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Neutrosophic Analysis of the Nursing Care Process in the Teaching of Nursing

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Abstract. The health system in any country becomes a Strength based on the level of preparation that its professionals possess and with it their performance in the work. One of the important professionals in this sector is the nursing staff. In the teaching of nursing professionals in universities, the Nursing Care Process is the method of main application and link of all the components required for good professional behavior. The correct fulfillment of its stages, phases, and components achieves the required attention to each patient, the accurate diagnosis of the medical team, and the subsequent proper procedure. In this investigation, the potentialities that Neutrosophic Science possesses are exploited, which with its significant advances, facilitates the determination to a greater degree of the existing problems. A study of the Nursing Care Process in the teaching of Nursing in Ecuador is carried out, in which the criteria of experts in the university training and specialty are taken, as well as students of five selected groups from different regions of the country.

Keywords: Neutrosophy, process, Nursing Care Process, teaching, nursing.

1. Introduction

Medical care is an element of great importance in human well-being in any country, regardless of its economic and social development. Within this, primary care is of greater value, since subsequent follow-up of the patient depends on it. Increasing the capacity of the Health System to respond to the needs of the population is, without a doubt, a task that requires hard work. Primary Health Care, since it is the gateway to the system, should be the instance where the greatest number of health problems are resolved. Thus the importance of making it more resolute [1].

The development of medical care processes from the patient's arrival has to a large extent an important role in the work carried out by the nursing staff. Since its inception, this staff must carry out the tasks of data collection and nursing diagnosis, based on observation, interview, and exploration. They must be used in this same order, this will allow a logical development in the collection and integration of information about the patient by the nursing professional, thereby facilitating the contrast, verification, and in-depth analysis of the data that lead to making diagnoses more effectively.

The objectives of the health system are aimed at equity, the satisfaction of the population with respect to the services received, efficiency, and effectiveness in terms of health and quality of life. In the achievement of these objectives, the medical and nursing staff constitute a fundamental part [2]. In this sense, the training of nursing staff in Ecuador constitutes the basis of the procedure that is carried out. Within the training process, this staff acquires the fundamental knowledge of the Nursing Care Process, an essential process in the initial care of the patient that must be carried out in compliance with all its stages.

The strategy for primary care in the Basque Country, published in February 2019, includes the organization of the corporate model of Care Demand Management (CDM) in Primary Care (PC). This model was born and implanted in Catalonia in 2009, later spreading to other communities such as Andalusia. The objective of the CDM is for PC administrative, nursing, and medical professionals to work as a team, to provide an efficient and proactive response to the health needs presented by the citizen.

From the Patient or User Care Area (PUCA) an administrative triage is carried out to direct each patient to the place where their need can be solved. The implementation of the model requires these professionals to develop new skills and competencies. In the new strategy, the one that deals with the care skills of the PC is the nurse, to make her a benchmark in the care field in collaboration with the doctor. In the current context, the nurse acquires the competence to assess five self-limited mild processes, upper respiratory tract flu, fever, sore throat, nausea and/or vomiting, and diarrhea [3].

The transformation of primary care in Ecuador is shown in non-verbal communication, values and feelings, protection measures, direct attention to citizens, and the identification of vulnerable groups [4]. For this, the Nursing Care Process requires the nurse to have extensive knowledge of various disciplines. The nurse is expected to master basic concepts of Anatomy, Physiology, Chemistry, Microbiology, Nutrition, and Psychology. Such knowledge constitutes the scientific basis for assessing the physiological and psychological state of the individual, family, or community; identifying nursing diagnoses (human responses or functional patterns) in the face of problems related to the health-disease process; detecting factors that contribute to its frequency; selecting the individualized nursing actions that are most likely to be effective, and evaluating the effectiveness of the nursing actions.

The teaching process in the nursing course should include actions aimed at palliative care, which continues to be deficient, especially in its practical application, with training being necessary to have repercussions on the care of people with palliative needs and their families [5]. In this training process, technical skills or abilities involve specific procedures and techniques that allow the nurse to collect data, develop, execute and assess the care plan.

Interpersonal skills or abilities are important during the entire stage of the Nursing Care Process. Since it is a communicative-interactive process, the nurse must have highly developed verbal and non-verbal communication skills. This ability will facilitate the development of positive relationships between the nurse, the patient, and the family. These positive relationships will allow to:

1. Determine what the priorities of the patient or family are.
2. Identify added nursing problems.
3. Create a therapeutic environment in which joint results can be achieved.

The Nursing Care Process has its maximum manifestation during the training of nursing staff, in professional practice, where the nurse makes intentional decisions aimed at their objective. To this end, it relies heavily on critical reasoning, which involves questioning assumptions; determining conclusions, and identification of justifications that support them. You need to have critical thinking skills as an individual and as a professional and be able to make informed personal decisions, as well as all those necessary to provide safe, competent, and qualified nursing care.

This critical reasoning approach is based on the scientific method and reduces the limitations imposed when opinions, values, or feelings influence the reasoning process. Consistent use of well-developed critical thinking skills increases the chances of success in nursing practice and positive patient outcomes. The nursing professional uses the concepts outlined above while applying the Nursing Care Process. This is especially important as health care becomes more complex, its knowledge base expands, and nurses seek to practice more autonomously.

In the training process during teaching, the nurse must learn to make an exact and complete assessment to facilitate the diagnosis and treatment of human responses. The characteristics of the stages, phases, and components of the Nursing Care Process, in its learning and correct application, contribute to the acquisition of this knowledge. In this process, teamwork is required for the efficient development of skills, habits, and knowledge [6].

In the training of nursing staff, the teaching of the Nursing Care Process must allow students to develop skills for caring for people with complex chronic diseases who are vulnerable, which deteriorate as the diseases progress, requiring individualized and coordinated professional care that takes into account disease progression, transitions, and individual preferences [7], [20].

Based on these concepts, the study aims to carry out a neutrosophic analysis of the Nursing Care Process in the teaching of nursing in Ecuador, for which the following specific objectives are defined:

1. To determine the methods for the development of the neutrosophic study of the Nursing Care Process in the teaching of the nursing
2. To assess learning behavior in students of the Nursing Care Process
3. To analyze the learning outcomes of the Nursing Care Process during the course

The indeterminacy in the responses and considerations of the experts and respondents makes it necessary to develop research on the neutrosophic subject. For its realization, an epigraph dedicated to the exposition of materials and methods and another referring to the analysis of its application and discussion were structured. Later, the content of the work is summarized in the form of conclusions.

2. Materials and methods

2.1 Preliminaries

Definition 1: Let X be a space of points (objects) with generic elements in X denoted by x. A neutrosophic single-valued set (SVNS) A in X is characterized by the truth membership function TA(x), the indeterminacy membership function TA(x), and the falsehood membership function FA(x). Then, an SVNS A can be denoted by A=(x, TA(x), IA(x), FA(x) x ∈ X), where TA(x), IA(x), FA(x) ∈ [0.1] for each point x in X. Therefore, the sum of TA(x), IA(x), and FA(x) satisfies the condition 0 ≤ TA(x), +(x)+FA(x) ≤ 3. For convenience, an SVN number is denoted by A = (a b c), where a, b, c ∈ [0,1] and a + b + c ≤ 3 [8].

Definition 2: Let A_1= (a_1,b_1,c_1) and A_2= (a_2,b_2,c_2) be two SVN numbers, then the sum between A1 and A2 is defined as follows:

$$A_1 + A_2 = (a_1 + a_2 - a_1a_2, b_1b_2, c_1c_2) \quad (1)$$

Definition 3: Let A1= (a1,b1,c1) and A2= (a2,b2,c2) be two SVN numbers, then the multiplication between A1 and A2 is defined as follows:

$$A_1 * A_2 = (a_1a_2, b_1 + b_2 - b_1b_2, c_1+c_2 - c_1c_2) \quad (2)$$

Definition 4: Let A = (a,b,c) be an SVN number and $\lambda \in \mathbb{R}$ an arbitrary positive real number, then:

$$\lambda A = \left(1-(1-a)^{\lambda}, b^{\lambda}, c^{\lambda}\right), \lambda > 0 \quad (3)$$

Definition 5: Let A={A1,A2,…,An } be a set of n SVN numbers, where Aj= (aj,bj,cj) (j= 1,2,…,n). The single-valued neutrosophic weighted average operator is defined by:

$$\sum_{j=1}^{n} \lambda_j A_j = \left(1-\prod_{j=1}^{n}(1-a_j)^{\lambda_j}, \prod_{j=1}^{n} b_j^{\lambda_j}, \prod_{j=1}^{n} c_j^{\lambda_j}\right) \quad (4)$$

Where λ is the weight of Aj (j= 1,2,…,n), $\lambda_j \in [0,1]$ and $\sum_{j=1}^{n} \lambda_j = 1$

Definition 6: Let $A^* = \{A_1^*, A_2^*, \ldots, A_n^*\}$ be a vector of n SVN numbers, such that Aj* = (a*,b*,c) (j= 1,2,…,n), and Bi={Bi1,Bi2,…,Bim } (i= 1,2,…,m), (j= 1,2,…, north). Then the measure of separation between Bi and A* based on the Euclidean distance is defined as follows:

Next, a scoring function is proposed to classify SVN numbers as follows:

$$s_i = \left(\frac{1}{3}\sum_{j=1}^{n}\left(|a_{ij} - a_j^*|\right)^2 + \left(|b_{ij} - b_j^*|\right)^2 + \left(|c_{ij} - c_j^*|\right)^2\right)^{\frac{1}{2}} \; (i = 1,2,\ldots,m) \quad (5)$$

Then, a scoring function is proposed to classify SVN numbers as follows:

Definition 7: Let $A = (a,b,c)$ be a single-valued neutrosophic number, a score function of a single-valued neutrosophic value, based on the truth-membership degree, indeterminacy-membership degree and falsehood membership degree is defined by:

$$S(A)=\frac{1+a-2b-c}{2} \quad (6)$$

Where: $S(A) \in [-1,1]$

The scoring function S reduces to the scoring function proposed by [8] if b = 0 and a + b ≤ 1.

A linguistic variable is a variable whose values are characterized by words or phrases rather than numbers in a natural or artificial language. The value of a linguistic variable is expressed as an element of its term set. The concept of linguistic variables is very useful for solving decision-making problems with complex content. For example, we can express the performance ratings of alternatives on qualitative attributes using linguistic variables such as very important, important, medium, somewhat important, very slightly important, and so on. Such linguistic values can be represented using single-valued neutrosophic numbers [9, 21]. In the case of the investigation, the linguistic variables to be used are shown below:

Linguistic term	SVNSs
Very No Influence / (VNI)	(0.9;0.1;0.1)
No influence /(NI)	(0.75;0.25;0.20)
Medium influence /(M)	(0.50;0.5;0.50)
Influence /(I)	(0.35;0.75;0.80)
Very High Influence /(VHI)	(0.10;0.90;0.90)

Table 1: Neutrosophic values of linguistic terms. Adapted from: Kilic and Yalsin [9].

2.2 TOPSIS

In the method, there are k-decision makers, m-alternatives, and n-criteria. Decision makers *k* assess the importance of the m-alternatives under n-criteria and rank the performance of the n-criteria with respect to linguistic statements converted to single-valued neutrosophic numbers [10, 24, 25, 26, 27]. Here, decision makers often use a set of weights such that W = (very important, important, medium, unimportant, and very unimportant), and the importance weights based on single-valued neutrosophic values of the linguistic terms are given in Table 1.

On the other hand, the TOPSIS method for SVNS used consists of the following: Assuming that A={ρ1,ρ2,…,ρm } is a set of alternatives and G={β1,β2,…,βn } is a set of criteria, the following steps will be carried out:

Step 1: Determine the relative importance of the experts: For this, the specialists evaluate according to the linguistic scale shown in Table 1, and the calculations are made with their associated SVNN. Le $A_t = (a_t, b_t, c_t)$ be the SVNS corresponding to the t-th decision maker ($t = 1, 2, \dots, k$). The weight is calculated by the following formula:

$$\delta_t = \frac{a_t + b_t\left(\frac{a_t}{a_t + c_t}\right)}{\sum_{t=1}^{k} a_t + b_t\left(\frac{a_t}{a_t + c_t}\right)} \quad where: \delta_t \geq 0 \; and \sum_{t=1}^{k} \delta_t = 1 \tag{7}$$

Step 2: Construction of the aggregate single value neutrosophic decision matrix: This matrix is defined by $D = \sum_{t=1}^{k} \lambda_t D^t$, where $d_{ij} = (u_{ij}, r_{ij}, v_{ij})$and is used to aggregate all the individual evaluations. It is calculated as the aggregation of the evaluations given by each expert, using the weights of each one with the help of equation 7. In this way, a matrix D = $(d_{ij})_{ij}$ is obtained, where each d_{ij} is a SVNN ($i = 1,2,..,m$; $j = 1,2,\dots,n$)..

Step 3: Determination of the Weight of the Criteria: Suppose that the weight of each criterion is given by $W = (w_1, w_2, \dots, w_n)$, where w_j denotes the relative importance of the criterion $\lambda_t w_j^t = (a_j^t, b_j^t, c_j^t)$. *Si* is the evaluation of the criterion λ_t by the t-th expert. Equation 7 is then used to aggregate the w_j^t with the weights λ_t [11], [22].

Step 4: Construction of the weighted average of single values neutrosophic decision matrix regarding the criteria.

$$D^* = D * W, where\; d_{ij} = (a_{ij}, b_{ij}, c_{ij}) \tag{8}$$

Step 5: Calculation of the positive and negative SVNN ideal solutions: The criteria can be classified as cost-type or benefit-type. Let G_1 be the set of benefit-type criteria and G_2 the cost-type criteria. The ideal alternatives will be defined as follows [12]:

The positive ideal solution that corresponds to G_1.

$$\rho^+ = a_{\rho+w}(\beta_i), b_{\rho+w}(\beta_i), ac_{\rho+w}(\beta_i) \tag{9}$$

The negative ideal solution that corresponds to G_2.

$$\rho^- = (a_{\rho-w}(\beta_i), b_{\rho-w}(\beta_i), ac_{\rho-w}(\beta_i)) \tag{10}$$

Where:

$$a_{\rho+w}(\beta_j) = \begin{cases} max_i a_{\rho iw}(\beta_j), si\; j\epsilon G_1 \\ min_i a_{\rho iw}(\beta_j), si\; j\epsilon G_2, \end{cases} \qquad a_{\rho-w}(\beta_j) = \begin{cases} min_i a_{\rho iw}(\beta_j), si\; j\epsilon G_1 \\ max_i a_{\rho iw}(\beta_j), si\; j\epsilon G_2, \end{cases}$$

$$b_{\rho+w}(\beta_j) = \begin{cases} max_i b_{\rho iw}(\beta_j), si\; j\epsilon G_1 \\ min_i b_{\rho iw}(\beta_j), si\; j\epsilon G_2, \end{cases} \qquad b_{\rho-w}(\beta_j) = \begin{cases} min_i b_{\rho iw}(\beta_j), si\; j\epsilon G_1 \\ max_i b_{\rho iw}(\beta_j), si\; j\epsilon G_2, \end{cases}$$

$$c_{\rho+w}(\beta_j) = \begin{cases} max_i c_{\rho iw}(\beta_j), si\; j\epsilon G_1 \\ min_i c_{\rho iw}(\beta_j), si\; j\epsilon G_2, \end{cases} \qquad c_{\rho-w}(\beta_j) = \begin{cases} min_i c_{\rho iw}(\beta_j), si\; j\epsilon G_1 \\ max_i c_{\rho iw}(\beta_j), si\; j\epsilon G_2, \end{cases}$$

Step 6: Calculation of the distances to the positive and negative SVNN ideal solutions: With the help of equations 9 and 10 the following equations are calculated:

$$d_i^+ = \left(\frac{1}{3}\sum_{j=1}^{n}\left\{(a_{ij} - a_j^+)^2 + (b_{ij} - b_j^+)^2 + (c_{ij} - c_j^+)^2\right\}\right)^{\frac{1}{2}} \tag{11}$$

$$d_i^- = \left(\frac{1}{3}\sum_{j=1}^{n}\left\{(a_{ij} - a_j^-)^2 + (b_{ij} - b_j^-)^2 + (c_{ij} - c_j^-)^2\right\}\right)^{\frac{1}{2}} \tag{12}$$

Step 7: Calculation of the Coefficient of Proximity (CP): The CP of each alternative is calculated with respect to the positive and negative ideal solutions [13].

$$\widetilde{\rho_J} = \frac{s^-}{s^+ + s^-} \tag{13}$$

Where: $.0 \leq \widetilde{\rho_J} \leq 1$

Step 8: Determining the order of the alternatives: They are sorted according to what was achieved by $\widetilde{\rho_J}$. The alternatives are ordered from greatest to least, with the condition that $\widetilde{\rho_J} \rightarrow 1$ is the optimal solution [14, 15, 19], based on the results obtained in the surveys applied to five nursing groups selected from different regions of Ecuador that have approximately the same characteristics.

3 Results and discussion

The training of nursing staff in Ecuador requires good preparation for the Nursing Care Process that favors their comprehensive training in the patient care process[16, 17, 18, 23]. To assess the main components within this process, 8 experts were selected, with a close relationship in the training of nursing staff and high experience in it, who also have links with medical institutions and are updated in the care process. The criteria and components that were taken into account in the development of the research are shown in Fig. 1.

Criteria

- Care offered to the patient
- Mastery of the knowledge required
- Affective climate to establish with the patient
- Development of skills when exercising the activity
- Nursing staff decision level

Components

- Data collection
- Initial case documentation
- Preparation of diagnostic data
- Formulation of the nursing diagnosis
- Recognition
- Diagnostic Documentation
- Priority setting
- Elaboration of results, objectives or expectations
- Development of nursing interventions
- Planning documentation
- Preparation
- Nursing intervention
- Documentation of execution in the intervention

Figure 1: Relevant elements for the investigation. Source: own elaboration.

For the determination of the components most influenced by the previously exposed criteria, the application of the TOPSIS method was necessary. Initially, the weight of the groups of decision-makers established in figure 1 was determined. Due to the relevance determined within the Nursing Care Process and the actions of the nursing staff, the five with the greatest weight were selected. Table 2 shows the results:

	Group 1	Group 2	Group 3	Group 4	Group 5
Importance Vector λ_t	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
Numerical Importance	0.1646	0.2236	0.2236	0.1646	0.2236

Table 2: Determination of the weight of the main components. Source: own elaboration.

Subsequently, it was necessary to take into account the consideration of these groups, which were asked to fill out a questionnaire to evaluate components against criteria according to the neutrosophic linguistic scale determined in section 2.1 (see Table 3), which gave way to the elaboration of the single-valued criteria matrix (see Table 4). Below is the result of the mode of the rankings of the respondents.

	Group 1	Group 2	Group 3	Group 4	Group 5
			Data collection		
P1	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)
P2	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
P3	(0.75;0.25;0.2)	(0.35;0.75;0.80)	(0.75;0.25;0.2)	(0.75;0.25;0.2)	(0.75;0.25;0.2)
P4	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
P5	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)
			Formulation of the diagnosis		
P1	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
P2	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
P3	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
P4	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
P5	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
			Priority setting		
P1	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
P2	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
P3	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
P4	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)

P5	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)
			Development of nursing interventions		
P1	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
P2	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
P3	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)
P4	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
P5	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.50;0.5;0.50)
			Documentation of execution in the intervention		
P1	(0.50;0.5;0.50)	(0.35;0.75;0.80	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
P2	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)
P3	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)
P4	(0.75;0.25;0.20)	(0.50;0.5;0.50)	(0.75;0.25;0.20)	(0.50;0.5;0.50)	(0.75;0.25;0.20)
P5	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)

Table 3: Evaluation of the components according to criteria. Source: own elaboration.

	C1	C2	C3	C4	C5
P1	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)
P2	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)
P3	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)
P4	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)
P5	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)

Table 4: Criteria array of single values. Source: own elaboration.

Continuously and logically, the weights of the problems determined by the group of experts were defined (see Table 5). In addition, the weighted aggregate decision matrix was calculated (see Table 6).

	Criterion weight
C1	(0.6431;0.36581;0.3699)
C2	(0.68262;0.31738;0.30487)
C3	(0.56289;0.45317;0.44142)
C4	(0.38126;0.65378;0.67023)
C5	(0.55363;0.45751;0.46262)

Table 5: Vector of criteria weights. Source: own elaboration.

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
P1	(0.28017;0.74074;0.73996)	(0.34547;0.67378; 0.66363)	(0.28488;0.73867;0.7297)	(0.19296;0.83454;0.84042)	(0.32547;0.69692; 0.69509)
P2	(0.09035;0.92622;0.93369)	(0.1114;0.90716;0.91422)	(0.09186;0.92563;0.93107)	(0.06222;0.95291;0.95931)	(0.10495;0.91375; 0.92225)
P3	(0.13741;0.89893;0.911579)	(0.16943;0.87283; 0.89107)	(0.13971;0.89813;0.91247)	(0.09463;0.9355;0.94833)	(0.15962;0.88185; 0.90126)
P4	(0.14533;0.89421;0.91262)	(0.17919;0.86689; 0.88697)	(0.14776;0.89337;0.90917)	(0.10008;0.93249;0.94638)	(0.16881;0.87633; 0.89755)
P5	(0.31657;0.6898;0.68155)	(0.39032;0.60968; 0.58807)	(0.32186;0.68732;0.66899)	(0.218;0.80203;0.80458)	(0.36772;0.63767; 0.6266)

Table 6: SVNS Weighted Aggregate Decision Matrix. Source: own elaboration.

The results corresponding to the values of the Coefficient of Proximity are shown in Table 7, which served as the basis for determining the ranking of the effects in terms of the difficulties of preparation in the Nursing Care Process in the nursing education of the population range under study.

	Ideal value +	Ideal value -
P1	(0.10495;0.91375;0.92225)	(0.10495;0.6374;0.6678)
P2	(0.1114;0.90716;0.91422)	(0.1114;0.6097;0.5881)
P3	(0.09186;0.92563;0.93107)	(0.0918;0.6873;0.669)

P4	(0.06222;0.95291;0.95931)	(0.06222;0.802;0.8046)
P5	(0.09035;0.92622;0.93369)	(0.31657;0.6898;0.6816)

Table 7: Positive and negative ideal values and distances. Source: own elaboration.

Alternatives	d+	d-	CP	Order
C1	0.35506471	0.381339	0.51784	4
C2	0.15460157	0.602875	0.7959	1
C3	0.15049808	0.565311	0.78975	2
C4	0.15340259	0.559522	0.78483	3
C5	0.45245592	0.367267	0.44804	5

Table 8: Ranking of components according to Coefficient of Proximity (CP). Source: own elaboration.

Analyzing the results, the formulation of the diagnosis is the main problem within the Nursing Care Process in the teaching of Ecuadorian nursing. In this sense, actions must be reinforced to ensure that nurses, in any of the specialties in which they are trained or specialized, achieve to make a *nursing diagnosis* as accurate as possible. Based on this, what comes next is the *setting of the priorities* and *development of nursing interventions* that this professional is capable of performing. Although preparation actions are carried out, the main direction in the process must be in this path, which will allow, coupled with the comprehensive knowledge, that this staff achieves in each case, to make precise decisions from the nursing diagnosis and its intervention.

Conclusions

The teaching in the nursing course in Ecuador, includes in its formation the Nursing Care Process, an important aspect, The studies of Neutrosophic Science and its significant advances, allowed to make an assessment of this process and determine the existing situation in care to each of its main components and the difficulties in them.

Neutrosophy allowed us to verify more accurately that nursing students in Ecuador, despite the actions developed, require greater attention within the Nursing Care Process, to the main components of the process. It allows this professional to perform an adequate and accurate follow-up of the patient from the moment they enter the medical center, which in turn, serves as a basis and strength for the doctor for the definitive diagnosis and application of the treatment or procedure.

The analysis of the results obtained by the benefits of the application of Neutrosophic Science, allowed to determine that in nursing education, the component with the greatest affectation in training is the *formulation of the diagnosis*, which leads the professional to the correct establishment of priorities and development of nursing interventions, in compliance with each of the stages, phases, and components that make up the Nursing Care Process.

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