importantly, safety issues related to postnatal transmission of COVID-19 through breastfeeding practices need to be discussed. Although in very few cases SARS-CoV-2 RNA has been detected in breastmilk, RT-PCR has not been validated for viral detection in breastmilk, while the detection of RNA does not necessarily imply transmissibility [45]. Moreover, in these cases although mothers reportedly were using respiratory and hand hygiene, the contamination of breast milk samples by respiratory secretions cannot be ruled out. On the other hand, protective antibodies against SARS-CoV-2 have been detected in human breastmilk, supporting its beneficial use [46]. Breastmilk is rich in a variety of antimicrobial and

Table 1. Interim guidelines from international agencies and different countries (in alphabetical order).

Agency/Country	Rooming-in	Direct BF	Guidelines
United Nations Children's Fund (UNICEF) [16]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
World Health Organization (WHO) [17]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene. If mother is critically ill, relactation, wet nursing (another woman breastfeeding or caring for your child) or using donor human milk.
UNFPA Asia Pacific Regional Office [18]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Union of European Neonatal and Perinatal Societies (UENPS) [19]	Conditional*	Conditional*	Continue breastfeeding with respiratory and hand hygiene if mother is asymptomatic or paucisymptomatic/ No separation. If mother is severely ill, symptomatic and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
WHO- Regional office for Europe in cooperation with EAP; EPA; ECPCP & EBCOG [20]	yes	yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene. If mother is critically ill, relactation wet nursing or using donor human milk.
Australia [21]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Belgium [22]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Brazil [23]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If direct breastfeeding is not possible, expression of breast milk through breast pump, using breast and pump hygiene.
Canada [24]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene /No separation.
China [25]	No	No	No breastfeeding or breast milk feeding/ full separation.
France [26]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If direct breastfeeding is not possible, expression of breast milk through breast pump, using breast and pump hygiene.
Germany [27]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Greece [28]	Conditional [#]	Conditional [#]	Continue breastfeeding with respiratory and hand hygiene if mother is asymptomatic or paucisymptomatic/ No separation. If mother is severely ill, symptomatic and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
India [29]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene according to mother's wishes/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Iran [30]	No	No	If mother is mildly ill, expression of breast milk through breast pump, using breast and pump hygiene. If mother is severely ill, use donor human milk. Full separation.
Ireland [31]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If direct breastfeeding is not possible, expression of breast milk through breast pump, using breast and pump hygiene.
Italy [19]	Conditional [#]	Conditional [#]	Continue breastfeeding with respiratory and hand hygiene if mother is asymptomatic or paucisymptomatic/ No separation. If mother is severely ill, symptomatic and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Kenya [32]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If direct breastfeeding is not possible, expression of breast milk through breast pump, using breast and pump hygiene. In hospitalized premature neonates, use donor human milk.
Malaysia [33]	No	No	No breastfeeding or breast milk feeding/ full separation.
Philippines [34]	Conditional [#]	Conditional [#]	Continue breastfeeding with respiratory and hand hygiene if mother is asymptomatic or paucisymptomatic/ No separation. If mother is severely ill, symptomatic and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
South Africa [35]	Conditional [#]	Conditional [#]	Continue breastfeeding with respiratory and hand hygiene if mother is asymptomatic or paucisymptomatic/ No separation. If mother is severely ill, symptomatic and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
Spain [36]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If direct breastfeeding is not possible, expression of breast milk through breast pump, using breast and pump hygiene. In hospitalized premature neonates, use donor human milk.
Sweden [37]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
UK [38]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.
USA – AAP [8]	Conditional [#]	Conditional [#]	Continue breast milk feeding with expression of breast milk through breast pump, using breast and pump hygiene. Separation if possible. If the mother wishes to breastfeed directly her infant, then breastfeeding with respiratory and hand hygiene.
USA – CDC [39]	Yes	Yes	Continue breastfeeding with respiratory and hand hygiene according to mother's wishes/ No separation. If mother is severely ill and temporarily separated, expression of breast milk through breast pump, using breast and pump hygiene.

EAP: European Academy of Pediatrics; EPA: European Pediatric Association; ECPCP: European Confederation of Primary Care Pediatricians; EBCOG: European Board and College of Obstetrics and Gynecology; UNFPA - United Nations Population Fund; WBTI: Word breastfeeding trends initiative; BF: exclusive breast feeding at 6 months of age.

*Neonatal Mortality per 1000 live births

[#]Conditional = Yes, in asymptomatic or paucisymptomatic mothers/No, in symptomatic mothers. Most recommend discussion of risks and benefits and decision case by case.

antiviral factors, as well as growth factors, hormones and beneficial flora, boosting not only the immature immune system of the neonate, but providing a solid base for future health [47,48].

However, horizontal transmission of the virus from the mother to her newborn through respiratory droplets during breastfeeding remains the main concern, rather than the breast milk itself. To date, only some case reports of direct breastfeeding with safety precautions measures by SARS-CoV-2 positive mothers are available: one reported an asymptomatic infant with RT-PCR (+) swab [49], while other showed no proof of horizontal transmission [50–52]. Conversely, data supporting the benefits of isolation of the neonates born to mothers with COVID-19 during the first days of life are limited and whether separation minimizes the risk of transmission remains unproven, especially in the phase of increased transmission in the community.

Although guidelines issued by countries with different level of wealth, neonatal mortality, level of crisis preparedness, and reported breastfeeding patterns were reviewed, no major differences between guidelines were identified (Table 1). Most countries, irrespective to geographic region, development or economic status, comply with WHO guidelines. Confronting the second wave of COVID-19, one may examine whether the extensively approved guidelines are implemented. China seemed to have stricter measures with regard to mother-newborn separation, but these guidelines were issued earlier in the epidemic when uncertainty was greater. In Asia, other countries, like Iran and Malaysia, follow these guidelines. Actual practice must take into account country's resources, cultural associated breastfeeding habits, local extent of the COVID-19 outbreak, as well as healthcare system capacity, among other factors. For example, in countries with a high pandemic preparedness, alternative strategies can be proposed, such as providing scales and home phototherapy to families, parental teaching *via* telehealth and in-person education at the doors of the hospital, and telehealth newborn follow-up [53]. Separation of the neonate will double the burden of both human and material resources in a period with exhaustion of the health care staff and global shortage of personal protective equipment. Mother-child separation becomes even more problematic, as maternal COVID-19 negative testing remains a requirement for hospital discharge in most institutions. According to the literature, SARS-CoV-2 viral shedding can persist up to the second week of symptoms or more [54]. Alternatively, discharge of mother and newborn to home quarantine could be discussed when feasible.

In our experience so far, additional challenges impeding the implementation of rooming-in have been encountered. In Greece, a consensus on management of neonates born to COVID-19 positive mothers, favoring breastfeeding or expression of breast milk with pump under precautions, was recently published [28]. Working in a referral center for COVID-19 building infrastructure constraints have to be taken into account. Women are hospitalized post-partum in COVID-19 designated wards with up to four COVID-19 infected adults in the same room. Under these circumstances, no rooming-in of an unaffected neonate can be provided. The overwhelming demands prevent HCWs to actively support mothers as before the pandemic. Furthermore, nursing staff shortages may also cause significant limitations in adopting a more demanding “modus operandi,” especially in countries like Greece with a longstanding economic crisis, which has decreased the number of available personnel. Nevertheless, encouraging pumping with strict hygiene measures and promoting bonding with frequent visual contact of mother and child resulted in lactation preservation and exclusive breastfeeding after recovery, when desired. As we enter the new phase of the pandemic, a dedicated ward in the Obstetrics Department was set that meets the requirements of appropriate distancing, physical barrier, donning and doffing personal protective equipment area and will enable us to hospitalize neonates together with their asymptomatic/paucisymptomatic mother.

Conclusion

Separation between newborn and mother may have adverse effect on the maternal-child relationship and may disrupt breastfeeding, the importance of which is undisputed. Recent guidelines almost universally support rooming-in and direct breastfeeding of newborns born to COVID-19 women. As we acquire more knowledge of COVID-19, more data will be gathered about the transmissibility of SARS-CoV-2 through breastfeeding. If indeed the safety of direct breastfeeding is shown, it is hoped that scientists will be able to argue assertively against the isolation of neonates born to SARS-CoV-2 positive mothers and to strongly promote the benefits of rooming-in, nursing and breastfeeding using necessary respiratory precautions. Further education and multidisciplinary discussions with all HCWs involved in the care of women and offspring are needed, in order to reinforce best practices after proper counseling for necessary hygiene measures.

Disclosure statement

Pinelopi Triantafyllidou and Anna Daskalaki are International Board Certified Lactation Consultants (IBCLC). The rest of authors have no conflict of interest to disclose.

References

- [1] World Health Organization. WHO announces COVID-19 outbreak a pandemic. [cited 2020 Jul 15]. Available from: <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>.
- [2] Della Gatta AN, Rizzo R, Pilu G, et al. COVID19 during pregnancy: a systematic review of reported cases. *Am J Obstet Gynecol*. 2020;S0002-9378(20):30435–30438.
- [3] Baud D, Greub G, Favre G, et al. Second-trimester miscarriage in a pregnant woman with SARS-CoV-2 infection. *JAMA*. 2020;323(21):2198.
- [4] Penfield CA, Brubaker SG, Limaye MA, et al. Detection of severe acute respiratory syndrome coronavirus 2 in placental and fetal membrane samples. *Am J Obstet Gynecol Mfm*. 2020;2(3):100133–100138.
- [5] Patanè L, Morotti D, Giunta MR, et al. Vertical transmission of coronavirus disease 2019: severe acute respiratory syndrome coronavirus 2 RNA on the fetal side of the placenta in pregnancies with coronavirus disease 2019-positive mothers and neonates at birth. *Am J Obstet Gynecol Mfm*. 2020;2(3):100145.
- [6] Lamouroux A, Attie-Bitach T, Martinovic J, et al. Evidence for and against vertical transmission for severe acute respiratory syndrome coronavirus 2. *Am J Obstet Gynecol*. 2020;223(1):91.e1–e4.
- [7] Zeng L, Xia S, Yuan W, et al. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. *JAMA Pediatr*. 2020;174(7):722.
- [8] Puopolo KM, Hudak ML, Kimberlin DW, et al. American Academy of Pediatrics Committee on Fetus and Newborn, Section on Neonatal Perinatal Medicine, and Committee on Infectious Diseases. Initial Guidance: Management of Infants Born to Mothers with COVID-19. 2020. [cited 2020 Jul 14]. Available from: <https://downloads.aap.org/AAP/PDF/COVID19InitialNewbornGuidance.pdf>.
- [9] Hanson LA. Breastfeeding provides passive and likely long-lasting active immunity. *Ann Allergy Asthma Immunol*. 1998;81(6):523–533.
- [10] Maxwell C, McGeer A, Tai KFY, et al. Management guidelines for obstetric patients and neonates born to mothers with suspected or probable severe acute respiratory syndrome (SARS). *J Obstet Gynaecol Can*. 2009;31(4):358–364.
- [11] Costa S, Posteraro B, Marchetti S, et al. Excretion of SARS-CoV-2 in human breastmilk samples. *Clin Microbiol Infect*. 2020;S1198-743X(20):30304–30309.
- [12] Groß R, Conzelmann C, Müller JA, et al. Detection of SARS-CoV-2 in human breastmilk. *The Lancet*. 2020;395(10239):1757–1758.
- [13] Kirtsman M, Diambomba Y, Poutanen SM, et al. Probable congenital SARS-CoV-2 infection in a neonate born to a woman with active SARS-CoV-2 infection. *CMAJ*. 2020;192(24):E647–E650.
- [14] Wu Y, Liu C, Dong L, et al. Coronavirus disease 2019 among pregnant Chinese women: case series data on the safety of vaginal birth and breastfeeding. *BJOG*. 2020;127:1109–1115.
- [15] Tam PCK, Ly KM, Kernich ML, et al. Detectable severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in human breast milk of a mildly symptomatic patient with coronavirus disease 2019 (COVID-19). *Clin Infect Dis*. 2020:ciaa673.
- [16] United Nations Children's Fund (UNICEF), The UN Refugee Agency (UNHCR), United Nations World Food Programme (WFP), World Health Organization (WHO). Infant and Young Child Feeding in the Context of the COVID-19 Pandemic Eastern, Central and Southern Africa. 2020. [cited 2020 Jul 14]. Available from: <https://www.unicef.org/southafrica/reports/infant-and-young-child-feeding-context-covid-19-eastern-central-and-southern-africa>.
- [17] World Health Organization (WHO). Breastfeeding advice during the COVID-19 outbreak. 2020. [cited 2020 Jul 4]. Available from: <http://www.emro.who.int/nutrition/nutrition-infocus/breastfeeding-advice-during-covid-19-outbreak.html>.
- [18] UNFPA Asia-Pacific Regional Office Coronavirus (2019-nCoV) Guidance Document. 2020. [cited 2020 Jul 14]. Available from: <https://china.unfpa.org/sites/default/files/pub-pdf/APRO%20Coronavirus%202019-nCoV%20Guidance%20Note-%20final%20%2806%20Feb%202020%29.pdf>.
- [19] Davanzo R, Moro G, Sandri F, et al. Breastfeeding and Coronavirus Disease-2019. Ad interim indications of the Italian Society of Neonatology endorsed by the Union of European Neonatal & Perinatal Societies. *Matern Child Nutr*. 2020;16(3):e13010.
- [20] World Health Organization (WHO). Regional office for Europe. COVID-19 and breastfeeding-Position paper (2020). 2020. Available from: http://www.euro.who.int/__data/assets/pdf_file/0010/437788/breastfeeding-COVID-19.pdf?ua=1.
- [21] Queensland Health 11 March: COVID-19 Guidance for Maternity Services. Statewide Maternity and Neonatal Clinical Network. 2020. [cited 2020 Jul 15]. Available from: <https://www.ibfan.org/wp-content/uploads/2020/03/Queensland-Health.pdf>.
- [22] Belgian Academy of Pediatrics. Belgian guideline for newborns of COVID-positive mothers. Newsletter-Belgian Pediatric COVID-19 Task Force. 2020. [cited 2020 Jul 15]. Available from: https://gbs-vbs.org/fileadmin/user_upload/Unions/PED/Newborn_COVID_final_28-3.pdf.
- [23] COVID-19: Pediatras divulgam recomendações sobre amamentação em lactantes infectadas pelo vírus ou com suspeita. 2020. Departamento Científico de Aleitamento Materno da Sociedade Brasileira de Pediatria (SBP). [cited 2020 Jul 15]. Available from: <https://www.sbp.com.br/imprensa/detalhe/nid/covid-19-pediatras-divulgam-recomendacoes-sobre-amamentacao-em-lactantes-infectadas-pelo-virus-ou-com-suspeita/>.
- [24] British Columbia Centre for Disease Control (BCCDC). Interim Guidance: Public Health Management of cases

- and contacts associated with novel coronavirus (COVID-19) in the community. 2020. [cited 2020 Jul 15]. Available from: http://www.bccdc.ca/resourcegallery/Documents/GuidelinesandForms/GuidelinesandManuals/Epid/CDManual/Chapter1-CDC/2019-nCoV-Interim_Guidelines.pdf.
- [25] Wang L, Shi Y, Xiao T, et al. Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection (First edition). *Ann Transl Med.* 2020;8(3):47.
- [26] Société Française de Néonatalogie et Société Française de Pédiatrie. Propositions de la Société Française de Néonatalogie et de la Société Française de Pédiatrie concernant les nouveau-nés dans le contexte d'épidémie à COVID-19 (version du 10/03/2020 actualisée le 16/03/2020). 2020. Available from: <https://www.societe-francaise-neonatalogie.fr/>.
- [27] Stellungnahme der Deutsche Gesellschaft Pädiatrische Infektiologie (DGPI) im Einvernehmen mit der Deutschen Gesellschaft für Gynäkologie und Geburtshilfe (DGGG) und der Deutschen Gesellschaft für Perinatale Medizin (DGPM) DGPM: Umgang mit Neugeborenen SARS-CoV-2 positiver Mütter. 2020. [cited 2020 Jul 15]. Available from: <https://dgpi.de/stellungnahme-dgpi-dggg-dgpm-umgang-mit-neugeborenen-sars-cov-2-positiver-muetter/>.
- [28] Consensus on management of neonates with COVID-19. Hellenic Neonatal Society and Hellenic Society of Paediatric Infectious Diseases. 2020. [cited 2020 Jul 15]. Available from: <https://eody.gov.gr/wp-content/uploads/2020/04/covid-19-diaxeirisi-neognon.pdf>.
- [29] Federation of Obstetric and Gynaecological Societies of India (FOGSI). Good clinical practice recommendation on pregnancy with COVID-19 infection. 2020. [cited 2020 Jul 14]. Available from https://www.fogsi.org/wp-content/uploads/covid19/fogsi_gcpr_on_pregnancy_with_COVID_19_version_1.pdf.
- [30] Asadi L, Tabatabaei RS, Safinejad H, et al. New coronavirus (COVID-19) management in pregnancy and childbirth. *Arch Clin Infect Dis.* 2020;15(COVID-19):e102938.
- [31] Institute of Obstetricians and Gynaecologists – Royal College of Physicians of Ireland. COVID-19 Infection-Guidance for Maternity Services. 2020. Available from https://rcpi-live-cdn.s3.amazonaws.com/wp-content/uploads/2020/04/COVID19-Infection-Guidance-for-Maternity-Services-03_04_2020.pdf.
- [32] Ministry of Health of Kenya. A Kenya practical guide for continuity of reproductive, maternal, newborn and family planning care and services in the background of COVID19 Pandemic. 2020. [cited 2020 Jul 15]. Available from <https://www.health.go.ke/wp-content/uploads/2020/04/KENYA-COVID19-RMNH.pdf>.
- [33] Ministry of Health of Malaysia. Guideline on management of coronavirus disease 2019 (COVID-19) in pregnancy. 2020. [cited 2020 Jul 15]. Available from http://covid-19.moh.gov.my/garis-panduan/garis-panduan-kkm/Annex_23_Guidelines_COVID_Pregnancy_22032020.pdf.
- [34] Philippine Obstetrical and Gynecological Society (POGS) and Philippine Pediatric Society (PPS). Approach to the management of COVID-19 in pregnancy and the newborn. 2020. [cited 2020 Jul 15]. Available from <https://pps.org.ph/wp-content/uploads/2020/03/APPROACH-TO-THE-MANAGEMENT-OF-COVID-19-IN-PREGNANCY-AND-THE-NEWBORN.pdf>.
- [35] Health Republic of South Africa and National Institute for Communicable Diseases (NICD). Clinical management of suspected or confirmed COVID-19 disease. 2020. [cited 2020 Jul 15]. Available from <https://www.nicd.ac.za/wp-content/uploads/2020/05/Clinical-management-of-suspected-or-confirmed-COVID-19-Version-4.pdf>.
- [36] Recomendaciones para el manejo del recién nacido en relación con la infección por SARS-CoV-2. Versión 6.0. Fecha 13/04/2020. Sociedad Española de Neonatología. 2020. [cited 2020 Jul 15]. Available from: https://www.analesdepediatria.org/contenidos/pdf/Recomendaciones_pediaticas_Covid2.pdf?1.
- [37] The Public Health Agency of Sweden. COVID-19-What are the recommendations for pregnant women? 2020. [cited 2020 Jul 14]. Available from: https://www.Folkhalsomyndigheten.se/the-public-health-agency-of-sweden/communicable-disease-control/covid-19/?exp=69313#_69313.
- [38] The Royal College of Paediatrics and Child Health (RCPCH). COVID-19 – guidance for paediatric services. 2020. [cited 2020 Jul 15]. Available from: <https://www.rcpch.ac.uk/sites/default/files/generated-pdf/document/COVID-19—guidance-for-paediatric-services.pdf>.
- [39] US Centers for Disease Control and Prevention (CDC). Coronavirus Disease (COVID-19) and breastfeeding. 2020. [cited 2020 Jul 15]. Available from: <https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/maternal-or-infant-illnesses/covid-19-and-breastfeeding.html>.
- [40] American Breastfeeding Medicine statement as of 23 June 2020. 2020. [cited 2020 Jul 15]. Available from: <https://www.bfmed.org/abm-statement-coronavirus>.
- [41] Society of Maternal and Fetal Medicine guidelines as of 23 June 2020. 2020. [cited 2020 Jul 15]. Available from: https://s3.amazonaws.com/cdn.smfm.org/media/2267/COVID19_updated_3-17-20_PDF.pdf.
- [42] American College of Obstetrics and Gynecologists guidelines as of 23 June 2020. 2020. [cited 2020 Jul 15]. Available from: <https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2020/03/novel-coronavirus-2019>.
- [43] Yassa M, Birol P, Yirmibes C, et al. Near-term pregnant women's attitude toward, concern about and knowledge of the COVID-19 pandemic. *J Matern Fetal Neonatal Med.* 2020;33:3827–3834.
- [44] Human Milk Banking Association of North America. Milk banking and COVID-19. Human Milk Banking Association of North America; 2020. [cited 2020 Jul 15]. Available from: https://www.hmbana.org/file_download/inline/a04ca2a1-b32a-4c2e-9375-44b37270cfbd.
- [45] Lackey KA, Pace RM, Williams JE, et al. SARS-CoV-2 and human milk: what is the evidence? *Matern Child Nutr.* 2020;16(4):e13032.
- [46] Yu Y, Xu J, Li Y, et al. Breast milk-fed infant of COVID-19 pneumonia mother: A case report. *Res. Square.* 2020;15:68.

- [47] Peroni DG, Fanos V. Lactoferrin is an important factor when breastfeeding and COVID-19 are considered. *Acta Paediatr.* 2020;109(10):2139–2140.
- [48] Kell DB, Heyden EL, Pretorius E. The biology of lactoferrin, an iron-binding protein that can help defend against viruses and bacteria. *Front Immunol.* 2020;11:1221.
- [49] Buonsenso D, Costa S, Sanguinetti M, et al. Neonatal late onset infection with Severe Acute Respiratory Syndrome Coronavirus 2. *Am J Perinatol.* 2020;37:869–872.
- [50] Alonso Díaz C, López Maestro M, Moral Pumarega MT, et al. First case of neonatal infection due to COVID-19 in Spain. *An Pediatr.* 2020 ;92(4):237–238.
- [51] Lowe B, Bopp B. COVID-19 vaginal delivery – a case report. *Aust N Z J Obstet Gynaecol.* 2020;60(3):465–1111.
- [52] Perrone S, Giordano M, Meoli A, et al. Lack of viral transmission to preterm newborn from a COVID-19 positive breastfeeding mother at 11 days postpartum. *J Med Virol.* 2020;92(11):2346–2347.
- [53] Amatya S, Corr TE, Gandhi CK, et al. Management of newborns exposed to mothers with confirmed or suspected COVID-19. *J Perinatol.* 2020;40(7):910–987.
- [54] Wölfel R, Corman VM, Guggemos W, et al. Virological assessment of hospitalized patients with COVID-2019. *Nature.* 2020;581(7809):465–469.