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NANDA International nursing diagnoses in the coping/stress tolerance domain and their linkages to Nursing Outcomes Classification outcomes and Nursing Interventions Classification interventions in the pre-hospital emergency care

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Abstract

Aim: To determine the prevalence of NANDA International nursing diagnoses in the coping/stress tolerance domain and their linkages to Nursing Outcomes Classification outcomes and Nursing Interventions Classification interventions in the pre-hospital emergency care setting.

Design: Retrospective descriptive study of electronic record review.

Methods: Eight thousand three hundred three episodes recorded during the year 2019 were recovered from the electronic health records of a public emergency care agency. The prevalence of NANDA International nursing diagnosis, Nursing Outcomes Classification outcomes and Nursing Interventions Classification interventions was determined. A cross-tabulation analysis was performed to determine the linkages. Data were accessed in November 2020.

Results: NANDA International nursing diagnoses *Anxiety (00146)* and *Fear (00148)* represented more than 90% of the diagnoses recorded in the domain. *Anxiety level (1211)* and *emotional support (5270)* were the most recorded Nursing Outcomes Classification outcomes and Nursing Interventions Classification interventions, with almost 20% and 5% of total records, respectively. The linkage between nursing diagnosis *Anxiety (00146)*, outcome *Anxiety level (1211)* and intervention *Anxiety reduction (5820)* was the most recorded with slightly more than 3% of the total.

Conclusion: Eight different NANDA International nursing diagnoses in the coping/stress tolerance domain were recorded. Nursing Outcomes Classification outcomes were selected aimed mainly at psychological well-being and Nursing Interventions Classification interventions to support coping. In general, linkages were aimed to provide emotional support, physical well-being, information, education and safety.

Impact: This study showed that pre-hospital emergency care nurses diagnose and treat human responses in the coping/stress tolerance domain. Expert consensus-based

linkages may be complemented by the results of this study, increasing the levels of evidence of both individualized and standardized care plans for critical patients assisted by pre-hospital emergency care nurses.

1 | INTRODUCTION

Unlike other pre-hospital emergency care models where paramedics make up the care teams, European models, including the Spanish model, integrate physicians and nurses in these resources (Fàbrega & Canela, 2020; Palma et al., 2005). The pre-hospital emergency care nurse's role had traditionally focused on physical human responses due, among other elements, to the life-threatening nature of the critical pathologies attended in pre-hospital emergency care. Therefore, their clinical practice consisted mainly in developing technical interventions, monitoring and managing technological equipment. This role limitation is incompatible with the idea of professional nursing autonomy (Briggs, 1991). It also relegates the holistic care of the critically ill person to a second plane, lacking rigour (Torres et al., 2002), limiting the information contained in the care records to the technical interventions developed. Therefore, the possibilities of increasing the clinically based nursing knowledge over the physical human responses in pre-hospital emergency care patients are restricted without a holistic point of view. In this way, multiple factors enhance clinical practice variability, impoverishing health outcomes (Fernández-de-Maya & Richard-Martínez, 2010).

Standardized nursing languages directly impact care (Rutherford, 2008). Their use promotes visibility of nurses' interventions, improves the quality and safety of patient care and enhances recorded data (Zeffiro et al., 2021). Using standardized nursing languages allows the evaluation of the fulfilment of health outcomes, increases adherence to quality standards in clinical practice and facilitates the assessment of the nurse's competence (Zhang et al., 2021). Furthermore, it improves communication, not only between healthcare providers, but also between nurses themselves (Rutherford, 2008). In addition, the accuracy of nursing documentation is important for patient safety and care (D'Agostino et al., 2019).

In Andalusia, a region in southern Spain, pre-hospital emergency care nurses develop care plans following the guidelines of the public emergency care agency of the region. These guidelines are based on the consensus of the nursing experts in the agency. These nurses base their care plans on a holistic approach based on Virginia Henderson's Needs Theory (Butts & Rich, 2013) and Carpenito's bifocal model (Carpenito-Moyet, 2016) orienting care to the health process presented by the patient in health care (Grupo Regional de Cuidados EPES, 2017). Among the agency's objectives are the individualization of care and the use of the best available evidence.

Nurses use electronic health record (EHR) systems to record care using the standardized language NANDA International (NANDA-I) Nursing Diagnosis Classification (Herdman et al., 2021), Nursing Outcomes Classification (NOC) (Moorhead et al., 2018) and Nursing Interventions Classification (NIC) (Butcher et al., 2019) in digital format. This orientation enables a holistic assessment and a universal approach to the human responses of patients assisted by these pre-hospital emergency care teams, including coping and tolerance to stress derived from their health situation.

Different stressors can generate coping responses in the critical patient. A new experience, uncertain prognosis, unfamiliar environment, medical or nursing interventions, dependency and loss of autonomy (Montero et al., 2016) are common when a patient is admitted to an intensive care unit (Wesson, 1997). Similar stressors may be present in critical patients in the pre-hospital setting, where patients, under circumstances of confusion, stress, illness, ignorance of the environment and feel threatened, are more vulnerable to environmental risks, whether physical or psychological (Péculo-Carrasco et al., 2020). This conditions that critical illness may be viewed and felt as a catastrophic event that will invariably cause some coping responses to the patient (Wesson, 1997). NANDA-I nursing diagnoses in the coping/stress tolerance domain allow the nurse to record coping / stress responses in a standard way, establishing a clinical judgement and facilitating a systematic therapeutic plan. These nursing diagnoses are present in different contexts and specialties (Ferreira et al., 2016; Noh & Lee, 2014; Park, 2014; Villarejo Aguilar, 2011; Yang et al., 2019) but have not been widely investigated in the pre-hospital emergency setting. Nor is it known how nurses address them in this context.

Knowing the patients' most frequent nursing diagnoses in each care setting allows the comparison of these elements. It also facilitates the identification of patients' needs by nurses and new research to improve diagnostic accuracy. The study of NANDA-I nursing diagnoses, NOC outcomes and NIC interventions (NNN) linkages would support decision-making and improve health outcomes. It would also increase the levels of evidence for the expert consensus-based NNN linkages identified in the literature (Johnson et al., 2011).

2 | BACKGROUND

Using the nursing process in clinical practice enables the identification of human responses that the nurse is responsible for treating (Monteiro

Mantovani et al., 2020). Its use improves patient outcomes and documentation accuracy (D'Agostino et al., 2019). The use of nursing diagnoses proposed by NANDA-I is recommended to identify the human responses that nurses address (Herdman et al., 2021). SNLs can be used in all contexts and specialties (Monteiro Mantovani et al., 2020), although their use is not widespread in pre-hospital emergency care in Spain.

The literature on the use of SNLs in the pre-hospital emergency care setting is scarce (Cámara & Valenzuela, 2007; Coca et al., 2020; Cyrillo et al., 2009). Cámara & Valenzuela (2006) and Coca et al. (2020) described the prevalence of NANDA-I nursing diagnoses recorded in patients assisted by pre-hospital emergency teams and transferred by another type of resource to the hospital centre in Spain. Similarly, Cyrillo et al. (2009) studied the most prevalent NANDA-I nursing diagnoses in trauma victims in the Brazilian pre-hospital emergency care setting. In these studies, no information on NOC outcomes and NIC interventions were reported, and therefore on NNN linkages. In general, studies reporting the prevalence of NNN linkages assigned by nurses in their clinical practice in all different care settings are still insufficient (Gencbas et al., 2018; Noh & Lee, 2014; Villarejo Aguilar, 2011; Yang et al., 2019) with a complete absence of published research in the pre-hospital emergency care setting.

Human responses in critical patients are not exclusively derived from their pathophysiological situation. These other human responses are not understood adequately and are usually not prioritized. Different elements suggest the need to change this convention. Initiatives for humanization of critical care have included attention to coping responses (Rojas, 2019). Furthermore, the current context of the COVID-19 pandemic has highlighted how coping responses must be specially considered (Swanson et al., 2020) in a scenario where people perceive a high degree of threat and are separated from their social environment with high levels of uncertainty. Nursing diagnoses in the coping/stress tolerance domain are related to the situations described above (Brito-brito et al., 2018), prevalent in patients assisted by pre-hospital emergency care teams (Péculo-Carrasco et al., 2020).

The occurrence of human responses of coping/stress tolerance diagnosed is understudied and their therapeutic approach in pre-hospital emergency care patients is still unknown. In other words, there is insufficient evidence on the most prevalent NANDA-I diagnoses (Herdman et al., 2021) in this clinical setting and the prevalence of Nursing Outcomes Classification (NOC) outcomes (Moorhead et al., 2018), and Nursing Interventions Classification (NIC) interventions (Butcher et al., 2019) have not yet been empirically studied, as well as the linkages made by clinical nurses between NNN elements.

3 | THE STUDY

3.1 | Aims

This study aimed to determine the prevalence of NANDA-I nursing diagnoses in the coping/stress tolerance domain and their linkages to NOC outcomes and NIC interventions in the pre-hospital emergency care setting.

3.2 | Design

A retrospective descriptive study was carried out to review the electronic health records of a public emergency care agency that coordinates and attends health emergencies in Andalusia, an autonomous region of southern Spain.

3.3 | Sample/Participants

The study included episode records of people who were attended and transferred to the hospital by pre-hospital emergency care teams during 2019 due to an emerging health problem that presented nursing diagnoses in the coping/stress tolerance domain and had NOC outcomes and NIC interventions related to these nursing diagnoses recorded. We excluded records that: (a) presented more than one nursing diagnosis in the coping/stress tolerance domain, since it was not possible to link NOC outcomes and NIC interventions with the diagnosis in a nested manner due to how the EHR system retrieves the data, and (b) presented other nursing diagnoses in domains other than the one studied. Given the possibility of accessing all records and having the resources to exploit them, it was decided not to sample and conduct a census of all eligible records. Conducting a census rather than sampling eliminates the possibility of random sampling error and selection bias (Daniel, 2012).

3.4 | Data collection

The following variables were considered followed by their possible observations or units of measurement:

- Sociodemographic variables: age (years) and sex (male, female).
- Variables related to care: nursing diagnoses in domain number 9 'coping/stress tolerance' of the 2015–2017 edition of the NANDA-I classification of nursing diagnoses (Herdman & Kamitsuru, 2014) (presence, absence), NOC outcomes from the 5th edition of the Nursing Outcomes Classification (Moorhead et al., 2012) (presence, absence) and NIC interventions from the 6th edition of the Classification of Nursing Interventions (Bulechek et al., 2013) (presence, absence). In the case of nursing diagnoses, the EHR system has a series of predetermined diagnoses for each domain, chosen based on expert consensus by a company committee and collected in the organization's nursing care protocols. The selection of these diagnoses was based on the most frequent human responses identified in the pre-hospital emergency care setting. This preselection makes it easier for nurses to record these diagnoses. If nurses wished to record a diagnosis other than those preselected, they had a free text field to record them. For the domain of coping / stress tolerance, the selected nursing diagnoses were the following: *Ineffective coping (00069), Anxiety (00146), Fear (00148), Grieving (00136), Compromised family coping (00074), Ineffective denial (00072), Complicated Grieving (00135),*

Impaired resilience (00210), and Post-trauma syndrome (00141).

The attending nurse records the patient's care plan in the electronic health record using a portable touch screen computer operated with a digital pen. This equipment can connect to the emergency care agency's EHR system servers. The software has an intuitive interface that facilitates recording data from each phase of the nursing process through selectable fields and dropdown menus. This interface makes it easy to record these data with a single click. Once the process is completed, a care report is automatically generated and integrated into the patient's EHR system.

For this study, the emergency care agency's data manager and a research team member recovered the necessary data from the EHR system using a query technique. Data were exported to four Excel tables. One table contained sociodemographic data, and the other three included NANDA-I nursing diagnoses, NOC outcomes and NIC interventions, respectively. The recording of NANDA-I diagnoses, NOC outcomes and NIC interventions was done based on the presence or absence of the same in the case. A code was assigned to each case that replaced the personal identification number to protect anonymity. All tables were merged into a single table that was statistically exploitable.

Once the unified table was obtained, two research team members applied filters to select cases that met the eligibility criteria. Records that met a condition were filtered by sequential steps, retaining those that met the inclusion criteria. Once the final table with the included cases was obtained, it was exported to IBM SPSS Statistics for Windows (IBM Corp., Armonk, NY, USA).

3.5 | Ethical considerations

The corresponding ethics committee approved this study. Data confidentiality was maintained throughout the research process. As established, personal identification numbers were replaced by random codes assigned to each patient. The data files were password-protected and stored on secure computers with restricted access to the information.

3.6 | Data analysis

Descriptive statistics were used to characterize the sample for sociodemographic variables and to determine the prevalence of recorded NANDA-I nursing diagnoses, NOC outcomes and NIC interventions and their linkages. Continuous variables were summarized as mean and standard deviation, and categorical variables as frequency, percentages and cumulative percentage, where appropriate.

All the NANDA-I nursing diagnoses––NOC outcomes––NIC interventions (NNN) linkages were extracted from the database, retaining exclusively those that showed a statistical association between the NNN elements. First, the association between NOC outcomes and NIC interventions related to each diagnosis was

evaluated. For this purpose, a cross-tabulation analysis with NOC outcomes in columns and NIC interventions in rows was performed using the NANDA-I nursing diagnosis as a layer variable. Chi-square statistic was used to determine the association between the NNN elements when the expected values in at least 80% of the cells were greater than five. Fisher's exact test was used if this condition was not met. Second, the NOC outcomes with statistical association with NIC interventions were again tested for association with the NANDA-I nursing diagnosis using the same statistics mentioned. The focus was on the 25 most prevalent NNN linkages that met the above conditions to favour comprehensibility.

Statistical analysis of the data was performed with IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, NY, USA). The results were considered significant if p was <0.05.

3.7 | Validity and reliability/Rigour

Data extraction, coding and exploitation were carried out independently by two research team members and subsequently cross-checked.

4 | RESULTS/FINDINGS

Of the 61,608 records of pre-hospital care episodes with transfer to a hospital in 2019, 30.419 had at least one nursing diagnosis recorded. Of these, 452 records presented more than one nursing diagnosis in the coping / stress tolerance domain, and 5043 presented other nursing diagnoses in domains other than the one studied and were then excluded. Finally, 8308 records contained at least one diagnosis in the coping / stress tolerance domain with associated NOC outcomes and NIC interventions that made up the final sample.

4.1 | Description of the participants

Eight thousand three hundred eight patients were included with a mean age of 55.81 years (SD = 21.68), of whom 45.6% were men (n = 3877) with a mean age of 54.67 years (SD = 20.95), and 53.1% were women (n = 4412) with a mean age of 57.11 years (SD = 22.03). The remaining 1.3% did not have gender data recorded.

4.2 | Prevalence of NANDA-I nursing diagnoses

The prevalence of nursing diagnoses in the coping/stress tolerance domain in all the records was 27.31%. Eight different NANDA-I nursing diagnoses were identified in the coping/stress tolerance domain. The highest prevalence in the domain was for *Anxiety (00146)* with 52.24% (*n* = 4340) and *Fear (00148)* with 40.37% (*n* = 3354), followed by *Ineffective coping (00069)* with 6.15% (*n* = 511), *Grieving (00136)* with 0.045% (*n* = 37), *Compromised family coping (00074)* with 0.38%

TABLE 1 Descriptive for NOC outcomes recorded

Domain	*n*	%	Class	*n*	%	NOC (code)	*n*	%	Ranking
1. Functional health	210	1.65	A. Energy maintenance	55	0.43	**Activity tolerance (0005)**	55	0.43	**22**
			C. Mobility	29	0.23	Mobility (0208)	22	0.17	33
						Transfer performance (0210)	5	0.04	55
						Body positioning: Self-Initiated (0203)	2	0.02	67
			D. Self- Care	126	0.99	**Self-Care status (0313)**	126	0.99	**14**
2. Physiologic health	906	7.10	AA. Therapeutic response	60	0.47	**Blood glucose level (2300)**	59	0.46	**19**
						Post-Procedure recovery (2303)	1	0.01	74
			E. Cardiopulmonary	406	3.18	**Circulation status (0401)**	240	1.88	**8**
						Respiratory status (0415)	81	0.63	**17**
						Respiratory status: Gas exchange (0402)	56	0.44	**21**
						Respiratory status: Airway patency (0410)	29	0.23	28
			I. Metabolic regulation	5	0.04	Thermoregulation (0800)	5	0.04	54
			J. Neurocognitive	430	3.37	**Neurological status (0909)**	148	1.16	**12**
						Decision- Making (0906)	118	0.93	**15**
						Communication (0902)	70	0.55	**18**
						Neurological status: Consciousness (0912)	36	0.28	**25**
						Cognitive orientation (0901)	29	0.23	27
						Cognition (0900)	19	0.15	35
						Neurological status: Peripheral (0917)	8	0.06	50
						Heedfulness of affected side (0918)	2	0.02	65
			K. Digestion & nutrition	3	0.02	Swallowing status (1010)	3	0.02	61
			L. Tissue integrity	2	0.02	Physical injury severity (1913)	2	0.02	68
3. Psychosocial health	9892	77.55	M. Psychological well-being	4749	37.23	**Anxiety level (1211)**	2451	19.21	**1**
						Fear level (1210)	2172	17.03	**3**
						Mood equilibrium (1204)	53	0.42	**23**
						Self-esteem (1205)	35	0.27	26
						Agitation level (1214)	24	0.19	31
						Hope (1201)	14	0.11	39
			N. Psychosocial adaptation	1607	12.60	**Coping (1302)**	1394	10.93	**4**
						Acceptance: Health status (1300)	187	1.47	**10**
						Personal resiliency (1309)	22	0.17	34
						Psychosocial adjustment: Life change (1305)	4	0.03	56
			O. Self-Control	3536	27.72	**Anxiety self-control (1402)**	2314	18.14	**2**
						Fear self-control (1404)	1222	9.58	**5**

TABLE 1 Continued

Domain	n	%	Class	n	%	NOC (code)	n	%	Ranking
4. Health knowledge & behaviour	1414	11.08	FF. Health management	21	0.16	Self-Management: Acute illness (3100)	14	0.11	40
						Self-Management: Chronic disease (3102)	7	0.05	52
			GG. Knowledge health condition	264	2.07	**Knowledge: Disease Process (1803)**	213	1.67	**9**
						Knowledge: Acute illness management (1844)	19	0.15	36
						Knowledge: Treatment regimen (1813)	14	0.11	42
						Knowledge: Cardiac Disease Management (1830)	11	0.09	45
						Knowledge: Asthma management (1832)	3	0.02	59
						Knowledge: Diabetes management (1820)	3	0.02	60
						Knowledge: Heart failure management (1835)	1	0.01	73
			HH. Safety	43	0.34	Pre-Procedure readiness (1921)	17	0.13	38
						Fall prevention behaviour (1909)	12	0.09	43
						Falls occurrence (1912)	9	0.07	49
						Safe wandering (1926)	3	0.02	58
						Personal safety behaviour (1911)	2	0.02	66
			Q. Health behaviour	884	6.93	**Symptom control (1608)**	415	3.25	**6**
						Pain control (1605)	304	2.38	**7**
						Participation in health care decisions (1606)	140	1.10	**13**
						health seeking behaviour (1603)	14	0.11	41
						Compliance behaviour: Prescribed medication (1623)	6	0.05	53
						Compliance behaviour (1601)	3	0.02	63
						Treatment behaviour: Illness or Injury (1609)	1	0.01	70
						Compliance behaviour: Prescribed diet (1622)	1	0.01	75
			R. Health beliefs	3	0.02	Health Beliefs: Perceived threat (1704)	3	0.02	62
			S. Knowledge health promotion	137	1.07	**Knowledge: Health resources (1806)**	96	0.75	**16**
						Knowledge: Medication (1808)	28	0.22	29
						Knowledge: Fall prevention (1828)	12	0.09	44
						Knowledge: Health behaviour (1805)	1	0.01	72
			T. Risk control	62	0.49	**Risk control (1902)**	58	0.45	**20**
						Risk control: Cardiovascular disease (1914)	4	0.03	57

TABLE 1 Continued

Domain	n	%	Class	n	%	NOC (code)	n	%	Ranking
5. Perceived health	246	1.93	U. Health & life quality	22	0.17	Personal health status (2006)	11	0.09	46
						Comfort status: Environment (2009)	10	0.08	47
						Comfortable death (2007)	1	0.01	71
			V. Symptom status	224	1.76	**Pain level (2102)**	179	1.40	**11**
						Discomfort level (2109)	44	0.34	**24**
						Pain: Disruptive effects (2101)	1	0.01	69
6. Family health	88	0.69	W. Family caregiver performance	9	0.07	Caregiver home care readiness (2202)	7	0.05	51
						Caregiver-Patient relationship (2204)	2	0.02	64
			X. Family well-being	70	0.55	Family participation in professional care (2605)	27	0.21	30
						Family support during treatment (2609)	24	0.19	32
						Family coping (2600)	19	0.15	37
			Z. Family member health status	9	0.07	Caregiver well-being (2508)	9	0.07	48

Note: The top 25 NOC outcomes in the prevalence ranking are highlighted in bold type.

(n = 32), *Complicated grieving (00135)* with 0.13% (n = 11), *Impaired resilience (00210)* with 0.07% (n = 6) and *Post-trauma syndrome (00141)* with 0.06% (n = 5).

4.3 | Prevalence of NOC outcomes

Table 1 shows the different NOC outcomes recorded (n = 82), as well as the domains (n = 6) and classes (n = 24) to which they belong. Of the total NOC outcomes, the top five made up 74.89% of the total selected. *Anxiety level (1211)* with 19.21% (n = 2451) was the most recorded NOC outcome followed by *Anxiety self-control (1402)* with 18.14% (n = 2314), *Fear level (n = 1210)* with 17.03% (n = 2172), *Coping (1302)* with 10.93% (n = 1394) and *Fear self-control (n = 1404)* with 9.58% (n = 1222).

The selected NOC outcomes of 7 7.55% belonged to the *Psychosocial health* domain, with *Psychological well-being* (37.23%) being the class that agglutinated the most NOC outcomes, followed by *Self-control* (27.72%) and *Psychosocial adaptation* (12.60%). Of the NOC outcomes recorded, 11.08% belonged to the *Health knowledge & behaviour* domain (11.08%), with *Health behaviour* being the most prevalent class with 6.93%

4.4 | Prevalence of NIC interventions

Table 2 shows the different recorded NIC interventions (n = 115), as well as the domains (n = 6) and classes (n = 25) to which they belong. Of the total number of selected NIC interventions, 10 represented 51.73% of the total, being the top five ranking: *Emotional support (5270)* with 5.31% (n = 6835), *Family presence facilitation (7170)* with

5.18% (n = 6672), *Anxiety reduction (5820)* with 5.09% (n = 6552), *Touch (5460)* with 5.06% (n = 6514) and *Presence (n = 5340)* with 4.97% (n = 6394).

Of the NIC interventions selected, 45.49% belonged to the *Behavioural* domain, where *Coping assistance* (20.93%) and *Patient education* (12.87%) were the most common. The *Safety* domain represented 21.11% of the NIC interventions, with *Risk management* (15.84%) the class with the highest number of interventions recorded.

4.5 | NNN Linkages

Table 3 shows the NNN linkages used most frequently. A total of 473 different NNN linkages were identified, of which 25 showed a prevalence greater than 1000. representing 59.86% of the total. The 10 most frequently used NNN linkages were *Anxiety (00146)-Anxiety level (1211)-Anxiety reduction (5820)* (n = 2208), *Anxiety (00146)-Anxiety self-control (1402)-Anxiety reduction (5820)* (n = 2153), *Anxiety (00146)-Anxiety self-control (1402)-Emotional Support (5270)* (n = 2029), Anxiety (00146)-Anxiety self-control (1402)-Touch (5460) (n = 1896), Anxiety (00146)-Anxiety level (1211)-Vital signs monitoring (6680) (n = 1879), *Fear (00148)-Fear level (1210)-Presence (5340)* (n = 1845), *Fear (00148)-Fear level (1210)-Touch (5460)* (n = 1834), *Fear (00148)-Fear level (1210)-Emotional Support (5270)* (n = 1826), *Fear (00148)-Fear level (1210)-Family presence facilitation (7170)* (n = 1815) and *Anxiety (00146)-Anxiety level (1211)-Presence (5340)* (n = 1806). Of the 10 most prevalent NNN linkages, six were made with the NANDA-I nursing diagnosis *Anxiety (00146)*, interrelated with two different NOC outcomes and five different NIC interventions. The most prevalent NNN linkages were

TABLE 2 Descriptive for NIC interventions recorded

Domain	n	%	Class	n	%	NIC (code)	n	%	Ranking
1. Physiological: Basic	13,117	10.19	A. Activity and exercise management	1133	0.88	Energy management (0180)	1034	0.80	33
						Teaching: Prescribed exercise (5612)	99	0.08	67
			B. Elimination management	17	0.01	Urinary catheterization (0580)	17	0.01	99
			C. Immobility management	4261	3.31	**Positioning (0840)**	2333	1.81	**20**
						Transfer (0970)	1069	0.83	30
						Splinting (0910)	384	0.30	49
						Traction/ Immobilization care (0940)	183	0.14	58
						Physical Restraint (6580)	152	0.12	61
						Transport (0960)	140	0.11	62
			D. Nutrition support	110	0.09	Teaching: Prescribed diet (5614)	82	0.06	70
						Gastrointestinal intubation (1080)	28	0.02	92
			E. Physical comfort promotion	7568	5.88	**Environmental management: Comfort (6482)**	5662	4.40	**8**
						Pain management (1400)	1539	1.20	28
						Nausea management (1450)	211	0.16	56
						Vomiting management (1570)	156	0.12	60
			F. Self-care facilitation	28	0.02	Post-mortem care (1770)	28	0.02	93
2. Physiological: Complex	20,045	15.57	G. Electrolyte and acid–base management	228	0.18	Hypoglycaemia management (2130)	115	0.09	65
						Phlebotomy: Arterial bloodsample (4232)	71	0.06	73
						Hyperglycaemia management (2120)	35	0.03	85
						Acid–Base management (1910)	7	0.01	108
			H. Drug management	5211	4.05	**Medication administration (2300)**	3563	2.77	**13**
						Teaching: Prescribed medication (5616)	423	0.33	46
						Analgesic administration (2210)	399	0.31	47
						Medication management (2380)	329	0.26	52
						Medication reconciliation (2395)	216	0.17	55
						Medication administration:Intravenous (IV) (2314)	110	0.09	66
						Sedation management (2260)	77	0.06	72
						Chemical restraint (6430)	41	0.03	80
						Medication administration:Inhalation (2311)	25	0.02	95
						Medication administration: Subcutaneous (2317)	16	0.01	100
						Medication administration:Intraosseous (2303)	12	0.01	104

TABLE 2 (Continued)

Domain	n	%	Class	n	%	NIC (code)	n	%	Ranking
			I. Neurologic management	1359	1.06	Neurologic monitoring (2620)	1215	0.94	29
						Seizure management (2680)	59	0.05	75
						Seizure precautions (2690)	50	0.04	76
						Unilateral neglect management (2760)	35	0.03	84
			K. Respiratory management	2349	1.82	Respiratory monitoring (3350)	922	0.72	35
						Oxygen therapy (3320)	515	0.40	41
						Ventilation assistance (3390)	426	0.33	45
						Aspiration precautions (3200)	210	0.16	57
						Airway management (3140)	63	0.05	74
						Mechanical ventilation management: Noninvasive (3302)	45	0.03	78
						Mechanical ventilation management: Invasive (3300)	41	0.03	81
						Airway insertion and stabilization (3120)	32	0.02	90
						Cough enhancement (3250)	30	0.02	91
						Airway suctioning (3160)	23	0.02	96
						Artificial airway management (3180)	19	0.01	97
						Asthma management (3210)	18	0.01	98
						Mechanical ventilation management: Pneumoniaprevention (3304)	4	0.00	111
						Tube care: Chest (1872)	1	0.00	115
			L. Skin/ Wound management	471	0.37	Wound care (3660)	456	0.35	44
						Wound care: Burns (3661)	15	0.01	102
			M. Thermoregulation	570	0.44	Temperature regulation (3900)	570	0.44	37
			N. Tissue perfusion management	9857	7.66	**Cardiac care: Acute (4044)**	2363	1.84	**18**
						Intravenous (IV) insertion (4190)	2148	1.67	**22**
						Intravenous (IV) therapy (4200)	2134	1.66	**23**
						Cardiac care (4040)	2064	1.60	**24**
						Phlebotomy: Cannulated vessel (4235)	529	0.41	39
						Dysrhythmia management (4090)	342	0.27	51
						Cardiac risk management (4050)	124	0.10	63
						Haemodynamic regulation (4150)	83	0.06	69
						Bleeding reduction: Wound (4028)	39	0.03	82
						Shock management (4250)	15	0.01	101
						Pacemaker management:Temporary (4092)	9	0.01	107
						Haemorrhage control (4160)	5	0.00	110
						Defibrillator management: Internal (4096)	2	0.00	113

TABLE 2 (Continued)

Domain	*n*	%	Class	*n*	%	NIC (code)	*n*	%	Ranking
3. Behavioural	58,574	45.49	O. Behaviour therapy	354	0.27	Patient contracting (4420)	319	0.25	53
						Self-Modification assistance (4470)	35	0.03	86
			P. Cognitive therapy	646	0.50	Reality orientation (4820)	555	0.43	38
						Learning facilitation (5520)	91	0.07	68
			Q. Communication enhancement	2290	1.78	**Active listening (4920)**	2246	1.74	**21**
						Communication enhancement: Speech deficit (4976)	44	0.03	79
			R. Coping assistance	26,947	20.93	**Emotional support (5270)**	6835	5.31	**1**
						Touch (5460)	6514	5.06	**4**
						Presence (5340)	6394	4.97	**5**
						Security enhancement (5380)	2630	2.04	**17**
						Counselling (5240)	2028	1.58	**25**
						Coping enhancement (5230)	1057	0.82	32
						Decision-making support (5250)	574	0.45	36
						Hope inspiration (5310)	524	0.41	40
						Self-esteem enhancement (5400)	176	0.14	59
						Support system enhancement (5440)	121	0.09	64
						Grief work facilitation (5290)	48	0.04	77
						Crisis intervention (6160)	35	0.03	88
						Dying care (5260)	11	0.01	105
			S. Patient education	16,573	12.87	**Teaching: Disease process (5602)**	5753	4.47	**7**
						Teaching: Procedure/treatment (5618)	5636	4.38	**9**
						Preparatory sensory information (5580)	3214	2.50	**14**
						Health education (5510)	1970	1.53	26
			T. Psychological comfort promotion	11,764	9.14	**Anxiety reduction (5820)**	6552	5.09	**3**
						Distraction (5900)	5212	4.05	**11**
4. Safety	27,183	21.11	U. Crisis management	6788	5.27	**Family presence facilitation (7170)**	6672	5.18	**2**
						Code management (6140)	36	0.03	83
						Resuscitation (6320)	33	0.03	89
						Emergency care (6200)	27	0.02	94
						First Aid (6240)	11	0.01	106
						Triage: disaster (6362)	7	0.01	109
						Triage: Emergency centre (6364)	2	0.00	114
			V. Risk management	20.395	15,84	**Vital signs monitoring (6680)**	5962	4.63	**6**
						Environmental management: Safety (6486)	5407	4.20	**10**
						Surveillance (6650)	4629	3.60	**12**
						Fall Prevention (6490)	3006	2.33	**15**
						Risk Identification (6610)	950	0.74	34
						Surveillance: Safety (6654)	389	0.30	48
						Infection control (6540)	35	0.03	87
						Abuse Protection Support (6400)	15	0.01	103
						Immunization/Vaccination Management (6530)	2	0.00	112

TABLE 2 (Continued)

TABLE 2 (Continued)

Domain	n	%	Class	n	%	NIC (code)	n	%	Ranking
5. Family	4371	3.39	X. Lifespan care	4371	3,39	**Family support (7140)**	2344	1.82	**19**
						Family involvement promotion (7110)	1069	0.83	31
						Family mobilization (7120)	490	0.38	42
						Caregiver support (7040)	468	0.36	43
6. Health system	5460	4.24	a. Health system management	80	0.06	Specimen management (7820)	80	0.06	71
			b. Information management	2168	1,68	Referral (8100)	1906	1.48	27
						Health care information exchange (7960)	262	0.20	54
			Y. Health system mediation	3212	2,49	**Patient rights protection (7460)**	2847	2,21	**16**
						Health system guidance (7400)	365	0.28	50

Note: The top 25 NIC interventions in the prevalence ranking are highlighted in bold type.

made with the nursing diagnosis *Anxiety (00146)* linked to the NOC outcome *Anxiety level (1211)* and six different NIC interventions.

5 | DISCUSSION

The SNLs NNN and their use in electronic records facilitate the analysis of patient care and evidence-based practice (Park, 2014; Zeffiro et al., 2021). However, NNN are not yet systematized in most pre-hospital emergency healthcare services in Spain. This circumstance, together with the lack of global homogeneity of pre-hospital health care models, could be conditioning the scarcity of studies on prevalence of NNN to compare the present study results.

About the characteristics of the sample, it was found that the study population is made up primarily of middle-aged adults and with a higher percentage of women, characteristics similar to those described previously in the study setting (Montero et al., 2016).

Determining the prevalence of NNN elements was the first objective of this study. Nursing diagnoses in the coping/stress tolerance domain were recorded in a few more than one of every four care plans of people assisted by pre-hospital emergency care teams. This implies that pre-hospital emergency care nurses diagnose human responses related to coping/stress tolerance on an ongoing basis. Addressing human responses is the responsibility of nurses who plan and execute care aimed at these responses. Therefore, the findings of this study evidence the development of the autonomous role of nurses in the pre-hospital emergency care.

Eight NANDA-I nursing diagnoses in the coping/stress tolerance domain were identified in the records. *Anxiety (00146)* and *Fear (00148)* agglutinated more than 90% of the recorded diagnosis in the domain, followed by *Ineffective coping (00069)* with 6.15%. The remaining six NANDA-I nursing diagnoses showed a prevalence that did not even reach 1% of the total. Similar results were identified in the pre-hospital setting by Cámara and Valenzuela (2007), Cyrillo et al. (2009) and Coca et al. (2020) where *Anxiety (00146)* and *Fear*

(00148) were the most recorded NANDA-I nursing diagnoses in the coping/stress tolerance domain.

The prevalence of these diagnoses in the context studied could be related to the increased stress levels and uncertainty associated with the need for emerging health care (Péculo-Carrasco et al., 2020). This also occurs at the hospital setting. Brito-Brito et al. (2018) stated that patients attending in hospital emergency departments and their companions present stress, Anxiety and coping difficulties. Something similar also occurs in a hospital acute cardiac care unit, where Park (2014) studied the most used NANDA-I nursing diagnoses, NOC outcomes and NIC interventions in patients with heart failure, a health problem in the context of critical care similar to those faced by emergency teams. Their study showed that NANDA-I nursing diagnoses in the coping/stress tolerance domain were present in these patients, being *Fear (00148)* and *Anxiety (00146)* the two most recorded in the domain. Similarly, in this study, expert consensus proposes nursing diagnoses with the highest prevalence among those that must be considered in patients with COVID-19 (Moorhead et al., 2021), relating them to fear of death. This high degree of threat is shared by people who have an emerging health process regardless of the clinical setting in which they are treated.

Identifying key NOC outcomes for a specific patient profile is fundamental to increase care effectiveness, quality and safety (Park, 2014). In this study, 82 different NOC outcomes were identified in the records of the patients. The NOC outcomes in the Psychosocial health domain were the most commonly used, including the five NOC outcomes representing 74.89% of the total selected: *Anxiety level (1211)* was the most recorded outcome followed by *Anxiety self-control (1402)*, *Fear level (1210)*, *Coping (1302)* and *Fear self-control (1404)*. These belong to the *Psychological well-being* (1211, 1210), *Self-control* (1402) and *Psychosocial adaptation* classes (1302). The establishment of outcomes aimed at quantifying human responses and enhancing the patient's ability to control these responses is observed. The NOC outcomes in the domain of Health knowledge & behaviour were second in the ranking, providing goals oriented to personal actions and evaluating knowledge about

TABLE 3 Top 25NNN linkages recorded

NANDA-I (code)	NOC (code)	NIC (code)	n	p (NANDA-I-NOC)[a]	p (NOC-NIC)[a]
Anxiety (00146)	Anxiety level (1211)	Anxiety reduction (5820)	2208	<0.001	<0.001
Anxiety (00146)	Anxiety self-control (1402)	Anxiety reduction (5820)	2153	<0.001	<0.001
Anxiety (00146)	Anxiety self-control (1402)	Emotional Support (5270)	2029	<0.001	<0.001
Anxiety (00146)	Anxiety self-control (1402)	Touch (5460)	1896	<0.001	<0.001
Anxiety (00146)	Anxiety level (1211)	Vital signs monitoring (6680)	1879	<0.001	<0.001
Fear (00148)	Fear level (1210)	Presence (5340)	1845	<0.001	0.009
Fear (00148)	Fear level (1210)	Touch (5460)	1834	<0.001	0.031
Fear (00148)	Fear level (1210)	Emotional Support (5270)	1826	<0.001	<0.001
Fear (00148)	Fear level (1210)	Family presence facilitation (7170)	1815	<0.001	0.002
Anxiety (00146)	Anxiety level (1211)	Presence (5340)	1806	<0.001	<0.001
Anxiety (00146)	Anxiety level (1211)	Family presence facilitation (7170)	1804	<0.001	0.004
Anxiety (00146)	Anxiety self-control (1402)	Presence (5340)	1772	<0.001	<0.001
Fear (00148)	Fear level (1210)	Environmental management: comfort (6482)	1652	<0.001	0.002
Anxiety (00146)	Anxiety self-control (1402)	Distraction (5900)	1651	<0.001	<0.001
Anxiety (00146)	Anxiety level (1211)	Teaching: disease process (5602)	1646	<0.001	0.029
Anxiety (00146)	Anxiety self-control (1402)	Teaching: Procedure/ Treatment (5618)	1610	<0.001	<0.001
Anxiety (00146)	Anxiety self-control (1402)	Vital signs monitoring (6680)	1598	<0.001	0.001
Anxiety (00146)	Anxiety self-control (1402)	Teaching: disease process (5602)	1588	<0.001	0.001
Fear (00148)	Fear level (1210)	Teaching: Procedure/ Treatment (5618)	1553	<0.001	<0.001
Fear (00148)	Fear level (1210)	Environmental Management: Safety (6486)	1521	<0.001	0.008
Fear (00148)	Fear level (1210)	Vital signs monitoring (6680)	1516	<0.001	<0.001
Anxiety (00146)	Anxiety level (1211)	Environmental Management: Safety (6486)	1374	<0.001	0.001
Fear (00148)	Fear level (1210)	Distraction (5900)	1327	<0.001	<0.001
Fear (00148)	Fear self-control (1404)	Emotional Support (5270)	1116	<0.001	<0.001
Fear (00148)	Fear self-control (1404)	Touch (5460)	1079	<0.001	<0.001

[a]Chi-square statistic or Fisher's exact test.

care-related elements. This orientation supports the emergency care agency's commitment in which the study was conducted to position the patient as an active element in healthcare (Grupo Regional de Cuidados EPES, 2017). The Physiologic health domain ranks third in prevalence, with NOC outcomes aimed primarily at assessing pathophysiological elements. This fact is reasonable considering the characteristics of the context studied, pre-hospital emergency care, where the patient's vital situation is usually compromised, and its control and stabilization are a priority. Furthermore, the establishment of objectives in this domain, together with those in the Perceived Health domain, is consistent, since the presence of signs or symptoms associated with severity, high degree of threat and specific interventions generate stress coping/tolerance responses (Park, 2014; Recio Recio & Recio Recio, 2005; Shrestha & Kuria, 2012; Torres et al., 2002).

From a patient safety perspective, continuity of care is crucial (Moorhead et al., 2018). This continuity of care in referral and transfer to hospital centres is necessary for the pre-hospital emergency care setting. Recording NOC outcomes in these patients facilitates the transmission of information to the next level of care, increasing patient safety and quality of care. It is also worth highlighting the recording of outcomes in the Family health domain, aimed at the family/caregiver in a context such as the one studied, in which health care is traditionally focused on the patient. Studies such as those by De la Flor et al. (2006) in the pre-hospital emergency care setting or Barreto et al. (2019) and Gheshlaghi et al. (2020) at the hospital level describe the benefits of the presence of the family member in emergencies, generally facilitating the coping responses of both the patient and the family. However, and despite these results and the benefits described in the literature, family integration remains an issue that generates controversy and is not accepted by all pre-hospital emergency care teams in the same way (Grupo Regional de Cuidados EPES, 2017). Acceptation is conditioned by attitudinal issues and professional receptivity (Barreto et al., 2019).

One hundred and fifteen different NIC interventions were recorded. The interventions identified were mainly addressed in the Behavioural, Safety and Physiological: Complex domains. NIC interventions in the Behavioural domain were most used, providing, among others, NIC interventions aimed primarily at improving coping (*Emotional support (5270), touch (5460)* and *Presence (5340))*, providing information to the patient (*Teaching: Disease process (5602), Teaching: Procedure/treatment (5618), Preparatory sensory information (5580)*) and promoting psychological comfort (*Anxiety reduction (5820) and Distraction (5900)*). The Safety domain was the second most used. NIC interventions in this domain were oriented towards risk management (*Vital signs monitoring (6680), Environmental management: Safety (6486)*) and crisis management (*Family presence facilitation (7170)*). The Physiological: Complex domain ranked third in prevalence, mainly providing NIC interventions aimed at tissue perfusion and drug management. After this, the Physiological: Basic domain contributes to interventions for physical comfort among the most prevalent (*Environmental management: Comfort [6482]*).

Park (2014) identified 143 different NIC interventions for patients with heart failure in the hospital setting. In his study, *Emotional support (5270)* was among the top five by prevalence. Similarly, the domains presented in his study coincide with those identified in this study, with differences in ranking. This author described a higher prevalence in the Physiological domain: Complex followed by Behavioural, with the rest of the domains coinciding. This difference may be because this study focuses on NANDA-I diagnoses in the coping/stress tolerance domain, and Park studied all NANDA-I diagnoses present in patients with heart failure. Based on identified outcomes, recorded interventions aimed at the family are notable. These interventions aimed to support the patient's coping or the coping of the family or caregiver itself. The NICs recorded with the highest prevalence show a high level of coincidence in both studies.

The second objective of this study was to determine the most prevalent NNN linkages in the pre-hospital emergency care setting. Empirically knowing these linkages provides many benefits for the patient, the nurse and the institutional and scientific levels. The linkage between the three standardized languages assists clinical nurses in selecting the most appropriate outcomes and interventions for their nursing diagnoses. Furthermore, NNN linkages can indicate the care needs of patients in a particular clinical setting (Yang et al., 2019). None of the studies developed in the pre-hospital emergency care setting and mentioned previously (Cámara & Valenzuela, 2007; Coca et al., 2020; Cyrillo et al., 2009) reported information on NNN linkages. Therefore, the present study is the first to address NNN linkages in this setting on an empirical basis. Moreover, to our knowledge, this study has the largest sample among published studies on NNN linkages.

The 25 NNN linkages identified with the highest prevalence included the NANDA-I nursing diagnoses *Anxiety (00146)* or *Fear (00148)*. These diagnoses were linked to four NOC outcomes belonging to the Psychosocial health domain, aimed at psychological well-being and self-management of the coping response. The interventions identified in these NNN linkages are primarily grouped in the Behavioural domain, followed by Safety and Physiological: Basic. About *Anxiety (00146)*, the most prevalent linkage was with the NOC outcome *Anxiety level (1211)* and the NIC intervention *Anxiety reduction (5820)*. This linkage was the most prevalent among all records. The linkage with the highest prevalence included the nursing diagnosis *Fear (00148)*, which ranked sixth. *Fear (00148)* was linked with the NOC outcome *Fear level (1210)* and the NIC intervention *Presence (5340)*. Of the NNN linkages identified with higher prevalence, seven were suggested by Johnson et al. (2011) in the book on NNN linkages: four for *Anxiety (00146)* and three for *Fear (00148)*. The others were consistent with the nursing diagnosis selected. Furthermore, many NIC interventions are categorized in the exact domains as interventions described in patients with heart failure (Park, 2014).

This study showed that pre-hospital emergency care nurses diagnose and treat human responses in the coping/stress tolerance domain. Furthermore, it showed the NNN linkages they identified for nursing diagnoses in this domain. Expert consensus-based NNN

linkages could be complemented with the empirical results of this study, increasing the levels of evidence of individualized and standardized care plans for critical patients assisted by pre-hospital emergency care nurses. Additionally, these findings would improve clinical reasoning and support evidence-based practice in this clinical setting. This study and future research may help to understand how the nursing process is applied in pre-hospital emergency care and how SNLs are used in this setting.

6 | LIMITATIONS

This study has several limitations that need to be highlighted. First, a census of a local emergency care agency allows a good characterization of the NNN linkages and the prevalence of its elements in the patients attended, but makes it difficult to generalize the results to other contexts in the same country or abroad. It could be of interest to replicate this study in different Spanish and international emergency services to identify differences with the results of this study. Second, there was an under-recording of nursing care of 50.62% of the total number of records made, which may have affected the prevalence results. Third, since it was not possible to associate the NOC outcomes and NIC interventions with the diagnosis in a nested manner due to how the EHR system retrieves the data. For this reason, the study was based only on records that contain only one nursing diagnosis in the Coping/stress tolerance domain, rejecting records that have more than nursing diagnoses in the domain or some nursing diagnosis in the domain together with some or some from other domains, and, therefore, considerably underestimating the prevalence. Fourth, diagnostic accuracy was not evaluated, so there is an opportunity that diagnoses with a low level of accuracy were identified. Low accuracy might lead to poor therapeutic decision-making and inappropriate outcome determination by the nurse. Different elements influence the way nurses diagnose. The complexity of the patient's situation, the institution's diagnosis policy and individual characteristics of the nurse herself, such as training, experience and attitude towards nursing diagnosis, are crucial factors in the diagnosis process (Paans et al., 2011; Park, 2014; Romero-Sánchez, 2014). These elements were not controlled. The high variability in the ability of nurses to execute care plans was also not controlled and was assumed to have influenced the selection of NNN elements. However, a care model using SNLs is fully implemented in the emergency care agency in which the study was carried out and professionals received specific training. In addition, an agency working group proposes lines of action for the process. It periodically audits the records in the EHR system to determine whether they meet the standards of practice. Both aspects favour the reduction of the previously assumed variability in both the care provided and, therefore, its record. However, it would be interesting to perform care audits of some of these records and formally assess the ability of professionals to make care plans and record them to establish improvement strategies.

7 | CONCLUSIONS

Nursing diagnoses in the coping/stress tolerance domain were recorded in a few more than one of every four records of people assisted by pre-hospital emergency care teams, with *Anxiety (00146)* and *Fear (00148)* at the top of the ranking. The NOC outcomes recorded are primarily aimed at psychological well-being and psychological adaptation of the patient, knowledge, and control of signs and symptoms. NIC interventions were selected mainly to support coping, improve patient teaching and education, ensure safety and address pathophysiological aspects. NNN linkages were generally recorded to provide emotional support, physical well-being, information, education and safety, focusing on the patient and family.

Expert consensus-based NNN linkages may be complemented by the results of this study, increasing the levels of evidence of both individualized and standardized care plans for critical patients assisted by pre-hospital emergency care nurses. In addition, these findings would improve the clinical reasoning and support the evidence-based practice in this clinical setting.

CONFLICT OF INTEREST
No conflict of interest has been declared by the author(s).

AUTHOR CONTRIBUTIONS
All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE*): (1) substantial contributions to conception and design, acquisition of data or analysis and interpretation of data; (2) drafting the article or revising it critically for important intellectual content. * http://www.icmje.org/recommendations/

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