



REVISION STUDY

'INEFFECTIVE SPONTANEOUS VENTILATION (00033)' nursing diagnosis: a revision study

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Findings:

It is important to maintain the distinction between the nursing diagnoses "Impaired Spontaneous Ventilation" and "Ineffective Breathing Pattern" both because of the important clinical differences between them and the different types of nursing care that are required to address them.

ABSTRACT

BACKGROUND: Spontaneous ventilation, essential for human life, is addressed by the nursing diagnosis "Ineffective Spontaneous Ventilation" (ISV) which requires strong scientific support.

Aim: This revision study aimed to elevate this nursing diagnosis to a higher level of evidence by clarifying its definition, clinical indicators, and differentiation from other diagnoses. The diagnosis is crucial for identifying patients with compromised breathing who may require respiratory support.

METHODS: Researchers searched the PubMed biomedical literature database for studies (2006-2021) on the "Ineffective Spontaneous Ventilation" diagnosis.

RESULTS: The search identified 45 studies, but after applying pre-defined criteria, only 10 articles were included in the final analysis. These articles mainly focused on the accuracy of defining characteristics for the diagnosis. Despite limitations of individual defining characteristics, Impaired Spontaneous Ventilation remains a valuable nursing diagnosis for patients with respiratory issues. Utilizing clusters of these characteristics and considering the specific context can significantly enhance the accuracy of ISV diagnosis.

CONCLUSION: The findings unequivocally corroborate the definition of Impaired Spontaneous Ventilation, with eight out of ten articles providing validation. Moreover, the analysis proposes additional defining characteristics, namely dyspnea and cyanosis, to further refine the diagnosis. The clinical applicability of Impaired Spontaneous Ventilation extends to a wide range of patient populations and conditions. It serves as a critical marker for premature infants grappling with respiratory and cardiac challenges, trauma victims battling life-threatening injuries, and patients relying on mechanical ventilation in intensive care settings.

KEYWORDS: *Impaired Spontaneous Ventilation, Nursing Diagnosis, Nanda-I, Level of Evidence*

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REVISION STUDY

La diagnosi infermieristica 'INEFFECTIVE SPONTANEOUS VENTILATION (00033)': un revision study

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Riscontri:

E' importante mantenere la distinzione fra le diagnosi infermieristiche "Ventilazione spontanea compromessa" e "Modello di respirazione inefficace" sia per le importanti differenze cliniche fra le due che per i differenti tipi di assistenza infermieristica che sono richiesti per affrontarle.

ABSTRACT

INTRODUZIONE: La ventilazione spontanea è essenziale per la vita umana ed è affrontata dalla diagnosi infermieristica "Ventilazione Spontanea Compromessa" (ISV).

Scopo: Questo studio di revisione mira ad elevare questa diagnosi infermieristica a un livello di evidenza superiore, chiarendone la definizione, gli indicatori diagnostici e la differenziazione da altre diagnosi. La diagnosi è fondamentale per identificare i pazienti con problemi respiratori che potrebbero richiedere supporto respiratorio.

METODI: I ricercatori hanno effettuato una ricerca sulla banca dati medica PubMed per studi (2006-2021) sulla diagnosi di "Ventilazione Spontanea Compromessa".

RISULTATI: La ricerca ha identificato 45 studi, ma dopo aver applicato criteri predefiniti, 10 articoli sono stati inclusi nell'analisi finale. Questi articoli si sono concentrati principalmente sulla precisione degli indicatori diagnostici. Nonostante le limitazioni delle singole caratteristiche di definizione, la Ventilazione Spontanea Compromessa rimane una diagnosi infermieristica preziosa per i pazienti con problemi respiratori. L'utilizzo di insiemi di queste caratteristiche e la considerazione del contesto specifico possono migliorare significativamente l'accuratezza della diagnosi di ISV.

CONCLUSIONI: I risultati corroborano inequivocabilmente la definizione di Ventilazione Spontanea Compromessa, con otto articoli su dieci che forniscono la convalida. Inoltre, l'analisi propone ulteriori caratteristiche di definizione, ovvero dispnea e cianosi, per affinare ulteriormente la diagnosi. L'applicabilità clinica della Ventilazione Spontanea Compromessa si estende a una vasta gamma di popolazioni di pazienti e condizioni. Serve come marcatore critico per i neonati prematuri alle prese con problemi respiratori e cardiaci, le vittime di traumi che combattono lesioni potenzialmente letali e i pazienti che dipendono dalla ventilazione meccanica in terapia intensiva.

KEYWORDS: *Ventilazione Spontanea Compromessa, Diagnosi infermieristica, Nanda-I, Livello di evidenza*

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INTRODUCTION

Background

Nursing diagnosis is "a clinical judgment concerning a human response to health conditions/life process, or a vulnerability to that response, by an individual, caregiver, family, group, or community. A nursing diagnosis provides the basis for selection of nursing interventions to achieve outcomes for which the nurse has accountability" [1]. They were created to document clinical practice, as the nursing profession autonomously diagnoses and treats people's health problems. NANDA-I is an organization responsible for the control and development of a nursing diagnosis classification system. In the twelfth edition of the book *Nursing Diagnoses, Definitions and Classification 2021-2023*, NANDA International, there is a list of 40 nursing diagnoses that need to be revised and submitted to NANDA-I by the DDC Task Force or by individuals who provide revisions independently. The revision of diagnoses involves carrying out the required in-depth work to ensure an adequate level of evidence or to identify appropriate diagnostic indicators [2]. These 40 nursing diagnoses need to be revised because they are not supported by any level of evidence LOE. The levels of evidence LOE of the validity of nursing diagnoses are correlated with the consistency of the scientific evidence that supports their development or validation. These diagnoses will therefore be withdrawn from the next edition 2024-2026 of the NANDA-I Taxonomy unless additional research and

clinical trial work is done to bring them to Level of Evidence 2.1 or higher. For NANDA-I, the revision of these 40 nursing diagnoses is considered a priority to be addressed and resolved [2].

Foreground

Spontaneous ventilation is an essential autonomous process vital to human life, involving the intake of oxygen into the lungs and subsequent expulsion of carbon dioxide [3]. Inhalation, occurring through the nose or mouth, guides air through the respiratory pathways (pharynx, larynx, trachea, bronchi, and bronchioles), reaching the lung's alveoli. Gas exchange between oxygen and carbon dioxide takes place within these alveoli, enriching the blood with oxygen while expelling carbon dioxide as the oxygenated air retraces its path. The process of expelling air containing carbon dioxide is known as expiration. Whenever spontaneous ventilation is compromised, the necessity for support arises, fulfilled by mechanical ventilation [4]. person unable to initiate and/or maintain adequate spontaneous ventilation for vital support is at life risk.

We conducted a study to enable the revision of the nursing diagnosis 'Ineffective Spontaneous Ventilation' (Code 00033) to elevate it to Level 2.1.1, corresponding to the Conceptual Validity of Components. This level encompasses nursing diagnoses with evidence criteria related to the development of a conceptual analysis aimed at





clarifying the diagnosis's definition and its clinical indicators. It seeks to differentiate the nursing diagnosis from other diagnoses within the Taxonomy. NANDA International's Taxonomy II is the globally accepted classification of nursing diagnoses, comprising 13 Domains, 47 Classes, and 267 Diagnoses. The fourth domain, termed "Activity/Rest," is defined by NANDA-I as "the production, conservation, expenditure, or balance of energy resources". Within this domain lies the class "Cardiovascular/Pulmonary Responses,"

characterized as "Cardiopulmonary mechanisms that support activity/rest" [2]. This class encompasses the nursing diagnosis of Ineffective Spontaneous Ventilation (ISV). The ISV diagnosis was introduced and approved by NANDA-I in 1992 and underwent revision in 2017. It is defined as "inability to initiate and/or maintain independent breathing that is adequate to support life". The diagnosis code is 00033, with a focus on spontaneous ventilation. It consists of 10 Defining Characteristics, 1 Related Factor, and 1 Associated Condition (See Table 1).

Table 1. Diagnostic Indicators of Nursing Diagnosis: Ineffective Spontaneous Ventilation.

Diagnostic Indicators	
Defining Characteristics	Apprensiveness Decreased arterial oxygen saturation Decreased cooperation Decreased partial pressure of oxygen Decreased tidal volume Increased accessory muscle use Increased heart rate Increased metabolic rate Increased partial pressure of carbon dioxide (PCO ₂) Psychomotor agitation
Related Factor	Respiratory muscle fatigue
At risk population	----
Associated Condition	Impaired metabolism

AIM

This study pursues two primary objectives: firstly, to establish the Levels of Evidence (LOE) ensuring the retention of this nursing diagnosis within NANDA-I's Taxonomy II. Secondly, to underscore the

specificity of Ineffective Spontaneous Ventilation concerning the alternate diagnosis, Ineffective Breathing Pattern (IBP) (Code 00032), despite ISV being considered inclusive in IBP as per the study

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'Analysis of ineffective breathing pattern and impaired spontaneous ventilation of adults with oxygen therapy' by Seganfredo and colleagues [5]. In fact, Ineffective Breathing Pattern is another nursing diagnosis under Domain 4, Class 4, defined as 'inspiration and/or expiration that does not provide adequate ventilation' [2]. The conclusions of the aforementioned article imply that the clinical evidence suggests the collective Defining Characteristics of the two diagnoses under study might fit better into a singular structure, hinting at the incorporation of Impaired Spontaneous Ventilation's Defining Characteristics into the nursing diagnosis of Ineffective Breathing Pattern. However, the aim remains to maintain the distinction between the two nursing diagnoses, representing two different type of ineffective human responses.

METHODS

Study selection and data extraction

PubMed biomedical literature database was utilized for research, applying temporal and linguistic filters for studies published in English, Italian, Spanish, and Portuguese between 2006 and 2021. The research activity within this database occurred from January 18 to January 25, 2022. The search string comprised keywords from the diagnostic title and its English definition for the "Impaired Spontaneous Ventilation" diagnosis, connected with Boolean operators AND and OR. The specific search string

used in PubMed was as follows: (((initiate or maintain) AND independent (breathing or respiration or respiratory)) AND "life support") OR ("impaired spontaneous ventilation").

Eligibility and Exclusion Criteria

Inclusion criteria for this study encompassed articles specifically addressing the ISV diagnosis and those examining conditions related to its definition, defining characteristics, related factors, or conditions associated with this nursing diagnosis. Exclusion criteria encompassed research on extracorporeal life support, extracorporeal oxygenation, and veterinary medicine. Studies irrelevant to the scope of this specific investigation, as well as those solely focused on mechanical ventilation and cardiopulmonary resuscitation without specific analysis of the ISV nursing diagnosis, were also excluded.

Registration

This study was registered in the NANDA International Research Registry (NANDA-IR2). (<https://NANDA.org/research-registry/impaired-spontaneous-ventilation-risk-for-self-directed-violence-chronic-pain/>).

RESULTS

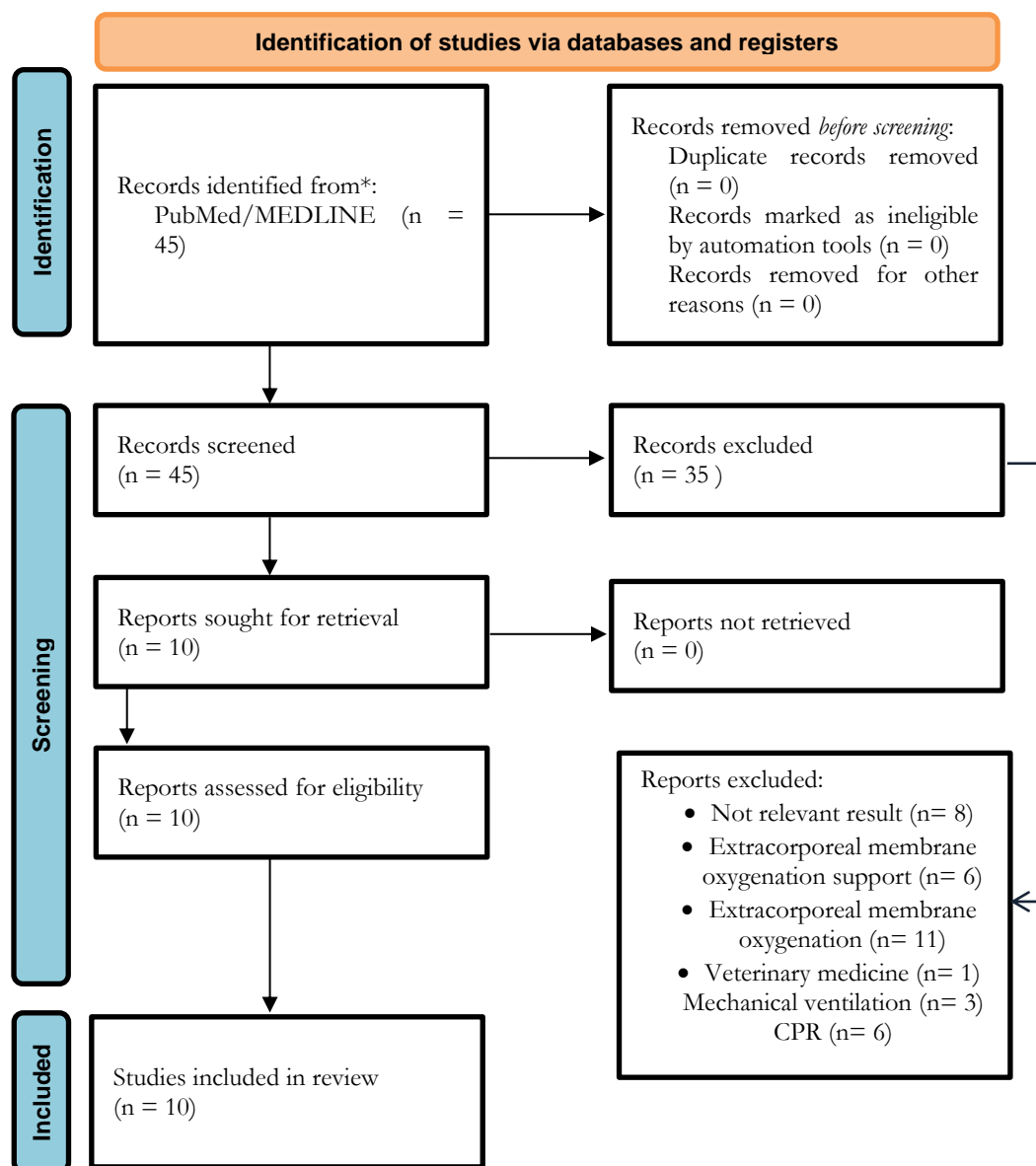
Following the preliminary search on PubMed, 45 studies were identified. However, in line with predefined inclusion criteria, 35 studies were excluded



as they did not specifically address the utilization of the nursing diagnosis "impaired spontaneous

ventilation." Consequently, 10 articles were selected and included in the study (Figure 1).

Figure 1. PRISMA flow chart for records screening.



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The articles found on PubMed mainly consist of cross-sectional studies. We found 1 methodological study, 2 case reports, 3 cross-sectional studies, 1 literature review, 1 retrospective study, and 2 mixed-method studies (descriptive, cross-sectional, and observational). Six studies originate from Brazil, 1

from Italy, 2 from Spain, and 1 from the United Kingdom. English is the most commonly used language (N=8), 2 articles were written in Spanish. The research findings are presented in the synoptic table (Table 2).

Table 2. Main characteristics of included studies

Title, Authors, Publication Year, Journal Name, and Country	Study Design	Sample Description	Study Objective	Study Findings	Study Conclusions
1) "Frequency of Respiratory Nursing Diagnoses and Accuracy of Clinical Indicators in Preterm Infants", Avena MJ, Pedreira MDLG, Bassolli de Oliveira Alves L, Herdman TH, de Gutiérrez MGR, 2019, Int J Nurs Knowl, Brazil.	Cross-sectional study	The sample consists of 92 premature infants, admitted to neonatal intensive care units (NICU) in two university hospitals in São Paulo, Brazil.	Identify the frequency of the nursing diagnoses: Ineffective Breathing Pattern, Impaired Gas Exchange, and Impaired Spontaneous Ventilation in Infants and analyze the accuracy of the diagnostic indicators found for each of these three diagnoses.	The use of accessory muscles to breathe and alteration in depth of breathing were the most observed clinical indicators with a frequency greater than 50%. The most frequently identified nursing diagnosis, with 74.5%, was "Ineffective breathing pattern", followed by "Impaired gas exchange" (31.5%) and "Impaired spontaneous ventilation" (16.8%).	The nursing diagnosis "Ineffective breathing pattern" was the most frequently identified; use of accessory muscles, alteration in depth of breathing, abnormal breathing, and dyspnea were the most representative signs/symptoms.
2) "Nursing outcomes for ineffective breathing patterns and impaired spontaneous ventilation in intensive care", do Canto DF, Almeida Mde A, 2013, Rev Gaucha Enferm, Brazil.	Cross-sectional study	A study conducted in three ICUs of a university hospital in Brazil. The population consisted of 15 experienced nurses.	Validate the NOC, selected from NOC-NANDA-I, for the nursing diagnoses: Impaired spontaneous ventilation and Ineffective breathing pattern in intensive care clinical practice.	For the nursing diagnosis "Ineffective breathing pattern", of the 26 NOC outcomes proposed, 5 were considered priority, 17 secondary, and 4 were discarded. While for "Impaired spontaneous ventilation", of the 16 NOC outcomes proposed, 5 were considered priority, 7 secondary, and 4 were discarded.	It was observed that experts use the diagnosis "Impaired spontaneous ventilation" more often for patients who use mechanical ventilation and "Ineffective breathing pattern" for patients who do not use this technology. Among the nursing outcomes validated as priority for the diagnosis "Impaired spontaneous ventilation", only "Response to mechanical ventilation: adult" is suggested in the NOC-NANDA-I link.
3) "Analysis of ineffective breathing pattern and impaired spontaneous ventilation of adults with oxygen therapy", Seganfredo DH, Beltrão BA, Silva VMD, Lopes MVO, Castro SMJ, Almeida MA, 2017, Rev Lat Am Enfermagem, Brazil.	Cross-sectional study	The sample consists of 626 patients admitted to the ICU, using oxygen therapy in three different modes.	Analyze the manifestations of the defining characteristics of the two nursing diagnoses Impaired Spontaneous Ventilation and Ineffective Breathing Pattern and the defining characteristics identified in the literature for the concept of "ventilation" in adult patients admitted to the ICU using oxygen therapy.	Most of the defining characteristics exhibited low discriminatory ability and low percentage of variation for the two nursing diagnoses.	The clinical evidence obtained affirms that the set of defining characteristics of the two diagnoses would fit better into a single construct.

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<p>4)“Nursing diagnoses and theoretical frameworks in neonatal units: a literature review”, Di Sarra L, D'Agostino F, Cocchieri A, Vellone E, Zega M, Alvaro R, 2016, Prof Inferm, Italy.</p>	<p>Literature review</p>	<p>Study conducted in neonatal units.</p>	<p>The main objective is to identify nursing diagnoses and theoretical frameworks used in neonatal units through a literature review.</p>	<p>Two taxonomies and six major theoretical frameworks were identified. The most commonly used nursing diagnoses were: Activity Intolerance, Impaired Spontaneous Ventilation, Ineffective Breathing Pattern, Risk for aspiration, Delayed Growth and Developmental, Ineffective Breastfeeding, Ineffective Infant Feeding Pattern, Hyperthermia/Hypothermia, Risk for infection, Impaired tissue Integrity, Interrupted Family Processes, Risk for Impaired Parenting, and Risk for Impaired Attachment.</p>	<p>Nursing diagnoses and theoretical frameworks enable nurses working in neonatal units to more effectively manage the nursing care process and provide higher quality nursing care.</p>
<p>5)“Accuracy of Defining Characteristics for Nursing Diagnoses Related to Patients with Respiratory Deterioration”, Vieira LF, Fernandes VR, Papathanassoglou E, Azzolin KO, 2020, Int J Nurs Knowl, Brazil.</p>	<p>Retrospective study</p>	<p>This study was conducted in the clinical and surgical units of a 795-bed hospital in Brazil.</p>	<p>The purpose is to assess the accuracy of the defining characteristics of the following nursing diagnoses: Impaired gas Exchange, Impaired Spontaneous Ventilation, and Ineffective Breathing Pattern.</p>	<p>391 records were identified in this study. For the diagnosis Impaired gas Exchange, the defining characteristics or clusters with greater efficiency are Hypercapnia, Somnolence, and Hypercapnia + Tachycardia. For Impaired Spontaneous Ventilation are Increased HR + Decrease in Cooperation. For Ineffective breathing pattern no cluster or defining characteristic exceeded 70% efficiency.</p>	<p>Clusters represented greater efficiency than defining characteristics, which represented less adequate efficiency for nursing diagnoses.</p>
<p>6)“The adequacy of the defining characteristics of the diagnostics "impaired gas exchange" and spontaneous ventilation" in asthmatic children”, Carvalho OM, da Silva VM, Távora RC, Chaves DB, Beltrão BA, Lopes MV, 2015, Enferm Clin., Brazil.</p>	<p>Observational, descriptive, cross-sectional study</p>	<p>The sample consists of 205 asthmatic children who went to the emergency room of a hospital in Brazil.</p>	<p>The objective of the study is to determine measures of diagnostic accuracy for the defining characteristics of respiratory nursing diagnoses Impaired Gas Exchange and Impaired Spontaneous Ventilation in asthmatic children in the emergency department.</p>	<p>28.8% of asthmatic children had the diagnosis Impaired gas exchange. The most frequent defining characteristics were Dyspnea, Abnormal Breathing, Tachycardia, and Hypoxemia. Hypoxemia had the highest sensitivity and specificity. While 5.9% of asthmatic children had the diagnosis Impaired spontaneous ventilation. The most frequent defining characteristics were Dyspnea, Increased heart rate and Decreased oxygen saturation. Increased accessory muscles use to breathe represented the best measure of validity for this diagnosis.</p>	<p>Hypoxemia and Increased accessory muscle use had the best validity measures for the diagnosis Impaired Gas Exchange and Impaired Spontaneous Ventilation, respectively.</p>
<p>7)“Mixed shock in patients with acute myocardial infarction: Nursing interventions.”, Martínez Font S, López Doménech G, Juan Esgleas S, Ruiz Falqués C, Soler Selva M., 2021, Enferm Intensiva, Spain.</p>	<p>Case report</p>	<p>The sample involves a 40-year-old woman with a medical diagnosis of AMI.</p>	<p>The aim is to develop optimal, individual care plans using the NANDA-NOC-NIC taxonomies.</p>	<p>The assessment is based on Virginia Henderson's basic needs. Two dysfunctions emerged: breathing and circulation. The patient required mechanical ventilation and mechanical circulatory support. Accordingly, six priority nursing diagnoses were identified: Risk of decreased cardiac output, Impaired spontaneous ventilation, Impaired tissue integrity, Risk for infection, Risk for hypothermia, and Risk for disuse syndrome.</p>	<p>Established NOCs showed favorable evolution after 96 hours. A standardized NANDA-NOC-NIC language allowed the development of an appropriate care plan.</p>
<p>8)“A case report: Nursing interventions on a patient with anaphylactic shock in ICU.”, Zariquiey-Esteva G, Santa-Candela P., 2017, Enferm Intensiva, Spain.</p>	<p>Case report</p>	<p>The sample concerns a 42-year-old woman admitted to the ICU with anaphylactic shock after ingestion of Amoxicillin/clavulanic acid.</p>	<p>The aim of the study is to develop a care plan for a 42-year-old woman with anaphylactic shock, using the NANDA-NOC-NIC taxonomy.</p>	<p>Following assessment, three dysfunctional needs emerged: breathing and circulation, elimination and hygiene, and skin protection. According to the NANDA-I taxonomy, seven priority nursing diagnoses emerged: Risk of allergic response, Risk of infection, Risk of ineffective renal perfusion, Decreased cardiac output, Impaired spontaneous ventilation, Risk of unstable blood glucose level, and Risk of dysfunctional gastrointestinal motility.</p>	<p>Established NOCs showed favorable evolution after 24 hours. A standardized NANDA-NOC-NIC language allowed the development of an appropriate care plan.</p>

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<p>9)“Nursing diagnoses in trauma victims with fatal outcomes in the emergency scenario.”, Sallum AM, Santos JL, Lima FD., 2012, Rev Lat Am Enfermagem, Brazil.</p>	<p>Cross-sectional, descriptive and exploratory study</p>	<p>The sample consists of 406 patients evaluated in a hospital in Brazil.</p>	<p>The aim is to identify and analyze nursing diagnoses that are risk factors for death in trauma victims in the first 6 hours after the event.</p>	<p>The analysis indicated that Ineffective Breathing Pattern, Impaired Spontaneous Ventilation, Risk of Bleeding and Risk of Ineffective Gastrointestinal Tissue Perfusion are nursing diagnoses that relate to risk factors for patient death. In addition, the diagnoses Ineffective Airway Clearance, Impaired Comfort, and Acute Pain were identified as protective factors.</p>	<p>The data obtained can direct health care teams to implement specific and appropriate nursing interventions, already knowing in part what nursing diagnoses address risk factors for death in trauma victims.</p>
<p>10)“Ventilatory weaning: a case study of protracted weaning”, Pattison N, Watson J., 2009, Nurs Crit Care, United Kingdom.</p>	<p>Methodological case study</p>	<p>The sample involves a 51-year-old woman with breast cancer and bone metastases</p>	<p>Examine why it took the patient so long to wean herself off the ventilator, using nursing diagnoses to explain the weaning process.</p>	<p>The patient's experiences of ventilatory weaning were examined using nursing diagnoses and examining the physiological, social, emotional, and psychological factors affecting the weaning and recovery process in the ICU. The diagnoses that proved useful in determining why this patient had prolonged weaning are: Dysfunctional Ventilatory Weaning Response, Impaired Spontaneous Ventilation, Ineffective Breathing Pattern, Anxiety, and Impaired Verbal Communication.</p>	<p>This study highlights the importance and benefits of the nurse-patient relationship during prolonged ventilatory weaning.</p>

DISCUSSION

The first article considered in our review addresses respiratory distress, the leading cause of admission to the Neonatal Intensive Care Unit (NICU) for premature infants [6]. Respiratory distress symptoms include excessive respiratory effort, increased respiratory rate, elevated workload on respiratory muscles, intercostal retractions, grunting, cyanosis, desaturation, and oxygen requirement. Within the respiratory nursing diagnoses for the respiratory system, known as respiratory nursing diagnoses, are Ineffective Breathing Pattern (000032), Impaired Gas Exchange (00030), and Impaired Spontaneous Ventilation (00033). This study examines the prevalence and reproducibility of these diagnoses and the accuracy of their defining characteristics. It investigates these nursing diagnoses related to breathing patterns in premature infants requiring early interventions. In NICUs, premature infants often

receive respiratory support and supplemental oxygen. Out of 32 listed clinical indicators, 29 were used for the diagnoses, with the “Increased accessory muscle use” being observed in over 50% of cases. The Impaired Spontaneous Ventilation nursing diagnosis was obtained in 16.8% of cases, with an 81.5% agreement frequency among experts regarding the presence or absence of respiratory nursing diagnoses. The clinical indicator demonstrating the best sensitivity and negative predictive value was the “Increased accessory muscle use”, albeit with low specificity and positive predictive value. This suggests that while the phenomenon exists, the indicator may not confirm the presence of the diagnosis. Clinical indicators like Dyspnea, Restlessness, and Decreased SaO₂ showed high specificity and negative predictive value, implying that their absence increases the likelihood of the diagnosis not being present, though their presence does not necessarily confirm the

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diagnosis. The Impaired Spontaneous Ventilation diagnosis obtained a low agreement coefficient among expert nurses, potentially due to a lack of knowledge and shared defining characteristics among these respiratory nursing diagnoses [6]. In the article titled "Nursing outcomes for ineffective breathing patterns and impaired spontaneous ventilation in intensive care" the nursing diagnoses Ineffective Breathing Pattern and Ineffective Spontaneous Ventilation were highlighted as the most prevalent diagnoses related to the psychobiological need for oxygenation [7]. This investigation conducted across three ICU settings aimed to validate nursing care outcomes selected from NANDA-I-NOC linkage [8] for the diagnoses of Ineffective Breathing Pattern and Ineffective Spontaneous Ventilation in adult ICUs. The NOC classification suggested four outcomes and twelve additional associated outcomes for the diagnosis of Ineffective Spontaneous Ventilation. Among the 16 proposed nursing outcomes by NOC, five were considered primary, seven secondary, and four were discarded by the evaluators. For the Ineffective Spontaneous Ventilation diagnosis, only the NOC outcome "Mechanical Ventilation Response: adult (0411)" was included in the second stage of the study, meeting the set scoring criteria. For the Ineffective Breathing Pattern diagnosis, only the outcome "Respiratory Status: Airway Patency (0410)" was included in the second stage for the same reason. The "Mechanical Ventilation Response: adult (0411)" outcome, as defined by NANDA-I, entails the gas exchange between alveoli and tissue perfusion

achieved through mechanical ventilation [7]. From the findings, it was inferred that nurses tend to attribute the diagnosis of Ineffective Spontaneous Ventilation to patients using mechanical ventilation and assign the diagnosis of Ineffective Breathing Pattern to those who do not use such technology. Additionally, the article suggested considering "Infection Severity (0703)" among the NOC outcomes since the Ineffective Spontaneous Ventilation diagnosis is applied to patients on mechanical ventilation, which is linked to high rates of pneumonia in ICUs. Electrolyte and acid-base balance, respiratory status, and cardiopulmonary status outcomes were considered priorities for both diagnoses. A significant number of validated indicators for both diagnoses showed noteworthy results. The NOC indicators "Mechanical Ventilation Response: adult (0411)" demonstrated that NOC encompasses elements nurses routinely assess in patients. Toward the end of the validation process, similarity between the two nursing diagnoses was observed, with three outcomes validated as priorities for both. However, crucial differences were identified: experts utilize the diagnosis of Ineffective Spontaneous Ventilation for mechanically ventilated patients [7]. The aim of Seganfregio and colleagues was to investigate if the defining characteristics supported the existence of two distinct diagnoses, Impaired Spontaneous Ventilation and Ineffective Breathing Pattern, or if they indicated a single nursing diagnosis encompassing the key concept of "ventilation" in adult patients admitted to ICUs with



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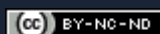


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oxygen therapy [5]. The study examined three severity samples: patients with spontaneous ventilation (mild severity), patients with non-invasive mechanical ventilation (NIMV) (intermediate severity), and patients with invasive mechanical ventilation (IMV) (severe severity). In clinical practice, the diagnosis of Impaired Spontaneous Ventilation is often attributed to ICU patients. This diagnosis, in its definition, includes the term "adequate respiration" whereas the Ineffective Breathing Pattern diagnosis involves "adequate ventilation." With non-invasive mechanical ventilation, patients need to use their muscles for ventilation, indicating that it is not a substitute for ventilatory musculature but rather facilitates respiratory work. Hence, defining characteristics like "Increased heart rate", "Increased accessory muscle use", "Increased metabolic rate", and "Decreased tidal volume" showed higher frequencies in samples with intermediate severity. Thus, in patients with severe severity using IMV, ventilatory mechanics may entirely replace respiratory musculature work, reducing the number of defining characteristics in these patients. "Decreased cooperation" exhibited high sensitivity values for both NIMV and IMV. "Decreased cooperation" can manifest earlier due to an altered state of consciousness, Decreased PO₂, and Hypoxia. The defining characteristics that appeared for the Impaired Spontaneous Ventilation diagnosis were "Apprehensiveness", "Decreased partial pressure of oxygen", "Increased partial pressure of carbon dioxide (PCO₂)", and "Decreased arterial oxygen saturation". Hypoxia may precede

compensatory physiological signs for respiratory stress, including "Increased accessory muscles use" and Altered respiratory rate. In the NIMV sample, the defining characteristics with the highest sensitivity were "Decreased partial pressure of oxygen", "Increased partial pressure of carbon dioxide (PCO₂)", Altered respiratory rate, and Changes in expiratory volume. In the IMV sample, defining characteristics with the highest sensitivity were "Decreased cooperation", Increased restlessness, Altered respiratory rate, "Decreased partial pressure of oxygen", "Increased partial pressure of carbon dioxide (PCO₂)", and Hypoxia. Clinical evidence from this study seemed to indicate that the set of defining characteristics of the two selected nursing diagnoses align more cohesively as a single construct. One proposed possibility was incorporating the defining characteristics of Impaired Spontaneous Ventilation into the Ineffective Breathing Pattern diagnosis [5]. In the article by Di Sarra and colleagues, the Italian researchers had two primary objectives: first, to demonstrate the care needs of neonates through a literature review, and second, to understand the theoretical frameworks supporting clinical practice [9]. The aim was to identify nursing diagnoses and theoretical frameworks used in neonatal units. The literature review identified 28 nursing diagnoses from the ICA taxonomy and 79 diagnoses from the NANDA-I taxonomy. The most frequent nursing diagnoses from NANDA-I included "Decreased activity tolerance", "Ineffective spontaneous ventilation", "Ineffective breathing

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pattern”, “Risk for aspiration”, Delayed growth and development, “Ineffective breastfeeding”, “Ineffective infant feeding dynamics”, “Hyperthermia”, “Hypothermia”, “Risk for infection”, “Impaired skin integrity”, “Dysfunctional family processes”, “Risk for impaired parenting”, and “Risk for impaired attachment” Concerning theoretical frameworks, six primary ones were identified. Based on the literature review, the most frequently used diagnostic classification was the NANDA-I taxonomy. Several risk diagnoses were identified, possibly due to neonates being at higher risk for both short and long-term complications. The most utilized theoretical frameworks during the literature review were Carpenito's clinical practice model and Gordon's assessment tool. Therefore, nurses had identified nursing diagnoses according to NANDA-I and collaborative problems following Carpenito. Nursing diagnoses allow nurses in neonatal units to effectively manage the care process [9]. In the article 'Accuracy of Defining Characteristics for Nursing Diagnoses Related to Patients with Respiratory Deterioration' by Vieira et al., patients experiencing respiratory deterioration were analyzed [10]. Specific clinical indicators used for identifying respiratory dysfunction include respiratory rate, dyspnea, hypoxemia, and acidosis. These indicators partially comprise the defining characteristics of the nursing diagnoses: “Impaired Gas Exchange”, “Ineffective Spontaneous Ventilation”, and “Ineffective Breathing Pattern”. The study aimed to assess the accuracy of defining

characteristics for these three respiratory nursing diagnoses in patients experiencing respiratory deterioration. The focus was on identifying clusters or statistically significant defining characteristics as predictors of nursing diagnoses. The analysis revealed that the “Impaired Gas Exchange” diagnosis was present in 6.1% of patients, “Ineffective Spontaneous Ventilation” in 32.2%, and “Ineffective Breathing Pattern” in 39.1%. For the nursing diagnosis of “Ineffective Spontaneous Ventilation”, four defining characteristics exhibited statistically significant agreement with the diagnosis: “Decreased cooperation”, “Increased heart rate”, “Decreased partial pressure of oxygen”, “Increased accessory muscle use”, and a cluster comprising “Increased heart rate” + “Decreased cooperation”. However, diagnostic accuracy of isolated defining characteristics for this diagnosis was low, while the cluster Increased heart rate + Decreased cooperation achieved an efficiency of 70%. This cluster, when absent, served as a better predictor of the diagnosis absence. The defining characteristic “Increased metabolic rate” showed 100% sensitivity but had low efficiency (33%). Additionally, “Increased accessory muscle use” and the cluster “Decreased cooperation” + “Increased metabolic rate” were statistically significant. In conclusion, while few defining characteristics exhibited adequate accuracy and predictive capability, certain clusters of defining characteristics enhanced diagnostic accuracy. Only the cluster “Increased heart rate” + “Decreased cooperation” reached an efficiency of 70.1% and



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served as a predictor for the diagnosis of Ineffective Spontaneous Ventilation [10]. In their study on respiratory complications in asthmatic children, Carvalho and colleagues aimed to determine the diagnostic accuracy of defining characteristics for two respiratory nursing diagnoses, “Impaired Gas Exchange” and “Impaired Spontaneous Ventilation”, within an emergency department setting [11]. Experienced nurses established these diagnoses, focusing on their significance due to asthma's potential for respiratory complications and disruptions in the gas exchange process. These diagnoses become crucial priorities for intervention as asthma can rapidly progress to respiratory failure. During the study, a prevalence of 28.8% was observed for the nursing diagnosis “Impaired Gas Exchange” in asthmatic children. Dyspnea, Abnormal breathing, Tachycardia, and Hypoxemia were the defining characteristics with the highest frequency for this diagnosis. On the other hand, “Ineffective Spontaneous Ventilation” had a prevalence of 5.9% in asthmatic children. The defining characteristics with the highest frequency for this diagnosis were Dyspnea, “Increased heart rate”, and “Decreased arterial oxygen saturation”. “Increased accessory muscle use” was the most accurate measure for this diagnosis. “Decreased cooperation”, “Decreased arterial oxygen saturation”, and “Increased accessory muscle use” were statistically associated with the presence of the “Ineffective Spontaneous Ventilation” diagnosis. “Hypoxemia” demonstrated the best validity measure for the “Impaired Gas

Exchange” diagnosis, while “Increased accessory muscle use” exhibited the best validity measure for the “Ineffective Spontaneous Ventilation” diagnosis. These defining characteristics are crucial for providing an adequate definition and for use in the clinical practice of these two nursing diagnoses [11]. In the study conducted by Martínez Font et al. the primary aim of researchers was to present an individualized care plan utilizing the NANDA-I, NIC, NOC taxonomies for a patient experiencing cardiogenic and anaphylactic mixed shock, necessitating ventricular circulatory assistance [12]. The initial assessment, based on Henderson's needs model, revealed two dysfunctional patterns: respiratory and circulatory models. The patient required both mechanical ventilation and mechanical circulatory support. Six nursing diagnoses emerged as primary needs: “Decreased cardiac output”, “Impaired spontaneous ventilation”, “Impaired tissue integrity”, “Risk of disuse syndrome”, “Risk of infection”, and “Risk of hypothermia”. The nursing diagnosis “Impaired spontaneous ventilation” was associated with metabolic alteration (bronchospasm and cardiorespiratory arrest) and decreased arterial oxygen saturation (SaO₂). Two NOCs were selected: Response to mechanical ventilation: adult, with indicators including Inspired oxygen fraction (FiO₂) meeting oxygen demand, Arterial oxygen partial pressure (PaO₂), Arterial carbon dioxide partial pressure (PaCO₂), Arterial pH, Oxygen saturation, and Respiratory secretions. Additionally, Severity of anaphylactic shock, with indicators like Respiratory


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stridor and Bronchospasm, constituted the chosen NOC criteria. Meanwhile, the NICs included Maintenance of invasive mechanical ventilation, Airway suctioning, and Maintenance of artificial airways. The care plan exhibited positive outcomes and favorable progression after 96 hours [12]. Within the study detailed in 'A Case Report: Nursing Interventions on a Patient with Anaphylactic Shock in ICU,' the primary aim was to design a comprehensive care plan, integrating nursing interventions, for a patient hospitalized in the ICU due to anaphylactic shock [13]. Anaphylactic shock, characterized by circulatory instability, poses life-threatening risks when it affects the airways. In such scenarios, individuals often require artificial ventilation in the ICU. Anaphylactic shock presents specific symptoms: airway obstruction, low blood pressure, gastrointestinal symptoms, and generalized skin reactions following exposure to an immediate hypersensitivity-inducing substance. An assessment revealed three dysfunctional patterns: respiration and circulation, elimination and hygiene, and skin protection. Based on these dysfunctional patterns, seven priority nursing diagnoses were identified for the patient: "Risk of allergic reaction", "Risk of infection", Risk for ineffective renal perfusion, "Decreased cardiac output", "Impaired spontaneous ventilation", "Risk for unstable blood glucose levels", and "Risk for dysfunctional gastrointestinal motility". The nursing diagnosis "Impaired spontaneous ventilation" was linked to metabolic factors (such as laryngeal angioedema due to anaphylactic shock) and

the patient's "decreased cooperation". The established NICs for this diagnosis included: 3120 Insertion and stabilization of airways, 2260 Sedation management, 3180 Management of artificial airways, 3300 Management of invasive mechanical ventilation, 3160 Suctioning of artificial airways, 3310 Weaning from mechanical ventilator, 3270 Endotracheal extubation. The established NOCs encompassed "Respiratory Status: Gas Exchange (0402)", with outcome indicators including "Partial pressure of oxygen in arterial blood (PaO₂) (040208)", "Partial pressure of carbon dioxide in arterial blood (PaCO₂) (040209)", and "Arterial pH (040210)". The NANDA-NOC-NIC care plan outcomes demonstrated positive progress for the patient within 24 hours [13]. The aim of the ninth article under review was to identify and scrutinize nursing diagnoses acting as mortality risk factors in trauma victims during the initial 6 hours post-incident [14]. The study revealed 12 nursing diagnoses, prevalent in at least 50% of the deceased cases. These diagnoses were primarily centered around oxygen supply and the repercussions of insufficient ventilation, encompassing aspects such as fluid management, hemorrhage control, neurological evaluation, and patient exposure. Notably, a nursing diagnosis related to "Ineffective breathing patterns" achieved a frequency of 77.3%, emphasizing its significance in the early phases of patient care, particularly in managing airways and ensuring adequate oxygen delivery. The conclusive analysis highlighted certain diagnoses as mortality risk factors, including "Ineffective breathing patterns", "Impaired

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spontaneous ventilation”, “Risk for ineffective gastrointestinal tissue perfusion”, and “Risk for bleeding”, while “Ineffective airway clearance”, “Impaired comfort”, and “Acute pain” were identified as protective factors [14]. The final article reviewed, in the tenth entry, delved into the subject of ventilatory weaning in a case involving protracted disconnection from mechanical ventilation [15]. The focus centered on the nursing diagnosis related to the dysfunctional response during the process of weaning, encompassing a patient with multiple concurrent complications. Nursing diagnoses were utilized to delineate the challenges encountered by the patient during the weaning process, highlighting four specific issues: “Ineffective breathing pattern”, “Impaired spontaneous ventilation”, “Anxiety”, and “Impaired verbal communication”. The patient was hospitalized due to respiratory distress and a thoracic infection. The initial nursing diagnoses of “Ineffective breathing pattern” and “Impaired spontaneous ventilation” became particularly significant throughout the process. Upon assessment, the patient exhibited “Impaired spontaneous ventilation” and an “ineffective breathing pattern”, manifesting pallor, breathlessness, tachycardia, tachypnea, and reliance on accessory muscles for respiration. The study aimed to reflect on why the patient took an extended period to be weaned from the ventilator, utilizing nursing diagnoses to elucidate facets of the weaning process. The four identified nursing diagnoses proved instrumental in understanding the patient's prolonged weaning journey. Employing nursing diagnoses in

intensive care settings can heighten awareness and provide strategies for managing dysfunctional responses during ventilatory weaning [15].

Implication for practice

The compilation of articles scrutinized in our study reveals the pervasive importance of the nursing diagnosis ISV across multifaceted clinical circumstances. In this comprehensive analysis, the significance of ISV is vividly portrayed. Its application spans the delicate care of premature infants with respiratory and cardiac challenges in neonatal units to the intricate management of patients relying on mechanical ventilation in intensive care settings. Notably, this diagnosis emerges as a primary concern in traumatic injuries, anaphylactic shocks, and instances of prolonged ventilatory weaning, effectively serving as an ominous predictor for mortality and highlighting the urgent need for respiratory support. Each article adds a distinct dimension to the understanding of ISV. The analysis of its relevance in neonatal care spotlights its critical role in necessitating immediate interventions, underlining its pertinence in a vulnerable patient population. Meanwhile, its association with mechanical ventilation, as established in ICU settings, marks it as a common identifier often attributed by nurses in clinical practice. Moreover, the discussions on ISV's role in traumatic incidents, its relevance in anaphylactic shock, and its significance in protracted weaning scenarios underscore its versatility as an



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essential marker. It not only signifies compromised respiratory function but also serves as a warning sign demanding swift and decisive respiratory interventions. Collectively, these findings solidify ISV's pivotal position in guiding nursing interventions, underlining its role as a fundamental diagnostic entity across a spectrum of critical care scenarios. In Appendix 1, we presented a matrix featuring articles sourced from PubMed and included the definition of the nursing diagnosis ISV, breaking it down based on its key components. Additionally, we included all defining characteristics, related factors, and associated conditions currently listed within the diagnosis. Subsequently, we marked the respective boxes with an "X" whenever we found confirmation of the definition, defining characteristics, related factors, or associated conditions across the ten selected articles on the search engine. From the data obtained, we can assert that 8 out of 10 articles corroborate the definition of the nursing diagnosis ISV. Some articles confirm only certain characteristics of the definition, while others validate it entirely. No further data emerged suggesting a need to modify the current diagnosis definition. All defining characteristics were confirmed in various articles, with the most frequently used being Apprehensiveness, Decreased arterial oxygen saturation, Decreased cooperation, and Increased accessory muscle use. It's conclusive that the presently existing defining characteristics are validated. Moreover, we identified additional defining characteristics to propose and append to the ISV

diagnosis, namely: Dyspnea and Cyanosis of the skin, lips, or extremities, Altered arterial blood gases, Hypoxia, based on three articles [4,5,11]. The sole confirmed related factor has been established. No further related factors were found to suggest inclusion. Regarding the solitary associated condition identified, this was similarly supported by the articles selected for our study. Furthermore, we discovered several associated conditions to propose and augment within the nursing diagnosis ISV. The associated conditions for proposal encompass: Respiratory distress, Mechanical ventilation, Respiratory deterioration, Asthma, Cardiorespiratory arrest, Mixed shock, Anaphylactic shock, and Angioedema [5-7,10-13].



Limits

This study is the culmination of a bachelor's degree thesis, with the last author being the thesis advisor. The research, exclusively reliant on the MEDLINE database within PubMed, might present a potential constraint, notably attributed to the unavailability of access to the CINAHL database, which requires a subscription for use. The primary author's lack of experience, acting as the principal investigator during the related thesis study, presents an additional disadvantage. However, this was effectively compensated for through collaboration and supervision from more experienced co-authors.

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CONCLUSIONS

The collected data confirmed the definition of the nursing diagnosis "Impaired Spontaneous Ventilation" (ISV) and suggested additional characteristics to be integrated. While the clinical significance of ISV extends across various contexts, it is crucial to emphasize its specificity compared to the alternative diagnosis of Ineffective Breathing Pattern (IBP). Although both ISV and IBP represent ineffective human responses related to respiration, they remain distinct diagnoses with important differences. ISV specifically describes a critical health issue requiring immediate ventilatory support, especially in intensive care units and neonatal settings. It is characterized by an inability to maintain independent breathing that adequately supports life, often necessitating mechanical ventilation. In contrast, IBP encompasses a broader range of breathing difficulties that may not require such immediate or invasive interventions. The distinction between these two diagnoses is further evidenced by their defining characteristics and clinical contexts. ISV is often associated with more severe conditions and critical care scenarios, while IBP may be observed in less acute situations. This differentiation is crucial for accurate assessment and appropriate intervention planning. Maintaining the distinction between ISV and IBP remains an important objective, as they represent different types of ineffective human responses requiring distinct nursing approaches. The broad clinical relevance of ISV, spanning various

critical care conditions, underscores its fundamental significance as a descriptor of a severe respiratory compromise requiring immediate intervention, thus differentiating it from the more general respiratory issues encompassed by IBP. In conclusion, this review not only confirms the importance of ISV as a nursing diagnosis but also clarifies its unique position in relation to IBP. This distinction ensures more accurate diagnosis and appropriate interventions in critical care settings, ultimately contributing to improved patient outcomes. Future research should continue to refine the defining characteristics and associated conditions of both ISV and IBP to further enhance their diagnostic accuracy and clinical utility, while maintaining their important distinctions.



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APPENDIX 1. Confirmation matrix of ISV diagnosis indicators in selected studies.

DEFINITION											
ARTICLES	INABILITY TO INITIATE			INABILITY TO MAINTAIN		INDEPENDENT BREATHING		SUPPORT LIFE		OTHER	
1							X				
2		X			X		X		X		
3					X		X		X		
4		X			X		X		X		
5											
6							X		X		
7											
8		X			X		X		X		
9							X		X		
10		X			X		X		X		
DEFINING CHARACTERISTICS											
	APPREHENSIVENESS	DECREASED ARTERIAL OXYGEN SATURATION	DECREASED COOPERATION	DECREASED PARTIAL PRESSURE OF OXYGEN	DECREASED TIDAL VOLUME	INCREASED ACCESSORY MUSCLE USE	INCREASED HEART RATE	INCREASED METABOLIC RATE	INCREASED PARTIAL PRESSURE OF CARBON DIOXIDE (PCO ₂)	PSYCHOMOTOR AGITATION	OTHER
1	X	X				X					Dyspnea
2											
3	X	X	X		X	X					Cyanosis of the skin, lips or extremities, Altered arterial blood gases, Hypoxia.
4											
5	X		X	X		X	X	X			
6	X	X	X			X	X			X	Dyspnea
7		X						X			
8		X	X					X			
9											
10	X	X	X	X		X	X	X	X		

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RELATED FACTORS

	RESPIRATORY MUSCLE FATIGUE	OTHER
1	X	
2		
3		
4		
5		
6	X	
7		
8		
9		
10	X	

ASSOCIATED CONDITIONS

	IMPAIRED METABOLISM	OTHER
1		Respiratory distress
2		Mechanical ventilation
3		Mechanical ventilation
4		
5		Respiratory deterioration
6		Asthma
7	X	Cardiorespiratory arrest, Mixed shock
8	X	Anaphylactic shock, Angioedema
9		
10	X	

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