Article

Concept Analysis of the Nursing Diagnosis of Impaired Spontaneous Ventilation in Critical Patients

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Theme: Epistemology

Contribution to the discipline: Concept analyses are types of theoretical studies that contribute to advances in nursing knowledge. Thus, this study enabled a better understanding of the Nursing Diagnosis Impaired Spontaneous Ventilation in critically ill patients based on antecedents, critical and consequent attributes.

Abstract

Introduction: In nursing practice, this concept has been identified in studies that address the nursing diagnosis of impaired spontaneous ventilation. Nursing performance facing this unwanted human response is considered essential for the maintenance and control of vital signs, cardiovascular monitoring, gas exchange and respiratory pattern, as well as constant surveillance aimed at signs of hypoventilation and inadequate ventilation. **Objective:** To analyze the concept of impaired spontaneous ventilation in critically ill patients in an intensive care unit. **Methodology**: This study is a concept analysis, according to Walker's and Avant's method, conducted using an integrative review. All the referential steps were followed: concept selection, determining the objectives and proposals for concept analysis, identifying the possible uses of the concept, determining the defining attributes, identifying a model case, identifying a contrary case, and identifying the precedents and consequences of the concept. **Results:** A sample of 38 studies was selected. The following were identified as attributes: distress and fatigue, respiratory distress, tachycardia, hemodynamic instability, altered mental status, abnormal arterial blood gas results, dyspnea, anxiety, agitation, sweating, hypoxemia and hypercapnia. Antecedents: sex, age, oxygen saturation lower than 90%, diseases of the respiratory, cardiovascular, neurological, gastrointestinal, neuromuscular, and metabolic systems, respiratory infections, trauma, poisons, toxins, and sedatives. Consequences: increased heart rate, decreased partial oxygen saturation, increased use of respiratory muscles, dyspnea, increased metabolic rate and restlessness. The model case and the contrary case were used to illustrate the attributes, antecedents, and consequences. **Conclusion:** The study directed the strengthening of evidence about the phenomenon and demonstrated a strong occurrence in patients who need assistance in intensive care units, thus demanding critical care.

Keywords (Fonte: DeCS)
Pulmonary ventilation; respiratory failure; intensive care units; nursing; nursing diagnoses.

Análisis de concepto del diagnóstico de la ventilación espontánea deteriorada en pacientes críticos

Resumen

Introducción: en la práctica de enfermería, este concepto fue identificado en estudios que abordan el diagnóstico de la ventilación espontánea deteriorada. La actuación desde enfermería para enfrentar esta indeseada respuesta humana es esencial para el mantenimiento y el control de los signos vitales, el monitoreo cardiovascular, el intercambio de gases y el patrón de respiración, así como para la vigilancia constante de los signos de hipoventilación y ventilación inadecuada. **Objetivo:** analizar el concepto de ventilación espontánea deteriorada en pacientes críticos en una unidad de cuidado intensivo. **Metodología:** Este estudio es un análisis de concepto, de acuerdo con el método de Walker y Avant, conducido usando una revisión integrada. Se siguieron todos los pasos referenciales: selección del concepto, determinación de los objetivos y propuestas para el análisis de conceptos, identificación de los posibles usos del concepto, determinar los atributos definitorios, identificación del caso modelo, identificación del caso contrario e identificación de precedentes y consecuencias del concepto. **Resultados:** se seleccionó una muestra de 38 estudios. Se identificaron como atributos: angustia y fatiga, dificultad respiratoria, taquicardia, inestabilidad hemodinámica, estado mental alterado, gasometría arterial anormal, disnea, ansiedad, agitación, sudoración, hipoxemia e hipercapnia. Antecedentes: sexo; edad; saturación de oxígeno inferior al 90%; enfermedades de los sistemas respiratorio, cardiovascular, neurológico, gastrointestinal, neuromuscular y metabólico; infecciones respiratorias; traumatismos, y venenos, toxinas y sedantes. **Consecuencias:** aumento del ritmo cardíaco, disminución de la saturación parcial de oxígeno, aumento del uso de los músculos respiratorios, disnea, aumento del índice metabólico e inquietud. Se utilizaron el caso modelo y el caso contrario para ilustrar los atributos, antecedentes y consecuencias. **Conclusión:** el estudio dirigió el fortalecimiento de la evidencia sobre el fenómeno y demostró una fuerte ocurrencia en pacientes que necesitan asistencia en unidades de cuidados intensivos, quienes requieren, en consecuencia, de cuidados críticos.

Palabras clave (Fuente: DeCS)
Ventilación pulmonar; falla respiratoria; unidad de cuidados intensivos; enfermería; diagnósticos de enfermería.

Análise conceitual do diagnóstico de ventilação espontânea prejudicada em pacientes críticos

Resumo

Introdução: na prática da enfermagem, esse conceito foi identificado em estudos que abordaram o diagnóstico de ventilação espontânea prejudicada. A atuação da enfermagem para enfrentar essa resposta humana indesejável é essencial para a manutenção e o controle dos sinais vitais, da monitorização cardiovascular, das trocas gasosas e do padrão respiratório, bem como para a vigilância constante dos sinais de hipoventilação e ventilação inadequada. **Objetivo:** analisar o conceito de ventilação espontânea prejudicada em pacientes graves internados em uma unidade de terapia intensiva. **Materiais e método:** este estudo é uma análise conceitual, de acordo com o método de Walker e Avant, realizada por meio de uma revisão integrada. Todas as etapas referenciais foram seguidas: seleção do conceito, determinação dos objetivos e proposições para a análise do conceito, identificação dos possíveis usos do conceito, determinação dos atributos definidores, identificação do caso-modelo, identificação do contracaso e identificação dos precedentes e consequências do conceito. **Resultados:** foi selecionada uma amostra de 38 estudos. Os atributos identificados foram angústia e fadiga, angústia respiratória, taquicardia, instabilidade hemodinâmica, estado mental alterado, gases sanguíneos arteriais anormais, dispneia, ansiedade, agitação, sudorese, hipoxemia e hipercapnia. **Antecedentes:** sexo; idade; saturação de oxigênio inferior a 90%; doenças dos sistemas respiratório, cardiovascular, neurológico, gastrointestinal, neuromuscular e metabólico; infecções respiratórias; trauma; e venenos, toxinas e sedativos. **Consequências:** aumento da frequência cardíaca, diminuição da saturação parcial de oxigênio, aumento do uso dos músculos respiratórios, dispneia, aumento da taxa metabólica e inquietação. O caso-modelo e o caso oposto foram usados para ilustrar os atributos, os antecedentes e as consequências. **Conclusões:** o estudo teve como objetivo fortalecer as evidências sobre o fenômeno e demonstrou uma forte ocorrência em pacientes que necessitam de assistência em unidades de terapia intensiva e que, consequentemente, requerem cuidados críticos.

Palavras-chave (Fonte DeCS)
Ventilação pulmonar; insuficiência respiratória; unidade de terapia intensiva; enfermagem; diagnósticos de enfermagem.

Introduction

This research has as its object of study the analysis of the concept of Impaired Spontaneous Ventilation (ISV). In nursing practice, this concept has been identified in studies that address the nursing diagnosis of impaired spontaneous ventilation, often attributed in clinical practice to patients with a higher level of severity, who are usually assisted in intensive care units and using invasive mechanical ventilation (1).

The nursing diagnosis (ND) of ISV was added to the taxonomy "NANDA-International Nursing Diagnoses" in 1992, in domain 4, "activity/rest," and is defined as the "Inability to initiate and/or maintain independent breathing that is adequate to support life" (2).

As a clinical condition that predisposes to ISV, acute respiratory failure (ARF) stands out as the main indication for mechanical ventilation. Nursing performance facing this unwanted human response is considered essential for the maintenance and control of vital signs, cardiovascular monitoring, gas exchange and respiratory pattern, as well as constant surveillance aimed at signs of hypoventilation and inadequate ventilation, in addition to assessing the level of anxiety (3). Therefore, it requires from the nurses, scientific knowledge and sufficient skills for decision-making, from the theoretical-conceptual level to the management of this clinical condition through critical reasoning.

Nursing care for patients with ISV in a scenario where there is indisputably a demand for the implementation of Resolution 358/2009, must be based on the nursing process (NP), a working instrument for nurses that materializes the Systematization of Nursing Care. The use of standardized language systems, such as NANDA-I in the NP, contributes to standardizing the knowledge of the profession, in addition to bringing legitimacy to nursing records (4).

Taxonomy II proposed by NANDA-I classifies nursing diagnoses (ND) and guides nurses in clinical decision-making. In the current edition, NANDA-I points out the need to review ND with more recent scientific investigations to raise the level of evidence (LOE) of some diagnoses present in the taxonomy. For the ND of ISV (00333), there is a need for studies so that it remains in the next edition of the NANDA-I (2).

Linked to this, it appears that the diagnosis is regularly inferred in adult patients and several units of the health service, particularly in the intensive care unit. However, there are still gaps in the literature regarding studies focused on this diagnosis. Therefore, it is important to note the diagnosis's present definition and clinical indicators are still little explored, without contemplating broader and clearer aspects of the individual's needs.

In this perspective, regarding the respiratory function assessment scenario, accurately defining a ND becomes a potential confounder

due to the existence of several diagnoses with similar characteristics. Therefore, questions converge by relating groups of similar clinical manifestations, related to the same defining characteristics and used in a similar context (1, 2). With that, it becomes essential to favor a precise and accurate evaluation in the recognition of the phenomenon as impaired spontaneous ventilation.

Thus, understanding concepts that are closely related to nursing practice is necessary to minimize doubts when choosing between one or more diagnoses (2). Because of this and based on the homonymous ND present in NANDA-I, the study aimed to analyze the concept of Impaired Spontaneous Ventilation in patients in the context of an intensive care unit.

Methodology

This is a concept analysis based on the framework proposed by Walker and Avant (5) and for theoretical composition, an integrative literature review was carried out (6). The model chosen as analysis is justified by clarifying ambiguities and clarifying important concepts, with the expectation of favoring the development of nursing. In addition, the approach comprises the concept with characteristics and attributes capable of defining the corresponding phenomenon. Therefore, it enables the expression of attributes frequently related to the concept, which will allow the researcher to have a broad view of the elements that compose it (5).

The ISV concept was chosen to investigate it as an undesirable human response in nursing. Therefore, the decision to study it was based on the researchers' recognition of clinical practice and previous research, mainly based on previous readings and previous experiences in studies focused on critical care, intensive care unit and nursing diagnoses. Thus, it represents a phenomenon that demands precise investigation and clarification of the knowledge produced. To this end, this framework suggests the selection of a concept that highlights the researchers' greatest interest while at the same time approaching their needs (5).

The analytical model proposed by Walker and Avant analyzes the concept in eight steps. The first one is the selection of the concept; it should reflect the area of greatest interest to the researcher. In the present study, the area of interest was the ND of ISV. The second step is the objective of the analysis, which aims to answer the question of why the analysis will be performed (5). Thus, this study aims to analyze the conceptual core of the ND of ISV. In the third stage, which is the identification of the use of the concept, it is recommended to use all available literature to verify the possibilities of identifying the different attributes of the concept (5). In this way, the use of the ISV concept. The fourth step is determining the attributes, which are the characteristics that will determine the presence of the concept (5). Thus, the attributes

that define the ND of ISV. The fifth one is the identification of a model case, which is an example of using the concept that demonstrates all its attributes or defining characteristics (5). The sixth step is the identification of a contrary case and consists of clear examples that do not represent the concept (5). The seventh step is the identification of the antecedents and consequences of the phenomenon, which are the events commonly occurring before the identification of the phenomenon and all those events or occurrences that arise as a result of the phenomenon, respectively (5). The eighth step is the definition of empirical references, that is, the empirical references for the attributes, which constitute categories of real phenomena that demonstrate the occurrence of the concept (5).

Despite the reference proposing the identification of borderline, related, invented and illegitimate cases, in this study, only the model case and the opposite case were used, as these are believed to be sufficient to clarify the concept. Regarding the integrative literature review, the recommended stages were followed for the systematization of the knowledge produced and available in electronic sources of data on ISV. The stages were the identification of research questions, literature search, data assessment, analysis of results and presentation of the review. The following research questions were elaborated: What are the definitions of ISV? What are the uses of ISV? What are the attributes of the concept of ISV? What are the antecedents and consequences of the concept of ISV? What are the empirical references of ISV?

The selection of studies was conducted respecting the eligibility criteria according to Table 1. It is noteworthy that a time frame was not included for the research to identify the largest number of publications related to the subject under study.

Table 1. Eligibility criteria. Natal, RN, Brazil, 2021

INCLUSION	EXCLUSION
Full articles available in the databases	Editorials, abstracts, letters to the editor, reviews, previous notes, and expert opinions.
Articles in Portuguese, English or Spanish	
Articles addressing the theme and objectives of the study, including bibliographic reviews, guidelines, and book chapters.	

Source: Prepared by the authors.

The search was performed from March to September 2021 by a pair of researchers at the same time, using the same internet network and on different machines, in eight data sources: SciELO, ScienceDirect, PubMed (MEDLINE), Cochrane, Scopus, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science and Virtual Health Library, accessed through the portal of the Co-

ordination for the Improvement of Higher Education Personnel (CAPES). The following descriptors indexed in the MeSH (Medical Subject Headings) and DeCS (Descriptors in Health Sciences) in Portuguese, English, and Spanish were used: "Pulmonary ventilation", "Respiratory failure" and "Artificial respiration", using the four crossings: (Ventilação pulmonar OR Pulmonary ventilation OR Ventilación pulmonar) AND (Insuficiência respiratória OR Respiratory insufficiency OR Insuficiencia respiratoria) AND (Respiração Artificial OR Respiration, Artificial OR Respiración Artificial); (Ventilação pulmonar OR Pulmonary ventilation OR Ventilación pulmonar) AND (Insuficiência respiratória OR Respiratory insufficiency OR Insuficiencia respiratoria); (Ventilação pulmonar OR Pulmonary ventilation OR Ventilación pulmonar) AND (Respiração Artificial OR Respiration, Artificial OR Respiración Artificial); (Insuficiência respiratória OR Respiratory insufficiency OR Insuficiencia respiratória) AND (Respiração Artificial OR Respiration, Artificial OR Respiración Artificial).

After these crossings, other new crossings were conducted to collect more data that could reach the greatest possible number of studies focused on nursing. The following descriptors indexed in MeSH (Medical Subject Headings) and DeCS (Descriptors in Health Sciences), in Portuguese, English and Spanish were used: "Pulmonary ventilation", "Intensive care units", "Nursing diagnoses" and "Nursing", using the three crossings: (Ventilação pulmonar OR Pulmonary ventilation OR Ventilación pulmonar) AND (unidades de terapia intensiva OR Intensive Care Units OR Unidades de Cuidados Intensivo) AND (diagnósticos de enfermagem OR Nursing Diagnosis OR Diagnóstico de Enfermería) AND (Enfermagem OR Nursing OR Enfermería); (Ventilação pulmonar OR Pulmonary ventilation OR Ventilación pulmonar) AND (unidades de terapia intensiva OR Intensive Care Units OR Unidades de Cuidados Intensivo) AND (diagnósticos de enfermagem OR Nursing Diagnosis OR Diagnóstico de Enfermería); (Ventilação pulmonar OR Pulmonary ventilation OR Ventilación pulmonar) AND (diagnósticos de enfermagem OR Nursing Diagnosis OR Diagnóstico de Enfermería) AND (Enfermagem OR Nursing OR Enfermería).

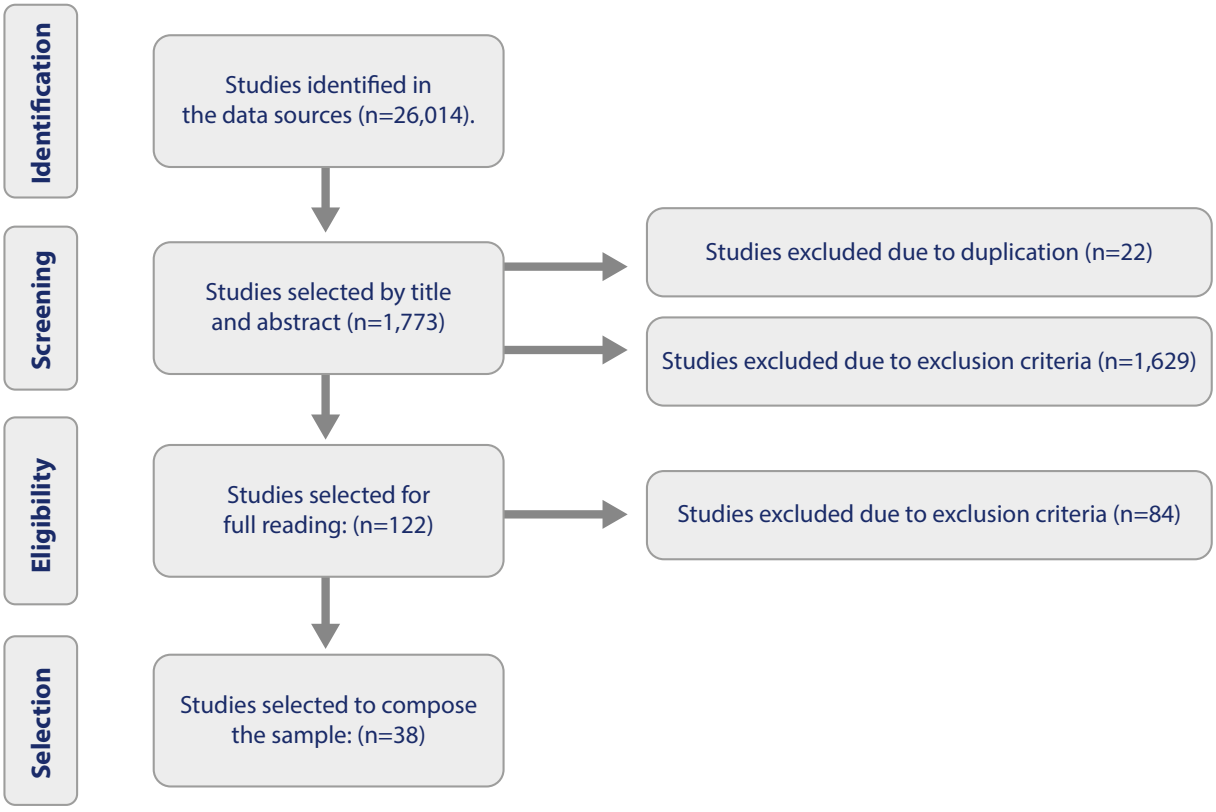
A total of 26,014 titles were found in the databases. Considering the inclusion criteria, 1,773 titles were read and selected for the second stage. Of these articles, 1,651 were excluded (1,629 did not meet the inclusion criteria and 22 were duplicated), totaling 122 publications for full reading. The final sample was composed of 38 studies (Figure 1).

After obtaining the sample, data extraction began using two instruments: a worksheet containing items related to concept analysis (uses, definitions, attributes, antecedents, consequents, and empirical references) and other items that made it possible to the characterization of the studies (title, authors, year, journal in which the study was published, country of origin, and method).

Each sample study was read in detail to extract the elements addressed in the cited instruments, which were recorded on cards. For each study in the sample, a characterization form of the studies was prepared with the elements recommended for the concept analysis and, finally, the final analysis was carried out to compile the results.

This study was conducted in public domain databases, which do not require submission to a Research Ethics Committee.

Figure 1. Flowchart of the Literature Search and Article Selection According to the PRISMA-ScR Guidelines. Natal-RN, Brazil, 2021



Source: Prepared by the authors.

Results

The sample comprises 38 studies. Among the different countries identified in the sample, the United States of America (USA) stands out with seven articles (18,4%). Other countries were identified, namely: Brazil, the United Kingdom, Denmark, Canada, Taiwan, France, China, Tunisia, Spain, The Netherlands, India, Austria, Turkey, England, Sweden, Italy, Egypt, and Mexico.

As for the year of publication, the articles date from 1987 to 2020. Of these articles, 26 (68,4%) were published in the last 10 years (2011-2020), indicating greater interest in the subject in the last decade. Regarding the method used by the studies comprising the final sample, observational studies stand out, totaling 22 articles (57,9%), as in Table 2.

Table 2. Characterization of Studies According to Authors, Year of Publication, Journal, Country, and Method. Natal, RN, Brazil, 2021

AUTHORS	YEAR	JOURNAL	COUNTRY OF ORIGIN	METHOD
Perkins GD et al. (7)	2018	JAMA	United Kingdom	Randomized clinical trial
Diaz-Abad M, Brown JE (8)	2014	J Bras Pneumol	USA	Case report
Antonio ACP et al. (9)	2017	Rev Bras Ter Intensiva	Brazil	Comparative clinical trial
Girault C et al. (10)	2011	Am J Respir Crit Care Med	Tunisia	Randomized multicenter trial
Ferreira JC et al. (11)	2017	BMC Pulm Med	Brazil	Randomized crossover trial
Hennus MP et al. (12)	2013	PLoS ONE	The Netherlands	Case control study
Teixeira SN et al. (13)	2015	Respir Care	Brazil	Prospective randomized, unblinded, controlled trial
Figueroa-casas JB et al. (14)	2010	Respir Care	USA	Prospective randomized controlled study
Raurich JM et al. (15)	2008	Respir Care	Spain	Prospective controlled study
Mokhlesi B et al. (16)	2007	Respir Care	USA	Prospective observational cohort study
Gnanapandithana K et al. (17)	2011	Rev Por Pneumologia	India	Randomized study
Putensen C et al. (18)	2001	Am J Respir Crit Care Med	Austria	Randomized prospective study
Ely EW et al. (19)	1996	N Engl J Med.	USA	Randomized and controlled trial
Deslisle S et al. (20)	2011	Respir Care	Canada	Prospective study
Andrade LZC et al. (21)	2012	Acta paul. enferm	Brazil	Observational study
Campbell ML (22)	2018	Am J Crit Care	USA	Observational study
Storm DS, Baumgartner RG (23)	1987	Int J Nurs Stud	USA	Case study
Sørensen D et al. (24)	2013	Int J Nurs Stud	Denmark	Observational study
Sørensen D et al. (25)	2013	Intensive Crit Care Nurs	Denmark	Qualitative descriptive observational study
Manfredini GMSG, Machado RG, Mantovani R (26)	2013	Journal of Nursing UFPE	Brazil	Study quantitative, exploratory, descriptive
Pertab D (27)	2009	Br J Nurs	United Kingdom	Simple review

AUTHORS	YEAR	JOURNAL	COUNTRY OF ORIGIN	METHOD
Yücel ŞÇ et al. (28)	2011	Int J Nurs Pract	Turkey	Descriptive observational study
Pattison N, Watson J (29)	2009	Nurs Crit Care	United Kingdom	Case study
Cools F, Offringa M (30)	2000	Cochrane Database Syst Rev	USA	Systematic review
Greenough A et al. (31)	2008	Cochrane Database Syst Rev	England	Systematic review
Prado PR, Bettencourt ARC, Lopes JL (32)	2019	Rev. Latino-Am. Enfermagem	Brazil	Observational study
Hsu JC et al. (33)	2013	Biomed Eng Online	Taiwan	Randomized controlled clinical trial
Kauppi W et al. (34)	2020	BMC Emerg Med	Sweden	Retrospective observational study
Jellington MO et al. (35)	2016	BMC Nurs	Denmark	Observational study
Tonnelier JM et al. (36)	2005	Crit Care	France	Prospective study
Li W et al. (37)	2016	Exp Ther Med	China	Retrospective study
Yanga L et al. (38)	2019	Medicine	China	Retrospective study
Vitacca M et al. (39)	2014	Respir Care	Italy	Observational cohort study
Rose L, Gerdtz MF (40)	2009	J Clin Nurs	Canada	Integrative review
Belveyre T, Auchet T, Levy B (41)	2019	Respir Med Case Rep	France	Case report
Mohammed H, Abdelatief D (42)	2016	Egyptian Journal of Chest Diseases and Tuberculosis	Egypt	Simple review
Liang YR et al. (43)	2020	Asian Nurs Res (Korean Soc Nurs Sci)	Taiwan	Prospective study
Hernández-Hernández G, Reynoso-García JG (44)	2019	Enferm univ	Mexico	Case study

Source: Prepared by the authors.

By analyzing the articles, it was possible to identify the components of the concept, as described below.

Identification of Uses of the Concept

The main definitions of ISV according to the literature. The definitions, authors, research source and context of use are shown in Table 3. Most definitions were used in the context of mechanically ventilated patients.

Table 3. Summary of the Main Definitions of ISV According to the Literature. Natal, RN, Brazil, 2021

DEFINITIONS	AUTHORS	RESEARCH SOURCE	CONTEXT OF USE
"Failure of the spontaneous breathing trial that makes it difficult to wean from invasive mechanical ventilation"	Perkins GD et al. (7)	CINAHL	Adults who received invasive mechanical ventilation for more than 48 hours and in whom a spontaneous breathing trial failed.
"Inability to tolerate an attempt at spontaneous breathing showing signs of respiratory distress (respiratory rate above 35 breaths per minute, arterial oxyhemoglobin saturation less than 90%, use of accessory respiratory muscles or paradoxical thoracoabdominal ventilation), tachycardia (heart rate > 140 beats per minute), hemodynamic instability (systolic blood pressure < 90 mmHg or 20% above baseline levels) or altered mental status (drowsiness, coma and anxiety)"	Antonio ACP et al. (9)	Virtual Health Library	Adults eligible for mechanical ventilation liberation.
"Inability to sustain pulmonary function and protect the airway"	Deslisle S et al. (20)	Scopus	Mechanically ventilated patients recovering from a respiratory failure of various causes.
"Inability to initiate and/or maintain adequate independent breathing to support life"	Herdman TH, Kamitsuru S, Lopes CT (2)	Book	Definition of the nursing diagnosis ISV (NANDA-International).

Source: Prepared by the authors.

Therefore, the synthesis of the definition for ISV can be understood as "an inability to maintain spontaneous breathing and sustain pulmonary function to protect the airway."

Identification of Empirical References

The Spontaneous Breathing Trial (SBT), Respiratory Distress Observation Scale (RDOS), and arterial blood gas were selected according to the possibility of demonstrating the occurrence of ISV. The latter two are empirical references capable of application by nurses, which will be described below.

Spontaneous Breathing Trial (SBT)

The spontaneous breathing trial consists of the use of a T-piece by the patient, in which the patient is disconnected from mechanical ventilation, and can be connected to supplemental oxygen, lasting from 30 to 120 minutes. The patient is observed for signs of intolerance to the trial, such as tachypnea, tachycardia, agitation, or diaphoresis. If these signals are present during the previously mentioned time interval of two minutes, the test result is faulty. SBT can also be performed with low levels of pressure support (5 to 7cm-H2O), use of CPAP, Proportional Assisted Ventilation (PAV) and ATC (Automatic Tube Compensation) mode.

Although clinical decisions related to the weaning process from mechanical ventilation are taken by the medical professional, in UK countries, for example, the initiation of SBT and its respective monitoring are performed by nurses together with the respiratory therapist (19).

Respiratory Distress Observation Scale (RDOS)

The RDOS is an ordinal scale used to measure the respiratory difficulty of critically ill or near-death adult patients who are unable to self-report dyspnea, being widely used in patients who are in the intensive care unit (ICU). It consists of 8 items, where each variable is scored from 0 to 2 points, at the end the points are added, and may range from 0 to 16. The scale scores range from 0 to 2, which suggests the absence of respiratory distress, a score of 3 indicates mild distress, a score of 4 to 6 suggests moderate distress, and a score of 7 or more indicates a severe level of distress (22).

Arterial Blood Gas

Arterial blood gas is constantly used in ICU and emergency departments to check the patient's respiratory status. Nurses, in turn, are directly related to obtaining and analyzing the results of arterial blood gas, and it is essential that nurses working in the ICU are aware of the interpretation to identify ventilation disorders and avoid inappropriate treatments (42).

Critical Attributes

The attributes found were distress and fatigue, respiratory distress, tachycardia, hemodynamic instability, altered mental status, abnormal arterial blood gas results, dyspnea, anxiety, agitation, sweating, hypoxemia, and hypercapnia.

Distress and Fatigue

They are characterized by physiological changes [signs of respiratory distress, tidal volume (L) greater than 105 min-¹1-¹, hemodynamic

instability, tachycardia and cardiac arrhythmias], clinical changes (anxiety, depressed mental state, sweating, cyanosis and increased respiratory effort – dyspnea, facial expression of distress and use of accessory muscles) and arterial blood gases (partial oxygen less than 8 kPa, FiO2 greater than 0.5 or partial oxygen saturation less than 90%, partial carbon dioxide greater than 6.5 kPa or an increase greater than 1kPa and pH less than 7.32) (7).

Respiratory Distress

The signs of respiratory distress are respiratory rate above 35 breaths per minute, arterial oxyhemoglobin saturation below 90%, use of accessory respiratory muscles or paradoxical thoracoabdominal ventilation (9).

Tachycardia

It is characterized as >140 heartbeats per minute (9).

Hemodynamic Instability

It occurs when systolic blood pressure is less than 90 mmH or 20% above baseline levels (9).

Altered Mental Status

It is characterized by drowsiness, coma, and anxiety (9).

Abnormal Arterial Blood Gas Results

It is characterized as abnormal when there are changes in the standardized values for gas exchange, ventilatory disorders and acid-base balance in arterial blood (42).

Dyspnea

It is characterized by a subjective experience of respiratory distress that presents itself in different sensations and may vary in intensity (22). The other attributes found were anxiety (9, 13, 15, 16, 19, 25, 29), agitation (10, 13, 15, 16, 17), sweating (10, 13, 15), hypoxemia (11, 27), and hypercapnia (37).

Antecedents and Consequences

Antecedents

Intrinsic factors are male sex and mean age of 53.3 years (older age: 71 years; younger age: 90 days), oxygen saturation lower than 90% (16), acute or chronic hypercapnic respiratory failure

(10) of different etiologies, being more common Chronic Obstructive Pulmonary Disease and Acute Respiratory Distress Syndrome (9, 14, 10, 17, 13).

Other comorbidities or clinical conditions predispose the emergence of ISV, such as amyotrophic lateral sclerosis (8); congestive heart failure with an ejection fraction less than 45%, left ventricular diastolic dysfunction, kidney replacement therapy, ascites (9); respiratory syncytial virus with infection in the lower respiratory tract (12); head trauma, obesity (13), multiple traumas, neurological urgency (14); imbalance between ventilatory demand and work capacity and work endurance(15); neuromuscular disorders, poisons and toxins (17); use of sedatives such as sufentanil and midazolam (18); pneumonia, gastrointestinal tract diseases, cancer, overdose or ketoacidosis (19); tachypnea, hypertension and hypercapnia (20).

Consequences

This analysis found some implications, namely: increased heart rate (7, 9, 13, 14, 18), decreased partial oxygen saturation (9, 13, 18), increased use of respiratory muscles (9, 18), dyspnea (7), increased metabolic rate (14, 18) and agitation (14). It should be noted that these consequences are in line with the defining characteristics of the ISV diagnosis present in the NANDA-I diagnostics taxonomy (2).

Identification of a Model Case and a Contrary Case

For this stage, the following fictitious case was constructed:

Model case

Mr. José, 53 years old, was admitted to the ICU due to respiratory failure. During hospitalization, he had oxygen saturation <90% and was unable to sustain breathing spontaneously, requiring invasive mechanical ventilation. After a week in the ICU, he was screened to perform the SBT but was unsuccessful. At the time of the trial, he presented sweating, agitation, tachycardia, use of accessory muscles and dyspnea. He returned to MV, but even so, he developed severe hypoxemia with respiratory acidosis.

Contrary Case

Lúcia, 25 years old, presented cough, afternoon fever, night sweats, tiredness and fatigue for more than 15 days. She went to the family health unit in her neighborhood and the nurse requested a smear. The examination detected the presence of Koch's bacillus and Lúcia was referred to a medical consultation to continue the treatment and start the use of tuberculostatic drugs. Despite her tiredness and fatigue, Lúcia was able to breathe spontaneously in ambient oxy-

gen, saturating at 96% and does not require hospitalization. Her follow-up occurs on an outpatient basis with medical consultations and through home visits by nurses.

Discussion

The advancement of knowledge on the subject allowed us to identify a strong trend in research on the phenomenon, with emphasis on the last ten years. It is believed that in the current health context, where there is a predominance of diseases with patterns of respiratory tract involvement, the ND of ISV tends to be frequently attributed to patients, which makes it necessary to clarify the concept. The need for clarification regarding the diagnostic concept of ISV was pointed out by a study that showed this conceptual core caused confusion when confronted with another ND, which could compromise diagnostic accuracy (1).

The selected studies identified that the phenomenon of ISV has been strongly associated with critical environments as a care context, especially in patients using MV. This finding corroborates a study that showed that nurses commonly infer the ND of ISV in patients using MV in the ICU (4-1). Added to these considerations, factors such as agitation, dyspnea, hypoxemia, irritability, decreased cooperation, increased heart rate and decreased partial pressure of oxygen and increased use of accessory muscles are commonly identified in patients with ISV (21). In addition, patients undergoing deep sedation for surgical procedures may present ISV (45).

The literature points to empirical references of ISV that can be measured by other health professionals, in addition to nurses. Among them is pulmonary ultrasound, which can be used during spontaneous breathing attempts to check for impediments to successful extubation. This imaging method is based on the interpretation of artifacts, that is elements resulting from the interaction between air and fluids in the lungs, such as the loss of pulmonary aeration (9). Also noteworthy is the daily screening to assess mechanical ventilator parameters, cough reflex and use of sedatives and vasopressors. And it can be used together and in a stage prior to SBT (19).

As in the current health pandemic scenario caused by COVID-19, the role of nurses in critical patients with ISV is essential. This is because the virus named SARS-CoV-2 is responsible for causing acute respiratory distress syndrome (ARDS) in about 70% of patients admitted to the ICU. In addition, among those requiring invasive mechanical ventilation, there are records of a 97% mortality rate, and of these deaths, 53% are caused by respiratory failure (46).

The role of nursing becomes essential for patients who develop ISV. Nurses are responsible for identifying health/disease situations, implementing results, interventions and nursing care (47).

For the ISV ND contained in NANDA-I, the Nursing Outcomes Classification (NOC) suggests some of the following nursing outcomes: response to mechanical ventilation in adults (alveolar changes and tissue perfusion are expected to be effectively served by the MV); response to weaning from mechanical ventilation in adults (it is expected that there will be a respiratory and psychological adaptation to weaning from mechanical ventilation); drug response (the therapeutic effects of prescribed drugs are expected to be achieved); prevention of aspiration (intended to prevent the passage of liquids and solid particles to the lung); pulmonary tissue perfusion (adequate blood flow through the pulmonary vasculature must be maintained to perfuse alveoli/capillary unit); state of psycho-spiritual comfort; and cardiopulmonary status (adequacy of the volume of blood ejected from the ventricles and exchange of carbon dioxide and oxygen at the alveolar level is expected (48).

In addition, incorporating the stages of the NP, the sixth edition of the Classification of Nursing Interventions (NIC) brings as interventions for the ISV ND, which can be performed by nurses: medication administration, emotional support, aspiration of the airways, assistance ventilation, control of invasive and non-invasive mechanical ventilation, control of artificial airways and respiratory monitoring (49).

Furthermore, the research favors the strengthening of the level of evidence of the nursing diagnosis based on the analysis of the concept, and thus allows the solidification of knowledge, presenting the representativeness of its components, constituting higher and desired levels of scientific evidence to promote its permanence in the taxonomy.

For this reason, it facilitates the standardization of language among nursing professionals, based on communication and decision-making through the development of taxonomies with the precise and accurate recognition of this human response. Thus, it promotes a solidified classification arrangement, based on evidence, and with conceptual organization resulting from continuous evaluation, clarification and refinement, essential aspects for promoting the consolidation of the nursing process.

Conclusion

The study found, as essential attributes for the occurrence of the phenomenon, distress and fatigue, respiratory distress, tachycardia, hemodynamic instability, altered mental status, abnormal arterial blood gas results, dyspnea, anxiety, agitation, sweating, hypoxemia and hypercapnia.

The definition identified for the concept specifies the understanding of the phenomenon since the analysis reveals the relevance and emphasis of a harmful and disabling condition, which can be avoided through accessible nursing interventions. Thus, understanding this human response represents progress in its study by defining and synthesizing ISV in a typical and predisposed scenario.

This analysis of the concept of ISV provided the strengthening of evidence about a phenomenon commonly identified in nursing care practice that is little debated regarding the diagnostic concept. The antecedents found through the integrative literature review indicate that ISV is not uni-causal and can be triggered by critical and varied pathological processes.

Based on the consequences, it is evident that this phenomenon can trigger long periods of hospitalization in critical environments for the patients, requiring a technological apparatus to maintain life and respiratory function. In addition, this study will strengthen the level of evidence and the feedback of nursing theory and practice, as it allows the recognition of the phenomenon in clinical practice, through the identification of its attributes, antecedents, consequences and empirical references.

Furthermore, it allows the standardization of language, by providing the enrichment of nursing taxonomies, facilitating communication and decision-making. In this way, it also contributes to the consolidation of the nursing process. Therefore, it is suggested the continuity of studies on the subject with research that can understand the phenomenon in the context of the clinical practice of nurses in different research designs.

As a limitation of the study, the integrative review method chosen to operationalize the concept analysis stands out, since the information was restricted to what was in the data sources and published in the previously selected languages. Another limitation found refers to the methodological quality of the selected studies, because to cover the maximum amount of information about the selected concept, studies with lower scientific evidence were admitted, such as case reports.

Conflict of interest: None declared

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