

Nurses' understanding of newborn care in oxygen therapy

Compreensão do enfermeiro sobre o cuidado ao recém-nascido em oxigenoterapia

La comprensión de las enfermeras de la atención a los recién nacidos en la terapia de oxigenoterapia

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ABSTRACT

Objective: To analyze nurses' understanding of the care given to newborns in oxygen therapy in the Intermediate and Intensive Neonatal Care Unit. **Method:** This is a descriptive, qualitative study conducted with 16 nurses from the Neonatal Unit of a public hospital in Petrolina / PE, from December 2015 to January 2016, through a semi-structured interview. Data were analyzed through thematic content analysis. **Results:** Nurses understand what constitutes oxygen therapy, its indications, purposes and possible associated complications, as well as the main nursing care that should be directed to the newborns in therapy with supplemental oxygen. **Conclusion:** The qualification and the ability of the nurse to assist the newborn in the use of oxygen therapy, within the Neonatal Unit, is essential in guaranteeing a safe care, in the early identification of signs of adversity and in the prevention of possible complications.

Descriptors: Oxygen therapy, Assistance, Newborn, Nurses.

RESUMO

Objetivo: Analisar a compreensão do enfermeiro sobre a assistência prestada ao recém-nascido em oxigenoterapia na Unidade de Cuidados Neonatais Intermediários e Intensivos. **Método:** Trata-se de estudo descritivo, de abordagem qualitativa, realizado com 16 enfermeiros da Unidade Neonatal de um hospital público de Petrolina/PE, de dezembro de 2015 a janeiro de 2016, por meio de entrevista semiestruturada. Os dados foram analisados mediante análise de conteúdo temática. **Resultados:** Os enfermeiros compreendem o que se configura como oxigenoterapia, suas indicações, finalidades e possíveis complicações associadas, bem como os principais cuidados de enfermagem que devem ser direcionados aos recém-nascidos em terapia com oxigênio suplementar. **Conclusão:** A qualificação e

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a habilidade do enfermeiro que assiste ao recém-nascido em uso de oxigenoterapia, dentro da Unidade Neonatal, é imprescindível na garantia de uma assistência segura, na identificação precoce dos sinais de adversidade e na prevenção de possíveis complicações.

Descritores: Oxigenoterapia, Assistência, Recém-nascido, Enfermeiros.

RESUMEN

Objetivo: Analizar la comprensión de las enfermeras acerca de la atención prestada a los recién nacidos en la terapia de oxígeno en la unidad neonatal de cuidados intermedios e intensivos. **Método:** Se realizó un estudio descriptivo de enfoque cualitativo, realizado con 16 enfermeras de la unidad neonatal de un hospital público de Petrolina / PE, de diciembre 2015 a enero 2016 a través de entrevistas semiestructuradas. Los datos se analizaron utilizando el análisis de contenido temático. **Resultados:** Las enfermeras entienden lo que se configura como la terapia de oxígeno, sus indicaciones, efectos y posibles complicaciones asociadas, así como los principales cuidados de enfermería cuales deben estar orientados a los recién nacidos en la terapia con oxígeno suplementario. **Conclusión:** La calificación y la capacidad de la enfermera que atiende al recién nacido en el uso de la terapia de oxígeno en la unidad neonatal, es esencial para garantizar una atención segura, la identificación precoz de los signos de la adversidad y la prevención de posibles complicaciones.

Descritores: Oxígeno, Asistencia, Recién nacido, Enfermeras.

INTRODUCTION

Neonatology is characterized by numerous changes that have been modifying the prognosis and quality of life of preterm newborns or those that present some pathology. In this context, scientific advances have contributed and continue to contribute to the reduction of a newborn (NB) morbidity and mortality rates, guaranteeing their survival. This is all associated with technology and the consequent sophistication of techniques, procedures, methods, equipment and also personnel.¹

Neonatal care has been improving and improving progressively in recent years, influencing the survival of NB, particularly premature babies. Due to the immaturity of organs and systems of this group, respiratory diseases appear as the main reason for hospitalization in the Neonatal Unit of Intermediate and Intensive Care. Furthermore, the therapy used, such as ventilatory support, also has the potential to cause such pathologies during the period of NB's hospitalization in these sectors.²

In these circumstances, pulmonary immaturity, associated with the difficulty of adapting to extrauterine life, generally implies supplemental oxygen therapy to NB that present difficulties in performing the pulmonary gas exchange. Nonetheless, like any medicine, oxygen can be toxic and cause numerous complications due to inadequate use of any of the ventilatory supports, causing reversible or non-reversible damages.³

Oxygen therapy consists of inhaling oxygen (O₂) at a pressure greater than that of ambient air, which facilitates gas exchange and reduces the work of breathing. It is an essential therapy for the treatment of hypoxia and/or correction of respiratory failure, which can be perceived through various signs and symptoms, such as nose-flapping, hypotension,

costal retraction, apnea, dyspnea, increased respiratory effort, among others.⁴

The types of ventilatory supports involve devices such as Oxi-Hood (halo), a kind of helmet that provides a mixture of O₂ with compressed air to NB that breathe spontaneously and that show respiratory discomfort of mild to moderate intensity;^{5,6} Continuous Positive Airway Pressure (nasal CPAP), in which O₂ is administered associated with compressed air through the nasal prong, with continuous pressure and flow;⁷ Mechanical Ventilation (MV), an invasive therapeutic modality indicated in cases of either respiratory failure or severe respiratory insufficiency, among others.⁸

Oxygen therapy is a procedure that presents a risk to the patient and requires that the multidisciplinary and interdisciplinary team, before giving the necessary care to the NB under ventilatory assistance, knows the conduits, the equipment, and devices related to it, in a standardized and specific way for each one. Additionally, the team should be able to perform continuous monitoring of vital conditions.⁶

As a member of the multi-professional team, the nurse, who is in direct contact with the NB, needs to constantly assess their respiratory status. It is imperative that you guide and support the family and develop a care plan based on the nursing process, checking and recording vital signs, as well as beginning and ending therapy.³ Therefore, you need to be able and safe to provide quality care, with due knowledge about the factors and complications related to this therapy.⁵

In this sense, this research has the potential to favor the improvement of the quality of NB care in O₂ therapy, since it will allow knowing the possible limitations in the conduct of nursing assistants in the neonatal unit. From this, the approach of the problem studied was based on the following questions: What is the nurse's understanding of oxygen therapy and its possible complications? What does the nurse recognize as nursing care for the neonate undergoing oxygen therapy?

Hence, the present study aimed to analyze the nurses' understanding of the care provided towards newborns undergoing oxygen therapy in both the Neonatal Intensive Care Unit and the Neonatal Intermediate Care Unit.

METHODS

It is a descriptive study with a qualitative approach, which is characterized by the capacity to interconnect meanings and intentionality with human relations, seeking to respond in a profound and particular way to the questions that occupy a level of social reality that should not be quantified.⁹

The study was developed in both the Neonatal Intensive Care Unit and the Neonatal Intermediate Care Unit, which are located in a large public hospital in *Petrolina* city, a referral in maternal and child health and that integrates the State health network between *Pernambuco* and *Bahia* States.

The participants of the study were sixteen nurses who work in the Neonatal Unit of Intermediate and Intensive Care II of the referred hospital, being interviewed over the period from December 2015 to January 2016. Although all the multi-professional team have, within its attributions, the function of attending the NB in hospitalized oxygen

therapy in the neonatal units, it was decided to interview only nurses, considering that the researchers are part of the same professional category chosen and aroused the interest in working with the perception of these professionals, within this context.

As inclusion criteria, the following was adopted: being assistant nurse or manager of these units acting for at least six months, considered adequate and sufficient time for the professionals to have a greater contact with the routine of the service and the opportunity to attend with quality to the neonates in oxygen therapy. To preserve the anonymity of nurses, we chose to assign identifier codes according to the sequence in which they were interviewed (N1, N2, N3... N16).

Data collection was done through a semi-structured interview script, which allows questions to be redirected by the interviewer, just in case the participants either do not understand the question or make statements not correlated to the interview.⁹

In order to achieve the results, the following guiding questions were made: 1. To describe the understanding of oxygen therapy, also including the types of ventilatory support that can be used in neonatology; 2. To speak how do you recognize the complications arising from oxygen therapy and the most recurrent ones in your working sector; 3. To describe how the nursing care is provided to NB undergoing oxygen therapy, as well as the interventions when facing complications.

The research was initially authorized by the institution where the data was collected, by signing the letter of consent, later forwarded and approved by the Research Ethics Committee Involving Humans Begins, with the *Certificado de Apresentação para Apreciação Ética (CAAE)* [Certificate of Presentation for Ethical Appraisal] No. 47983515.6.0000.5207 and under the Legal Opinion No. 1.321.183. The interviews were only carried out after authorization of each interviewee, through the signing of the Free and Informed Consent Term.

In this sense, the interviews were conducted through a portable recorder, at schedules previously scheduled with the participants, by the researchers themselves, after rigorous training, in order to make possible the better progress of the process and avoid the loss of important information for the conclusion of the research. This stage of data collection was performed in a place chosen by the participants and lasted an average of 20 minutes, according to the convenience of the interviewees.

Operationally, data analysis included the analysis of thematic content from Minayo's perspective and involved comprehensive reading, exploration of the material or analysis and interpretive synthesis, thus composing the three steps: pre-analysis, material exploration, and results handling with data interpretation.⁹

The corpus constitution for data analysis comprised the organization of the empirical material, which involved the transcription of the recorded material, carried out after each interview. With all the transcribed material, the first phase of the analysis consisted of exhaustive and floating readings of the material, seeking to organize it according to similarities in the speeches and other relevant aspects brought by the

participants, according to the general theme, being configured as a corpus' pre-analysis.

The second phase, exploration of the material, consisted in the categorization, which served to advance the thematic analysis of the material, in which the prioritized the senses related to nurses' vision on oxygen therapy in the newborn and the nursing attributions facing this situation, according to the proposed objectives.

The third and last phase of analysis, the treatment of the obtained data and interpretations, consisted of the moment in which inferences were made and other clues or dimensions were opened up from the exhaustive reading of the material, resulting in the categories of analysis.

RESULTS AND DISCUSSION

The nurses interviewed work in the Neonatal Unit of Intermediate and Intensive Care II in day and night shifts, and also daily regime. Most of them have more than two years of training, with an employment relationship in the sector between one year and a half to five years. Only one of them has less than two years of training and ten months in the sector; another nurse has 27 years of training, with 15 years of work in the neonatal intermediate care unit.

The fact that they have more than six full months of performance in the studied sector favors the achievement of satisfactory results in the care implementation towards the NB, since they can act more precisely in reducing the complications of the established treatments, in order to facilitate the adaptation and survival.

Of the nurses interviewed, fifteen of them have specialization course either completed or in progress, and only one of them does not have any of it. It is noteworthy that almost all the specializations presented are related to care in neonatology and pediatrics, and most of them participated in some training on oxygen therapy care, which allows a greater chance of a more comprehensive and continuous assistance to individuals.

After investigating the participants' characterization, the following three thematic categories are discussed:

1. The nurse and his/her understanding of oxygen therapy

Oxygen supplementary therapy in neonatology requires a technological apparatus and specialized professionals, either due to the prematurity of NB or another problem that may cause respiratory distress. Oxygen therapy is a procedure that requires the knowledge of the health professional, in order to facilitate its management and wide assistance in the face of any abnormality resulting from the procedures.¹⁰

In these circumstances, when asked about what they understand with regards to oxygen therapy, the nurses' narrative brings the following explanations:

Therapeutic treatment aimed at patients with some type of respiratory insufficiency or patients with another underlying disease who cannot be submitted to respiratory effort. (N1)

It is a support for patients who present respiratory diseases requiring oxygen. [...] It serves to improve patient respiratory pattern and blood oxygenation and to improve gas exchange. (N4)

[...] Oxygen support aiming to ensure adequate ventilation and breathing. It is indicated for either respiratory failure or respiratory distress. (N6)

Oxygen therapy involves the improvement of oxygenation, respiratory pattern and the ease of gas exchange, contributing to the maintenance and recovery of the health status of NB who need it.³ Therefore, it is observed that nurses understand what is configured as oxygen therapy, then corroborating with the literature.^{2,3}

It is known that the nurse working in a neonatal unit must know the functioning of this therapy, as well as its therapeutic indication, and be able to recognize subtle deviations of its clinical evolution and know how to intervene at the crucial moment.

Transient tachypnea of NB is indicated in Acute Respiratory Distress Syndrome. (N2)

Indicated for respiratory discomfort, transient tachypnea of NB, [...] for those children who are born very premature and the lung is not much. (N3)

Newborns who show transient tachypnea [...], cardiopathy already intrauterine. Premature infants who are apneic of prematurity due to respiratory fatigue. (N10)

[...] Respiratory distress syndrome, meconium aspiration syndrome. (N14)

It is noted that there is knowledge of NB therapy indications by nurses, which consist of the possible situations in which the neonate needs ventilatory support to meet their ventilation and oxygenation needs. Thus, oxygen therapy is indicated when there is a respiratory difficulty, such as Respiratory Distress Syndrome, Transient Tachypnea of the NB, Pulmonary Adaptive Syndrome, Meconium Aspiration Syndrome, among other indications, which also include simple dyspnea.^{3,11}

Despite the innumerable benefits associated with oxygen therapy, the O₂ administration, when performed improperly, can also cause toxic effects and complications that, in turn, may increase NB hospitalization time and alter the prognosis and quality of life of the patient.^{4,5}

Such complications can be caused by high concentrations of O₂ without necessity, prolongation of its administration or individual sensitivity of NB, causing lung damage or even chronic diseases of prematurity, such as Retinopathy of Prematurity and Bronchopulmonary Dysplasia.^{4,12}

It was observed in the speeches that the nurses recognize that this therapy can present adverse effects and greater complications, if used unduly and without precautions:

It can generate neurological sequelae, metabolic disorder [...]. Some heart patients might not tolerate a higher level of oxygen, complicate and die. (N4)

Abdominal distention, irritation of the nasal mucosa or septal lesions caused by poor positioning of the CPAP probe. There is also hyperventilation. (N5)

Retinopathies, the release of free radicals in the child, difficulty in hemodynamic stability, [...] develop pneumothorax due to excess oxygen, barotrauma, [...] pulmonary bronchodysplasia [...]. Atelectasis as well. (N12)

Prolonged use of oxygen therapy may lead to some deleterious effects on NB, such as respiratory system depression, decreased pulmonary surfactant, pneumothorax, absorption atelectasis, barotrauma, bronchopulmonary dysplasia, retinopathy of prematurity, reduction of vital capacity, musculoskeletal dehydration, among others.^{4,7}

Hence, it is crucial that the health team is capable and assured to provide quality care, having adequate knowledge of the technique and factors related to this therapy, and even the complications that oxygen therapy can cause, in order to identify in time and prevent further injury.

Still related to the possible complications, some nurses showed some lack of knowledge or confusion about the effects that the therapy can cause:

Lethargy, torpor, lowering of the level of consciousness. (N1)

Through a cyanosis you see that he is with some oxygen deficiency, the discomfort, he has the subcostal, intercostal drawing, he has the nose wing beat, the moaning. (N11)

The most common clinical signs of hypoxia include cyanosis, tachycardia, irritability, lethargy, sweating, prostration, among others. In this context, respiratory insufficiency can be identified when there is nose-flapping, chest retractions, apnea, dyspnea, increased respiratory effort, in addition to the signs aforementioned,¹³ showing that what has been brought by some nurses is more an indication of therapy and not exactly as complications of it.

The interviewees were also exposed to enterocolitis and blindness as complications of oxygen therapy, although this evidence was not identified in the literature:

There are other things in oxygen therapy that can cause problems, like a case of enterocolitis, something like that. (N6)

The absence of movement of the eyeball, a vague look, that's when we begin to suspect that he is blind [...]. The complication I am aware of is blindness. (N8)

Risk factors for enterocolitis include nosocomial infections in Neonatal Intensive Care Unit, inadequate enteral nutrition, administration of artificial milk, respiratory pathologies, use of umbilical catheters, prematurity, among others,¹⁴ and there is no direct association with the use of supplemental oxygen.

However, the incidence of retinopathy of prematurity can lead to blindness or low vision, being one of the main causes of preventable blindness in childhood.¹⁵ Nevertheless, this is not necessarily caused by oxygen therapy, since it may be due only to retinopathy, in a portion of the cases, considering also that retinopathy is not caused solely by this therapy.

In contrast, a study conducted eight years ago showed that the use of high concentrations of O₂ in premature infants, especially extreme preterm infants, is considered a factor that can lead to blindness due to the interruption of the growth of new blood vessels in the retina,¹⁶ even though it is not a focus of more recent studies. The others studies show, as already explained, that oxygen therapy can cause retinopathy of prematurity, and this culminates in blindness, and is not necessarily a direct complication of the use of supplemental O₂.

From this perspective, it becomes pertinent that the nursing professional who acts directly in the care of the NB hospitalized in a neonatal unit, must have knowledge not only of the indications and the installation of the ventilatory support, but also about complications that they can present in terms of weaknesses physiological functions.

2. Types of oxygen therapy

Oxygen therapy can be administered through various low and high flow ventilation devices and their management involve risks associated with NB adequacy, installation, maintenance, and monitoring. These aspects are observed in the following statements:

The types of ventilatory support that can be used are CPAP, halo, circulating O₂ and O₂ on halo (free oxygen), respirator, [...] VPP with ambu and mask. (N2)

We have CPAP, we have halo and oxygen free. (N9)

It has ambu, VPP and nebulization that you use in oxygen. (N11)

It has the halo, the CPAP, the NIV and the mechanical ventilation itself, [...] that the ventilator takes on practically the child's breathing completely. (N12)

The main oxygen modalities found in the literature are the incubator, campanula (helmet, halo or hood), face mask and funnel, nasal cannula, neonatal glasses catheter, CPAP and invasive MV.³ The use of one technique over another is chosen by the doctor, neonatologist or intensive care unit, according to the respiratory difficulty manifested, as well as the availability of devices and materials in the hospital.⁴

The ventilatory supports used in NB must be known to the professionals who work in the sectors in which the therapy is administered, as well as the situations in which one opt for one oxygen modality in detriment of the other. In this sense, training and training are strategies that can improve NB care in ventilatory support, making this practice safe and avoiding complications arising from its use.¹⁷

On the other hand, even though there were other more effective and safe supports in the O₂ supply to NB, some types of ventilatory support were cited by the interviewees, which are not well tolerated by them, cause discomfort and irritability, and make some procedures unfeasible:

According to the need of the newborn nasal cannula are used [...]. (N5)

And the types that can be used in NB are nasal catheter and Venturi mask. (N6)

Here we use [...] Venturi, but we use less in neonatal. (N15)

The Venturi mask is used during the stabilization of NB or in cases of sudden worsening of peripheral capillary oxygen saturation (SpO₂). However, it is poorly tolerated, due to the discomfort that can be caused by its adaptability to the face, besides the difficulty of measuring the fraction of inspired oxygen (FiO₂) offered and the infeasibility of certain procedures, such as oral feeding. Likewise, the cannula or catheter type glasses, positioned in the nostrils of the NB with direct and continuous flow, they all can cause dryness and mucus accumulation.³

3. Nursing care towards the newborn undergoing oxygen therapy

The nurse is one of the professionals who provides assistance to NB in ventilatory support in neonatal units, and playing a key role part in this context. Nursing care, therefore, implies understanding the characteristics and physiology of NB, knowledge of the functioning of the respiratory system and the capacity to intervene at the appropriate time.^{13,18} Regarding the nursing care to NB undergoing oxygen therapy, it was possible to observe the following lines:

Complete care and physical examination from patient admission, [...] warming up, ensuring that he/she is receiving adequate ventilation support, the amount of oxygen offered..., aspiration every 3 hours and when necessary. Maintain monitoring. (N1)

Assessing the response of oxygen therapy, [...] FiO₂, oxygen saturation, discussing the conducts along with the physiotherapists [...], ensuring airway permeability, adequate equipment handling, avoid infection. (N6)

Observation of respiratory rate, humidification of the airways, aspiration every 12 hours and when necessary. Always be watching. [...] Change of position, monitoring when necessary and care with the probe, right? [...] Changing the water every day of the humidifier. (N13)

It was possible to notice that the interviewed nurses mentioned the use of oxygen therapy techniques, heating, humidification, hygiene of the system and the device, and

physical examination for neonatal care. However, the few references to hand hygiene and recordkeeping as a form of care are noteworthy, even though these are essential and basic behaviors in assisting all individuals to prevent complications and control their clinical evolution.

The main nursing care in oxygen therapy is to clean the hands before and after the care; use prongs of adequate size and caliber; keep the nostrils permeable, lubricating with 0.9% saline solution; performing asepsis and decontamination of the device to prevent bacterial proliferation; check the adaptation of the circuit connections with frequency and presence of water in the system; to maintain NB in high decubitus, among others.³

In addition to the most commonly performed care, it is also considered to protect the nasal septum with hydrocolloid; check vital signs and record whenever necessary; promote NB contact with the parents, if he tolerates, and continuously monitor the O₂ concentration by means of O₂ environment analyzers, verification of oximetry levels and arterial blood gases.³

In this sense, nursing know-how in a neonatal unit is considered of fundamental importance, since the team needs to organize the environment and its activities between NB and equipment. That is why the importance of a qualified team, capable of providing individualized care to the NB,¹⁹ bearing the ability to identify situations that require immediate action and intervene before them in an attempt to avoid further complications:

Faced with a complication, the physician is called and is still coming, but I am already sucking up, increasing the concentration of gases, putting the CPAP in a greater concentration to reduce the child's respiratory discomfort. (N7)

I have put down the FiO₂ because the saturation of the NB has been 100% for a long time, so I did it. Some things we can do alone, before complicating, [...] ventilating, vacuuming, checking if everything is right, I can do this without the physician. (N12)

When faced with complications, sometimes we get our hands tied; we really count on the doctor to take action. But I think if we see that support is not adequate, then we can give an opinion and together with the team provide something that best meets the NB's need. (N15)

It can be identified by the statements that nurses have the competence to act in the face of complications arising from the inadequate use of oxygen therapy in their respective sectors of action, identifying emergency situations, even before the arrival of the medical professional.

The reduction of neonatal mortality in intermediate and intensive care units is due to the contribution of health professionals in recognizing the interurrences presented in relation to the weaknesses in the physiological functions

of the NB, as well as knowing what to do before them, and always within their professional competencies.¹⁷

Given the aforementioned, it can be perceived that the effectiveness of oxygen therapy does not require an integral nursing care, mixing technical, scientific and human knowledge, in which the professional needs to be prepared to provide a care free of complications, and also intervene in a punctual and effective manner.

FINAL CONSIDERATIONS

The nurses interviewed showed that they understood oxygen therapy as a therapeutic modality responsible for improving the respiratory pattern and oxygenation, as well as its therapeutic indication. The nurses have shown the types of ventilatory support that can be used with the NB, and also in which situations it is prioritized by a specific support. Furthermore, they have shown the recognition of the subtle deviations of the NB's clinical evolution and the possible complications due to the misuse of this therapy.

Given the aforementioned, it is understood that the nursing care to the newborn in oxygen therapy comprises the care provided from the moment of admission to the neonatal unit and is guaranteed by the understanding of all the parameters related to this therapy, for a better clinical evolution, a better prognosis, and a shorter hospital stay.

It is hoped that this study will contribute to the reflection on the subject in question, although it is known that this approach is not exhausted with the results of this research. Indeed, this was only the possible cut in that moment, and new and more in-depth studies need to be performed as a subsidy to nursing professionals.

The limitations encountered during this research involved the resistance of some professionals to collaborate, then demonstrating that they did not know the importance of carrying out studies aiming to improve care practice, as well as the short period of time established by the institution to carry out the data collection.

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