

Conceptual validation of the defining characteristics of respiratory nursing diagnoses in neonates

Validação conceitual das características definidoras de diagnósticos de enfermagem respiratórios em neonatos

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Keywords

Nursing diagnosis; Neonatal nursing; Signs and symptoms respiratory; Nursing care; Infant, newborn; Patient care planning

Descritores

Diagnóstico de enfermagem; Enfermagem neonatal; Sinais e sintomas respiratórios; Cuidados de enfermagem; Recém-nascido; Planejamento de assistência ao paciente

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Abstract

Objective: To develop and validate conceptual and operational definitions for the defining characteristics of the respiratory nursing diagnoses, ineffective breathing pattern, impaired gas exchange and impaired spontaneous ventilation, in newborns.

Methods: This was a methodological study of conceptual validation of the defining characteristics of three respiratory nursing diagnoses, by consensus analysis of a committee of five specialist nurses, and then a group of five non-nursing professionals, using the Delphi technique.

Results: After two rounds of evaluation, consensus was obtained that was equal to or greater than 80% on all of the definitions, which were then considered validated.

Conclusion: The definitions developed for the defining characteristics of three nursing diagnoses were validated with a high level of consensus.

Resumo

Objetivo: Elaborar e validar definições conceituais e operacionais para as características definidoras dos diagnósticos de enfermagem respiratórios, Padrão Respiratório Ineficaz, Troca de Gases Prejudicada e Ventilação Espontânea Prejudicada em recém-nascidos.

Métodos: Estudo metodológico, de validação conceitual das características definidoras dos três diagnósticos de enfermagem respiratórios por meio da análise de consenso de um comitê de cinco enfermeiras especialistas e de cinco profissionais não enfermeiros, utilizando a técnica *Delphi*.

Resultados: Após duas rodadas de avaliação, obteve-se consenso igual ou superior a 80% na totalidade das definições, sendo consideradas validadas.

Conclusão: As definições elaboradas para as características definidoras dos três diagnósticos de enfermagem foram validadas com elevado grau de consenso.

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Introduction

The activity of diagnosing in nursing has been developing since the early nineteenth century. During the Crimean War, Florence Nightingale and a group of volunteer nurses decreased the mortality rate in military hospitals, through observation, data collection, diagnosis and differential treatment for war wounds, showing that these actions were important for making any judgment about the patient.⁽¹⁾ However, the term nursing diagnosis only emerged in the 1950s, with Louise McManus and, until the 1970s, had little practical application, being included in the nursing process only in 1973.⁽²⁾

The use of nursing diagnosis in clinical practice provides a systematic basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable.⁽³⁾ This structure which approximates the nurse to the object of work requires the use of clinical reasoning and analysis of the observed signs and symptoms, ending in a clinical judgment based on knowledge acquired in academic education, associated with his clinical experience. Diagnosing involves a cognitive process, with inferences drawn about the observed data and as a result, the problem, when interpreted correctly, enables the nurse to direct his actions and anticipate the desired outcomes, improving the quality of nursing care. Its application requires the use of a common language among professionals, in order to assure a unique understanding about ideas and terms that represent the phenomena about which nurses are interested, to outline the actions under their responsibility.⁽⁴⁾

In the practice of nursing diagnosis, the understanding of the defining characteristics of the diagnoses may be different among professionals, which may compromise the diagnostic accuracy and, consequently, the quality of nursing care and patient safety, if interventions dissonant to the actual needs are proposed and implemented.^(5,6)

The accuracy of the nursing interpretations about patient responses differ in a significant manner.⁽⁷⁾ Operational and conceptual definitions pro-

vide meaning to a concept and are essential components for understanding the defining characteristics, as they describe what is being assessed and how it should be evaluated. The establishment of guidelines for identification of nursing diagnoses in specific populations, may improve the diagnostic accuracy, promoting the understanding and interpretation of signs and symptoms in a similar manner by all nurses.⁽⁶⁾

Several different studies were encountered in the literature dealing with the conceptual and operational definitions of the defining characteristics of some nursing diagnoses, but they were related to adult and pediatric populations, with few in newborn infants.^(6,8,9) This fact motivated the development of the present study.

In the decade of the 1950s, the intensive care instituted in the intensive care unit and with mechanical ventilation had a positive impact on survival in this population, followed by disappointing findings in the 1960s, when it was realized that such therapy resulted in structurally damaged lungs. Even today, the improvement in survival of preterm infants, and the outcome of modern neonatal intensive treatment, represent important factors in morbidity and mortality related to chronic lung disease.⁽¹⁰⁾ Many premature infants present difficulties with their adaptation to extrauterine life, because their lungs are structurally immature and, frequently, deficient in surfactant, which leads to the impairment of respiratory function. Still, chronic lung disease of premature newborns is the result of intensive neonatal treatment used to ensure survival.⁽¹⁰⁾

This situation demands specific interventions for treatment and monitoring. In this context, the respiratory nursing diagnoses, that is, those in which the label, definition, signs and symptoms and related factors/etiology have a direct relationship with respiration, become relevant.

Thus, for this study, three respiratory nursing diagnoses that are part of the NANDA International, Inc. (NANDA-I) classification and related to the respiratory pattern and/or changes in normal breathing pattern, were selected: impaired gas exchange (00030-TGP), ineffective

breathing pattern (00032-PRI) and impaired spontaneous ventilation (00033-VEP). Other respiratory nursing diagnoses were not included, such as dysfunctional ventilatory weaning response (00034), related to the gradual withdrawal of mechanical ventilation or ventilatory weaning, considering that this represents a situation corresponding to a specific and late phase of treatment of newborns with respiratory distress who require mechanical ventilation. Meanwhile, the nursing diagnosis, ineffective airway clearance (00031), despite being frequently identified in patients on respiratory support and, especially, those on mechanical ventilation, was not part of the study because in the current NANDA-I classification, it is in the class, Physical Injury.⁽³⁾

The objective of this study was to develop and validate conceptual and operational definitions of the defining characteristics of the respiratory nursing diagnoses, ineffective breathing pattern, impaired gas exchange and impaired spontaneous ventilation in newborns.

Methods

This was a methodological study, conducted from January of 2011 to April of 2012.

The process of validation of conceptual and operational definitions of the defining characteristics proposed by NANDA-I for the three respiratory nursing diagnoses studied in neonates included the analysis of the characteristics, development of definitions, followed by consensual validation by health experts in the area of children and neonates requiring respiratory care.

The construction of the conceptual and operational definitions for each defining characteristic was based on knowledge grounded in the areas of nursing, medicine and physiotherapy. They were then submitted for assessment by two clinical nurses, specialists in intensive care and neonatology.

Aiming at the refinement of definitions of the three nursing diagnoses, the material was

submitted to a committee composed of five doctorally prepared nurses, intensive care specialists with more than three years in neonatal and pediatric intensive care and in the use of nursing diagnoses. These experts also developed teaching activities in pediatric and neonatal nursing.

The process of evaluation of the material received by the committee was organized within six meetings, of approximately five hours each, in which the definitions of the defining characteristics were discussed, reformulations were suggested, and, new searches of scientific studies were conducted to obtain consensus about each of them.

After this step, these definitions were sent for analysis by five other professionals, including four physicians and a physical therapist, with clinical experience in respiratory care for neonates and the minimal educational level of a master's degree.

The instrument with the defining characteristics and their conceptual and operational definitions, developed by the committee, was submitted to those experts for analysis and agreement or lack of agreement with the definition and, in case of disagreement, suggestions were requested. In this step the Delphi technique was applied, which consisted of repeated rounds of submission to obtain consensus among the experts. It was established that definitions with agreement equal to or greater than 80% would be considered validated.⁽¹¹⁾

The development of the study met the national and international standards of ethics in research involving human beings.

Results

Of the 46 defining characteristics proposed by NANDA-I for the three respiratory nursing diagnoses, eight were excluded by the members of the expert committee, as they considered that they were not subject to verification in newborns, and two common signs of respiratory

distress in this population were included. In the end, 40 defining characteristics were submitted for validation (Chart 1).

Of the conceptual and operational definitions of the 40 defining characteristics presented to the experts, 12 achieved 100% agreement in the first round and the remaining 28 received suggestions for reformulation of the writing or

revision of the concept. Of these, 14 were accepted because the suggestions were related to technical language, for example, substitute *alteration of oxygen supply* with *hypercapnia*, when the indicator was related to increased CO₂, or modify *pulling in of accessory muscle* as *abnormal thoracic retraction*. All of the suggestions as to the format, when relevant, were accepted. The

Chart 1. Defining characteristics of respiratory nursing diagnoses

Ineffective Breathing Pattern (00032)		
NANDA-I Alterations in depth of breathing Pursed-lip breathing Nasal flaring Bradypnea Decreased vital capacity Increased anterior-posterior diameter Dyspnea Altered chest excursion Prolonged expiration phase Orthopnea Decreased expiratory pressure Decreased inspiratory pressure Assumption of three-point position Tachypnea Use of accessory muscles to breathe Decreased minute ventilation	Excluded Assumption of three-point position Orthopnea Pursed-lip breathing Included by Committee Expiratory grunt Decreased vesicular murmur	Submitted for validation Alterations in depth of breathing Nasal flaring Bradypnea Decreased vital capacity Increased anterior-posterior diameter Dyspnea Altered chest excursion Prolonged expiration phase Decreased expiratory pressure Decreased inspiratory pressure Tachypnea Use of accessory muscles to breathe Decreased minute ventilation Expiratory grunt Decreased vesicular murmur
Impaired Gas Exchange (00030)		
NANDA-I Restlessness Nasal flaring Cyanosis (in neonates only) Abnormal skin color (pale, dusky) Diaphoresis Decreased carbon dioxide Dyspnea Abnormal arterial blood gases Hypercapnia Hypoxemia Hypoxia Irritability Abnormal arterial pH Abnormal breathing (rate, rhythm, depth) Somnolence Tachycardia Headache upon awakening Confusion Visual disturbances	Excluded Headache upon awakening Confusion Visual disturbances	Submitted for validation Restlessness Nasal flaring Cyanosis (in neonates only) Abnormal skin color (pale, dusky) Diaphoresis Decreased carbon dioxide Dyspnea Abnormal arterial blood gases Hypercapnia Hypoxemia Hypoxia Irritability Abnormal arterial pH Abnormal breathing (rate, rhythm, depth) Somnolence Tachycardia
Impaired Spontaneous Ventilation (00032)		
NANDA-I Dyspnea Increased heart rate Increased PCO ₂ Decreased PO ₂ Decreased SaO ₂ Increase metabolic rate Increased use of accessory muscles Decreased tidal volume Reports apprehension Decreased cooperation	Excluded Reports apprehension Decreased cooperation	Submitted for validation Increased restlessness Dyspnea Increased heart rate Increased PCO ₂ Decreased PO ₂ Decreased SaO ₂ Increase metabolic rate Increased use of accessory muscles Decreased tidal volume

Source: Herdman TH (Ed). Diagnósticos de enfermagem da NANDA International: definições e classificação 2012– 2014. Trad. Regina Machado Garcez. Porto Alegre: ARTMED, 2012. 606 p.

remaining 14 definitions were reformulated according to the suggestions and submitted for a second round of evaluation. As a result of this

round, of the 14 defining characteristics, seven obtained 100% agreement and seven had 80% (Chart 2).

Chart 2. Results of expert analysis in the first round of review

Ineffective Breathing Pattern (00032) Defining characteristics	Suggestions	Decision
Alterations in depth of breathing	Format	Accepted
Nasal flaring	Format	Second round
Bradypnea	None	100% agreement
Decreased vital capacity	None	100% agreement
Increased anterior-posterior diamete	None	100% agreement
Dyspnea	Format	Second round
Altered chest excursion	None	100% agreement
Prolonged expiration phase	Format	Accepted
Decreased expiratory pressure	Concept	Accepted
Decreased inspiratory pressure	Format	Accepted
Tachypnea	Format	Accepted
Use of accessory muscles to breathe	Format and Concept	Accepted
Decreased minute ventilation	Format	Accepted
Expiratory grunt	Format	Accepted
Decreased vesicular murmur	Format	Accepted
Impaired Gas Exchange (00030) Defining characteristics	Suggestions	Decision
Restlessness	Format	Accepted
Nasal Flaring	Format	Second round
Cyanosis	None	100% agreement
Abnormal skin color	Format	Second round
Diaphoresis	None	100% agreement
Decreased carbon dioxide	Format	Second round
Dyspnea	Format	Second round
Abnormal arterial blood gases	Concept	Second round
Hypercapnia	None	100% agreement
Hypoxemia	Concept	Second round
Hypoxia	Format and Concept	Second round
Irritability	None	100% agreement
Abnormal arterial pH	Concept	Second round
Abnormal breathing	Format	Accepted
Somnolence	None	100% agreement
Tachycardia	None	100% agreement
Impaired Spontaneous Ventilation (00033) Defining characteristics	Suggestions	Decision
Increased restlessness	Format	Accepted
Dyspnea	Format	Segunda avaliação
Increased heart rate	Format	Accepted
Increased PCO ₂	Format	Second round
Decreased PO ₂	Concept	Second round
Decreased SaO ₂	Concept	Second round
Increased metabolic rate	None	100% agreement
Increased use of accessory muscles	Format and Concept	Accepted
Decreased tidal volume	None	100% agreement

At the end of this process, the conceptual and operational definitions of the defining characteristics of the three respiratory nursing diagnoses

were considered validated, given the degree of consensus achieved and that are presented in chart 3.

Chart 3. Conceptual and operational definitions of the defining characteristics

Ineffective Breathing Pattern (00032) Definition: Inspiration and/or expiration that does not provide adequate ventilation.		
Defining characteristics	Conceptual definition	Operational definition
Alteration in depth of breathing	Alteration in the depth of breathing means superficial respiratory movements, observed by the rise of the chest < 0.5 cm in the sternum or very profoundly that causes a sinking of the rib cage.	Observed increased or decreased thoracic expansion or abnormal retraction of the rib cage during breathing cycles.
Nasal flaring	Nasal flaring is the movement of the nasal flap during inspiration, in a physiological attempt to decrease the resistance of the upper airway and work of respiration in order to increase tidal volume.	Observe opening and closing of the nares during the inspiratory and expiratory phase of the respiratory cycle.
Bradypnea	Bradypnea is the clinical term used to define a lower respiratory rate < 30 breaths per minute for the full term newborn and 40 breaths per minute for the premature newborn.	To identify the inspiratory movements for thoracic expansion or by auscultation for one minute, values < 30 breaths per minute for a full term newborn and 40 breaths per minute for a preterm newborn.
Decreased vital capacity	Decreased vital capacity (VC) is that which is considered insufficient to achieve pulmonary capacity, represented by the total maximum volume of air inhaled and exhaled.	Vital capacity is measured by spirometry and the approximate value for the neonate is 35 mL/Kg.
Increased anteroposterior diameter	An increased thoracic diameter in newborns is that which has an anteroposterior diameter that is greater than the latero-lateral diameter, making a costal angle larger than 90°.	Observe by inspection the presence of a bulging chest with sternal prominence and identify through the measurement of an anteroposterior diameter that is larger than the latero-lateral. .
Dyspnea	Dyspnea is the medical term used for difficulty in breathing. It is characterized by increased effort to breathe and is manifested by alterations in the normal breathing pattern.	Identify signs of respiratory distress with changes in frequency, rhythm, expansion and muscular effort to breathe, manifested by nasal flaring, prolonged expiration and abnormal thoracic cage retractions: suprasternal, supraclavicular, subcostal, intercostal, sternal and of the xiphoid process.
Altered chest excursion	Altered thoracic excursion is the asymmetry of the movements of the thoracic cage resulting from structural or physiological factors	Observe asymmetry in the movement of the thoracic cage, inspecting both sides of the thorax and topographically locating the change.
Prolonged expiration phase	The prolonged expiratory phase consists of a period for elimination of pulmonary gas greater than twice the expiratory time and may be due to increased pulmonary airway resistance.	Inspect for one minute in the breathing cycle an expiratory time greater than twice the inspiratory time.
Decreased inspiratory pressure	Decreased inspiratory pressure (Pinsp) is that which is insufficient for filling the respiratory airways and aeration of recruitable alveoli, resulting in reduced tidal volume, deficient alveolar inflation and inefficient air flow for gas exchange.	Observe elevation of thoracic cage < 0.5 cm at the level of the sternum, associated with increased respiratory rate, use of accessory muscles, decreased oxygen saturation and arterial blood gas changes. In neonates with mechanical ventilation, decreased inspiratory pressure can be observed on the monitor as a pressure less that required and / or given to the patient. The inspiratory pressure necessary for the neonate in mechanical ventilation must be enough to raise the chest about 0.5 cm during the inspiratory cycle reflecting a sufficient blood gas value for adequate gas exchange. Reference values of blood gases: PaO ₂ : 45-70 mmHg and PaCO ₂ : 45-60mmHg. The desired SpO ₂ is 85-95%.
Decreased expiratory pressure	Decreased expiratory pressure is that which is insufficient to maintain adequate functional residual capacity and stabilize the alveolar volume during expiration, resulting in atelectasis.	Observe change in breathing pattern associated with blood gas and radiological changes evidencing insufficient lung volume to include 8-9 posterior costal arches. In neonates in mechanical ventilation, decreased expiratory pressure can be observed in the monitor as a lower positive expiratory end pressure (PEEP) than that necessary and / or given to the patient. Reference values of blood gases: PaO ₂ : 45-70mmHg, PaCO ₂ : 45-60mmHg. The desirable SpO ₂ is 85-95%.
Tachypnea	Tachypnea is the medical term used to describe neonatal respiratory rate (RR) persistently > 60 breaths per minute at rest.	Identify inspiratory movements by observation of thoracic expansion or by pulmonary auscultation, of a value > 60 breaths during the period of one minute.
Use of accessory muscles to breathe	Consists of the profound use of internal muscles called "accessories" and visible by the retraction of muscles, represented, during inspiration, by the sternocleidomastoid, scalenes and external intercostals and, on expiration, the internal intercostals, internal and external obliques, the rectus, transverse abdominals and the intercostals that aid in inspiration and expiration in order to provide improved gas exchange.	Observe active and visible effort of accessory muscles characterized by retraction of the suprasternal, intercostal, subdiaphragmatic, sternal, subcostal and of the xiphoid process.
Decreased minute ventilation	Decreased ventilation or minute volume is when the amount of air that enters and exits the lungs for one minute is insufficient for adequate ventilation. It is the result of an insufficient respiratory rate and depth of respiration, determining volume (inspiratory and expiratory) of < 200-480 mL/Kg during the period of one minute.	Observe change in breathing pattern characterized by oscillation of frequency and depth of breathing, may be associated with gasometrical signs of hypercapnia with possible decreased oxygen saturation, and use of accessory muscles to breathe. Reference values of blood gases: PaO ₂ : 45-70mmHg, PaCO ₂ : 45- 60mmHg, SpO ₂ 85-95%.
Expiratory grunt	Sound produced during exhalation, when the air is forced into the partially closed glottis.	Identify fine sound, of low intensity, similar to a groan, during expiratory cycle, audible with or without the aid of pulmonary auscultation performed in the upper thoracic region.

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Decreased vesicular murmur	Decreased vesicular murmur is the reduction of audible noise produced by the friction between the air and the lung tissues during inspiration, resulting in decreased focal or diffuse lung ventilation.	Position the diaphragm of the stethoscope on the anterior, posterior and lateral regions of the thorax of the newborn, from the apex to the lung bases, alternating auscultation between the same anatomical areas of both hemithorax. It is considered to be a diminished sound when respiratory auscultation reveals decreased physiological respiratory sounds.
Impaired Gas Exchange (00030) Definition: Excess or deficit in oxygenation and/or carbon dioxide elimination at the alveolar-capillary membrane.		
Defining characteristics	Conceptual definition	Operational definition
Restlessness	Restlessness is a state of agitation, irritability, or physical excitement and may be due to hypoxemia or hypercapnia.	Observe restlessness or excessive motor activity, with difficulty with being consoled.
Nasal flaring	Nasal flaring is the movement of the nasal flap during inspiration, in a physiological attempt to decrease the resistance of the upper airway and work of respiration in order to increase tidal volume.	Observe opening and closing of the nares during the inspiratory and expiratory phase of the respiratory cycle.
Abnormal skin color (pale, dusky)	Abnormal skin color is characterized by alteration of the pink coloration of the newborn that can be darkened, bluish or pale, indicating hemodynamic impairment or flushed due to vasodilation occurring with hypercapnia (hypoperfusion or hypoxemia).	Observe, through inspection, skin that is a little rosy with darkened coloring, cyanotic, pale or flushed.
Cyanosis	Cyanosis is a bluish color of mucosa, skin and nail bed of the child, expressing low arterial oxygen saturation and is the result of the increased amount of reduced hemoglobin or deoxyhemoglobin with purplish-blue color in the blood (amount > 5g/dL).	Observe bluish discoloration of the extremities, nail beds, perioral region, tongue and mucosa, or generalized.
Decreased carbon dioxide	The decreased partial pressure of carbon dioxide (PaCO ₂) refers to the amount of carbon dioxide in arterial blood < 35mmHg and reflects a state of alveolar hyperventilation.	Identified through arterial gasometry, the level of PaCO ₂ less than the minimum reference values. PaCO ₂ in 10 minutes of life: 4 mmHg; PaCO ₂ at 3rd day of life: 35mmHg; PaCO ₂ at 2nd day of life: 33mmHg and PaCO ₂ of newborn: 35mmHg.
Diaphoresis	Diaphoresis can be defined as an intense transpiration, profuse sweating or intense sweating.	Observe intense sweat on body surface of the newborn.
Dyspnea	Dyspnea is the medical term used for difficulty in breathing. It is characterized by increased effort to breathe and is manifested by alterations in the normal breathing pattern.	Identify signs of respiratory distress with changes in frequency, rhythm, expansion and muscular effort to breathe, manifested by nasal flaring, prolonged expiration and abnormal thoracic cage retractions: suprasternal, supraclavicular, subcostal, intercostal, sternal and of the xiphoid process.
Abnormal arterial blood gases	The abnormal blood gases designation refers to values of PaO ₂ < 50 mmHg or > 70 mmHg, PaCO ₂ < 40mmHg or > 60mmHg; SaO ₂ < 85% or > 95%. Consider the changes that occur in the first days of life and during cardiopulmonary adaptation period before stabilization of the neonate.	Interpret the changes of arterial blood gases within a clinical context, considering the adaptations of the newborn to extrauterine life. Reference value for newborn: PaO ₂ : 50-70mmHg, PaCO ₂ 40-60mmHg, SaO ₂ : 85-95%.
Hypercapnia	Hypercapnia refers to the amount of CO ₂ > 60mmHg in arterial blood of the newborn and reflects inadequate alveolar ventilation and the inability of the lungs to remove CO ₂ .	Identify through the arterial gasometry PaCO ₂ >60mmHg. Reference value: PaCO ₂ = 45-60mmHg.
Hypoxemia	Hypoxemia means PaO ₂ in the arterial blood of newborns < 40mmHg, with eventual insufficient oxygenation of tissues and organs.	Identify through the arterial gasometry a PaO ₂ < 40mmHg or SaO ₂ < 85%.
Hypoxia	Hypoxia is defined as inadequate oxygen supply to the tissues, impairing their normal metabolic functions. Hypoxemic hypoxia is the episode in which the blood that supplies the tissue shows a decreased amount of oxygen, causing insufficient oxygen delivery to the tissues, either with or without signs of hemodynamic compromise.	Identify hypoxemic hypoxia, through the arterial blood gases, with a PaO ₂ < 40mmHg, and in the pulse oximetry a SpO ₂ < 85%.
Irritability	Irritability is a behavioral response to adverse stimuli, characterized by agitation, crying, whimpering or shaking.	Observe excessive or exaggerated reaction of children to stimuli, prolonged crying to manipulation or aversive factors, or changes in oxygen saturation with ineffective response to attempts of comfort. ntativas de consolo.
Abnormal arterial pH	Abnormal arterial pH in the newborn is characterized by values < 7.25 or > 7.45.	Interpret changes in pH in the blood through the arterial gasometry, considering changes in values resulting from adaptation of the newborn to extrauterine life. Reference value: 1 st hour of life, pH = 7.20, 6 th hour of life, pH = 7.25; > 6 hours of life, pH = 7.30.
Impaired Spontaneous Ventilation (00033) Definition: Decreased energy reserves resulting in an inability to maintain independent breathing that is adequate to support life.		
Defining characteristics	Conceptual definition	Operacional definition
Increased restlessness	Restlessness is a state of agitation, irritability, or physical excitement and may be due to hypoxemia or hypercapnia.	Observe restlessness or excessive motor activity, with difficulty with being consoled.
Dyspnea	Dyspnea is the medical term used for difficulty in breathing. It is characterized by increased effort to breathe and is manifested by alterations in the normal breathing pattern.	Identify signs of respiratory distress with changes in frequency, rhythm, expansion and muscular effort to breathe, manifested by nasal flaring, prolonged expiration and abnormal thoracic cage retractions: suprasternal, supraclavicular, subcostal, intercostal, sternal and of the xiphoid process.
Increased heart rate	Increased heart rate (HR) is that which is > 20-25% the baseline value presented by the neonate in the last 24 hours, which can progress to values > 160bpm and characterize tachycardia when lasting more than 10 minutes.	Auscultate the heartbeat with the stethoscope diaphragm positioned at the apex of the heart in the 2 nd intercostal space at the left the midclavicular line for a period of one minute. Consider HR increased when the values are above the baseline of neonates and tachycardia if > 160 bpm. Reference value: HR = 120-160 bpm.

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Increased PCO ₂	The increased pressure of carbon dioxide in arterial blood (PaCO ₂) in the newborn refers to the amount of carbon dioxide > 60 mmHg and reflects alveolar hypoventilation and an inability of the lungs to remove carbon dioxide.	Identify, through the arterial gasometry, PaCO ₂ > 60mmHg. Reference value: PaCO ₂ = 40- 60mmHg.
Decreased PO ₂	The decreased partial pressure of oxygen in the arterial blood (PaO ₂) in the newborn, refers to the amount of oxygen <40mmHg and reflects the decrease of blood oxygenation and oxygen transport to the tissues.	Identify, through the arterial blood gases, a PaO ₂ < 40mmHg. Reference value: PaO ₂ : 40-70mmHg.
Decreased SaO ₂	The decreased arterial oxygen saturation (SaO ₂) in the newborn refers to the amount of oxygen-carrying hemoglobin < 89%, accepting values < 85% in infants with chronic pathologies.	Identify, through the arterial blood gases, a PaO ₂ < 40mmHg. Reference value: PaO ₂ : 40-70mmHg.
Increased metabolic rate	Metabolic rate (BMR) or increased energy expenditure is that greater than expected for age range, measured by indirect calorimetry with values > 40-50 kcal/kg/day.	Measure BMR or energy expenditure using the formula proposed by FAO/WHO / UNU (1985). For female children 0-3 years old, use (61.0 x W) - 54, and for males use (60.9 x W) - 54, where W = weight in kg. Values > 40-50 kcal/Kg are considered elevated.
Increased use of accessory muscles	Consists of the profound use of internal muscles called "accessories" and visible by the retraction of muscles, represented, during inspiration, by the sternocleidomastoid, scalenes and external intercostals and, on expiration, the internal intercostals, internal and external obliques, the rectus, transverse abdominals and the intercostals that aid in inspiration and expiration in order to provide improved gas exchange.	Observe active and visible effort of accessory muscles characterized by retraction of the suprasternal, intercostal, subdiaphragmatic, sternal, subcostal and of the xiphoid process.
Decreased tidal volume	Decreased tidal volume (TV) is characterized by an amount of inspired and expired gas (mL/Kg), in each respiratory cycle, < 4 mL/Kg, with insufficient gas exchange for the neonate.	Perform tidal volume measurement using spirometry and consider it to be reduced when the values are < 4mL/Kg. Reference value: TV = 4- 8 mL/Kg.

FAO – Food and Agriculture Organization of the United Nations; WHO – World Health Organization; UNU – United Nations University

Discussion

The limitations of the results of this study are related to the number of specialized professional participants from a university/hospital. On the other hand, the methodology used for the development and refinement of the definitions permitted that two rounds of the administration of the questionnaire were sufficient to achieve high consensus.

Providing conceptual and operational definitions of the defining characteristics for the three respiratory nursing diagnoses represents an important contribution so that clinical nurses can identify, in a precise manner, these signs and symptoms in the newborn. It is a tool that allows the identification of an appropriate nursing diagnosis and enables the proposition of more appropriate interventions for the clinical situation, leading to the safest care for the neonate.

As the 46 defining characteristics of the three nursing diagnoses were analyzed, eight were related to signs or symptoms that were not measurable in the newborn. As neonates do not verbalize what they feel, and only use nasal breathing, the characteristics of *headache upon awakening*, *confusion*, *visual disturbances*, *reports apprehension*, *decreased cooperation*, *breathing with pursed lips*, *orthopnea* and *assumption of three-point position* were removed.

However, two common signs of respiratory distress in this population, encountered in reference literature, *grunting* and *decreased vesicular murmur* were included.⁽¹²⁻¹⁴⁾

Of the 40 defining characteristics submitted, 26 (65.0%) obtained an agreement greater than 80%.

Of these, 12 (30.0%) defining characteristics obtained 100% agreement and 14 (35%) received suggestions, accepted in the first stage of evaluation. Of these, 11 (27.5%) received recommendations regarding format, two (5.0%) related to format and concept, and one (2.5%) only as a concept.

The suggestions as to the format were accepted, since these were grammatical adjustments. The suggestions regarding the concept of three defining characteristics were related to reference values that were confirmed in the literature.

Of the other 14 (35.0%) defining characteristics that achieved less than 80% consensus, in eight (57.0%), the disagreement was related to format, five (35.0%) were about the concept, and one (7.0%) about the format and the concept. After these were structured according to the suggestions and submitted to a second round of evaluation by the experts, these defining characteristics obtained an agreement higher than 80% and were considered acceptable.

Summarizing, of the 40 defining characteristics, thirteen (28%) received suggestions related to the format or concept, nine (22.5%) about the concept, and six (15%) needed to be rewritten. The data seemed to indicate that the preliminary study with the group of experts that developed the definitions resulted in material that adequately reflected the researched subject.

The knowledge acquired with the studies about nursing diagnosis provides a scientific basis for patient care planning of different populations and contributes to nursing actions that are directed to measurable and safer outcomes. Particularly, those with respiratory problems, hospitalized in intensive care units, or those pertaining to specific populations, such as newborns, who require further studies to support the clinical practice of the nurse.

The development of definitions for indicators of nursing diagnoses is recommended by researchers of diagnostic validation. In research, the conceptual and operational definitions allow one to improve the reliability and validity of data related to the studied nursing diagnosis, facilitate replication by other researchers, and provide clear and objective information about what will be assessed and how it will be evaluated. Knowing how the defining characteristics were operationalized is essential to evaluate research, outcomes, conclusions and to identify criteria that can be used in clinical practice.⁽⁶⁾

While the conceptual definition expresses the abstract or theoretical sense of the concept being studied, whose final result has the purpose of giving meaning to this concept for those who are studying it, the operational definition specifies the operation that should be completed to collect necessary information in terms of procedures by which the concept should be measured.

The non-use of the operational definition produces inconsistent outcomes on assessments by nurses, when compared to outcomes obtained by nurses who do use them.⁽⁶⁾

In clinical practice, the definitions of the defining characteristics of nursing diagnoses provide subsidies for nurses to identify the same signs and symptoms corresponding to the real condition of

the child. However, a set of definitions developed for one population is not necessarily appropriate for another, so there is a need for specific studies and distribution of the results for use in clinical practice. It was in this context that the study just described was situated, which, although it was developed based on the opinion of a small number of experts from a single institution, represents an initial contribution to fill this gap.

Despite the fact that several clinical validation studies have been conducted and have reported the development of operational and/or conceptual definitions of the defining characteristics of the diagnoses involved, their content is not available for practical use, suggesting that the use of these definitions are restricted to the field of research.^(6,15-17)

The development of a database, with conceptual and operational definitions for the characteristics of nursing diagnoses, represents team work that should be encouraged among nurses who study the NANDA-I taxonomy, and it is a topic of discussion of current research.

Conclusion

The conceptual and operational definitions of the defining characteristics of the nursing diagnoses, *ineffective breathing pattern*, *impaired gas exchange* and *impaired spontaneous ventilation* were developed, validated and achieved a high degree of consensus.

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Collaborations

Avena MJ; Pedreira MLG and Gutiérrez MGR, declare that they contributed to the conception and design, analysis and interpretation of data, drafting of the article, relevant critical revision of the intellectual content, and final approval of the version to be published.

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