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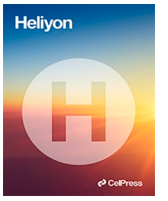

Research article

Nursing diagnoses in patients with COVID-19 admitted to the intensive care unit: CROSS-MAPPING

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A R T I C L E I N F O

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A B S T R A C T

Objective: To identify and analyze the nursing diagnoses listed in the medical records of COVID-19 patients admitted to an intensive care unit using Taxonomy II of NANDA-I. **Background**: COVID-19 is a complex disease with heterogeneous behaviors, and the role of intensive care nurses in accurately identifying related signs and symptoms has become even more critical during the pandemic. Nurses rely on classification systems or taxonomies to standardize concepts and language in practice. **Method**: This quantitative study employed a descriptive and individual approach, utilizing the cross-mapping method. Data were collected from 57 medical records of critical care patients in a hospital in northeastern Brazil between July 2020 and March 2021. Three researchers analyzed the mapped diagnoses, and agreement was assessed using the Content Validation Index and Fleiss' Kappa. **Results**: Among the listed nursing diagnoses, 54.28% were found to be standardized, 45.71% had corresponding nursing diagnoses, and 5.71% did not have an equivalent diagnosis in the reference taxonomy used in the study. Due to the possibility of multiple nursing diagnoses in the same patient, the most frequent diagnoses were Risk of pressure injury in adults (66.66%), Risk of falls in adults (64.91%), and Risk of infection (45.61%). Among the 37 diagnoses mapped, the risk diagnoses were the most prevalent and could be prevented if identified early. **Conclusions**: The study highlights the importance of standardized nursing diagnoses in the ICU for COVID-19 patients and the need for accurate identification and prevention of risk diagnoses to enhance patient care and improve outcomes.

1. Introduction

The onset of 2020 witnessed a global public health crisis characterized initially by the emergence of the first reported cases of pneumonia with unknown etiology in China in December 2019. Subsequently, the identification of a novel strain of coronavirus, namely Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), led to the well-known Coronavirus Disease 2019 (COVID-19). In January of the same year, the World Health Organization (WHO) declared a Public Health Emergency of International Concern (PHEIC) to mitigate the widespread transmission of the virus. Consequently, in March 2020, considering the extensive geographic spread of COVID-19, it was classified as a pandemic state [1,2].

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Individuals affected by COVID-19 exhibit a wide range of clinical manifestations, varying from mild to severe, which contribute to the disease being characterized as a complex entity with diverse behaviors. Given the pandemic context, the role of nurses in the intensive care unit (ICU) has assumed an even more significant position due to their responsibility to accurately identify the signs and symptoms and provide prompt and effective nursing care to critical patients [3–6].

Nurses rely on the Systematization of Nursing Care (SNC) and the Nursing Process (NP) to develop comprehensive care plans that guide the implementation of nursing interventions and achieve the desired outcomes. The SNC is a methodology that aims to enhance care delivery through the application of knowledge, clinical reasoning, and the decision-making process. On the other hand, the NP serves as a methodological tool that enables nurses to systematically identify, understand, evaluate, and predict the patient's health issues[3]. The Nursing Process comprises five stages: assessment, diagnosis, outcome/planning, implementation, and evalution [7].

Informed decision-making in nursing practice involves the use of classification systems or taxonomies that aim to standardize concepts and language. Prominent examples of such taxonomies include NANDA International nursing diagnoses (NANDA-I), Nursing Outcomes Classification (NOC), and Nursing Interventions Classification (NIC) [8].

NANDA-I is a classification system designed to organize nursing diagnoses (NDs), utilizing scientific evidence to identify problems, risks, and susceptibilities of individuals, families, and communities. This system plays a crucial role in guiding nurses through the second stage of the Nursing Process, which involves the establishment of NDs. Nurses rely on clinical judgment, considering human

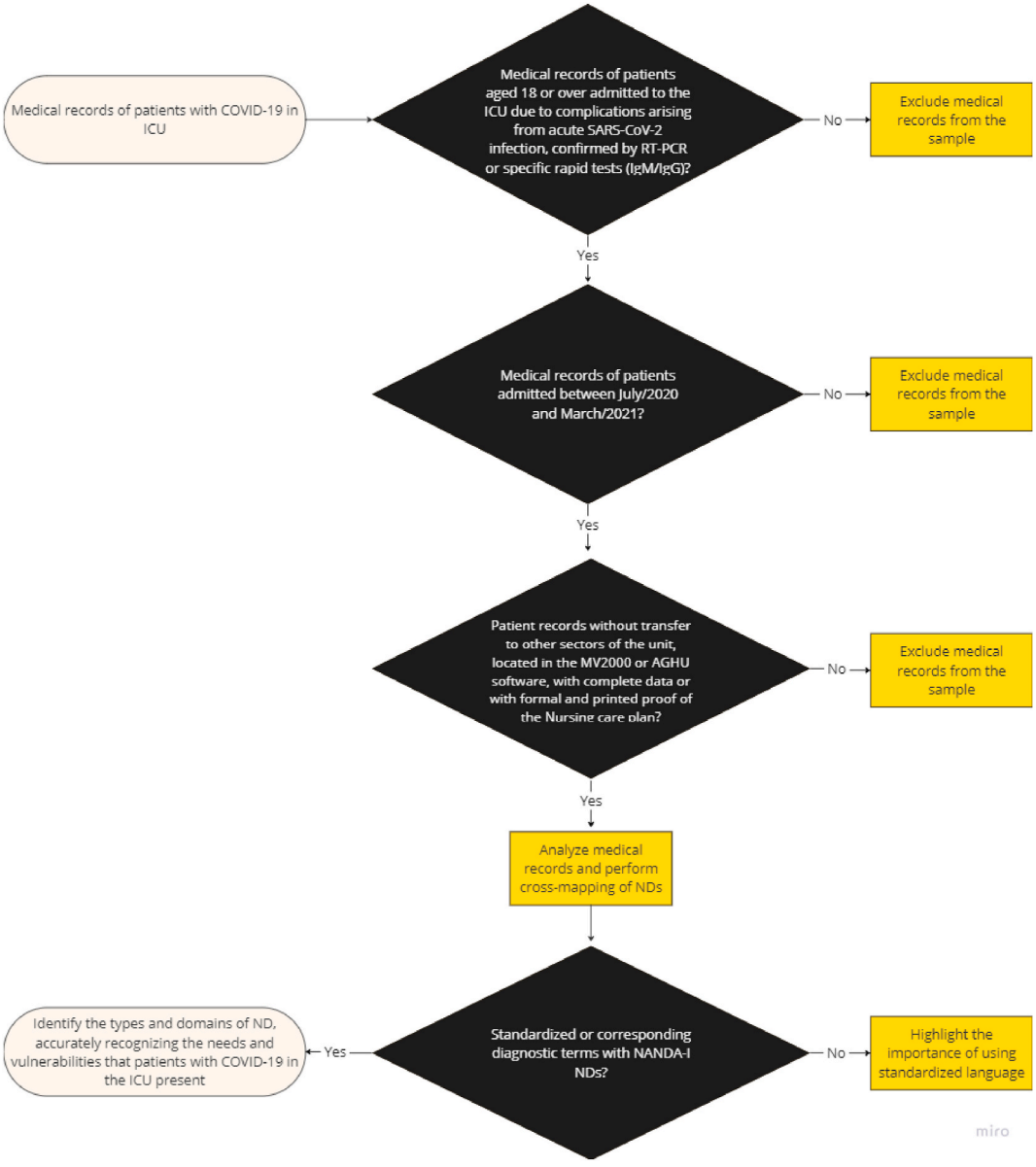

Fig. 1. - Algorithm demonstrating the execution of this cross-mapping study.

responses and the needs of patients, to formulate accurate NDs that drive appropriate care planning and interventions [9].

In order to establish NDs, nurses must utilize the Standardized Nursing Taxonomies (SNTs), which are based on NANDA-I. These SNTs provide a common terminology agreed upon by professionals, utilizing taxonomies that encompass NDs, outcomes, and interventions. By adhering to SNTs, nurses promote enhanced quality of care, ensuring clear and cohesive concepts in clinical practice to facilitate the planning and execution of interventions for each diagnosis [10]. However, it is noteworthy that some institutions still choose to use free discursive writing or rely on care prescriptions based solely on professional experience [11]. This approach can lead to a lack of clarity and cohesiveness in clinical practice, resulting in gaps arising from a lack of shared knowledge.

The utilization of cross-mapping in the scientific literature collection is progressively gaining popularity. It enables a comparative analysis between the information documented in a patient's medical record and taxonomies that possess a sound theoretical foundation [8,11]. Nonetheless, despite the numerous advantages and positive influence on patient care, there remains a dearth of studies that have undertaken the mapping of NANDA-I nursing diagnoses using the terms documented by nurses in the provision of care for COVID-19 patients admitted to the ICU. This scarcity of research on the subject is particularly noteworthy considering the current relevance and urgency of the topic.

In an effort to contribute to the advancement of Nursing knowledge, the following questions arose: "Which NDs are most prevalent in the priority Nursing care for COVID-19 patients admitted to the ICU?" and "How do the terms listed in the priority nursing care for patients affected by SARS-CoV-2 correspond to the NANDA-I taxonomy?" In light of these concerns, the objective of this study was to identify and analyze the NDs listed in the medical records of COVID-19 patients admitted to an ICU using Taxonomy II of NANDA-I.

2. Materials and methods

A quantitative, descriptive, cross-sectional study was conducted utilizing the cross-mapping method [12]. The study design was specifically developed to establish a cross-correspondence between the diagnostic terms documented by nurses in their care practice and the Taxonomy II of NANDA-I [9].

Data were collected from the medical records of adult patients with COVID-19 who were admitted to an ICU at a university hospital in northeastern Brazil. To determine the final sample, a survey was conducted based on the names and numbers of medical records that met the predetermined inclusion criteria. The inclusion criteria consisted of adult patients aged 18 years or above who were admitted to the ICU due to complications resulting from acute SARS-CoV-2 infection, confirmed through RT-PCR or specific rapid tests (IgM/IgG) designed for this purpose.

The documentation of patients admitted to the adult ICU in this institution is conducted through electronic medical records utilizing the MV2000 software, a dedicated platform for Nursing evolutions. Additionally, the Management Application for University Hospitals (AGHU) is used, specifically versions 4.8.0 and 10.40.0. The analysis of nursing records focused on the period encompassing the first 24 h from the patient's admission to the ICU, with the hour of admission considered as the starting point. The sample included patients who met the eligibility criteria and were admitted to the ICU between July 2020 and March 2021. Medical records of patients transferred to other sectors of the hospital unit, records that could not be located in the MV2000 or AGHU software, and records with missing data or lacking formal and printed evidence of the Nursing care plan were excluded (Fig. 1).

Data collection, both from physical and electronic medical records, was conducted between June and August 2021. Prior to data collection, three collectors, who possessed a strong understanding of the study's topic, underwent training to ensure proficiency in handling the data collection instrument and software [11,12].

For the purpose of data extraction, a comprehensive data collection instrument was employed. This instrument consisted of variables categorized into several domains, including sociodemographic characteristics, general clinical data, neurological support data, ventilatory support data, cardiovascular and hemodynamic support data, renal support data, evaluation of the skin and risk of pressure ulcers, medication usage, laboratory tests, microbiological tests, Simplified Acute Physiology Score (SAPS3), and the nursing care plan. The collected data were recorded, organized, and stored using both Google Sheets and Microsoft Word 2016 spreadsheets.

Data analysis involved the implementation of a cross-mapping strategy to establish correspondences between the NDs identified in the study's context and the diagnostic entities within NANDA-I taxonomy II [9]. To highlight the most prevalent diagnostic terms for cross-mapping purposes, a cutoff point of 40% was applied to the nursing diagnoses documented in patient care. The selection of this percentage was based on the researchers' discretion for the sake of convenience.

The cross-mapping of terms adhered to the recommended guidelines in the scientific literature, which outlined the following steps for the technique: (1) mapping based on the contextual relevance of the NDs, (2) mapping based on the inherent meaning of the words, (3) utilizing a specific "keyword" present in the listed term to identify the corresponding nursing diagnosis, (4) ensuring the consistency and logical coherence of the terms documented in the medical records, and (5) analyzing the terms in light of the defining characteristics, related factors, and risk factors associated with the diagnoses [13].

The researchers performed term normalization by conducting a comprehensive analysis that involved comparing the listed terms with the NDs defined in accordance with NANDA-I taxonomy. This analysis encompassed exact matches as well as partial combinations of terms to establish appropriate correspondences.

In terms of term writing, expressions were retained when exact matches were found with the corresponding taxonomy. Partial combinations of terms were utilized in cases involving synonyms or similar concepts. However, terms without any correspondence were excluded from the analysis. Following the mapping process, the obtained data underwent agreement analysis among the researchers. For this concordance analysis, each researcher created a table using Google Sheets, presenting the potential NDs according to NANDA-I that corresponded to the terms listed in the care practice. These tables were subsequently compared with the results of the other researchers.

Data analysis involved the utilization of descriptive statistics, which were presented through simple frequency distributions and statistical calculations encompassing measures such as the minimum, maximum, and average [14]. These analytical approaches were employed to monitor, express, and validate the significance of the obtained results.

To assess the level of agreement among the researchers, two statistical measures were utilized: the Content Validation Index (CVI) and Fleiss' Kappa. The CVI quantifies the percentage of researchers who agree on a specific aspect being analyzed and can be computed using the following formula [14]: CVI = Number of responses obtained by each researcher/Total number of answers.

In the current study, the relevance of matching responses was considered. Two distinct approaches were employed to calculate the overall validation index [14], namely I-CVI (calculated for each item by dividing the number of responses deemed relevant by the researchers by the total number of responses) and S-CVI/Ave (the average value derived from the individual calculations of the items). Subsequently, the sum of all previously calculated I-CVI values was divided by the number of items considered, which, in this instance, corresponds to the number of researchers involved.

The Kappa coefficient is a measure used to assess agreement in categorical responses. It has a measurable value ranging from 0 to 1, with 1 indicating complete agreement. This coefficient allows for the development of a hypothesis test to determine the significance of the index being measured. The formula for calculating Kappa is K=(K1 – K2)/(1 - K2), where K1 represents the cases classified by the researchers in the same way divided by the total number of diagnostic records, and K2 represents the number of subsequent concordances for each ND divided by the total value of diagnoses [15]. Based on this reasoning, the relationship is established as follows: $H0$: $K = 0$ and $H1$: $K > 0$. The null hypothesis (H0) states that Kappa assumes a value of zero, indicating no agreement between the researchers, while the alternative hypothesis (H1) suggests a value greater than zero, indicating agreement.

If the aforementioned hypothesis is rejected, it indicates the presence of agreement, albeit to a minimal extent. It is then the responsibility of the researchers to evaluate the corresponding significance and determine whether or not the observed outcome is satisfactory. The assigned values for K are as follows: $K < 0$ indicates the absence of agreement; $0 \leq K < 0.21$ indicates slight agreement; $0.21 \leq K < 0.41$ indicates weak agreement; $0.41 \leq K < 0.61$ indicates moderate agreement; $0.61 \leq K < 0.81$ indicates substantial agreement; and $0.81 \leq K \leq 1.00$ indicates almost perfect agreement [15]. According to the scientific literature, negative Kappa values indicate very low agreement or disagreement, and values close to zero (−0.10 to 0) can be interpreted as a lack of agreement [15].

3. Ethical approval

In compliance with the General Data Protection Regulation law of May 2018, authorizations were obtained from the Research Ethics Committee of the Onofre Lopes University Hospital, with a favorable opinion granted under the number 4,234,229.

4. Results

Initially, 60 patient records were selected to compose the sample for this study. However, three were excluded due to the impossibility of extracting some data of interest to the research due to missing information or insufficient data in the patient's physical and electronic medical records, with a final sample of 57 medical records being defined.

Among the 57 medical records of patients admitted to the adult ICU with a diagnosis of COVID-19, it was found that 33 patients

LISTED DIAGNOSIS*	NANDA-I DIAGNOSIS**	DOMAIN	CLASS	ABSOLUTE FREQUENCY (n)*	RELATIVE FREQUENCY (%)*
Risk for developing pressure ulcer/Risk for pressure ulcer	Risk for adult pressure injury	11. Safety/protection	2. Physical injury	38	66.66
Risk for falling	Risk for adult falls	11. Safety/protection	2. Physical injury	37	64.91
Risk for infection	Risk for infection	11. Safety/protection	1. Infection	26	45.61

Chart 1. Cross-mapping of nursing diagnoses in care practice, with prevalence from 40%, compared to Taxonomy II of NANDA-I.
Note: *Possibility of multiple diagnoses in the same patient. **Nomenclature corresponding to NANDA-I.
Source: The authors, 2023.

were male, with an age group ranging from 22 to 88 years (with a mean age of 57.5 years ±13.5). It was observed that 61.7% lived with a partner, 63.8% lived in the countryside, and 80% of the patients declared themselves brown. It was also noticed that the majority (28.3%) had incomplete primary education and that 45% of the patients had a family income of one to three minimum wages. As for religion, more than half of the sample (53.3%) were Catholics.

From the analysis of the medical records in the proposed period, 229 occurrences of NDs were found. After the content normalization process, 37 nomenclatures of diagnoses listed by the nurses were obtained in the first stage of the study. From the comparative analysis with the NANDA-I taxonomy, it was found that 54.28% of the sample (n = 19) had standardized NDs. On the other hand, 45.71% of the diagnoses (n = 16) had corresponding diagnostic entities according to NANDA-I. It is worth noting that 5.71% (n = 2) of the diagnoses did not have an equivalent nursing diagnosis listed in NANDA-I. It is important to highlight that out of the 37 diagnostic terms identified in the study, three of them had a prevalence equal to or greater than 40%, as depicted in Chart 1.

Upon analyzing the results obtained, it is evident that 28.57% (n = 10) of the diagnostic terms listed by the nursing professionals in the care service were classified as risk diagnoses. Out of these risk diagnoses, 90% (n = 9) belonged to domain 11 of NANDA-I (Safety/protection). Among the total of 37 diagnostic terms listed by the nursing professionals, two diagnoses had an applicability frequency exceeding 60%, with the highest prevalence expressed using the NANDA-I standardized terminology: Risk for adult pressure injury and Risk for adult falls (present in 66.66% and 64.91% of care plans, respectively). Furthermore, the diagnosis Risk for infection had a prevalence of 45.61%.

The analysis revealed that out of the 13 domains in NANDA-I Taxonomy II, seven domains were not represented by any of the listed NDs. These domains include Health promotion, Self-perception, Role relationship, Sexuality, Coping/stress tolerance, Life principles, and Growth/development. On the other hand, the domains of Activity/rest and Safety/protection were the most represented, with nine different NDs identified within these domains. The nursing statements "Risk for impaired respiratory function" and "Self-care deficit syndrome" were not included in the mapping process as they did not have corresponding diagnoses in the NANDA-I taxonomy.

5. NANDA-I terms and nursing diagnoses with Fleiss Kappa agreement and CVI

Following the process of normalizing and categorizing terms, a total of 33 terms were successfully mapped. Among these, the following diagnoses emerged as the most prevalent: Risk for adult pressure injury (66.66%), Risk for adult falls (64.91%), Risk for infection (45.61%), and Ineffective breathing pattern (35.09%) (Chart 1). Subsequently, the statistical analysis results were presented in tables, utilizing the Fleiss Kappa coefficient to assess the agreement for each analyzed diagnosis (Table 1).

The significance of the results is noteworthy, as the Kappa values obtained were greater than 0, specifically exceeding 0.75. This indicates an almost perfect agreement in the test application among the researchers. Additionally, the positive values of Fleiss' K demonstrate robust and reliable outcomes.

Among the findings, it was observed that some NDs were listed for only one patient, accounting for 34.28% of the sample. Due to the limited information available, the Kappa concordance test could not be applied in these cases. However, the content validation indices were calculated and averaged for all scale indices (S-CVI/Ave) for each diagnosis. This allowed for the identification of the most applicable NDs, which are presented in Table 2.

The general average of the S-CVI/Ave was calculated considering all 33 NDs, resulting in a value of 92.30%. However, to obtain a more accurate representation, 12 diagnoses that were listed only for one patient were excluded from the calculation. The excluded diagnoses were: Impaired verbal communication (00051), Chronic pain (00133), Constipation (00011), Dysfunctional gastrointestinal motility (00196), Insomnia (00095), Imbalanced nutrition: less than body requirements (00002), Disturbed sleep pattern (00198), Acute confusion (00128), Dysfunctional ventilatory weaning response (00034), Risk for other-directed violence (00138), Risk of ineffective thermoregulation (00274), and Risk of impaired skin integrity (00047). The resulting value for the S-CVI/Ave calculation, after excluding these diagnoses, was 90.28%.

Among the 33 NDs, three diagnoses demonstrated high frequency in nursing records and agreement between researchers. These diagnoses were: Risk for adult falls (00303), Adult pressure injury (00312), and Risk for infection (00004). Lastly, the NANDA-I nursing diagnoses were categorized based on the defining characteristics, related factors, risk factors, and associated conditions, which were mapped according to the original terms shown in Taxonomy II (Chart 2).

Table 1
- Analysis of agreement between crossed terms and NANDA-I nursing diagnoses. Natal, RN, Brazil, 2023 (n = 229).

NANDA-I diagnoses	Absolute frequency (n)*	Relative frequency (%)*	Fleiss' K
Risk for adult pressure injury	38	66.66	0.8341
Risk for adult falls	37	64.91	0.875
Risk for infection	26	45.61	0.8818
Total diagnostic records**			229

Note: *Possibility of multiple diagnoses in the same patient.
**Included in the record and counted for a single patient.
Source: The authors, 2023.

Table 2
Distribution of S-CVI/Ave for the assessment of mapped NANDA-I nursing diagnoses. Natal, RN, Brazil, 2023 (n = 229).

NANDA-I diagnoses	Frequency (n)*	S-CVI/Ave
Risk for adult pressure injury	38	100.00%
Risk for adult falls	37	94.31%
Risk for infection	26	96.43%
Mean S-CVI/Ave of 33 diagnoses		92.30%
*Average after exclusion** (-12)*		90.28%

Note: *Possibility of multiple diagnoses in the same patient.
**Diagnoses present in only one patient.
Source: The authors, 2023.

NANDA-I NURSING DIAGNOSES	RISK FACTORS	ASSOCIATED CONDITIONS
Risk for adult pressure injury	Surface friction; Increased magnitude of mechanical load; Shearing forces; Pressure over bony prominence; Excessive moisture; Decreased physical activity; Dehydration; Hyperthermia; Decreased physical mobility; Dry skin.	Impaired circulation; Diabetes mellitus; Critical illness; Edema; Immobilization; Hemodynamic instability; Decreased tissue oxygenation; Decreased tissue perfusion; Pharmaceutical preparations; Physical trauma.
Risk for adult falls	Dehydration; Diarrhea; Impaired postural balance; Hypoglycemia; Impaired physical mobility.	Assistive devices for walking; Pharmaceutical preparations; Vascular diseases.
Risk for infection	Exclusive formula feeding; Difficulty managing long-term invasive devices; Difficulty managing wound care; Impaired skin integrity.	Chronic illness; Immunosuppression; Invasive procedure.

Chart 2. - Characterization of NANDA-I nursing diagnoses listed in care practice with prevalence from 40%.
Source: The authors, 2023.

6. Discussion

This study identified and mapped a total of 37 NANDA-I nursing diagnoses, with the most frequent ones being Risk for adult pressure injury (00312), Risk for adult falls (00303), and Risk for infection (00004) in the care of ICU patients with COVID-19 in a university hospital in northeastern Brazil.

Given the consequences of SARS-CoV-2, patients may exhibit respiratory symptoms and experience involvement of various body systems such as the nervous, renal, digestive, and cardiovascular systems [16]. The multisystem nature of the disease often necessitates invasive procedures to support organ functions [2]. The diverse manifestations and clinical presentations of COVID-19 justify the presence of a wide range of NDs, encompassing both risk-focused and problem-focused diagnoses.

The nursing diagnosis is a clinical judgment that identifies an undesirable human response to a health-disease condition or vulnerability. It plays a crucial role in guiding the selection of interventions necessary to achieve expected outcomes for each patient [3]. By providing a standardized language, NDs assist in choosing and implementing appropriate care tailored to individual needs.

Among the 37 terms identified by the clinical nurses in this study, two terms, "Risk for impaired respiratory function" and "Self-care deficit syndrome", did not have corresponding NDs in the NANDA-I taxonomy. As a result, researchers and Nursing professionals from

the hospital had to adapt and apply these terms in the care practice to enhance the internal communication and understanding. It is important to note that the lack of software updates for diagnostic inference used by the nurses in the institution may have contributed to this finding.

The study findings revealed that despite the availability of classification systems for NDs, there is still a predominance of divergent terms in clinical practice. However, it is important to recognize that the taxonomy plays a crucial role in providing guidance for interventions, strengthening professional identity, identifying individual human needs, and guiding the delivery of targeted care [12,17].

Nevertheless, it was observed that in many hospital units, there is a tendency to adopt a more free-form approach to nursing care, where the care plan is formulated based on the individual nurse's clinical experiences. This practice reflects a resistance to standardization, which goes against the principles of the SNC [5]. Overcoming this challenge requires collaborative efforts from both health management and the nursing profession to promote the adoption of SNTs in nursing care.

Among the diagnoses listed in the nursing care, the three most prevalent were "Risk for adult pressure injury" (66.66%), "Risk for adult falls " (64.91%), and "Risk for infection" (45.61%). These diagnoses are categorized as risk diagnoses, indicating the patient's susceptibility to experiencing an undesirable human response [9]. Risk diagnoses in nursing imply the implementation of preventive strategies to mitigate potential problems.

The high prevalence of "Risk for adult pressure injury" can be justified by the occurrence of pressure injuries as adverse events in the care of COVID-19 patients admitted to the ICU [18]. Adult patients, especially those with compromised organic functions and hemodynamic instability, are at an increased risk. Factors such as severe hypoxia, reduced tissue oxygenation, physical restrictions, intubation, and impaired level of consciousness contribute to the development of pressure injuries. Additionally, the systemic coagulopathies associated with SARS-CoV-2 infection can further enhance the development of pressure injuries by promoting hypercoagulation and vascular occlusion [18].

Regarding the nursing diagnosis "Risk for adult falls", it was found that 70.27% (n = 26) of the sample of 37 patients had a moderate risk for falls according to the applicability of the Morse Scale. The occurrence of falls in the hospital setting can have negative consequences, including prolonged hospitalization and increased costs for the institution, as well as hindering the patient's recovery process. Therefore, in order to prioritize patient safety, it is crucial to assess the risk of falls and implement preventive measures to avoid such incidents [19]. In the case of patients with COVID-19, this nursing diagnosis was included due to factors such as impaired physical mobility, neurological alterations, extremes of age, environmental conditions, and psychological changes that contribute to an increased risk of falls.

Additionally, the nursing diagnosis "Risk for infection" was identified with an absolute frequency of 26 (45.61%). This diagnosis is associated with the high potential for contamination and infection within the hospital environment, particularly in the ICU dedicated to the care of critically ill patients with COVID-19. These patients are more susceptible to pathogens and are exposed to various invasive procedures during their hospitalization, increasing the risk of infection.

The current scientific literature highlights that the impairment of the body's defenses and the necessity to maintain vital organ functions within the ICU contribute to the occurrence of the nursing diagnosis "Risk for infection". Several factors increase the vulnerability of patients in the ICU, including the use of invasive devices and procedures. For instance, endotracheal tubes, invasive mechanical ventilation, and airway suctioning are employed to ensure respiratory system function. Gastric drainage tubes and tubes for nutritional support are used to maintain digestive functions. Urinary catheters and ostomies are utilized to support elimination functions. Additionally, various invasive procedures like venipuncture for drug therapy are performed, exposing patients to vulnerabilities [12].

A study conducted in an ICU demonstrated that the presence of invasive devices, such as nasal catheters, hemodialysis catheters, and venous catheters (both peripheral and central), poses a constant risk to critically ill patients and can contribute to increased mortality rates [20]. In this context, patients in the ICU, regardless of their underlying conditions, are often exposed to invasive procedures and an environment that may harbor nosocomial microbiological agents, thereby increasing the risk of infection.

In the context of patients admitted to the ICU with SARS-CoV-2, the most prevalent NDs listed in the priority nursing care are primarily focused on prevention. These diagnoses can be effectively addressed through early identification of patients' susceptibility to undesirable responses to their clinical condition and the implementation of individualized care that addresses their basic human needs. Among these diagnoses, the risk diagnoses stand out as they primarily involve risk factors and do not include other types of diagnostic indicators such as related factors and defining characteristics [3,5,21].

When effectively managed, risk nursing diagnoses have the potential to delay or prevent the occurrence of the actual diagnosis. This highlights the importance of systematic and evidence-based nursing care planning. By utilizing the nursing taxonomy, interventions can be implemented that improve the patient's clinical condition, reduce the duration of ICU hospitalization, prevent adverse effects, and optimize documentation and healthcare records.

The findings of this study align with previous research conducted with patients affected by SARS-CoV-2, which also reported a high prevalence of risk nursing diagnoses such as Risk for adult pressure injury and Risk for infection [4–6]. Research conducted in the Brazilian Amazon region involving ICU patients hospitalized with COVID-19 complications from March to December 2020 revealed that the nursing diagnosis "Risk for infection" was documented in 100% of the nurses' records and "Risk for adult pressure injury" was documented in 97% of them [5].

The mentioned ICU in the specified period of 2012–2014 had an incidence rate of 42.7% for pressure injuries, which is a significant factor requiring heightened attention. When compared to another ICU located in the São Francisco Valley, in Pernambuco, the reported prevalence was 22.3% [5,22,23]. These notable adverse health events should serve as warning signs for the healthcare team, and it is the responsibility of nurses to intervene by addressing vulnerabilities and contributing to the improvement of care.

Given the high incidence of the diagnosis "Risk for adult pressure injury" in patients with COVID-19, susceptibility to skin or tissue damage often arises from inadequate nutrition, immobility, and deficits in self-care. Therefore, it is crucial to employ alternative methods to relieve pressure on bony prominences, such as using specialized cushions and utilizing electric or pneumatic mattresses [24].

In a cross-sectional study conducted in an adult ICU of a renowned COVID-19 care hospital in southern Brazil, the diagnosis "Risk for infection" was identified in 98.7% of the sample (n = 148), while "Risk for adult pressure injury" was present in 50% (n = 75). These findings highlight the significance of these NDs in prioritizing patient care and establish them as key NANDA-I diagnoses in the study [4,6]. However, in national studies utilizing the NANDA-I taxonomy, the diagnosis "Risk for adult falls" was not identified in adults hospitalized with COVID-19 in the ICU.

The non-prevalence of ND focused on the cardiovascular/pulmonary response class is justified since, in the institution chosen for the study, specific targets are established to minimize the occurrence of falls, which may explain the attention given by nurses in preventing this outcome and potentially justifies the utilization of the corresponding nursing diagnosis.

The most commonly employed related factors in our study were Respiratory tract infection, which is listed in NANDA-I, as well as Fatigue and Impaired mobility. As for the risk factors, they included Compromised regulatory mechanisms, Endocrine or renal dysfunction, Impaired mobility, and Moderate risk for falling (Morse score between 25 and 44), as evidenced by the medical records of 20 patients in relation to the nursing diagnosis "Risk for adult pressure injury".

Healthcare-Associated Infections (HAIs) in ICU patients have significant consequences, including prolonged hospitalization, increased costs associated with medications and materials, and higher mortality rates. In recognition of this issue, the Brazilian National Patient Safety Program (PNSP) was established in 2013. The program's primary objective is to tackle the problem of HAIs and concentrate on developing strategies and implementing actions to enhance patient safety [19,20]. The PNSP aims to enhance the quality of healthcare services across the country by focusing on seven key dimensions of care: effectiveness, efficiency, optimization, acceptability, legitimacy, and equity. By implementing risk diagnoses, healthcare professionals can identify patients who are vulnerable to specific health issues and provide targeted interventions to address their specific needs and vulnerabilities. This approach facilitates the provision of safe and effective care, aligning with the goals of the PNSP. As a risk manager, the nurse must accurately identify vulnerabilities and potential susceptibilities in patients, ensuring that automated routines do not hinder their clinical judgment [6]. They play a crucial role in developing a comprehensive care plan that addresses both current and potential needs, providing individualized and effective care.

A cross-mapping study carried out in Brazil demonstrates that, although nursing professionals partially use standardized language, it is possible to verify that their care for patients with COVID-19 is not limited only to current human responses, but also potential responses. Noting that risk NDs are elevated more frequently (57.14%), for example there is Risk for Infection (51.70%), Risk for Impaired Cardiovascular Function (13.59%) and Risk for Ineffective Peripheral Tissue Perfusion (4.87%) [25].

The Pan American Health Organization highlights hyperthermia as clinical manifestations in addition to respiratory difficulty and lung injuries [26]. Class 6 Nursing Diagnoses, referring to thermoregulation, were not as evident in this study; in this class, the Risk for Ineffective Thermoregulation ND was high for one patient. However, research carried out in Spain highlights, in addition to physiological diagnoses focused on lung diseases and cardiac responses, the Risk for Ineffective Thermoregulation in patients with COVID-19 in intensive care [10].

The adoption of a margin of prevalence of diagnoses greater than or equal to 40% at the same time that it causes simplified display of results, hides information regarding other diagnoses such as Ineffective Respiratory Pattern (00032), Impaired spontaneous ventilation (00033) and Impaired Gas Exchange (00030). A total of 20 patients (35.09%) had Ineffective Breathing Pattern ND, being the fourth most prevalent diagnosis.

The disease caused by the new coronavirus presents fatigue as its most common symptom, highlighted in the taxonomy as one of the factors related to ND. Fatigue can be described in patients affected by SARS-CoV-2, as tiredness and lack of energy, which can directly impact the activity of the muscles involved in breathing [1].

Patients with a clinical picture of respiratory infection usually present signs of respiratory failure, with dyspnea being one of the characteristics defined as Impaired Gas Exchange, listed for ten hospitalized patients (17.54%). The progression of the dyspneic condition requires intervention with oxygen therapy and mechanical ventilation, which justifies the use of the Impaired Spontaneous Ventilation diagnosis in 11 patients (19.30%) of the sample [24]. Since this diagnosis means inability to breathe autonomously, independently, to maintain organic bodily functions.

Research developed in Indonesia shows that among all the Nursing Diagnoses listed for patients with COVID-19 in a hospital unit, Impaired Gas Exchange was the most prevalent [27]. Access to the results of a single study makes knowledge limited, comparison with the results of other studies adds robustness to the results since it is a systemic disease and has multiple manifestations depending on the situational context.In terms of study limitations, it is important to note that this research relied on secondary sources, which meant dealing with incomplete or missing data in the medical records. However, despite this challenge and the involvement of multiple researchers, the study yielded consistent results, as evidenced by the excellent concordance achieved in the Fleiss Kappa analysis (above 0.75). Additionally, the researchers obtained a high level of agreement using the CVI.

The scarcity of studies on this subject and method poses an additional limitation as it indicates a lack of comprehensive discussions for meaningful comparisons. This scarcity also hinders the establishment of a robust correlation between the primary NDs documented in the care of patients with SARS-CoV-2 and the NANDA-I taxonomy.

7. Conclusion

The analysis of the data successfully achieved the objectives of this study by mapping the NANDA-I nursing diagnoses through the intersection of the terms documented in the nursing records. The original terms listed by the nurses upon admission of COVID-19 patients to the ICU provided diagnostic inference, leading to the identification of the most prevalent NDs: Risk for adult pressure injury, Risk for adult falls, and Risk for infection.

The classification of the most prevalent diagnoses in patients with COVID-19 as risk diagnoses emphasizes the role of nurses as risk managers. It underscores the importance of identifying vulnerabilities to unwanted human responses, enabling preventive measures. Therefore, nurses must exercise clinical judgment and not let automated routines compromise the accuracy of their diagnostic assessments. Besides, the importance of the NP is emphasized as a valuable and effective tool for professional nurses to analyze and ensure the relevance of their clinical reasoning. Finally, the presence of non-standardized terms in the records highlights a partial use of SNTs in practice, emphasizing the importance of improving nursing care and documentation.

This research is significant as it encourages the adoption of SNTs in healthcare. The findings contribute to the organization of professional work, rationalize the NP, and provide guidance for interventions in ICU care for COVID-19 patients. It also opens possibilities for further research to improve the standardization of nursing communication.

Comparing the results achieved in this study with other research highlights the variability of potential nursing care problems for patients with COVID-19. However, in conclusion, there is a lack of studies on SNTs in the literature, highlighting the need for further research to redefine and emphasize the main terms used by nurses. Efforts to address the gaps in nursing records by adopting SNTs will be beneficial, considering the proven benefits it brings to the nursing profession and patient care.

Ethics declarations

This study was analyzed and approved by the Research Ethics Committee of the Hospital Universitário Onofre Lopes, with approval number: 4,234,229. Informed consent was not necessary for this study because it consisted of collecting data from secondary sources, medical records, at a time after the patient's clinical outcome, ICU discharge or death.

Data availability statement

The research data supporting the conclusions of this study are published in the Mendeley Data repository [28].

CRediT authorship contribution statement

Cyntia Leenara Bezerra da Silva: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ericles Lopes de Moura:** Writing – review & editing, Resources, Methodology, Investigation, Data curation, Conceptualization. **Thuanny Nayara do Nascimento Dantas:** Writing – original draft, Visualization, Data curation. **Karolayne Cabral Matias:** Writing – review & editing, Writing – original draft, Visualization. **Leandro Melo de Carvalho:** Writing – review & editing, Methodology. **Allyne Fortes Vitor:** Writing – review & editing, Supervision, Resources, Project administration, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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