


# Covid-19 beyond the disease: effects of the pandemic on the neonatal intensive care in the light of Nightingale's environmental theory


A covid-19 para além da doença: efeitos da pandemia no espaço intensivista neonatal à luz da teoria ambientalista de Nightingale

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## Abstract

The strict safety measures adopted in hospital environments due to the pandemic have also been extended to Neonatal Intensive Care Units (NICU). By means of a systematic observation and based on Nightingale's Environmental Theory, this article sought to unveil the organizational and structural changes in the NICU of a public hospital in the countryside of Bahia. Results indicate an interconnection between physical, psychological, and social environments, which were committed to the communication and relationship between family, newborn, and team, thus presenting a sensitive bias of the restrictive consequences of covid-19. These findings highlight the paradox between ensuring security and preventing informational and bond-facilitator practices that involve the aforementioned triad. From this context emerge new communication strategies leading professionals to reinvent themselves, and to dare in communication by remote resources not used before, emphasizing the use of digital technologies. **Keywords:** Neonatal Intensive Care Unit; Relatives; Communication; Health Technologies.

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## Resumo

As rigorosas medidas de segurança adotadas pelos hospitais, em decorrência da pandemia, estenderam-se também às Unidades de Terapia Intensiva Neonatais (UTIN). Este artigo desvela, por meio de observação sistemática, as mudanças organizacionais e estruturais ancoradas na Teoria Ambientalista de Nightingale que ocorreram na UTIN de um hospital público do interior da Bahia. Observou-se a interconexão entre os Ambientes Físico, Psicológico e Social, porém, com comprometimento na comunicação e relação entre família, neonato e equipe, apresentando um viés sensível das consequências restritivas da covid-19. Salienta-se o paradoxo entre zelar pela segurança e o impedimento das práticas informativas e facilitadoras de vínculos que envolvem o trinômio mencionado. Contudo, novas estratégias emergem desse contexto, levando os profissionais a se reinventarem e ousarem na comunicação, por meio de recursos remotos antes não utilizados, destacando as tecnologias digitais.

**Palavras-chaves:** Unidade de Terapia Intensiva Neonatal; Familiares; Comunicação; Tecnologias em Saúde.

## Introduction

The new coronavirus that causes covid-19 disease has caused several changes on behaviors, economies, and how people's health is promoted worldwide. It is a highly contagious disease, and social isolation has been one of the safest means to manage the disease (PAHO, 2020).

Social isolation provides for physical distancing between the individual and their network of contacts. The restrictions resulting from this measure lead to disorders in interaction, communication, and affections, which culminate in psychological distress. In addition to this conduct of disease prevention, other individual (hand washing and use of masks), environmental (routine cleaning of surfaces), and community conducts (restriction or prohibition of operation of spaces that may promote people crowding) had to be adopted and / or strengthened by recommendation of public health policies as non-pharmacological intervention (Malta et al., 2020).

In hospital settings, for example, strict conducts have been taken to prevent the virus spread. Some of the administrative measures modify work processes and flows, increasing the teams' use of personal protective equipment (PPE), drafting clinical guidelines related to preventive measures for patients with suspected covid-19, among others (Wong et al., 2020). The goal is to ensure quality care to hospitalized patients in any units, through a care schedule consistent with individual and not fragmented needs, emphasizing the importance of innovative and integrative care practices (Meira; Oliveira; Santos, 2021).

At the Neonatal Intensive Care Unit (NICU) the control of neonatal infections is part of a group of systematized strategies and practices aimed to prevent infections. Although hand hygiene procedures, protocols for entering and staying in the unit, for example, were already rigorous before the pandemic (Góes et al., 2020; Jurema, Cavalcante, and Buges, 2021), healthcare for newborns in this pandemic context underwent major adjustments, given the immunological immaturity of newborns. Technical note n° 6/2020 of the Ministry of Health (Brazil, 2020), in partnership with the Brazilian Society of Pediatrics (*Sociedade Brasileira de Pediatria*, SBP) supports the

need for social restrictive measures as an important element of control in the context of infection by the new coronavirus.

Although restrictions relevant to the pandemic prevention and control are extremely important in the current scenario, it is worth having in mind that these measures go beyond the flow of the service organization, and require the local health team to develop new care practices that ensure the quality of care (Morsch et al., 2020).

The study by Fonseca et al. (2020), conducted in a NICU, suggests that the institution's and care sector's elements of structural organization provide humanized quality care to the newborn and their parents. In this context, Negro et al. (2020) emphasize that healthcare quality is related to the quality of interaction between users and professionals of the multiprofessional team, and the users' satisfaction is directly linked to the health service conditions.

Araújo et al. (2021) reiterate this statement pointing out that clear and effective communication between the NICU health team and parents about the general health status of their children, as well as the quality care services that babies have received, is an important factor to generate satisfaction. Considering the integrated sense part of the NICU operation dynamics, and which is part of comprehensive health practices emerging from the relationship between the team and the family, care should not be limited to the newborns, rather, it should also consider the need for parents' interaction, especially in knowledge building (Souza; Ferreira, 2010).

However, we are currently experiencing a moment of hard integration of the triad parents, babies, and the multiprofessional team. That is so because of the pandemic times that demand measures of social distancing and isolation, which implies several restrictions on the hospital environment (Chaves et al., 2021).

Thus, this article unveils the organizational and structural changes that occurred at the NICU of a public hospital in the interior of Bahia as a result of the ongoing pandemic. The discussion is based on Florence Nightingale's Environmentalist

Theory, which focuses on the individuals' healthcare environment, and extends the concept of environment considering both emotional and social aspects (Levachof; Martins; Barros, 2021). Tavares et al. (2020) state that the first aspect, or emotional environment, may be affected in a space that provides multiple experiences. The social environment, in turn, would be affected through means of interrelationships between people involved in the physical care environment.

It is worth noting that the concern with environment in the context of care came about more strongly in mid-nineteenth century, when nursing was recognized as a profession. This zeal currently echoes in humanized care based on managing the environment in which patient is inserted. For Nightingale, this control comprises aspects of environmental hygiene and demand for care devices, but considers balancing them with what is around the patient, making them a subject of relationship and interaction with the environment in which they are inserted (Medeiros; Enders; Lira, 2015).

For Florence's Environmentalist Theory, a balanced place concurs with the restoration of the individual's health by means of general and specific care. Such care, therefore, should be understood in its entirety considering external factors that interact with the individual, thus giving rise to favorable conditions for recovery (Levachof; Martins; Barros, 2021).

## Methods

This is an observational study of qualitative and descriptive approach. The technique for data collection was systematic observation, following a predefined plan. The advantage of this technique is the possibility of obtaining a variety of events, and of understanding typical behaviors based on information and different phenomena. For the same author, observation is nothing but the use of senses to acquire routine information; however, it is used as a scientific method when it serves a formulated research objective, and is systematically planned. (GIL, 2008)

The idea of systematizing an observation to generate this study is bound to a larger study of operational research based on routine changes at the NICU of a public hospital in the interior of Bahia, considering the critical scenario of the new coronavirus pandemic.

The hospital where the study was conducted is a public administration hospital, providing medium and high-complexity medical and hospital care to spontaneous and referenced demand from other municipalities. Although it is a general hospital, it does not perform obstetric procedures such as deliveries, and the NICU is intended for external patients. These characteristics make it a suitable place to carry out the study, as there is higher probability of having families from other regions affected by the covid-19 restrictive measures (the researchers' workplace). The NICU sector has 10 beds, a nursing station, a prescription room, a medicine preparation room with a small storeroom, a reception room, a pantry, a breast milking room, three rest rooms for the multiprofessional team, two toilets/cloakrooms and a purge.

An observational script was developed as a data collection instrument (Chart 1).

The script was divided into the previously categorized environments, according to Nightingale's Environmentalist Theory. Physical Environment is

understood as the physical and material space that is changed by the way caregivers are organized. The Psychological Environment is related to the stress generated by the care environment itself, and may be associated to some measure that stresses the caregivers' actions. The Social Environment is related to a change in behavior of what is external, and that may interfere on those being cared for (Levachof; Martins; Barros, 2021; Peres et al., 2021).

The observers' eyes were directed at the implications of covid-19 within these environments, which are modulated by on-site care in a participatory and collaborative manner to the triad - team, neonate, and family. The sector's employees were aware of the operational research and, at the time, of the observations procedure, as well as the research objectives.

Three researchers, also working in the hospital, carried out the observations at different times, during daytime period, for a maximum of 4 hours a day, from October 4 to 30, 2020. An observation scale was previously prepared to organize visits to the sector, and presented to the NICU coordination as it is a place of restricted circulation.

Operational research was approved by local coordination and by the hospital's Permanent Education Center. This research was careful not to disclose data that allowed identifying the hospital or its employees, safeguarding their integrity and dignity.

**Chart 1 - Research data collection instrument**

PHYSICAL ENVIRONMENT	PSYCHOLOGICAL ENVIRONMENT	SOCIAL ENVIRONMENT
Is there a change in the Physical Environment?	Is there a change in the Psychological Environment?	Is there a change in the Social Environment?
( ) Yes ( ) No	( ) Yes ( ) No	( ) Yes ( ) No
Please specify:	Please specify:	Please specify:

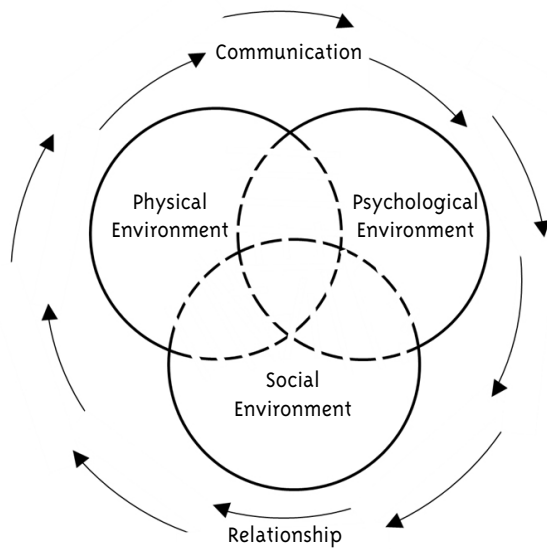
## Results

Results were organized into three categories coinciding with Nightingale's Environmentalist perspective, and observed in the light of the covid-19 effects: Physical Environment;

Psychological Environment; Social Environment (Figure 1).

Each category of this study entails as results the main points observed and that emerged from the field during data collection regarding the Environments studied (Chart 2).

**Figure 1 - Hologram of interconnection between the NICU environments**



Source: prepared by the author, based on Nightingale (1859).

Some structural changes happened in the Physical Environment to better meet the possible demand related to the diagnosis of some neonate with covid-19. A room, previously with 3 boxes, used for milking breast milk had to be adapted to receive a respiratory isolation bed for neonates, and now has 9 common beds and 1 isolation bed. The sector's nursing coordination room, with only 1 box, also needed to be adapted to accommodate the mothers who milk.

It is noteworthy the control of servers flow between environments in the sector; reinforcement of non-circulation through other spaces of the hospital; incrementation regarding the use, disposal, and hygiene of PPE; intensification of hygiene of incubators, surfaces in general, especially the hands; non-sharing of cutlery, cups, towels, and/or food with other people in the sector's pantry.

**Chart 2 - Main observations of the NICU Environments**

PHYSICAL ENVIRONMENT	PSYCHOLOGICAL ENVIRONMENT	SOCIAL ENVIRONMENT
•Environment that intensified sanitization of surfaces in general;	•Environment that required constant use of PPE;	•Site that restricted NICU stay to 1 h/day;
•Site that required increased use of PPE;	•Environment that increased biosecurity control at the parents' entrance;	•Environment that restricted access by the extended family;
•Environment that began to have access restricted to parents;	•Environment that was affected by temporary staff reduction;	•Environment that experienced less dedication to demands for interaction;
•An environment that temporarily reduced the number of beds;	•Site that possibly caused an work overload.*	•Environment that reinvented itself in forms of communicating with family members.
•Environment that adapted space for milking breast milk to create a bed for respiratory isolation.		

\*stress-generating assumption that emerged from the field considering the observations.

Regarding the Psychological Environment, the consistent use of PPE by the sector's employees and parents who were present during the observational period was observed. There was a temporary staff downsizing, which led to smaller number of beds, due to the absence of staff members with

flu-like symptoms that suggested or confirmed the covid-19. Others still needed to have their activities rescheduled, because they fit into a risk group.

Regarding Social Environment, and which could be related to the Psychological Environment, there were changes in the flow of visits and permanence of

family members at the NICU, among which stand out: permission of visits only to parents; permanence of parents in the unit reduced to 1 hour a day, with free access only to nursing mothers; and the issuing of medical reports restricted to parents or guardians. For family members who cannot be present, the use of digital technology was adopted for clinical information, and moments experienced by the babies (bath, diet, and sleep).

These results will be discussed and anchored in a set of concepts, relationships and hypotheses that design a systemic view of the phenomenon.

## Discussion

Due to the World Health Organization's (WHO) consideration of the pandemic character of covid-19, public and private institutions began to adopt control measures based on what was known about the disease. The moment requires an integral view that meets all the demands in the face of a disease that is constantly being studied. The demands regarding prevention measures, especially those of isolation and further reduction of people's circulation have become measures oriented by authorities and, thus, adopted by the health facility object of the study (PAHO, 2020).

The concept of Environment takes into consideration the place where patient and the family are for the provision of care, considering the physical, social and psychological components, which should be understood in an interrelated way with caregivers (Medeiros; Enders; Lira, 2015).

In view of the observations above, the interconnection of environments and the crossing of findings was observed, as shown in Figure 1. Corroborating what has been observed, Fernandes and Silva (2020) say that, as Florence already pointed out, the environment influences general health status of the individual, by understanding that physical stress could affect the psychological stress suggested, also, by changes on the social sphere.

In response to the surveillance actions implemented by means of measures to prevent the covid-19, the active servers became more rigorous, especially regarding hand washing and the systematic use of PPE. Silva et al. (2020) add that this care

should be developed in partnership with parents. In the observations of this study, such conducts were not only extended to the parents who began to live the daily routine of hospitalization with increased biosafety requirements, but in some way may have created an obstacle for the construction of a bond.

The fact that there is a pantry, bathroom and comfort available in the sector is a facilitator for the non-circulation in other environments of the hospital, leading to compliance with the guidelines provided, and collaborating to reduce risks of contamination and dissemination of the virus, besides reinforcing Nightingale's perspective regarding the Physical Environment (Barboza et al., 2020).

The need for some team members to be away from work activities may have brought greater physical and emotional burden to collaborators, since the restrictive measures of covid-19 imply, in its essence, suffering to the team providing care (Benedetto; Moreto; Vachi, 2020). In addition, it leads management to attrition regarding the (re) adaptation of duty schedules for the purpose of optimizing care. With the absence of employees, some inpatient beds should be temporarily blocked, thus reducing the supply of this specialized service to the population.

Given this scenario and the multiple facets that the multidisciplinary team assumes within the unit with their instrumental tasks, whether by volume or complexity, the possibility of echoing on the relationship between health team and family may lead to the disregard of phenomena involving the psycho-affective and informative/educational status to family members (Duarte et al., 2020). The study by Campos et al. (2017) points out the need to face stressors, such as work overload and even conflicts related to communication, in order to seek a better interplay among the team and, consequently, the relationship with users.

Thus, in addition to the environmental interrelation between the physical space and its restrictive requirements of social character, one can notice the repercussions on the psychological environment of both the professionals and the families involved. According to Fernandes and Silva (2020), the environmentalist theory encompasses a set of external conditions and influences that may

prevent, suppress, or contribute to health, disease, and even death in the physical, psychological, social, and spiritual dimensions. This theoretical approach even coincides with the concept of health defined by the WHO, as it also indicates that the aforementioned dimensions affect the individual's health.

By measuring the maximum risk of exposure for the extended family, newborns, and the local healthcare team, it was decided to suspend the visitation of any family members other than the parents, unless the parents were unable to be present. In this case, another responsible family member assumes the parental functions (visiting the newborn and receiving medical reports). Silva et al. (2020) showed that the absence of grandparents and other family members negatively affects the construction of bonds between the binomial baby and extended family, and in the possibility of qualified listening by the professionals with potential of direct intervention to these members (and especially psychology).

The restrictive measures related to the family access to the NICU enable some control related to the exposure to the virus in the hospital environment. This may corroborate with a greater sense of safety to professionals working in the hospital, and to the babies who are under intensive care. However, it should be emphasized that these measures may hardly cross the achievements related to practices that facilitate bonding and neonates' neurosensory protection, increasing the challenge posed to multiprofessional teams in providing healthcare (Morsch, 2020).

In this context, some parents cannot be present in the unit. Some because they comply with quarantine guidelines, due to signs and symptoms suggestive or confirmed of covid-19, and others because they live in neighboring regions and do not have socioeconomic conditions to stay in the city.

These limitations entail numerous challenges to the binomial family and team: it awakens in professionals the need to organize strategies that influence new communication practices, seeking to ensure, as far as possible, the service humanization by supporting family members, not only at emotional, but also at informative level (Dalmolin et al., 2016).

With this evident need, it was possible to realize the uniqueness of communication in all of the NICU environments. The establishment of clear

communication to transmit information about what has happened with the sick neonate brings the multiprofessional team closer to parents. This tends to enhance the sense of security about the care that is being offered in the hospital unit, which can echo in increased hope for recovery, and even the future life of the neonate (Rolim et al., 2017).

In this regard, the following actions were introduced to promote approximation with absent families: transmission of digital media-mediated medical reports (phone call), and the use of digital media to foster affective bonding (sending photos of the babies to the families, and audios received from them to the babies).

These actions try to relieve, to some extent, the tension caused by the physical distance added to the anguish resulting from the constant expectation of news about the baby's health status. However, it may not be effective in ensuring parents' understanding of what is going on. Perhaps it is necessary to take advantage of the technological potentialities to innovate in communication strategies seeking to advance in the team-family relationship and, thus, also incorporate it as an interventional proposal (Dalmolin et al., 2016; Balbino et al., 2020).

Miranda et al. (2019) point out that hypermedia, as an intervention for health education and promotion, are being extensively developed, validated, and used, aiming at better communication between health team, family, and user. In addition, they stimulate and strengthen the target audience, providing tools to develop strategies of coping, coexistence, and care.

This possibility inside the NICU becomes especially important, since isolation reduces the caregivers' interaction process with the team and, consequently, partnership in care. It also enables the approximation between the multiprofessional team and the parents, meeting the need for understanding about the process of hospitalization of their child, which also promotes greater security about care provided, and contributes to the reduction of stress (ORR et al., 2017; Rocha; Dittz, 2021).

Technological innovation with greater exploration of the use of digital media, for health information and communication with family members, may be a good strategy for educational practices in the pandemic scenario. Communication

with caregivers is one of the most valued aspects of care at any level of care (Negro et al., 2020).

## Conclusion

This study allowed unveiling the repercussions of covid-19 in the NICU Environment, and the effects of the changes imposed by it on the healthcare team, the family, and the neonate. Changes that occurred in detriment to the pandemic are translated into new ways of life, and new forms of practice representing a new local culture, where communication and relationships are actively maintained through resources still to be used. The referential of Nightingale's Theory was a contribution that provided an opportunity for a clearer understanding of the interconnection between the rules imposed by the pandemic moment on the interactions in different environments of the NICU. Observations made led to the Relationship and Communication intersection point, showing a sensitive bias of the restrictive implications of covid-19, leading the multidisciplinary team to reinvent, and dare in the communication and interaction through remote resources. The new culture of use of communication technologies is observed as a fruitful field to be explored in this environment. As limitations of the study, we point out the non-depth analysis of the repercussions of changes, in a singular analysis, for the subjects of the environments. This study raises the need for new research that seeks an analysis by the affections of the team and family members based on the changes imposed by the pandemic context.

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### Authors' contributions

Machado, Rocha, Amaral, Lima, Santos, Manfroi and Medeiros collaborated in the conception, planning, writing of the article, critical review and approval of the version to be published. Machado, Rocha, Amaral, and Lima were responsible for data collection and interpretation.

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