Revista Brasileira de Enfermagem
REBEn

Pediatric Intensive Care Unit: reflection in the light of Florence Nightingale's Environmental Theory

Unidade de Terapia Intensiva Pediátrica: reflexão à luz da teoria ambientalista de Florence Nightingale

Unidad de Terapia Intensiva Pediátrica: reflexión a la luz de la teoría ambientalista de Florence Nightingale

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How to cite this article:
Cardoso SB, Oliveira ICS, Souza TV, Carmo AS. Pediatric Intensive Care Unit: reflection in the light of Florence Nightingale's Environmental Theory. Rev Bras Enferm. 2021;74(5): 20201267. https://doi.org/10.1590/0034-7167-2020-1267

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Submission: 12-21-2020 **Approval:** 03-01-2021

ABSTRACT

Objective: To reflect on the environment of the Pediatric Intensive Care Unit in the light of the Florence Nightingale's Environmental Theory. **Methods**: A theoretical-reflexive essay of constructs originated from the final work of a discipline related to the Florence Nightingale's Environmental Theory and the current legislation regarding the environment of the unit. **Results:** The elements "lighting," "noise," "colors, and varieties of objects," "location of nursing units," and "odors" follow Florence Nightingale's assumptions while the elements "ventilation," "spacing between beds," "furniture" underwent adaptations to suit the current structure of the unit. **Final considerations:** The environmental theory is a milestone in the history of nursing. Despite the transformations, such as the emergence of intensive care units and the permanence of the family in these units, the nursing team must maintain Florence Nightingale's concern about the environment influencing the health/disease process and promoting an adequate environment for the care of the child and his family.
Descriptors: Nursing Theory; Hospital Design and Construction; Pediatric Nursing; Intensive Care Units, Pediatric; Child, Hospitalized.

RESUMO

Objetivo: Refletir sobre o ambiente da Unidade de Terapia Intensiva Pediátrica à luz da teoria ambientalista de Florence Nightingale. **Métodos:** Ensaio teórico-reflexivo de constructos relacionados à teoria ambientalista de Florence Nightingale e à legislação vigente quanto ao ambiente da unidade, sendo originado do estudo de conclusão de uma disciplina. **Resultados:** Os elementos "iluminação", "ruídos", "cores e variedades de objetos", "localização dos postos de enfermagem" e "odores" seguem os pressupostos de Florence Nightingale, enquanto os elementos "ventilação", "espaçamento entre leitos", "mobiliário" sofreram adaptações para se adequarem à estrutura atual da unidade. **Considerações finais:** A teoria ambientalista é um marco na história da enfermagem; apesar das transformações, tais como surgimento das unidades de terapia intensiva e permanência da família nessas unidades, a equipe de enfermagem deve manter a preocupação de Florence Nightingale quanto ao ambiente influenciando o processo saúde/doença e promovendo uma ambiência adequada para a assistência à criança e sua família.
Descritores: Teoria de Enfermagem; Arquitetura Hospitalar; Enfermagem Pediátrica; Unidades de Terapia Intensiva Pediátrica; Criança Hospitalizada.

RESUMEN

Objetivo: Reflejar sobre ambiente de Unidad de Terapia Intensiva Pediátrica basada en teoría ambientalista de Florence Nightingale. **Métodos:** Ensayo teórico-reflexivo de constructos relacionados a teoría ambientalista de Florence Nightingale y a legislación vigente cuanto al ambiente de la unidad, originado del estudio de conclusión de una disciplina. **Resultados:** Elementos "iluminación", "ruidos", "colores y variedades de objetos", "localización de puestos de enfermería" y "olores" siguen los principios de Florence Nightingale, mientras los elementos "ventilación", "espaciamiento entre lechos", "mobiliario" sufrieron adaptaciones para se adecuaren a estructura actual de la unidad. **Consideraciones finales:** Teoría ambientalista es un marco en la historia de enfermería; aunque las transformaciones, tales como surgimiento de unidades de terapia intensiva y permanencia de la familia en esas unidades, el equipo de enfermería debe mantener la preocupación de Florence Nightingale cuanto al ambiente influenciando el proceso salud/enfermedad y promoviendo un ambiente adecuado a la asistencia al niño y su familia.
Descriptores: Teoría de Enfermería; Arquitectura Hospitalaria; Enfermería Pediátrica; Unidades de Terapia Intensiva Pediátrica; Niño Hospitalizado.

INTRODUCTION

The influence of the hospital environment on the recovery of the patient process began with Florence Nightingale (FN), in the nineteenth century, who conceptualizes in her book "Notes on nursing – what is and what is not," the environment as the place where the patient and/or family members are, including health institutions and the home. The author does not distinguish between the physical, social, and psychological environments but explains that these three components need to be understandable in an interrelated way, and the key elements of the theory are the patient's condition and nature[1].

FN points out that the key elements in maintaining a healthy environment were: ventilation; provision of fresh and pure air; lighting; clarity and direct sunlight; hydration, clothing, play, heat to preventing cooling of patients; cleaning for the prevention of infections; noise, need to observe silence; odors; and food. Also, the variety of objects, shapes and colors to which patients are exposed, besides the fact that exposure to good subjects contributes to physical and mental recovery[1].

Still in her work, she emphasizes that children are much more susceptible to harmful influences than an adult, that is, they are affected by the same causes, but much more quickly and seriously. To provide adequate assistance to the child, it is necessary to control over: clean air; heat; cleanliness of the child's body; clothes; room, and house; offer food at regular times; do not frighten the child or shake his body; keep the environment bright and cheerful; and use appropriate bedding and personal clothing[1].

It is worth mentioning that the scenario pointed out by FN, in his theory, is the home environment, however in his work "Notes on Hospitals," published in 1863, prescribes the principles for the construction of hospitals, having as a reference the harmony between the environment and the construction technique. Among the principles, we highlight the orientation of the building in relation to the sun; prevailing winds; dimension and positioning of windows and doors; thermal resistance of walls and roofs, and also an optimal performance in energy efficiency through the horizontality of the building called "Pavilion"[2].

The concern for the environment is reflected in the principles of humanized care of today, based on the control of the environment around the patient, which is seen as a being in relationships and interactions with the environment in which it is inserted. The thinking of FN has a primary influence on the professional performance of Modern nursing, leading to reflection on professional activities, especially concerning the current ecological problem related to binomial health and environment.

This reflection should be intensified in units that serve the pediatric age group, since it is a priority that there be the provision of a stimulating environment, adequate to the different phases of the child's growth and development, providing a more effective recovery and a less traumatic hospitalization for the child and his family.

The issues of the ambience of a Pediatric Intensive Care Unit (PICU) were very relevant in a study related to the perception of hospitalized children about their experience in this unit, revealing that children want it to be more cheerful, with children's decoration, windows to be able to see the outside, less noise and with recreational activities of their preferences[3].

OBJECTIVE

Reflect on the environment of the Pediatric Intensive Care Unit (PICU) in light of Florence Nightingale's environmental theory.

METHODS

This is a theoretical essay of the reflexive type, originated from a study of completion of the discipline "Nursing and the Health of Population Groups," of the doctoral course of the Postgraduate Program of the Anna Nery School of Nursing, of the Federal University of Rio de Janeiro. This study establishes a correlation between the constructs of the FN's environmental theory and the current legislation regarding the PICU environment.

To present the reflections, we used the books "Notes on Hospital" and "Notes on Nursing: what is, and what is not," by FN, articles related to the FN's environmental theory, resolutions of the Ministry of Health regarding Intensive Care Units (ICU) and the primer of the National Humanization Policy (PNH).

This study was not submitted to an evaluation by the Research Ethics Committee, as there was no application in humans or the use of personal documents.

Ambience as a tool for humanizing care in the Pediatric Intensive Care Unit

The Intensive Care Unit is a functional unit whose activities provide conditions to admit critical patients in individual or collective environments, according to the degree of risk, age group, pathology, and requirements of privacy, monitoring, and uninterrupted assistance for 24 hours a day[4].

The services of intensive care treatment were divided according to the age range of the patients treated in the following categories: the Neonatal ICU designed to assist patients admitted between the ages of 0 and 28 days, a Pediatric ICU designed to assist patients at the age of 29 days to 14 or 18 years of age, which limit is defined as the routines of the institution, and in the ICU for adults and intended for the care of patients with age equal to or greater than 18 years of age, and to admit those 15 to 17 years old if it is defined by the rules of the institution [5].

The resolutions that establish standards and technical information for the architectural programming of an ICU are Resolution 50/2002 and Resolution 7/2010, which still have the minimum requirements for the operation of the unit, aiming at reducing risks to patients, visitors, professionals, and the environment[4-5].

The planning and architectural construction of an ICU is always a great challenge since it is a unit in which the technological apparatus stands out with great appreciation of hard technologies, which require technical-scientific knowledge of professionals. On the other hand, there is a need to seek strategies that involve the health team, patients, and family members, considering the individuality of care, coping with the disease, and the humanization of care. Therefore, the PICU needs an environment conducive to the better recovery of the child and his family.

For FN, the nursing professional can, through small adjustments and adaptations, improve the hospital environment, reducing stress, and meeting the needs of patients[1].

In 2003 the National Humanization Policy (PNH) was implemented, which, through clinical, ethical, and political guidelines, presents the structuring guidelines for the promotion of the humanized environment, such as reception, participatory management and co-management, ambience, expanded and shared clinic, valorization of the worker and defense of the rights of users[6].

The ambience is the "spatial guideline" for the other guidelines of the PNH, pointing out a double challenge that is to tune "what to do" with the "how to do," that is, the concept of ambience is the method for the collective construction of health spaces[7].

The ambience idea primarily follows three axes: ambience as a space for encounters between individuals, the production of health and subjectivities; space as a facilitator tool of the work process; and space that aims at comfort[7].

The chosen axis of this reflective study is the space that aims to promote comfort. This axis addresses elements such as morphology, light, color, smell, sound, synesthesia, art, privacy, and individuality[7]. Most of these elements are cited in the FN's environmental theory, which makes it a reference for construction projects of health units focused on humanization.

As for the comfort issue, PNH emphasizes that it is a positive attribute of architectural space, not limited to the suppression of undesirable factors, but involving something more, a set of values: environmental, social, cultural, and people's experience. Understanding comfort is subjective, but we can observe some components and qualify the environments in their thermal, acoustic, and lighting performances and in the sensations that their shapes, colors, textures, and odors produce in the people who pass by or work[7].

These components, when used with balance and harmony, create welcoming environments that can contribute to the health production process and healthy spaces[7]. On the other hand, FN emphasizes that if one or more aspects of an environment are unbalanced, the patient uses greater energy to counterbalance environmental stress and that the nurse must intervene to identify any imbalance in the environment to harmonize the energy, putting the patient in the best situation, so that nature acts on him, encouraging his healing[1].

The author highlights the nursing care focus on environmental hygiene and lists tasks that nurses must perform to assist sick individuals, many of which are relevant to the present day[1].

Regarding ventilation, air quality, FN emphasizes the need for clean and fresh air, always open windows, and attention to the origin of the ventilation of the environment when designing a unit. At that time, hospital buildings should have had a single floor since ventilation systems could not air-condition and filter the air from the wings; thus, contaminated and heated air invaded the upper floor[2].

Currently, we know that the PICU is a closed, air-conditioned and temperature-controlled environment. For the ICU with closed beds, the temperature should be adjusted separately, ranging from 24 °C to 26 °C and relative air humidity from 40% to 60%. The ICU must have an ambient thermometer. All air intakes should be as high as possible, and both air conditioning and heating should go through appropriate filtration systems. The air intake must respect a minimum distance of 8 m from places where there is a spread of infectious agents or harmful gases[4].

Regarding noise, FN indicates the need to observe silence since intermittent and sudden noise affects the patient more than repetitive noise[1]. Thus, we know that the ICU is an environment where there is too much noise due to the alarms of monitors, equipment, bells, telephones, television, and noises coming from communication between professionals. Also, acoustic comfort is related to ambient noise levels measured in decibels. Therefore, it is recommended that noise levels do not exceed 45 dB; and, in the ICU, the use of walls and floors that absorb sound waves should be adopted[4].

Furthermore, exposure to high noise levels leaves nurses in critical care units susceptible to having their productivity affected, impairing their effective ability to make decisions and regulate emotions, also affecting the quality of care provided[8].

Considering that the PICU environment is surrounded by people and equipment with acoustic alarms, it is necessary to check the noise level inside the unit through a decibelimeter to improve the quality of assistance and also the teams' work environment.

For lighting comfort, it is recommended to include controlled natural lighting with an external view, constituting an important aspect of sensory and perceptive orientation to the patient, and to not disturb the patient in bed, subdued lighting is suggested. The recommended lighting level for a PICU is 100 to 200 lux (general) and 150 to 300 lux (bed)[4].

FN points out that the patient's bed should be positioned so that he sees the window, and the environment should be very clear and with direct sunlight because, without sunlight, the body and mind degenerate. She also recommends that the wings contain one window for every two beds, with a distance of 1.21 m. The sill should be 60-90 centimeters from the floor and 30 centimeters from the ceiling[1-9].

A study conducted with school-age children admitted to the ICU found that they wanted the unit to have less noise and be less clear since these factors impaired sleep and rest. The study also reported the need to have windows in the sector so that patients could visualize how the weather was outside the unit[3].

In visual comfort, the approaches relate to colors, visual identity and signage. Color is an essential item in the external or internal architectural composition. In the internal area, color acts directly and intensely on people, influencing according to the age group, psychological structure, and cultural conditions of the individual. In the ICU, the colors of the walls should provide rest and provide a peaceful environment[4]

It is worth mentioning that, in the ICU, in addition to the use of colors the environment must have child characteristics, such as the "Carioca Aquarium" of the Martagão Gesteira Institute of Child Care and Pediatrics – *Instituto de Puericultura e Pediatria Martagão Gesteira* (IPPMG) and the project *Submarino Carioca* of the Jesus Municipal Hospital, both located in the city of Rio de Janeiro.

FN also presents in her works the concern with the color and decoration of the environment, attesting that the environment should have a variety of shapes and colors and should have flowers[1]. As confirmation, data from a study with school children reveal that they would like the PICU to be more colorful and decorated with children's and abstract motifs[3].

Regarding olfactory comfort, FN emphasizes that it is necessary to get rid of the harmful odor of the body caused by the

disease and be very careful with the odor coming from the environment[1]. The perception of odors is often a substantial issue in the experience of admission and can be directly related to the hospital environment. Thus, reflecting on the author's concepts, we should keep the place of the purge with the door closed at all times and located in such a way as to stay away from the patient (to be considered at the time of production of the construction project of the unit). In addition, it is necessary to be attentive to the products used in the disinfection and decontamination of the unit and equipment so that this odor is not harmful to patients.

On the other hand, the presence of the family member/companion in the ICU involves olfactory stimuli arising from the child-family bond resulting from touch or even contact with the family member's body, and the smell recognized by the child can transmit tranquility and confidence.

Regarding the nursing room or nursing station, FN states that the place should be in a position where it is possible to obtain a panoramic and privileged view of all spaces, with furniture for rest and storage and control of materials used in the procedures[1].

A PICU nursing unit should be centralized according to the minimum ratio of 1 for every 12 beds and provide a comfortable area, with sufficient size to accommodate all the functions of the work team, with minimum dimensions of 6 m^2[4].

FN studies also emphasize the furniture of the patient's unit, which describes it as being part of the room: chair with armrest, positioned next to the heating system; two tables; and privacy fold screen. The utensils used must be made of easy to clean material, and beds must have durable mattresses and material susceptible to minimize contamination, recommending that of horsehair (does not absorb moisture, has high durability, repels insects, and does not change body temperature), or the use of air or water mattresses for surgical beds and patients in anasarca or with difficulty in movement[2,9].

Also, FN establishes in her studies that the spacing between the beds cannot allow air stagnation and should favor people's movement for the simultaneous execution of procedures. The suggested measurements are 4.5 meters for the ceiling height, and 45.30 m^3 of space between the beds, with 3 to 3.5 meters between the opposite beds[2,9].

Currently, the patient unit of a PICU must be provided with a bed, a tray for instrumentals, a screen fold, a *hamper* holder, a university chair, a serum holder, a bedside table, a meal table, a ladder with two steps, a table for instrumentals, a trash can[4].

It is worth saying that, in addition to these equipment described in Resolution 50/2002, we should consider the chair used by the child's companion and the basic equipment used in this intensive unit, such as: infusion pumps, multiparameter monitor and equipment for invasive and non-invasive ventilatory support[4]. Moreover, screen folds are hardly found in the units today because we have curtains separating the beds in most of them, which provide privacy to the patient. Also, Resolution estimates a minimum area of 9 m^2 per bed of PICU, with a minimum of 1 m between beds and walls[4].

Concerning the bed mattress, it is essential to pay attention to the use of a pneumatic mattress or high-density foam, which must be covered by waterproof, resistant, and easily sanitized material.

Regarding the environment and the right to accompany, the Child and Adolescent Statute (ECA) provides that "health care facilities, including neonatal, intensive care and intermediate care units, must provide conditions for the full-time stay of one of the parents or guardian, in cases of hospitalization of a child or adolescent," but does not describe the conditions for the stay[10].

The child's right to have a companion requires the addition of furniture (chair or recliner) and objects used by the companion, reducing the space of the child's unit, and this can bring some comfort implications that interfere with the health professional-child interaction.

The PNH points out that it is not enough to guarantee the right to the companions, there must be spaces capable of welcoming them to the various environments of the health units so that they can also have moments of encounter, dialogues, relaxation, and entertainment, such as watching television or listening to music[7].

Given the limits and possibilities imposed by the PICU's scenario, it is essential to ensure the presence of the family/companion in the child's care because of the physical and psychological benefits inherent in the Child-Family-team triad.

FN also focuses on the choice of the material for coating the constructive elements (floors, walls, ceiling), which should be waterproof, washable, and quick-drying[2]. This guidance is still used today in health care facilities.

Therefore, it should be noted that elements such as lighting, noise, colors, and varieties of objects, location of nursing posts, and odors follow the FN's assumptions. However, details such as ventilation, the spacing between beds, furniture have undergone adaptations to suit the current structure of the ICU.

We identify the differences between FN's proposals and those practiced today due to the author's environmental theory instituted in the nineteenth century and not predicting hospital advances. She points to the child as the most vulnerable being to the elements of the environment. Moreover, she did not foresee the addition of many devices, an increase in the number of health professionals and their categories, nor the presence of the family in the PICU.

FINAL CONSIDERATIONS

The FN's environmental theory is a milestone in the history of Nursing, and its contributions are valued to the present day, being a reference for the construction of any health care facility, especially concerning the issue of humanization

Despite the transformations, such as the emergence of Intensive Care Units and family permanence in these units, the nursing team must maintain the concern of FN when referring to the environment influencing the health-disease process and thus promoting an adequate environment for the care of the child and his family.

Given the recommendations indicated in the text, the health team (in particular, the nurse) should be attentive to the adequacy of the PICU environment regarding the essential elements that promote comfort and well-being to establish the care centered on the child and his family as a goal.

The proposed adjustments do not necessarily imply high costs, but, in most cases, revisions and updates of care practices, including periodic training of the team.

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