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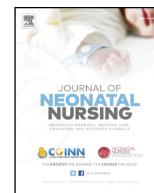
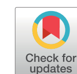


Neonatal nursing in the COVID-19 pandemic: can we improve the future?



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ABSTRACT

The current 2019 coronavirus disease (COVID-19) is the world's largest and most pervasive public health emergency in more than one hundred years. Although neonatal units have not been at the epicentre of the current health crisis, they have also been forced to adopt contingency plans with the aim of protecting hospitalised neonates, their families, and professionals. Neonatal units have been forced to alter the neonatal care framework based on promoting neurodevelopment and family-centred care.

The peak of the pandemic is falling in most countries, but COVID-19 infection is not eradicated and there is uncertainty about new outbreaks. It is time to reflect about better strategies to preserve the rights and excellence of care for newborns and their families. This column will highlight the changes that have occurred in neonatal units, and their impact on neonatal care and families. It is a time for critical reflection on nursing practice.

1. Manuscript text

The current 2019 coronavirus disease (Covid-19) is the world's largest and most pervasive public health emergency for more than 100 years. Despite an unprecedented scientific response and heroic professionalism, there has been a deficient and chaotic response from

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health systems with important restrictions on mobility, and imposed isolation.

Though at first there was great concern about the foetus and newborns due to their immature immune system, there is no definitive evidence that SARS-CoV-2 can be transmitted transplacentally (Alzamora et al., 2020; Chen et al., 2020; Dong et al., 2020; Egloff et al., 2020; Schwartz, 2020; Yu et al., 2020; Zeng et al., 2020). Data are also scarce on whether foetal infection can lead to teratogenic effects. Fortunately, most neonates horizontally infected to date have shown mild symptoms and good outcome (Dong et al., 2020; Lu et al., 2020).

Although neonatal units (NUs) have not been the epicentre of the current health crisis, they have also been forced to adopt contingency plans with the aim of protecting hospitalised neonates, their families, and professionals. NUs have altered the neonatal care framework based on promoting neurodevelopment and family-centred care (FCC) (Gooding et al., 2011).

The peak of the pandemic is subsiding in most countries, but COVID-19 infection is not eradicated and there is uncertainty about new outbreaks. It is time to reflect on better strategies to preserve the rights and excellence of care for newborns and their families.

From our large experience as neonatal nurses in Spanish NUs, we would like to take this opportunity of using this column to discuss and highlight some of the changes that may have had an impact on neonatal care and families. Though caution is necessary so as not to overgeneralise some of the principles and suggestions stated in this manuscript, we believe similar circumstances obtain in other countries with similar public health systems and family-centred neonatal care models.

2. Contingency plans and their impact

Contingency plans due to the covid-19 pandemic have impacted on three key areas: 1) the organization and workflow of neonatal units, 2) perinatal and neonatal care, including breastfeeding, and 3) communication-collaboration with parents.

2.1. Organization and workflow

During this crisis, NUs have implemented major changes in their daily workflow, which have entailed a major transformation in the care model and work culture of the NU. Spaces and workflows have been reorganized for patients, whether or not they are affected by Covid-19, in order to comply with the recommendations of the technical health reports.

In addition, NUs have been overwhelmed with a shortage of health care workers as staff became infected or transferred to other positions to reinforce hospital areas severely affected by COVID. This has forced long shifts in order to guarantee the quality of care, which made things difficult and unpredictable at first.

Many centres have adopted very restrictive policies to care for pregnant women who are positive for SARS-CoV-2 in the maternal area, as well as in the NUs, in order to control the spread of the virus and protect health professionals. Open access for both parents has been limited, and eliminated for other family members, altering the cornerstone of the FCC in which parents are not considered visitors, but rather the main collaborators and caregivers in their child's care (Gooding et al., 2011).

Contingency plans may have also affected hospital-assisted neonatal home care programmes. Some hospitals have adopted changes in the discharge decisions, with positive and negative impact on patients and families. Hospital discharge for healthy newborns has been advanced to lower the risk of the mother and infant becoming infected in hospital, while it has been delayed in premature babies ready to be discharged home due to mobility restrictions on the health professionals who give support to these programmes. However, the benefits of hospital-assisted neonatal home care programmes should not be dismissed and decisions should be weighed and considered on a case-by-case basis. Changes should be accompanied by an effort in the professional workflow structuring to conduct strict telematic surveillance followed by more thorough training of parents. In the case of premature babies, we must cautiously assess the impact that these decisions might have on the outcomes of babies and their families.

2.2. Perinatal and neonatal care

Initial recommendations to the management regarding the SARS-CoV-2-positive puerperant supported changes to delivery plans by introducing restrictions, both in vaginal deliveries and caesarean sections on the presence of the other parent at childbirth and postpartum unit, early skin-to-skin contact, and late-cord clamping (Chen et al., 2020; L. Wang et al., 2020). In addition, it was recommended that infants born to infected mothers as well as newborns with confirmed infection be separated and isolated in an individual room.

Fortunately, recommendations are being modified on a case-by-case basis, and separation is not recommended if the mother is in good clinical condition, providing that precautionary measures can be guaranteed to avoid contagion including using a face mask and practicing hygiene before feeding. Likewise, infected neonates are subject to recommendations that vary from isolated admission without caregivers to strategies adapted to their clinical status, but with the accompaniment of the parents (Chawla et al., 2020; Mimouni et al., 2020).

Neonates constitute a unique group of particularly vulnerable patients because they are immersed in a complex process of development and organic maturation, particularly the brain where a sensitive process of synaptogenesis, apoptosis, dendritic growth, and neuronal differentiation is taking place (Rice and Barone, 2000). On this biological basis, the FCC model has been incorporated into perinatal and neonatal care based on the ethics of care and scientific evidence.

In this model, free entry of parents in the NU helps continued affective contact and care empowerment of parents with their child as well as shared decision-making with the healthcare team (Craig et al., 2015; O'Brien et al., 2018). The current outbreak has brought about considerable changes in NU policy affecting not only infants with SARS-Cov-2 infection, but also the care offered to other admitted patients (Lu and Shi, 2020; J. Wang et al., 2020). In a desperate attempt to prevent the spread of the virus, NUs have implemented "visiting hours" and have limited the role of the parents in caregiving whether or not they were infected with SARS-CoV-2.

Likewise, skin-to-skin contact has suffered restrictions. Skin-to-skin is the simplest and most efficient tool to provide essential sensory input to the developing neonatal brain, improve breastmilk production, build up the bonding, and help parents to play an active role in alleviating the baby's pain and diminish their own stress (Anderzen-Carlsson et al., 2014; Baley et al., 2015). Furthermore, skin-to-skin care is the backbone that nurses use to structure FCC, help parents get close to their babies, and increase their confidence about taking care of them. Parents with a child admitted to the intensive care unit are especially vulnerable to restrictions as they have to take on emotional disturbance that may deeply alter bonding and the relationship established with the baby.

Scientific evidence, and emotional and ethical considerations, argue for cautious implementation of restrictive policies. The contingency plans required in a pandemic should remind us that restrictions on the empowerment of parents in the care of their newborns interfere with their neurological development and the psycho-emotional health of the family.

Although adherence to contingency plans is important, recommendations need to be based on evidence-based decision-making rather than fears. Decisions taken during pandemic outbreaks should have as little impact as possible on this FCC model. In fact, preserving the excellence of care is not at odds with using strict preventive measures. In addition to frequent hand-washing, cleaning of the breast before breastfeeding and skin-to-skin contact, and wearing face masks,

the risk to others can be reduced, for example, by testing parents and health professionals for SARS-CoV-2 and restricting their access to where their child is placed. In this sense, NUs with individualized areas may be better equipped to meet the FCC targets.

The impact of contingency plans in the NUs has been even more transcendent on the FCC than in any other clinical scenarios (Arnaez et al., 2020; Lu and Shi, 2020; J. Wang et al., 2020; L. Wang et al., 2020). Sharing contingency measures with parents and family organizations by seeking their point of view, strategies and contributions can be relevant to consensually define interventions tailored to the real needs of parents (Williams et al., 2018).

2.3. Breastfeeding

Apart from physiological benefits for infants and mothers, breastfeeding also helps the mother to better face the stress of hospitalization, connect emotionally and participate in the care of the baby, and facilitate the construction of the maternal role. Even though to date viral load has rarely been isolated in breast milk, international guidelines advise that breastfeeding should continue, whether or not the lactating parent has SARS-CoV-2 infection, with appropriate precautions (Davanzo et al., 2020; WHO, 2020). Furthermore, there are many ways to provide mothers their own breast milk if they don't want to take risks, such as pasteurizing their own milk, or throwing the milk away while keeping breastfeeding (with extraction) for 14 days until contagion becomes very unlikely.

Pasteurized donor human milk (milk bank) is a crucial resource for intensive care infants whose mothers are temporarily unable to provide their own milk. Interruption of feeding with donor human milk, particularly in very premature stages, increases the risk of necrotizing enterocolitis in these children. Hence it is considered a major health intervention in these patients (de Halleux et al., 2017).

However, in the current situation, most potential donors have restrictions on mobility, and given the shortage of reserves, the milk bank should be prioritized for preterm infants younger than 30 weeks of gestational age or weighing < 1500 g at birth whose mother cannot provide her own milk (Furlow, 2020).

2.4. Communication and collaboration with the families

Nurses are the key point in the communication and collaboration process with the parents and they are in an ideal position to explore their anxieties, fears, and difficulties in order to achieve empowerment and competence in their infant's care (Cleveland, 2008). Parents of admitted infants are extremely concerned about their child's separation, their caregiving, and the difficulties in sharing emotions with other family members.

From their autonomous role, nurses face the individualized care of the high-risk neonate and the family as an inseparable dyad (Griffin, 2006). With continuous presence and empathetic communication, nurses progressively establish a collaborative relationship with the parents to enhance parent-infant bonding and promote competency and empowerment in the infant's care (Reis et al., 2010). These elements are determinants for the cognitive, psycho-emotional, and physical development of neonates and ultimately for the health outcomes of the infant-parent twosome (Craig et al., 2015).

Stress factors have intensified during the pandemic. Sharing information openly and maintaining effective and empathetic communication based on respect and mutual trust are fundamental tools that nurses use to cushion parental stress and to facilitate parents' participation in the care of their newborn (Reis et al., 2010). Restrictions on the presence of parents in the NUs limits the encounters of interaction and communication with nurses, while a lack of effective communication and expectations regarding neonatal care inhibits negotiation between the nurse and parents on how to implement the FCC (Corlett and Twycross, 2006), (Lake et al., 2020).

The isolation of the infant with suspicion or confirmation of SARS-CoV-2 in special rooms and the use of protective equipment have created a physical barrier between professionals, the infant, and parents. In addition, interaction with the infant and the parents has been restricted to reduce the contagion, resulting in physical and emotional distance. Moreover, to the direct impact this can have on the quality of baby care, it also hinders effective communication and collaboration with families, contributing to a feeling of low-quality caregiving and increased moral distress.

In this context, it is necessary to set the fear aside and optimize the quality of the interaction and communication between the nurse and the family. When wearing a gown and mask, nonverbal communication elements take on added importance, including eye contact and the modulation of the tone of voice. The current pandemic has revealed that nurses' communication training and relational skills should be improved in order to respond to parents' feelings with empathy and cultural competence (Bry et al., 2016).

While no technology can replace face-to-face communication, telehealth can be a valuable complement. Nurses perceive the use of webcam systems to facilitate communication and interaction with parents positively; telehealth also enhances family education through schooling of parents and workshops, and neonatal follow-up after discharge (Hoffman et al., 2019). Telemedicine provides the opportunity to isolated parents to visit their child remotely and reduce their anxiety and stress (Epstein et al., 2017).

Due to isolation recommendations and restrictions on entry in the NU, end-of-life caregiving has often involved insufficient empathetic and compassionate care. Therapeutic communication is a determining tool to accompany the family and implement palliative care. Once risk for other admitted neonates is minimized, both parents should at least be allowed to say face-to-face goodbyes to their child to help the grieving process (Kenner et al., 2015).

Finally, affected parents have lost socialization with their partners and peer support. Therefore, more than ever it is necessary to support them in their day-to-day lives and also offer them specialized psychological support (Williams et al., 2018). Nurses need to work collaboratively with social workers and psychologists, since they can play an important role in identifying and supporting families at social risk and with limited financial resources.

3. Moral distress and consequences on health professionals

Nurses are central players in the provision of quality health care. In this pandemic, factors such as a shortage of medical resources, overwork with long shifts, restrictions on socialization, and the pain of losing infected colleagues as well as the fear to infect their family members have contributed to increasing stress in nurses. Likewise, they have experienced considerable stress in coping with this pandemic with heroic professionalism. In addition to managing the fear of contagion, they have been urged to take on ever-changing responsibilities, according to technical reports. Some of these emergency measures have forced nurses to sacrifice practices closely identified with the humanistic and compassionate profession of nursing. This situation has had a significant emotional cost on nurses which has contributed to increasing their moral distress, when they have been unable to act according to their personal and professional values concerning family care because of limitations beyond their control. In this situation, to recognize and mitigate moral distress are necessary. Well-designed actions that encourage stress reduction, provide psychological support and promote resilience can help make the day-to-day activities in neonatal units less stressful. Strategies such as identification of the most vulnerable professionals as well as the senior experts, debriefing together about ethics in clinical cases, effective communication within the team, accurate guidelines to be followed, and flexibility in nurse leadership to help nurses carry out their work effectively should help to deal with such difficulties and provide moral comfort (Prentice et al.,

Table 1
Difficulties and conflicts, and strategies proposed to remedy them.

DIFFICULTIES AND CONFLICTS		POTENTIAL STRATEGIES AND SOLUTIONS
Limiting parents' entry impedes their role as primary caregivers	**Organization and workflow**	24-h entry should not be restricted, providing measures to prevent contagion
Entry is allowed only for one progenitor		Facilitate stay of both parents even if for short periods
Scant support from family associations		Facilitate contact with associations by audio-visual means
Absence of peer support		Contact other parents telematically
Difficulties in finding spaces to prevent mother-child separation		Scout out imaginative strategies with managers to facilitate individual rooms
Unforeseen exceptional situations will appear		Consider complex admissions, end-of-life situations, and family difficulties
Scant presence of social workers due to mobility restrictions		Social workers can carry out their work with telehealth tools
While parents await covid test results they are separated from the child		Give preference to parents for testing, to reduce separation time
Parents do not participate in the joint contingency plans		Let parents make proposals and be part of the solution
Restrictions on early discharge programs from the neonatal units		Encourage early discharge accompanied by changes in professional workflow, with strict telematics surveillance after more thorough training of parents
Universal rules for all admitted infants		Individualize care and decisions according to the status of the mother and infant
Lack of agreement with parents on the delivery plan	**Perinatal care**	Listen to parents' wishes and entertain the possibility of fulfilling them, minimizing the risk of contagion
Partner accompaniment not allowed		Allow accompaniment with preventive measures
Skin-to-skin contact and baby's sucking at the breast is not allowed		Allow contact with precautions to prevent transmission
Lack of communication between the maternity area and neonatal unit		Facilitate a communication strategy between the two areas to make parents feel calmer and more reassured
Difficulties in parent care empowerment	**Neonatal care**	Facilitate extended parental stay and effective communication
Restrictions on skin-to-skin care to avoid transmission of the virus		Allow skin-to-skin care with recommended measures to prevent transmission of the virus
Exaggerated vigilance of parents to ensure compliance with isolation measures, but without proper training		Help parents adhere to contingency plans through training and by explaining the rules with empathy
Discouraged breastfeeding due to fear of contagion	**Breast-feeding**	Encourage breastfeeding based on scientific evidence
Own milk discouraged		No institution discourages it. Use own pasteurized milk
Decrease in milk bank storage		Increase donations by means of telephone recruitment, home blood tests and milk collection, assuring supplies for most vulnerable infants
Stress because contingency plans don't fit parents' needs	**Communication**	Let parents participate in contingency plans
Communication difficulties if parents are unable to enter the unit		Make it easier to use audio-visual media and technology to see the child and communicate with health workers
Loss of nonverbal communication because of masks		Use strategies that supplant this lack of nonverbal communication: tone of voice, eye contact, etc.
Communication difficulties with minority groups		Recognize the difficulty and communicate with cultural competence
Fear that parents are the virus transmitters		Stereotypes should be avoided and adherence to strict preventive approaches is desirable
Stress due to frequent changes in workflow	**Moral distress of professionals**	Horizontal leadership and effective communication to achieve flexibility
Stress from risk of contagion due to shortage of medical resources		Strictly follow the recommendations of protection and isolation. Demand protective equipment
Overwork with long shifts		Announce when physical and psychological exhaustion comes to facilitate release. Put self-care measures in place
Restrictions on socialization		Extend social media sources with family and colleagues
Pain of losing colleagues or becoming infected and possibly infecting families		Ask for ongoing psychological support and promote strategies to increase resilience
Absence of psychologists on the teams to help parents and health care staff		Include psychologists in the neonatal unit teams

2018).

4. Challenges from lessons learned

Neonatal care during the covid-19 pandemic has retreated several decades in time and NUs have seen many of their pillars wobble. However, infants and their parents will continue become infected and nurses will need to face difficulties in maintaining the excellence of the FCC. We have a great opportunity to take advantage of the current challenging situation and encourage healthcare providers to reflect on valuable strategies to develop well-balanced decisions to overcome the risk and fear of contagion and preserve the neonatal care framework based on the promotion of neurological development through the FCC (Table 1). In this sense, quantitative and qualitative research focused on understanding the perceptions of nurses as leaders in providing care, as well as the concerns, emotions, and attitudes of families during this pandemic, can lead to increased knowledge to contend with future outbreaks (Prentice et al., 2018).

Author contributions

M.T. Montes and N. Herranz-Rubia contributed equally to the manuscript and participated in the conception, writing, and reviewing of the manuscript. The authors included in the NeNe Nursing Group participated in the writing and reviewing of the manuscript.

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Declaration of competing interest

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References

Alzamora, M.C., Paredes, T., Caceres, D., Webb, C.M., Valdez, L.M., La Rosa, M., 2020. Severe COVID-19 during pregnancy and possible vertical transmission. Am. J. Perinatol. https://doi.org/10.1055/s-0040-1710050.

Anderzen-Carlsson, A., Lamy, Z.C., Tingvall, M., Eriksson, M., 2014. Parental experiences of providing skin-to-skin care to their newborn infant–part 2: a qualitative meta-synthesis. Int. J. Qual. Stud. Health Well-Being 9, 24907. https://doi.org/10.3402/qhw.v9.24907.

Arnaez, J., Montes, M.T., Herranz-Rubia, N., Garcia-Alix, A., 2020. The impact of the current SARS-CoV-2 pandemic on neonatal care. Front. Pediatr. 8, 247. https://doi.org/10.3389/fped.2020.00247.

Baley, J., Committee On, F., Newborn, 2015. Skin-to-Skin care for term and preterm infants in the neonatal ICU. Pediatrics 136 (3), 596–599. https://doi.org/10.1542/peds.2015-2335.

Bry, K., Bry, M., Hentz, E., Karlsson, H.L., Kyllonen, H., Lundkvist, M., Wigert, H., 2016. Communication skills training enhances nurses' ability to respond with empathy to parents' emotions in a neonatal intensive care unit. Acta Paediatr. 105 (4), 397–406. https://doi.org/10.1111/apa.13295.

Chawla, D., Chirla, D., Dalwai, S., Deorari, A.K., Ganatra, A., Gandhi, A., Kabra, N.S., Kumar, P., Mittal, P., Parekh, B.J., Sankar, M.J., Singhal, T., Sivanandan, S., Tank, P., Federation Of, O., Gynecological Societies Of India, N. N. F. O. I., & Indian Academy Of, P, 2020. Perinatal-neonatal management of COVID-19 infection - guidelines of the federation of obstetric and gynecological societies of India (FOGSI), national neonatology forum of India (NNF), and Indian academy of pediatrics (IAP). Indian pediatr. https://www.ncbi.nlm.nih.gov/pubmed/32238615.

Chen, D., Yang, H., Cao, Y., Cheng, W., Duan, T., Fan, C., Fan, S., Feng, L., Gao, Y., He, F., He, J., Hu, Y., Jiang, Y., Li, Y., Li, J., Li, X., Li, X., Lin, K., Liu, C., Liu, J., Liu, X., Pan, X., Pang, Q., Pu, M., Qi, H., Shi, C., Sun, Y., Sun, J., Wang, X., Wang, Y., Wang, Z., Wang, Z., Wang, C., Wu, S., Xin, H., Yan, J., Zhao, Y., Zheng, J., Zhou, Y., Zou, L., Zeng, Y., Zhang, Y., Guan, X., Eppes, C.S., Fox, K., Belfort, M.A., 2020. Expert consensus for managing pregnant women and neonates born to mothers with suspected or confirmed novel coronavirus (COVID-19) infection. Int. J. Gynaecol. Obstet. https://doi.org/10.1002/ijgo.13146.

Cleveland, L.M., 2008. Parenting in the neonatal intensive care unit. J. Obstet. Gynecol. Neonatal Nurs. 37 (6), 666–691. https://doi.org/10.1111/j.1552-6909.2008.00288.x.

Corlett, J., Twycross, A., 2006. Negotiation of parental roles within family-centred care: a review of the research. J. Clin. Nurs. 15 (10), 1308–1316. https://doi.org/10.1111/j.1365-2702.2006.01407.x.

Craig, J.W., Glick, C., Phillips, R., Hall, S.L., Smith, J., Browne, J., 2015. Recommendations for involving the family in developmental care of the NICU baby. J. Perinatol. 35 (Suppl. 1), S5–S8. https://doi.org/10.1038/jp.2015.142.

Davanzo, R., Moro, G., Sandri, F., Agosti, M., Moretti, C., Mosca, F., 2020. 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., e13010. https://doi.org/10.1111/mcn.13010.

de Halleux, V., Pieltain, C., Senterre, T., Rigo, J., 2017. Use of donor milk in the neonatal intensive care unit. Semin. Fetal Neonatal Med. 22 (1), 23–29. https://doi.org/10.1016/j.siny.2016.08.003.

Dong, L., Tian, J., He, S., Zhu, C., Wang, J., Liu, C., Yang, J., 2020. Possible vertical transmission of SARS-CoV-2 from an infected mother to her newborn. J. Am. Med. Assoc. https://doi.org/10.1001/jama.2020.4621.

Egloff, C., Vauloup-Fellous, C., Picone, O., Mandelbrot, L., Roques, P., 2020. Evidence and possible mechanisms of rare maternal-fetal transmission of SARS-CoV-2. J. Clin. Virol. 104447. https://doi.org/10.1016/j.jcv.2020.104447.

Epstein, E.G., Arechiga, J., Dancy, M., Simon, J., Wilson, D., Alhusen, J.L., 2017. Integrative review of technology to support communication with parents of infants in the NICU. J. Obstet. Gynecol. Neonatal Nurs. 46 (3), 357–366. https://doi.org/10.1016/j.jogn.2016.11.019.

Furlow, B., 2020. US NICUs and donor milk banks brace for COVID-19. Lancet Child Adolesc. Health. https://doi.org/10.1016/S2352-4642(20)30103-6.

Gooding, J.S., Cooper, L.G., Blaine, A.I., Franck, L.S., Howse, J.L., Berns, S.D., 2011. Family support and family-centered care in the neonatal intensive care unit: origins, advances, impact. Semin. Perinatol. 35 (1), 20–28. https://doi.org/10.1053/j.semperi.2010.10.004.

Griffin, T., 2006. Family-centered care in the NICU. J. Perinat. Neonatal Nurs. 20 (1), 98–102. https://doi.org/10.1097/00005237-200601000-00029.

Hoffman, A.M., Lapcharoensap, W., Huynh, T., Lund, K., 2019. Historical perspectives: telemedicine in neonatology. NeoReviews 20 (3), e113–e123. https://doi.org/10.1542/neo.20-3-e113.

Kenner, C., Press, J., Ryan, D., 2015. Recommendations for palliative and bereavement care in the NICU: a family-centered integrative approach. J. Perinatol. 35 (Suppl. 1), S19–S23. https://doi.org/10.1038/jp.2015.145.

Lake, E.T., Smith, J.G., Staiger, D.O., Hatfield, L.A., Cramer, E., Kalisch, B.J., Rogowski, J.A., 2020. Parent satisfaction with care and treatment relates to missed nursing care in neonatal intensive care units. Front. Pediatr. 8, 74. https://doi.org/10.3389/fped.2020.00074.

Lu, Q., Shi, Y., 2020. Coronavirus disease (COVID-19) and neonate: what neonatologist need to know. J. Med. Virol. https://doi.org/10.1002/jmv.25740.

Lu, X., Zhang, L., Du, H., Zhang, J., Li, Y.Y., Qu, J., Zhang, W., Wang, Y., Bao, S., Li, Y., Wu, C., Liu, H., Liu, D., Shao, J., Peng, X., Yang, Y., Liu, Z., Xiang, Y., Zhang, F., Silva, R.M., Pinkerton, K.E., Shen, K., Xiao, H., Xu, S., Wong, G.W.K., & Chinese Pediatric Novel Coronavirus Study, T, 2020. SARS-CoV-2 infection in children. N. Engl. J. Med. https://doi.org/10.1056/NEJMc2005073.

Mimouni, F., Lakshminrusimha, S., Pearlman, S.A., Raju, T., Gallagher, P.G., Mendlovic, J., 2020. Perinatal aspects on the covid-19 pandemic: a practical resource for perinatal-neonatal specialists. J. Perinatol. https://doi.org/10.1038/s41372-020-0665-6.

O'Brien, K., Robson, K., Bracht, M., Cruz, M., Lui, K., Alvaro, R., da Silva, O., Monterrosa, L., Narvey, M., Ng, E., Soraisham, A., Ye, X.Y., Mirea, L., Tarnow-Mordi, W., Lee, S.K., Group, F.I.S., Board, F.I.P.A., 2018. Effectiveness of Family Integrated Care in neonatal intensive care units on infant and parent outcomes: a multicentre, multinational, cluster-randomised controlled trial. Lancet Child Adolesc. Health 2 (4), 245–254. https://doi.org/10.1016/S2352-4642(18)30039-7.

Prentice, T.M., Gillam, L., Davis, P.G., Janvier, A., 2018. Always a burden? Healthcare providers' perspectives on moral distress. Arch. Dis. Child. Fetal Neonatal Ed. 103 (5), F441–F445. https://doi.org/10.1136/archdischild-2017-313539.

Reis, M.D., Rempel, G.R., Scott, S.D., Brady-Fryer, B.A., Van Aerde, J., 2010. Developing nurse/parent relationships in the NICU through negotiated partnership. J. Obstet. Gynecol. Neonatal Nurs. 39 (6), 675–683. https://doi.org/10.1111/j.1552-6909.2010.01189.x.

Rice, D., Barone Jr., S., 2000. Critical periods of vulnerability for the developing nervous system: evidence from humans and animal models. Environ. Health Perspect. 108 (Suppl. 3), 511–533. https://doi.org/10.1289/ehp.00108s3511.

Schwartz, D.A., 2020. An analysis of 38 pregnant women with COVID-19, their newborn infants, and maternal-fetal transmission of SARS-CoV-2: maternal coronavirus infections and pregnancy outcomes. Arch. Pathol. Lab Med. https://doi.org/10.5858/arpa.2020-0901-SA.

Wang, J., Qi, H., Bao, L., Li, F., Shi, Y., National Clinical Research Center for Child, H., Disorders, & Pediatric Committee of Medical Association of Chinese People's Liberation, A, 2020. A contingency plan for the management of the 2019 novel coronavirus outbreak in neonatal intensive care units. Lancet Child Adolesc. Health 4 (4), 258–259. https://doi.org/10.1016/S2352-4642(20)30040-7.

Wang, L., Shi, Y., Xiao, T., Fu, J., Feng, X., Mu, D., Feng, Q., Hei, M., Hu, X., Li, Z., Lu, G., Tang, Z., Wang, Y., Wang, C., Xia, S., Xu, J., Yang, Y., Yang, J., Zeng, M., Zheng, J., Zhou, W., Zhou, X., Zhou, X., Du, L., Lee, S.K., Zhou, W., Working Committee on, P., Neonatal Management for the, P., & Control of the Novel Coronavirus, I, 2020. 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. 8 (3), 47. https://doi.org/10.21037/atm.2020.02.20.

WHO, 2020. Q&A on COVID-19, pregnancy, childbirth and breastfeeding. May 30. Available at: https://www.who.int/docs/default-source/maternal-health/faqs-breastfeeding-and-covid-19.pdf?sfvrsn=d839e6c0_5.

Williams, K.G., Patel, K.T., Stausmire, J.M., Bridges, C., Mathis, M.W., Barkin, J.L., 2018. The neonatal intensive care unit: environmental stressors and supports. Int. J. Environ. Res. Publ. Health 15 (1). https://doi.org/10.3390/ijerph15010060.

Yu, N., Li, W., Kang, Q., Xiong, Z., Wang, S., Lin, X., Liu, Y., Xiao, J., Liu, H., Deng, D., Chen, S., Zeng, W., Feng, L., Wu, J., 2020. Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID-19 in Wuhan, China: a retrospective, single-centre, descriptive study. Lancet Infect. Dis. 20 (5), 559–564. https://doi.org/10.1016/S1473-3099(20)30176-6.

Zeng, L., Xia, S., Yuan, W., Yan, K., Xiao, F., Shao, J., Zhou, W., 2020. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in wuhan, China. JAMA Pediatr. https://doi.org/10.1001/jamapediatrics.2020.0878.