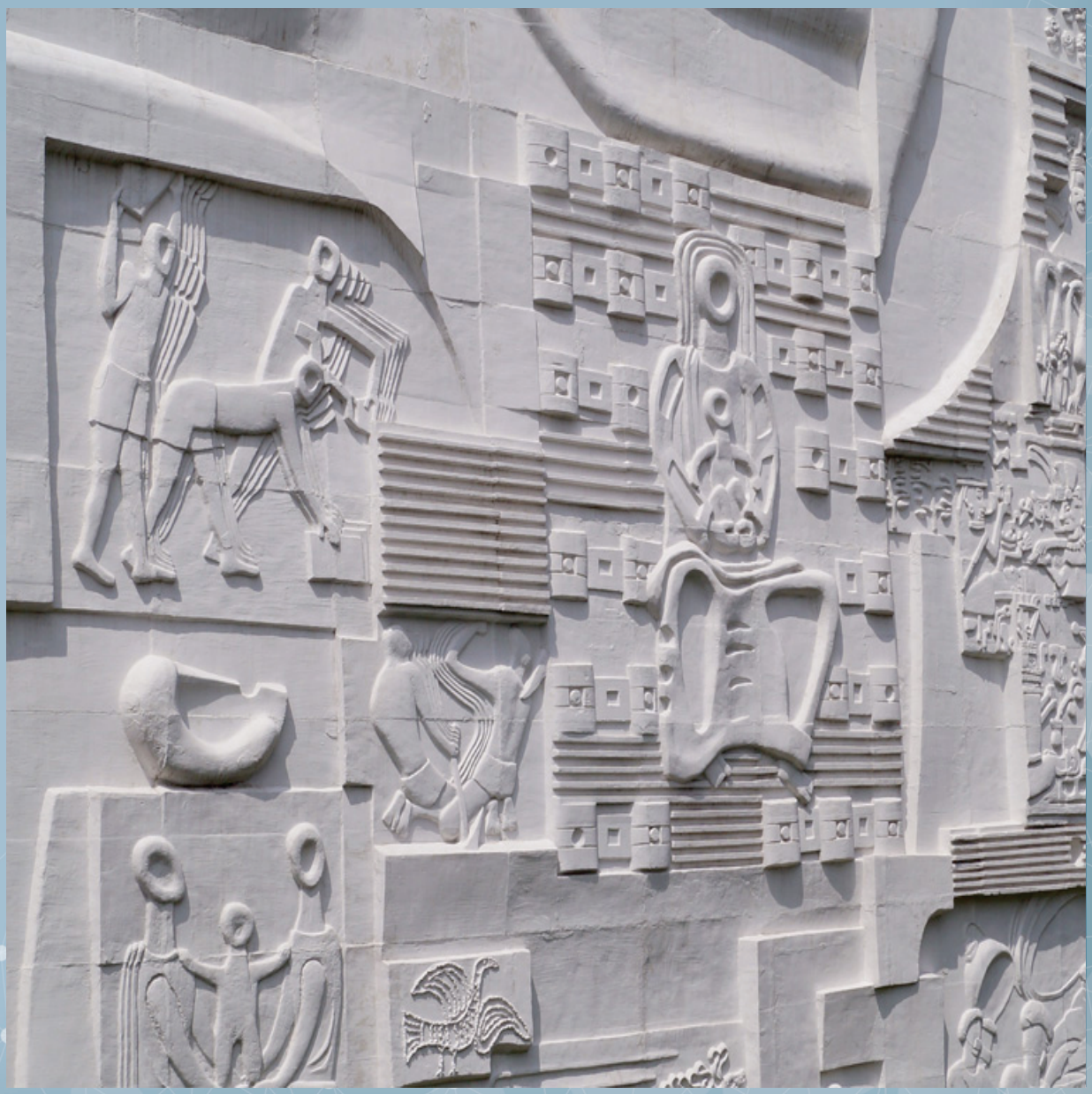
INSTITUTO NACIONAL DE NEUROLOGÍA Y NEUROCIRUGÍA

Manuel Velasco Suárez

# Revista de Enfermería Neurológica



ISSN - 1870-6592 • e-ISSN: 2954-3428 Indexado en: Base de datos CUIDEN (Granada, España)

January - April 2024

Vol. 23 N.1

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Revista de Enfermería Neurológica, Vol. 23, number 1, January - April 2024; a quadrimesterly publication. Edited by the Nursing Subdirectorate of the Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez, located at: Av. Insurgentes Sur #3877, Col. La Fama, 14269, Tlalpan, Mexico City; phone number: +52 (55) 5606 3822 ext. 5031 and 1062. Website: https://revenferneurolenlinea.org.mx; email: rev.enfermerianeurologica@innn.edu.mx. Reservation of Rights for Exclusive Use No. 04-2019-101711492900-102, e-ISSN 2954-3428, both granted by the National Copyright Institute.  This issue was published on Septiembre 17, 2024. Indexed in CUIDEN, LILACS, Latindex 2.0, and the Regional Nursing Virtual Health Library (BVS Enfermería).

# Revista de Enfermería Neurológica

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DOI 10.51422/ren.v23i1.465

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Original article

# Validación de la escala de barreras para la detección del cáncer de próstata en varones nahuas

# Validation of the barriers scale for prostate cancer screening in Nahua men

Alfredo Orozco Alonzo, Francisco Javier Báez Hernández, Vianet Nava Navarro, Arelia Morales Nieto, Víctor Manuel Blanco Álvarez, Miguel Ángel Zenteno López[1]

## Resumen

**Introducción:** El cáncer de próstata es un problema de salud pública. Estudios relacionados indican la falta de instrumentos adaptados a la lengua originaria que permitan medir las barreras para la detección del cáncer de próstata.

**Objetivo:** Diseñar y validar una escala de barreras para la detección del cáncer de próstata en varones nahuas pertenecientes a pueblos originarios de la Sierra Nororiental del estado de Puebla.

**Metodología:** Estudio progresivo transversal de cinco etapas: 1) diseño del instrumento, 2) validación de jueces, 3) traducción e interpretación en lengua náhuatl, 4) prueba piloto y 5) análisis estadístico multivariado.

**Resultados:** Se diseñó un instrumento con 18 afirmaciones. El análisis de factores principales encontró la existencia de cinco factores que explican el 71.805 % de la varianza total, con un valor $p < .001$, así como un alfa de Cronbach de .840.

**Discusión:** Los resultados coinciden con otras investigaciones, al demostrar que la intención de los varones para realizarse las pruebas de detección prostática está condicionada, entre otras causas, por la actitud y la falta de comunicación asertiva por parte del personal de salud.

**Conclusiones:** Se obtuvo un instrumento válido y confiable que mide las barreras para la detección del cáncer de próstata en varones de pueblos originarios de Puebla. Esta herramienta permitirá el desarrollo de la enfermería basada en la evidencia aplicada en poblaciones vulnerables.

**Palabras claves:** Estudio de validación, neoplasias de la próstata, barreras de comunicación, población indígena, salud de los pueblos indígenas.

Citation: Orozco Alonzo A, Báez Hernández FJ, Nava Navarro V, Morales Nieto A, Blanco Álvarez VM, Zenteno López MA. Validation of the barriers scale for prostate cancer screening in Nahua men. Rev Enferm Neurol.2024;23(1): pp. 1-12.

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Received: November 10, 2023
Accepted: April 3, 2024

## Abstract

**Introduction:** Prostate cancer is a public health problem. Related studies indicate the lack of instruments adapted to the native Nahuatl language to measure barriers for prostate cancer detection.

**Objective:** To design and validate a barriers scale for the detection of prostate cancer in Nahua men belonging to native peoples of the northeastern highlands of the state of Puebla.

**Methodology:** Progressive cross-sectional five-stage study: 1) design of the instrument, 2) validation by judges, 3) translation and interpretation into the Nahuatl language, 4) pilot test, and 5) multivariate statistical analysis.

**Results:** An instrument with 18 statements was designed. The principal factor analysis found the existence of five factors that explain 71.805% of the total variance, with a p-value of < .001; as well as a Cronbach's alpha of .840.

**Discussion:** The results coincided with other research, demonstrating that the intention to undergo prostate screening tests is conditioned, among other things, by the attitude and lack of assertive communication on the part of the health personnel.

**Conclusions:** A valid and reliable instrument that measures the barriers for prostate cancer detection in men of the native towns of Puebla was obtained. This tool will allow the development of evidence-based nursing applied to vulnerable populations.


**Keywords:** Validation Study, Prostatic Neoplasms, Communication Barriers, Indigenous Population, Health of Indigenous Peoples.

## Introduction

Prostate cancer is a public health problem1. In Mexico, it is the deadliest disease among men, reporting 9.8 deaths for every 100 thousand men[2,3], one of the most affected groups being native peoples[4]. 289 873 native men have been accounted for only in the state of Puebla, they are characterized by not having health care within their reach, which limits the early detection of this disease[5,6].

Based on studies that cover prostate cancer detection barriers, it has been shown that said hurdles are linked to a priori categories that generate perceptions, attitudes, and beliefs, including fear, dread, modesty, machismo, ignorance, shame, and misguided beliefs associated with the lack of male health prevention culture in their native language, which can be exacerbated by age, their sociodemographic, economical, and educational situation, as well as by social practices[7-10]. This makes it clear that a better way to change the willingness of male individuals to get tested to detect the presence of prostate cancer is through acknowledging said factors, not only in the person being treated, but also in health care providers.

In this sense, according to the existing scientific literature, there are only tools

that focus on the symptoms[11], living quality[12], and functional evaluation to treat patients with this pathology[13], as well as on the measurement of the beliefs, attitudes, and expertise associated with benign prostatic hyperplasia[14], but not to measure the discerned barriers to prevent this disease. There are even less tools translated to their native language which would allow to identify the hurdles that limit the acceptance of undergoing early detection testing.

It has been shown that there are risk factors for benign prostatic hyperplasia and prostate cancer among the native peoples of Tabasco, Mexico, which is why it is suggested for nursing professionals to carry out promotional activities for healthy lifestyles that involve the male worldview[4].

This is how the design and validation of a tool that measures the discerned barriers for the detection of prostate cancer among Nahua men, which, on one hand, helps recognize the fears, ambiguities, worries, and priorities presented by men belonging to native peoples. On the other hand, it helps health providers in recognizing and raising awareness among citizens about the importance of prostate cancer screening to promote informed decision-making among Nahua men about the different ways to timely detect this disease, therefore improving patient satisfaction and resutls[15-19].

Given the above, on the understanding that the delay in timely detection is not only exclusive to men, but also to the healthcare team[20], which is why the importance of designing and validating a barriers scale in the Nahuatl language for prostate cancer detection among men belonging to native peoples of the northeastern highlands of the state of Puebla, Mexico is clear.

## Methodology

The design was a progressive cross-sectional[21] five-stage study: 1) design of the instrument, 2) validation by judges, 3) translation and interpretation into the Nahuatl language, 4) pilot test, and 5) multivariate statistical analysis. These stages are described below:

1) **Design of the instrument:** this stage consisted of the search of scientific literature[22] about studies related to barriers for prevention and the different types of clinical evaluation that identify prostate cancer through a PICOT question (delimited to the phenomenon, result, and type of study). To do this, the stages of PRISMA[23] methodology were followed. The EBSCO, SCOPUS, and PUBMED databases were used to select quantitative and qualitative research no older than five years through a search string (Prostatic Neoplasms AND Prostate-Specific Antigen AND Barriers to Access of Health Services AND Communication Barriers AND Men AND Indigenous Population (Public Health) OR Health of Indigenous Peoples AND Digital Rectal Examination) in English and Spanish, with free access to the full text. This stage aimed to clarify the ontological and epistemological aspects of the study construct, which facilitated the recognition of the basic elements of what the barriers to prostate

cancer detection are, as well as how they are understood among men; this allowed for the proposal of a series of affirmative statements, resulting in the first version of the tool.

2) **Validation by judges:** the second stage consisted of recruiting a linguistics expert and 16 judges, who performed, respectively, a linguistics and content analysis of each of the statements of the tool. The judges answered to the following inclusion criteria: being nurses specialized in the care of patients with prostatic hyperplasia (malignant and benign), doctors in touch with male population from native peoples, chemists, and expert anthropologists; all of them with a PhD and belonging to the National System of Researchers (SNI). The invitation was sent via email, where a 15-days feedback period for the judges was established.

The content analysis by the judges aimed to evaluate each of the questions separately: the expert identified if the items were related or not to what was supposed to be measured, using a Likert-type scale as a response format, where 0 = definitely not related, 1 = not related, 2 = not sure of the relationship, the items need further review, 3 = related, but small modifications are needed, and 4 = extremely related, no alterations needed. The validation of the tool was done using the item validity index (IVI) and content validity index (IVC), where positive scores close to one mean a better content validity24. These analyses allowed for the changes suggested by experts on each of the items, which resulted in the final Spanish version of the tool.

3) **Nahuatl translation and interpretation:** the third stage consisted of the translation of the Spanish version of the tool into the native Nahuatl language, done by one of the authors of the tool who, besides being a nurse, is a certified native language interpreter and translator by the Native Language Institute (INALI). Then, the tool was sent for translation analysis to three judges characterized by their belonging to a native town of the northeastern highlands of the state of Puebla, knowing the culture, language, and being certified as interpreters and translators by the INALI in Mexico, to reach a syntax consensus. The invitation was sent via email and an eight-day period for the experts to send their feedback was established. Subsequently, the analysis was done according to the observations made by the judges with the aim of defining the version of the tool in the native Nahuatl language.

The tool used by Nahuatl translators to evaluate each of the questions was a Likert-type scale where five possible response options were presented: 0 = definitely not translated, 1 = not properly translated, 2 = I am unsure of the translation, it needs to be reviewed, 3 = it is well translated with only minor observations, and 4 = it is well translated and has no observations.

4) **Pilot test:** the fourth stage consisted consisted of the application of the tool in March of 2024 through convenience sampling of 30 men belonging to a native town of the northeastern highlands of the state of Puebla with the following inclusion criteria: being over 40 years old, Nahuatl speakers, no diagnosis of

benign prostatic hyperplasia or prostate cancer. Additionally, a considered exclusion criterion was being men who spoke the TL Nahuatl variant due to changes in pronunciation and meaning of the words. The goal of this stage was to understand comprehensibility, response time, and handling in the target population. This allowed for changes in the wording of some items to obtain the definitive version of the tool translated into Nahuatl.

5) **Multivariate statistical analysis:** the fifth stage was characterized by the application of the definitive version of the tool translated into Nahuatl in the months of April to June of 2024 through convenience sampling to a sample calculated through power analysis, with a statistical power of .90, an effect size of .25, and a significance level of .05. The result was n = 230 males belonging to a native town of the northeastern highlands of the state of Puebla that met the same inclusion and exclusion criteria as the pilot sample. In their homes, they were administered the *Barriers for Prostate Cancer Detection* tool with a Likert-type scale with five possible response options, where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. In this stage, the data obtained were processed in the SPSS version 27 statistical program to obtain the exploratory factor analysis, as well as the reliability of the instrument through the Cronbach's alpha coefficient and, complementarily, McDonald's omega coefficient, also known as Jöreskog's rho, which is recommended as a more accurate measure of reliability[25].

It is important to highlight that all the men of the study, in all of the research stages, gave their informed consent, which was written in Nahuatl. Their participation was also verbally clarified and explained to them in their native language; they and two witnesses were given a copy of their informed consent. This was done in accordance with the General Health Law on Research in Mexico[26]. This was also endorsed by bioethics and research committees belonging to a higher education institution of the state of Puebla.

## Results

Below are the results according to the stages suggested in the design:

1) **Design of the instrument:** this stage resulted in the clarification of the construct that was going to be measured based on 10 selected studies (table 1) that covered the selection criteria. Their analysis allowed for the definition of the barriers for prostate cancer screening as all those beliefs that interfere in the knowledge and preventive behavior related to prostate cancer, where the following was identified:

- **Internal stigmas (IS)**, referring the meanings that men give to prostate cancer prevention procedures, including macho conceptions that cause feelings of fear, dread, and shame, as well as thoughts related to the violation of their masculinity.
- **External stigmas (ES),** referring to the care provided by the healthcare professional regarding prostate cancer prevention, contribute to the delay in

**Table 1.** Selected studies

| *Author* | *Year* | *Country* | *Title* |
|---|---|---|---|
| Sánchez SK, Cruz SM, Rivas AV, Pérez CM. | 2021 | Mexico | Prevalence of Prostate Cancer Risk Factors and Symptoms in Indigenous People in Tabasco. |
| Mbugua RG, Karanja S, Oluchina S. | 2021 | Kenya | Barriers and Facilitators to Uptake of Prostate Cancer Screening in a Kenyan Rural Community |
| Paredes AAM, Shishido S. | 2022 | Peru | Perception and disposition to digital rectal examination in the prevention of prostate cancer |
| Baratedi WM, Tshiamo WB, Mogobe KD, McFarland DM. | 2020 | Sub-Saharan Africa | Barriers to Prostate Cancer Screening by Men in Sub-Saharan Africa: An Integrated Review. |
| Miller DB, Tyrone HC, Weidi Q. | 2020 | USA | Prostate cancer screening in Black men: Screening intention, knowledge, attitudes, and reasons for participation. |
| King OM, Arber A, Faithfull S. | 2019 | Trinidad and Tobago | Beliefs contributing to delays in prostate cancer diagnosis among Afro-Caribbean men in Trinidad and Tobago. |
| Durães OPS, Vinicius CMS, Andrade BH, Marques BRR, Barbosa RA, Maiada SV. | 2019 | Brazil | Prostate cancer: knowledge and interference in the promotion and prevention of the disease. |
| Opondo CO, Onyango PO, Asweto CO. | 2022 | Kenya | Effect of Perceived Self Vulnerability on Prostate Cancer Screening Uptake and Associated Factors: A Cross-Sectional Study of Public Health Facilities in Western Kenya |
| Charles BF, Henry LG, Moen K, John ME. | 2019 | Tanzania | Knowledge, Perceived Risk and Utilization of Prostate Cancer Screening Services among Men in Dar Es Salaam, Tanzania. |
| Méndez TJM. | 2019 | Mexico | Body borders and male identity. Experiences of research and conceptual reflections in the study of heatlth |

Source: Author´s own elaboration.

the acceptance of prostate screening.

The aforementioned resulted in the first version of the instrument with 13 statements distributed into two dimensions: male stigmas (internal stigmas), and the care regarding sexual and reproductive health (external stigmas).

2) **Validation by judges:** in this stage, 10 evaluations were received, enough for the analysis according to the suggested methodology[27]. Based on the observations of the experts, changes were done to the wording and presentation order of all the statements of the tool, as well as the incorporation of five questions that address the emotions of fear and shame, the stigma of rectal examination within the social circles of the person, communication on the part of the healthcare professional and the organic-functional structure of the place providing medical care, resulting in a total of 18 items, which allowed for a better understanding of the item, as well as the final Spanish version of the tool, with an acceptable IVC[21] equal to .910 (table 2).

3) **Translation and interpretation in Nahuatl language:** this procedure had two rounds with three translators to ensure a better understanding and interpretability of the ideas in each of the tool's sentences, which allowed for a pilot version of the tool translated into Nahuatl.

4) **Pilot Test:** this allowed for the recording of a 15-minutes filling time per participant and ensured the total understanding of the items by the respondents through the modification of some words, situating the instrument in the cultural

**Table 2.** Content validity analysis by judges

| *Ítem* | *J1* | *J2* | *J3* | *J4* | *J5* | *J6* | *J7* | *J8* | *J9* | *J10* | *IVI* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 2 | 3 | 0.90 |
| 2 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 2 | 3 | 0.87 |
| 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 2 | 3 | 0.90 |
| 4 | 4 | 4 | 4 | 4 | 3 | 2 | 4 | 2 | 4 | 3 | 0.85 |
| 5 | 4 | 4 | 4 | 3 | 4 | 3 | 2 | 4 | 4 | 4 | 0.90 |
| 6 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 0.92 |
| 7 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 3 | 0.92 |
| 8 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 2 | 4 | 0.90 |
| 9 | 4 | 4 | 4 | 4 | 2 | 3 | 3 | 4 | 3 | 4 | 0.87 |
| 10 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 0.95 |
| 11 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 0.92 |
| 12 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 4 | 0.95 |
| 13 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 3 | 0.92 |
| 14 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 0.95 |
| | | | | | | | | | | CVI | **0.91** |

Source: Author´s own elaboration. Note: Jn: Judges´ Numbering; IVI= Item Validity Index; IVC: Content Validity Index.

context experienced by the men.

**5) Results of multivariate statistics:** these showed, through Bartlett's Test of Sphericity ($x^2$ = 568.74; p = .001) and the Kaiser-Meyer-Olkin adequacy test (KMO = .627), significant correlations between the items, and a good relationship between the variables of the tool. Additionally, factor analysis using the principal components method and VIRAMAX rotation found the existence of five factors (dimensions) that explain 71.805% of the total variance (table 3 and figure 1).

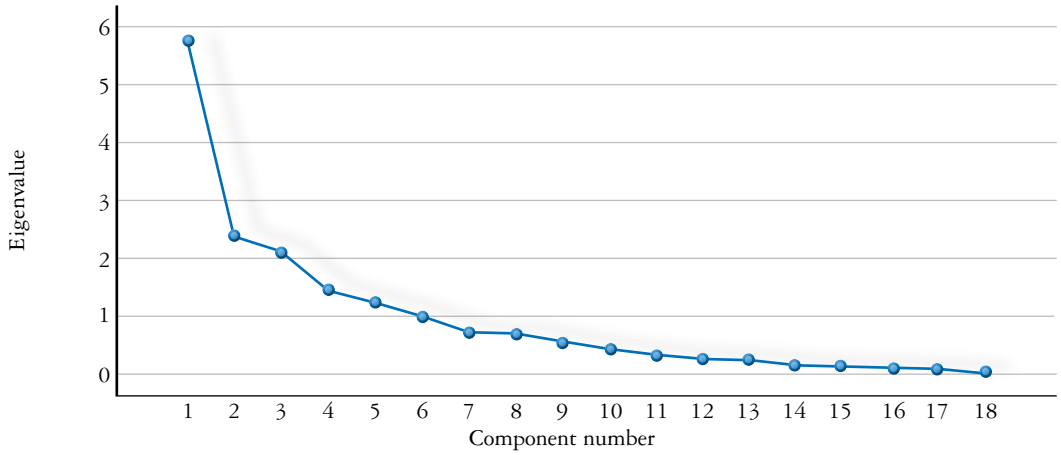
The first dimension refers to the beliefs,

**Table 3.** Explained variance considering the first five items with Varimax rotation.

| | *Initial Eigenvalues* | | | *Rotation Sums of Squared Loadings* | | |
|---|---|---|---|---|---|---|
| *Component* | *Total* | *% of variance* | *% cumulative* | *Total* | *% of variance* | *% cumulative* |
| 1 | 5.709 | 31.714 | 31.714 | 4.119 | 22.884 | 22.884 |
| 2 | 2.377 | 13.205 | 44.919 | 3.174 | 17.633 | 40.517 |
| 3 | 2.126 | 11.812 | 56.731 | 2.328 | 12.936 | 53.453 |
| 4 | 1.462 | 8.12 | 64.851 | 1.842 | 10.231 | 63.684 |
| 5 | 1.252 | 6.953 | 71.805 | 8.121 | 8.121 | 71.805 |

Extraction Method: Principal Component Analysis.

**Figure 1.** Scree plot.




feelings, and attitudes related to prostate detection (items 1-3, 5, 9, and 10); the second dimension corresponds to the creation of trust environments (items 8 and 12-15); the third dimension addresses the anticipatory conditions of preventive behavior (items 4, 6, and 7); the fourth dimension refers to accessibility for prostate evaluation (items 16 and 17), and the fifth dimension identifies healthcare experiences (items 11 and 18) (table 4).

Moreover, it was identified that questions 5, 8, and 12-15 had to be recoded by reversing their

**Table 4.** Rotate component matrix

| Question | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 1. Do you think that a digital rectal exam for prostate cancer detection makes you less of a man? | 0.543 | 0.378 | 0.474 | -0.119 | 0.106 |
| 2. Do you think that a digital rectal exam for prostate cancer detection is a procedure that alters your sexual identity? | 0.757 | 0.135 | 0.509 | -0.008 | 0.09 |
| 3. Would you feel embarrassed if a digital rectal exam was performed for prostate cancer detection? | 0.704 | 0.064 | 0.245 | -0.161 | 0.115 |
| 4. Would you be afraid of knowing the results of the prostate cancer screening test? | 0.321 | -0.023 | 0.771 | 0.107 | 0.1 |
| 6. Do you consider the preparation, technique, and emotional readiness required by the doctor for the digital rectal exam important? | -0.34 | -0.106 | 0.771 | -0.201 | -0.001 |
| 7. Should only men with a history of prostate cancer undergo screening tests for prostate cancer? | 0.253 | 0.088 | 0.518 | 0.34 | -0.331 |
| 9. If your friends or family knew you were undergoing prostate cancer screening, would you feel ashamed and stop visiting the doctor, health center, or clinic? | 0.887 | 0.07 | -0.039 | 0.241 | -0.062 |
| 10. If your coworkers knew you were undergoing prostate cancer screening, would they mock you, and would you stop visiting the doctor, health center, or clinic? | 0.778 | -0.036 | -0.101 | 0.303 | -0.265 |
| 11. Based on previous experiences with the doctor or another healthcare professional, would you refuse to undergo prostate cancer screening? | 0.329 | 0.467 | 0.408 | 0.151 | -0.469 |
| 16. Do the operating hours of your clinic prevent you from attending consultations to evaluate your prostate health? | 0.128 | 0.007 | 0.03 | 0.805 | 0.071 |
| 17. Does the distance to your clinic prevent you from attending consultations to evaluate your prostate health? | 0.049 | 0.069 | -0.023 | 0.797 | 0.055 |
| 18. Does the administrative bureaucracy at your clinic make it difficult to access consultations for prostate health evaluation? | -0.02 | 0.206 | 0.075 | 0.217 | 0.868 |
| 5. Would you be willing to allow a digital rectal exam to evaluate your prostate health? | 0.731 | 0.319 | -0.066 | 0.138 | -0.234 |
| 8. Would you undergo prostate screening even if no one in your family has done so? | 0.59 | 0.603 | 0.071 | 0.154 | 0.127 |
| 12. Has the doctor explained clearly what prostate cancer is? | 0.161 | 0.725 | -0.34 | 0.175 | -0.111 |

| | | | | | |
|---|---|---|---|---|---|
| 13. Does the doctor speak to you in your native language when explaining what prostate cancer is? | 0.043 | 0.839 | 0.095 | 0.035 | -0.16 |
| 14. Does the doctor make you feel comfortable to express any doubts related to prostate cancer? | 0.206 | 0.796 | 0.09 | 0.095 | 0.253 |
| 15. Does the doctor's attitude give you confidence to undergo prostate screening or detection tests? | -0.035 | 0.624 | 0.004 | -0.219 | 0.285 |

Note: Rotation method: Varimax with Kaiser normalization.

response form to obtain a better interpretation of the results, where higher scores indicate a higher perceived barrier. This happened prior to the conversion of the results of the tool to an index from 0 to 100.

Finally, the reliability of the instrument was determined through Cronbach's alpha and McDonald's omega coefficients, obtaining values considered acceptable: .840 and .844, respectively.

## Discussion

The goal of the present study was to design and validate a barriers scale for prostate cancer detection in men belonging to native peoples of the northeastern highlands of the state of Puebla, Mexico.

The validation and standardization carried out by the judges allowed to ensure an internal consistence of the barriers tool for prostate cancer detection. This happened after changing the wording of the items, as well as the addition of five statements that delved into structural barriers, which coincides with the research carried out in Medellin, Colombia[13] and the National Institute of Cancer of Mexico City[11], which shows that the intention to undergo prostate detection can be conditioned by the access to healthcare services, as well as the attitude and lack of assertive attitude from the people that work in these places, which can be a hurdle for the promotion of healthy lifestyles in native peoples of the northeastern highlands of the state of Puebla.

Regarding the pilot results, they differed from those obtained in the study conducted by the National Cancer Institute of Mexico City[11], with no item comprehension problems being found, which suggests that the prior review performed by a linguistics expert and judges ensure the understanding by the participant population. Additionally, this difference is due to the present study beginning with the design and not with the cultural adaptation of the tool.

According to the results of the factor analysis, the barriers that limit prostate screening among men belonging to native peoples are mainly determined by beliefs, feelings, trust, anticipatory conditions, and attitudes related to prostate detection, which are predictors for having a good preventive behavior or not, as well as the accessibility of prostate detection of these men regarding the experience of receiving healthcare, a situation similar to that obtained from Colombian men[14], where one of the main dimensions measured as a barrier that limits prostate evaluation is the attitude that the participating men have towards the medical exam and the disease.

The internal consistency of the scale was good. Additionally, a significative correlation between the items was obtained, which explains the statements of this scale not being similar. This can ensure that each

of the statements of the tool are measuring vastly different aspects, which complement each other in a very specific way to measure the variable of barriers for prostate cancer detection. This is consistent with the study carried out in the National Cancer Institute of Mexico City[11], where the tools obtained an acceptable internal consistency.

Finally, one of the limitations is that this tool is only applicable to the Nahuatl population of the northeastern highlands of the state of Puebla, as the existing language variants in other states of the Mexican Republic change in terms of writing and communication. Therefore, it is suggested to make adaptations, based on this tool, to the native languages of the communities where it is necessary to know the barriers for prostate cancer detection.

## Conclusions

A legitimate and reliable instrument that measures the barriers for the screening of prostate cancer in Nahua men belonging to native peoples of the northeastern highlands of the state of Puebla. This instrument will allow the development of evidence-based nursing applied to vulnerable populations, as well as the coverage of the worries and priorities of the men, which can ease the development of positive attitudes towards prostate screening. Finally, we recommend continuing the development and adaptation of this instrument through new research and more native languages to allow us to know the barriers for prostate cancer detection, specifically in men belonging to native peoples.

## References


1. **Organización Mundial de la Salud.** Datos y cifras, Cáncer. [Internet]. 2022 [accessed March 13, 2024]. Available from: https://www.who.int/es/news-room/fact-sheets/detail/cancer
2. **Instituto Nacional de Salud Pública.** Mortalidad por cáncer de próstata en México a lo largo de tres décadas. [Internet]. 2020 [accessed March 13, 2023]. Available from: https://www.insp.mx/avisos/4189-cancer-prostata-mx.html
3. **Secretaria de Salud.** México cuenta con infraestructura para tratamiento de cáncer de próstata: Secretaría de salud. [Internet]. 2023. [accessed March 15, 20245]. Available from: https://cutt.ly/feMiMUWt
4. **Sánchez SK, Cruz SM, Rivas AV, Pérez CM.** Prevalencia de factores de riesgo y sintomatología prostática en indígenas de Tabasco. Revista Cuidarte. [Internet]. 2021 [accessed March 13, 2024];12(2). Available from: https://doi.org/10.15649/cuidarte.1264
5. **Consejo Estatal de Población.** Puebla en cifras. [Internet]. 2021 [accessed March 13, 2023]. Available from: https://coespo.puebla.gob.mx/publicaciones-y-presentaciones/indigenas
6. **Mbugua RG, Karanja S, Oluchina S.** Effectiveness of a Community Health Worker-Led Intervention on Knowledge, Perception, and Prostate Cancer Screening among Men in Rural Kenya. Advances in Preventive Medicine. [Internet]. 2022 [accessed March 13, 2024];27:1-10. Available from: https://doi.org/10.1155/2022/4621446
7. **Paredes AAM, Shishido SS.** Percepción y disposición al tacto rectal en la prevención de cáncer de próstata. Anales de la Facultad de Medicina. [Internet]. 2022 [accessed March 13, 2024];83(1):49-53. Available from: https://doi.org/10.15381/anales.v83i1.20779

8. **Baratedi WM, Tshiamo WB, Mogobe KD, McFarland DM.** Barriers to Prostate Cancer Screening by Men in Sub-Saharan Africa: An Integrated Review. J Nurs Scholarsh. [Internet]. 2022 [accessed March 13, 2024];52(1):85-94. Available from: https://doi.org/10.1111/jnu.12529
9. **Miller DB, Tyrone HC, Weidi Q.** Prostate cancer screening in Black men: Screening intention, knowledge, attitudes, and reasons for participation. Social Work in Health Care. [Internet]. 2020 [accessed March 13, 2024];59:543-56. Available from: https://doi.org/10.1080/00981389.2020.1808149
10. **King OM, Arber A, Faithfull S.** Beliefs contributing to delays in prostate cancer diagnosis among Afro-Caribbean men in Trinidad and Tobago. Psycho-Oncology. [Internet]. 2019 [accessed March 13, 2024];28:1321-7. Available from: https://doi.org/10.1002/pon.5085
11. **Galindo VO, Aguilar GCN, Jiménez RMA, Meneses GA, Calderillo RG, Bargallo RE, Herrera GA.** Validación del cuestionario básico de síntomas M. D. Anderson (MDASI) para pacientes con cáncer en población mexicana. Psicooncología. [Internet]. 2021 [accessed March 13, 2024]. Available from: https://dx.doi.org/10.5209/psic.77757
12. **Ballesteros M, Sánchez R, Merchán B, Varela R.** Estudio de la estructura factorial de la escala de calidad de vida FACIT-P para los pacientes con cáncer de próstata. Revista Colombiana de Cancerología. [Internet]. 2012 [accessed March 13, 2024];16, 3, 162–169. Available from: https://www.revistacancercol.org/index.php/cancer/article/view/405
13. **Espinoza BM, Galindo VM, Jiménez RMA, Lerma A, Acosta SNA, Meneses GAA, Sánchez SJJ.** Propiedades psicométricas de la escala de evaluación funcional para el tratamiento del cáncer, versión próstata (FACT-P), en pacientes mexicanos. Cirugía y cirujanos. [Internet]. 2019 [accessed March 13, 2024];88 (6):745-52. Available from: https://doi.org/10.24875/ciru.19001755
14. **Vinaccia S, Fernández H, Sierra F, Monsalve M, Quiceno J. M.** Diseño de un cuestionario psicométrico para evaluar creencias, actitudes y conocimientos asociados a la hiperplasia prostática benigna. Suma Psicológica [Internet]. 2007 [accessed March 13, 2024];14(1):73-91. Available from: https://www.redalyc.org/articulo.oa?id=134216860004
15. **Durães OPS, Vinicius CMS, Andrade BH, Marques BRR, Barbosa Rodrigues A, Maiada Silva V.** Cáncer de próstata: conocimientos e interferencias en la promoción y prevención de la enfermedad. Enfermería Global. [Internet]. 2019 [accessed March 13, 2024];18(2):250-84. Available from: https://doi.org/10.6018/eglobal.18.2.336781
16. **Opondo CO, Onyango PO, Asweto CO.** Effect of Perceived Self-Vulnerability on Prostate Cancer Screening Uptake and Associated Factors: A Cross Sectional Study of Public Health Facilities in Western Kenya. Annals of Global Health. [Internet]. 2022 [accessed March 13, 2024];88(1):12:1–12. Available from: https://doi.org/10.5334/aogh.3064
17. **Bugoye, FC, Leyna, GH, Moen, K, Mmbaga, EJ.** (2019). Knowledge, Perceived Risk and Utilization of Prostate Cancer Screening Services among Men in Dar Es Salaam, Tanzania. Prostate cancer, [Internet]. 2019 [accessed March 13, 2024];2463048. Available from: https://doi.org/10.1155/2019/2463048
18. **Charles BF, Henry LG, Moen K, John ME.** Knowledge, Perceived Risk and Utilization of Prostate Cancer Screening Services among Men in Dar Es Salaam, Tanzania. Prostate Cancer. [Internet]. 2019 [consultado 2024 marzo 13]. Available from: https://doi.org/10.1155/2019/2463048

19. **Aktary ML, Shewchuk B, Qinggang R, Hyndman E, Lorena de C., Robson PJ.** Kopciuk KA. Health-Related and Psychosocial Factors Associated with Prostate Cancer Stage at Diagnosis among Males Participating in Alberta's Tomorrow Project. Prostate cancer. [Internet]. 2023 [accessed September 30, 2024]. Available from: https://doi.org/10.1155/2023/4426167
20. **Méndez TJM.** Fronteras corporales e identidad masculina. Experiencias de investigación y reflexiones conceptuales en el estudio de la salud. Methaodos.revista de ciencias sociales. [Internet]. 2019 [accessed March 13, 2024];(1):142-50. Available from: http://dx.doi.org/10.17502/m.rcs.v7i1.297
21. **Hernández-Sampieri R, Mendoza C.** Metodología de la investigación. Las rutas cuantitativa, cualitativa y mixta. Ciudad de México: Mc Graw Hill Education; 2018.
22. **Tapia Benavente L, Vergara Merino L, Garegnani LI, Ortiz Muñoz L, Loézar C. Vargas Peirano M.** Revisiones rápidas: definiciones y usos. Medwave. [En línea]. [Internet]. 2021 [caccessed March 13, 2024];21(01). Available from: http://doi.org/10.5867/medwave.2021.01.8090
23. **Moher D, Liberati A, Tetzlaff J, Altman DG.** Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLOS Medicine. [Internet]. 2009 [accessed March 13, 2024]; 21(01):e8090. Available from: https://doi.org/10.1371/journal.pmed.1000097
24. **Waltz C, Strickland O, Lenz, E.** Measurement in nursing and health research (Fourth edition). New York: Springer Publishing Company. 2016.
25. **Ventura León JL, Caycho Rodríguez T.** El coeficiente Omega: un método alternativo para la estimación de la confiabilidad Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud. [Internet]. 2017 [accessed March 13, 2024]; 15(1):625-7. Available from: https://www.redalyc.org/articulo.oa?id=77349627039
26. **Ley General de Salud.** Reglamento de la ley general de salud en materia de investigación para la salud. DOF 02-04-2014. [En línea]. 2014 [accessed March 13, 2024]. Available from: https://www.diputados.gob.mx/LeyesBiblio/regley/Reg_LGS_MIS.pdf
27. **Hyrkäs K, Appelqvist Schmidlechner K, Oksa L.** Validating an instrument for clinical supervision using an expert panel. International Journal of nursing studies. [Internet]. 2003 [accessed March 13, 2024];40(6):619-25. Available from: https://doi.org/10.1016/s0020-7489(03)00036-1

DOI 10.51422/ren.v23i1.469

Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez | Revista de Enfermería Neurológica

Original article

# Nivel de aplicación del protocolo FAST HUG en el Centro Médico Naval

# Level of application of the FAST HUG protocol at the Naval Medical Center

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## Resumen

**Introducción:** El apego al protocolo FAST HUG consiste en cuidar aspectos como la alimentación, analgesia, sedación, tromboprofilaxis, elevación de la cabecera, prevención de úlceras por estrés y el control de la glucosa en los pacientes. Estas medidas permiten disminuir lesiones, complicaciones o la tasa de morbimortalidad de quienes ingresan a las unidades de cuidados intensivos.

**Objetivo:** Describir el nivel de aplicación del protocolo FAST HUG por parte del personal de enfermería en la unidad de cuidados intensivos del Centro Médico Naval.

**Metodología:** Estudio descriptivo, observacional, transversal y prospectivo. La población estuvo conformada por 30 elementos del personal de enfermería especialistas en cuidados intensivos. Se utilizó una lista de verificación con indicadores contemplados en el protocolo FAST HUG.

**Resultados:** El nivel de apego al protocolo FAST HUG fue suficiente por un cumplimiento del 81.4 %. Estos resultados se explican por un apego eficiente en 4 partes de la mnemotecnia (S, H, U y G) con porcentajes mayores al 90 %; por otro lado, se observó un apego insuficiente en el inicio de alimentación temprana con un 43 %.

**Conclusiones:** La actuación enfermera sobre los cuidados a pacientes críticos en la unidad de cuidados intensivos del Centro Médico Naval es suficiente y beneficia su recuperación. Al mismo tiempo, representa una oportunidad para aspirar a mejorar el nivel de aplicación, además de incluir nuevos protocolos que incrementen la calidad de atención a los usuarios.

**Palabras clave:** FAST HUG, unidad de cuidados intensivos, calidad de atención en salud.

Citation: Hernández Pío G, Hernández López E, Martínez Martínez J. Level of application of the FAST HUG protocol at the Naval Medical Center. Rev Enferm Neurol.2024;23(1): pp. 13-22.

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Received: April 26, 2023
Accepted: August 22, 2024

## Abstract

**Introduction:** Adherence to the FAST HUG protocol consists of taking care of aspects such as feeding, analgesia, sedation, thromboprophylaxis, bedside elevation, prevention of stress ulcers, and glucose control in patients. These measures make it possible to reduce injuries, complications, or the morbimortality rate of those admitted to intensive care units.

**Objective:** To describe the level of application of the FAST HUG mnemonic protocol by the nursing staff in the intensive care unit of the Naval Medical Center (CEMENAV).

**Methodology:** Descriptive, observational, cross-sectional, and prospective study. The population consisted of 30 intensive care nurses from the morning, afternoon, evening, night A, and night B shifts and patients admitted to this service during June 2023. A checklist with indicators contemplated in the FAST-HUG protocol was used.

**Results:** The level of adherence to the FAST-HUG protocol was sufficient, with a compliance rate of 81.4%. These results are explained by an efficient adherence in 4 parts of the mnemonic (S, H, U, and G) with percentages higher than 90 %; on the other hand, an insufficient adherence was observed in the early feeding initiation with 43 %.

**Conclusions:** Nursing performance on critical patient care in the ICU of the CEMENAV is sufficient and benefits their recovery. At the same time, it represents an opportunity to aspire to improve the level of application, in addition to including new quality protocols that increase the quality of care for patients.


**Key words:** FAST HUG, intensive care unit, quality of health care.

## Introduction

The World Health Organization (WHO) defines quality of care as the degree to which health services can deliver the desired outcomes to patients. To this end, health personnel use their knowledge and react. This is based on the use of the knowledge of health personnel and a reaction based on scientific evidence, aiming to solve universally the problems of each individual[1].

Other institutions, in conjunction with the WHO, such as the Organization for Economic Cooperation and Development (OECD) and the World Bank (WB), have implemented various measures to achieve quality health services[2]. Some of these are universal and quality health coverage; national policies and strategies to improve the quality of care in all structures; efforts by the government and health personnel, as well as financial resources to facilitate quality care; this includes continuous surveillance systems and accessible health service delivery units that are well equipped; and health services that are available in case of any public health emergency or at the national level.

Thus, the concept of quality is related to continuous monitoring processes in favor of the recovery and maintenance of each patient's health. Establishing these control and monitoring processes is necessary to evaluate the results and find areas of opportunity where the quality of care of the patient can be improved[3].

The use of guidelines and protocols is a measure that makes it possible to identify the patient's state of health and act quickly to promote recovery. These tools also help to unify the efforts of health personnel with the optimal level of quality sought in intensive care units (ICU)[3].

In 2005, Jean-Louis Vincent suggested the concept of FAST HUG as a simple mnemonic for remembering the most important points in the care of critically ill patients. F stands for feeding; A, for analgesia; S, for sedation; T, for thromboprophylaxis; H, for bedside elevation; U, for stress ulcer prevention; and G, for glycemic control. However, this concept was updated in 2009 by Vincent W.R. and Hatton K. W.; specifically, the acronym BID was added, which refers to spontaneous ventilation, bowel care, catheter care, and antibiotic de-escalation[4,5].

At the Naval Medical Center (CEMENAV), the FAST HUG protocol has been implemented to ensure patient safety. This protocol has been approved by the General Health Council and aims to reduce or eliminate deficiencies in the delivery of healthcare services. If these deficiencies are not adequately addressed, they can lead to prolonged hospital stays and increased costs. Therefore, the purpose of this research was to evaluate the level of adherence of nursing staff to the FAST HUG protocol in adult patients admitted to the ICU at the Naval Medical Center.

## Materials and methods

This is a descriptive, observational, cross-sectional, prospective study. The study population consisted of 30 members of the CEMENAV nursing staff, who were evaluated during June 2023, specifically in the adult intensive care unit. Given that specific characteristics were required in the variables of interest, a non-probabilistic type of sampling was used for this study.

The inclusion criteria for this study were as follows: specialist nursing staff assigned to the adult intensive care unit of CEMENAV in the morning, afternoon, evening, night A and night B shifts. As exclusion criteria, specialists in intensive care who did not provide care were considered. The study focused on analyzing the application of the FAST HUG protocol. In addition, sociodemographic variables such as academic level, sex, age, work shift, and seniority in the service were considered, and obtained through staff surveys.

To collect the necessary data, a checklist was used to evaluate the personnel's adherence to the protocol during their care activities. The application of the FAST HUG protocol was determined according to compliance with the corresponding indicators, assigning a percentage of adherence to the protocol itself. Sociodemographic variables were obtained through staff surveys.

The analysis of the information collected in this study was carried out using a variety of tools and resources. For data processing and document writing, computer equipment and computer programs were used, including Microsoft Office (Word and Excel). In addition, Statistical Package for Social Sciences (SPSS) software was used for statistical analysis. Regarding physical resources, the infrastructure necessary to implement the protocol was provided by CEMENAV, which included adequate facilities and equipment for this study.

Descriptive statistics were performed to analyze the variables included in the study. A percentage approach was used to describe

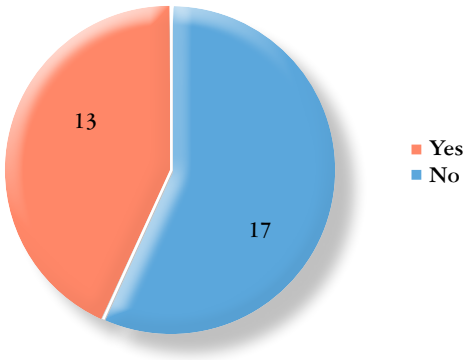
attachment, adopting a classification of the following levels: efficient application (>90 %), sufficient application (80-89 %), and insufficient application (<80 %). In addition, measures of central tendency, such as mean and median, were applied for a deeper understanding of the data. To examine possible associations or differences between nursing staff characteristics and their adherence to the FAST HUG protocol, the Chi-squared test was used.

## Results

Of the 30 participants in the sample analyzed, 67% of the nursing staff were female and 33% were male. The majority (57 %) were in the age range of 31 to 40 years, 30 % belonged to the group of 22 to 30 years, and 13 % were between 41 and 50 years of age. Concerning educational background, 67 % had postgraduate studies, 23 % had completed a post-technical level, and the remaining 10 % had a bachelor's degree. Regarding work experience in the nursing service, 53 % had 1 to 5 years of seniority, 23 % had between 6 and 10 years, 17 % had between 11 and 15 years, and 7 % had between 16 and 20 years of experience in the field. The distribution of the participants according to their work shift was as follows: 24% worked the morning shift, 30% worked the evening shift, and night shift A and night shift B each accounted for 23% of the personnel.

Figure 1 illustrates the results related to the early initiation of feeding (F), which, according to the guidelines, should be provided between the first 24 and 48 hours. It was observed that in 57% of the cases, feeding was initiated on time, while in 43% it was not initiated.

**Graph 1.** Early onset of feeding (F) in ICU patients




Source: Own elaboration based on nursing staff records.

Analgesia (A), consists of providing timely pharmacological therapy to relieve pain in patients[9]. Regarding the assessment of the level of analgesia, 67% of the participants indicated that it is performed, while 33% indicated that it is not.

Regarding pain management according to medical indications, a high percentage (97 %) stated that it is adequately carried out, in contrast to only 3 % who indicated otherwise. Regarding the scale used for assessment, 67 % of the cases used the Behavioral Pain Scale (BPS), while no scale was used in 33 % of the participants (Table 1).

**Table 1.** Assessment of sedation (S)

| Categories | Assesses the level of analgesia | | Manages pain according to medical indications | |
|---|---|---|---|---|
| | *N* | % | *N* | % |
| Yes | 20 | 67 | 29 | 97 |
| No | 10 | 33 | 1 | 3 |

Source: Own elaboration based on nursing staff records.

Regarding the sedation variable (S)[10], it was observed that 83% of the participants did evaluate the level of sedation, while 17% did not. Regarding its management according to medical indications, a high percentage, 97%, stated that it was adequately managed, as opposed to 3% who indicated that they had not done so.

Regarding the sedation rating scales used, 83 % (n=25) used the Richmond Agitation-Sedation Scale (RASS), 3 % (n=1) used the RAMSAY scale, and 14 % (n=4) did not apply any scale (Table 2).

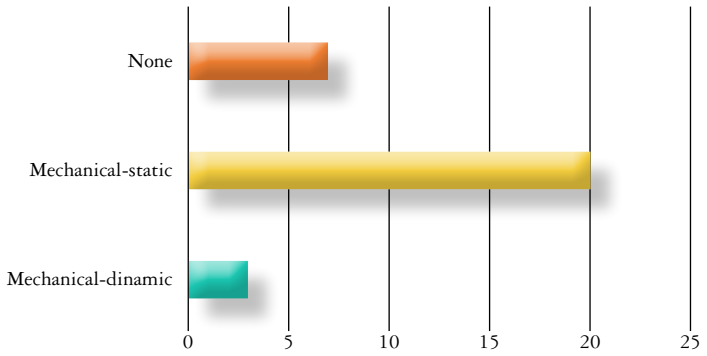
**Table 2.** Valoración de la sedación (S)

| Categories | Assesses the level of sedation | | Manages sedation according to medical indications | |
|---|---|---|---|---|
| | *N* | % | *N* | % |
| Yes | 25 | 83 | 29 | 97 |
| No | 5 | 17 | 1 | 3 |

Source: Own elaboration based on nursing staff records.

The evaluation of thromboprophylaxis (T) measures, essential to reduce the risk of deep vein thrombosis and thromboembolic events, venous or pulmonary, revealed varied distributions in their application[11,12]. According to the results shown in Graph 2, the most commonly used thromboprophylaxis measure was mechanical-static, used in 67% of cases. Mechanical-dynamic measures were used in 10 %. Notably, 23% of the cases did not apply any thromboprophylaxis measure.

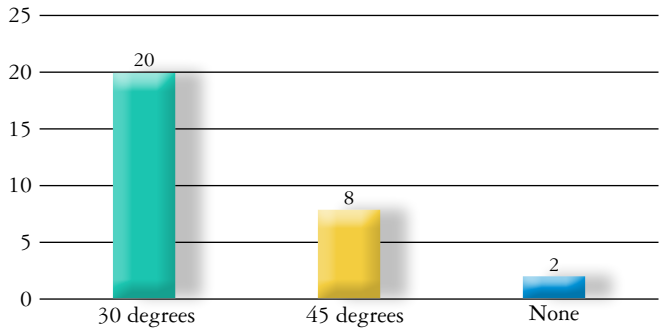
**Graph 2.** Thromboprophylaxis measures used (T)




Source: Own elaboration based on nursing staff records.

Regarding the headrest elevation (H) and the degree of tilt applied, the results showed that 67% of the nursing staff elevate the headrest to 30°, 27% choose to elevate it to 45°, while 6% do not elevate the headrest at all (Figure 3).

**Graph 3.** Headrest elevation (H)




Source: Own elaboration based on nursing staff records.

The evaluation of measures to prevent stress ulcers (U) showed high compliance in the application of gastric mucosal protective drugs[13], with 93 % of the nursing staff implementing this practice. According to the results shown in Table 3, the predominant route of administration of these drugs was intravenous, used in 77% of the cases, followed by oral administration in 17%. The route of administration was not recorded in 6 % of the cases.

**Table 3. Stress ulcer assessment (U)**

| Categories | Applies gastric mucosal protective drugs | | Categories | Route of administration | |
|---|---|---|---|---|---|
| | *N* | % | | *N* | % |
| Yes | 28 | 93 | Oral | 5 | 17 |
| No | 0 | 0 | Intravenous | 23 | 77 |
| Not indicated | 2 | 7 | None | 2 | 6 |

Source: Own elaboration based on nursing staff records.

In Table 4, which details glucose (G) control[14,15], it is observed that 93% of the nursing staff carried out glucose measurement during their shift. Regarding the application of pharmacological treatment, based on the figures obtained, 37 % applied such treatment, while 10 % did not. It should be noted that, in the context of glucose measurement, the category "*Not required*" is not applicable, although this category was included in the section on the application of pharmacological treatment, where it was recorded that, for 53% of the cases, it was not necessary to apply treatment.

To determine the level of personnel adherence to the FAST HUG protocol, the

**Table 4. Glucose control (G)**

| Categories | On-shift glucose measurement | | Applies pharmacological treatment according to the figures obtained | |
|---|---|---|---|---|
| | *N* | % | *N* | % |
| Yes | 28 | 93 | 11 | 37 |
| No | 2 | 7 | 3 | 10 |
| Not required | - | - | 16 | 53 |

Source: Own elaboration based on nursing staff records.

average compliance of all the items included was calculated. The result yielded an average of 81.4 %, which was considered sufficient implementation. As seen in Table 5, the total number of items completed in the sample of 30 participants ranged from a minimum of 3 to a maximum of 7, with a mean of 5.60 and a standard deviation of 1.248. In terms of percentage compliance, the values ranged from 42.86 % to 100.00 %, with a mean of 79.9990 % and a standard deviation of 17.83451 %.

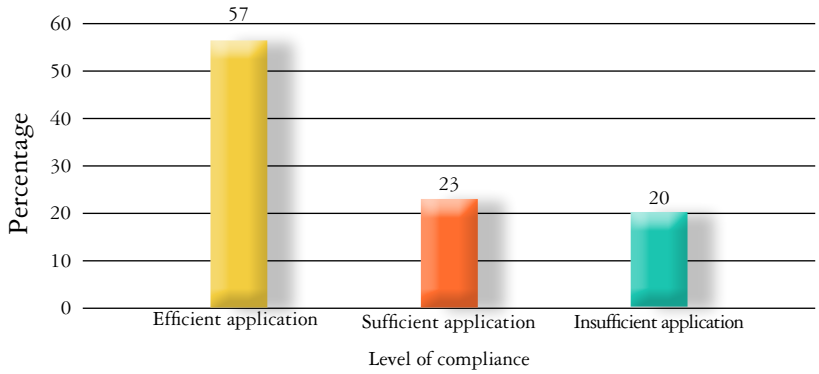
**Table 5.** Level of adherence to the FAST HUG protocol

| | Minimum | Maximum | Media | Deviation |
|---|---|---|---|---|
| **Total items completed** | 3 | 7 | 5,60 | 1,248 |
| **Compliance** (%) | 42,86 | 100,00 | 79,99 | 17,83 |

Source: Own elaboration based on nursing staff records.

Figure 4 shows the distribution of compliance with the FAST HUG mnemonic protocol among the participants, categorized according to the pre-established levels. Of the 30 items evaluated, 57% (n=17) achieved efficient application; 23% (n=7) were in the sufficient application category; and finally, 20% (n=6) of the items fell into the insufficient application category.

**Graph 4 .** Distribución del cumplimiento del protocolo FAST HUG, según niveles establecidos




Source: Own elaboration based on nursing staff records.

Finally, statistical analyses were performed to explore possible relationships between the level of compliance with the FAST HUG protocol and multiple sociodemographic and professional variables. Using Pearson's Chi-square test and Fisher's exact test, associations were examined with the area of medical diagnosis, educational level, work shift, sex, length of service, and age of participants.

The results of these analyses revealed the absence of significant differences. The crossover with the area of medical diagnosis showed a *p-value* of 0.5321, and the analysis related to educational level yielded a *p-value* of 0.642. Regarding the work shift, sex of the participants and length of service, the *p-values* were 0.117, 0.139 and 0.674, respectively. Finally, the relationship with the age of the participants resulted in a *p-value* of 1.000.

## Discussion

This study presents notable contrasts with previous research. It differs from the findings of Sanchez Nava[16] *et al*, in Mexico, who determined that compliance with four or more components of the FAST HUG protocol reduces the risk of mortality in critical ICU patients. In contrast to this study, Sanchez Nava *et al*. also linked the protocol components to the mortality rate, observing compliance of more than 80% in four of the seven components of the FAST HUG.

Likewise, the results of the present study contrast with those of Curiel Balsera *et al*.[17], who reported compliance above 90% in all components of the FAST HUG, with the exception of glucose control; similarly, they differ from the results obtained by Barrera Jiménez *et al*.[6] in 2019, who highlighted that nutrition, sedation, and thromboprophylaxis measures had greater relevance in reducing the risk of mortality in patients.

On the other hand, a coincidence was found with the research carried out by Mayo Hernández[18], which concludes that an attachment or adherence of less than 80% is considered insufficient. Similarly, this finding is in agreement with the study by Morales Alvarado[19], which states that a value above 80% is sufficient to improve the recovery of critically ill patients in the ICU.

Regarding the sufficient results achieved in this study, in aspects such as analgesia, sedation and thromboprophylaxis, it is in line with the observations of authors such as Rodriguez Ferreira *et al*.[20], who have highlighted the advantages for patients of applying all the components of the FAST HUG protocol. Specifically, it has been shown that the comprehensive implementation of this protocol can contribute to a reduction in the incidence of ventilator-associated pneumonia, hospital costs and mortality rates.

Finally, the results of the present investigation contrast with those obtained by Ortega Sagardi and Orozco Chino[21], who observed an absence of 90 % in compliance with pain assessment, 95 % in head elevation and the same percentage of absence for the recording of antibiotic scaling, as well as a total absence in the recording of spontaneous breathing tests. The average total adherence was less than 80 %, while in the present study a result of 81.4 % was obtained.

## Conclusions

After evaluating the performance of the nursing staff in the intensive care unit of

CEMENAV, in this study, it can be concluded that the performance has been, in general, sufficient in most of the areas evaluated. This finding supports the perception that the services offered by CEMENAV are efficient; however, it is worth noting the opportunity for continuous improvement in the level of adherence to the FAST HUG protocol, which would have a direct impact on improving services and patient recovery.

It is important to note that the level of adherence observed does not appear to be directly related to individual characteristics of the nursing staff involved in this study. Therefore, further research along these lines is suggested to further explore possible relationships and influencing factors.

The knowledge gained through this research is essential to properly understand and apply the principles of the FAST HUG protocol. The ultimate goal is to contribute to a decrease in the mortality rate and promote more effective patient recovery. Furthermore, in settings where the FAST HUG mnemonic protocol is already implemented, these results provide a solid basis for identifying and improving specific areas where the level of adherence to the protocol can be optimized.

## Referencias


1. **OMdl Health. World Health Organization.** [Online].; 2024 [cited 2020 February 20. Available from: https://www.who.int/es
2. **OMdl Health. World Health Organization.** Quality Health Services. [Online].; 2024 [cited 2020 February 20. Available from: https://cutt.ly/DeGQdDna
3. **Internet. UlUe.** Quality in health and patient satisfaction. [Online].; 2022 [cited 2022 February 20. Available from: https://cutt.ly/ceGQfimE
4. **Organización Panamericana de la Salud.** 2019. Available from: https://www.paho.org/es
5. **Jean-Louis V.** Give your patient a fast hug (at least) once a day. Critical Care Medicine. 2005;33(6):1225-9. DOI: 10.1097/01.CCM.0000165962.16682.46
6. **Barrera JB, Correa JC, Ruiz MLA, Mendoza RM.** Application of the FAST-HUG protocol and its association with the mortality of the critical patient in the ICU. Medicina Crítica. 2019;33(3):130-8. Available from: https://dx.doi.org/10.35366/88510
7. **Miranda PR.** Fallo intestinal agudo. Multimed Revista Médica Granma.2020;24(1):2010-224. Available from: https://cutt.ly/keGA4iyH
8. **Vaquerizo AC.** Nutrición Parenteral en el paciente crítico: indicaciones y controversias. Nutrición Clínica en Medicina. 2017;11:26-41. Available from: https://cutt.ly/2eGSpPQJ
9. **González-Estavillo AC, Jiménez-Ramos A, Rojas-Zarco EM, Velasco-Sordo LR, Chávez-Ramírez MA, Coronado-Ávila SA.** Correlacion entre las escalas unidimensionales utilizadas en la medición de dolor postoperatorio. Revista Mexicana de Anestesiología. 2018;41(1):07-14. Available from: https://cutt.ly/meGSgE3W
10. **Cala HFJ, Gómez-Llusá GR.** Sedación y Analgesia en pacientes con ventilación mecánica en Unidades de Cuidado Intensivo: Una visión narrativa [Internet]. [Madrid España]: Universidad Autónoma de Madrid; 2018. Available from: http://hdl.handle.net/10486/684700
11. **Caro AI, García CS, Peral BL, Aguinalde TA, Marquez PJ, Gaspar CM, Moreno R.** Profilaxis enfermedad tromboembólica

venosa: dispositivos de compresión neumática intermitente. gps SEFH; 2015. Available from: https://cutt.ly/JeGSxq9U

12. **Tabares AH.** Profilaxis de tromboembolismo venoso en las unidades de cuidados críticos. Hematologís. 2018;22(Extraordinario):44-9. Available from: https://cutt.ly/geGSn5h3
13. **Avendaño-Reyes JM, Jaramillo-Ramírez H.** Prophylaxis for stress ulcer bleending in the intensive care unit. Revista de Gastroenterología de México. 2014;79(1):50-5. DOI: 10.1016/j.rgmxen.2013.05.001
14. **García del Moral-Martín R, Cobos-Vargas A, Rodríguez-Delgado E, Colmenero M.** Blood glucose monitoring in intensive care. Results of a survey. Medicina Intensiva. 2021;45(9):e68-9. Available from: 10.1016/j.medine.2021.10.009
15. **Finter S, Chittock DR, Yu-Shuo SS, Blair D, Foster D, Dhingra v, et al.** Intensive versus Conventional Glucose Control in Critically Ill Patients. The New England Journal of Medicine. 2009;360(13):1283-97. DOI: 10.1056/NEJMoa0810625
16. **Sánchez NVM, Muñoz RMR, Chávez PCE, Flores MP, Ocegueda PC, Flores CJC.** Impacto de la aplicación del protocolo FASTHUG con mortalidad en los pacientes con falla orgánica. Medicina Crítica. 2012;26(1):21-5. Available from: https://cutt.ly/LeGSTZA0
17. **Curiel Be, Joya MC, Trujillo GE, Martinez GMC, Molina DH.** Evaluación diaria del protocolo FASTHUG y resultados a corto plazo. Medicina Intensiva. 2014;38(6):393-4. DOI: 10.1016/j.medin.2013.09.002
18. **Mayo HL.** Adherencia a indicadores de calidad de acuerdo al protocolo Fast Hug en pacientes críticamente enfermos del Servicio de Medicina Interna del Hospital de Especialidades Dr. Belisario Domínguez. [Internet] [Tesis de especialidad]. [Ciudad de México]: Universidad Nacional Autónoma de México; 2019. Available from: https://cutt.ly/weGQhC8p
19. **Morales Alvarado MI.** Intervención educativa de enfermería en la aplicación del protocolo FAST-HUG (abrazo rápido) en paciente crítico de la Unidad de Cuidados Intensivos en un hospital de segundo nivel [Internet] [Tesis de especialidad]. [Acapulco, México]: Universidad Autónoma de Guerrero; 2020. Available from: http://ri.uagro.mx/handle/uagro/2222
20. **Rodrígues FC, Fabiano de Souza D, Marques CT, Tavares M, Arab RSS, Santos PR, Dolinger de Brito RDV.** The effectiveness of a bundle in the prevention of ventilator-associated pneumonia. The Brazilian Journal of Infectious Disease. 2016;3:267-71. Available from: https://doi.org/10.1016/j.bjid.2016.03.004
21. **Ortega S, Orozco C.** Evaluación de las actividades del personal de enfermería en la unidad de cuidados intensivos en base a la nemotecnia FAST HUG BID. Int J Recent Adv Multidiscip Res [Internet]. 2020;7(12). Available from: https://cutt.ly/JeGSS7zB

DOI 10.51422/ren.v23i1.381

Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez | Revista de Enfermería Neurológica

Original article

# Intervención educativa gestionada por especialistas en enfermería comunitaria para modificar factores de riesgo de vulvovaginitis en adolescentes

# Educational intervention managed by specialists in community nursing to modify risk factors for vulvovaginitis in adolescents

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## Resumen

**Introducción:** En la práctica médica, las infecciones vaginales representan un problema de salud frecuente en nuestro medio.

**Objetivo:** Valorar la efectividad de una intervención educativa gestionada por especialistas en enfermería comunitaria para modificar factores de riesgo de vulvovaginitis en adolescentes.

**Método:** Se realizó un estudio cuasiexperimental con adolescentes del consultorio 15 del policlínico de Mataguá, en Cuba. La población de estudio estuvo constituida por 48 adolescentes. Se analizaron las variables edad, hacinamiento, estudio en escuelas internas, nivel de conocimientos de las adolescentes antes y después de la intervención y forma de aseo de los genitales. Los resultados se organizaron en tablas y gráficos después de su procesamiento.

**Resultados:** La edad que predominó fue de 12 a 14 años; la mayoría de las adolescentes vivían con hacinamiento y asistían a escuelas internas. Un número elevado manifestó no haber recibido información previa sobre el tema. Antes de la intervención, la mayoría de las adolescentes dormían acompañadas, realizaban de forma incorrecta el lavado de los genitales y desconocían con qué frecuencia debían hacerlo. Después de aplicar la intervención educativa, se elevó el nivel de conocimientos sobre estos aspectos.

**Conclusiones:** La intervención educativa fue satisfactoria, ya que alcanzó diferencias significativas en el nivel de conocimientos antes y después de la misma. Se recomienda extenderla al resto del universo de estudio y aplicar los procedimientos llevados a cabo en esta investigación a otros adolescentes cuyas necesidades de conocimientos pudieran ser similares.

**Palabras clave:** Vulvovaginitis; medicina del adolescente; enfermeras especialistas; factores de riesgo

Citation: Vázquez Valle D, Alvares Treto Y, Gómez Garcés M, Bernal Pacheco M. Educational intervention managed by community nurse specialists to modify risk factors for vulvovaginitis in adolescents. Rev. Enferm. Neurol. 2024;23(1): pp. 23-30.

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Received: July 26, 2023
Accepted: August 20, 2024

## Abstract

**Introduction:** In medical practice, vaginal infections represent a frequent health problem in our environment.

**Objective:** To assess the effectiveness of an educational intervention managed by community nurse specialists to modify risk factors for vulvovaginitis in adolescents.

**Methods:** A quasi-experimental study was carried out with 48 adolescents from clinic 15 of the Mataguá polyclinic in Cuba. The variables age, overcrowding, study in boarding schools, level of knowledge of the adolescents before and after the intervention, and way of genital hygiene were analyzed. The results were organized in tables and graphs after processing.

**Results:** The predominant age range was 12 to 14 years; most adolescents lived in overcrowded conditions and attended boarding schools. A high number reported not having received prior information on the subject. Before the intervention, most of the adolescent girls slept in company, did not wash their genitals properly, and did not know how often they should do it. After applying the educational intervention, the level of knowledge on these aspects increased.

**Conclusions:** The educational intervention was satisfactory since it achieved significant differences in the level of knowledge before and after the intervention. It is recommended that it be extended to the rest of the study universe and that the procedures carried out in this research be applied to other adolescents whose knowledge needs could be similar.


**Keywords:** Vulvovaginitis; adolescent medicine; specialist nurses; risk factors.

## Introduction

In medical practice, vaginal infections represent a frequent health problem, with 95% of patients presenting for consultation due to vaginal discharge.[1,2]

The vaginal ecosystem is a complex system of microorganisms interacting with host factors that maintain this balance. Therefore, it is important to know which factors control the delicate balance of the vaginal ecosystem and which can disrupt it.[3-5]

The term vulvovaginitis includes any inflammatory process affecting the vulva or vagina, usually accompanied by vaginal discharge[6,7]. Nonspecific vulvovaginitis or vulvovaginitis due to mixed bacterial flora is undoubtedly the most frequent in prepubertal girls.[8,9]

In some countries, there have been changes in infection patterns as a result of changing sexual behaviors. In the United States alone, 4 to 8 million cases of Gardnerella are reported each year.[10] In Cuba, it is an infection that is diagnosed in 5 to 15 % of women attending gynecology consultations.[11]

In the last three years, a total of 1,083 adolescents were seen at the provincial

infant and adolescent gynecology office; vulvovaginitis was the leading cause in adolescents aged 12 to 19 years.

Vulvovaginal irritation is caused by the absence of labial fat pads and pubic hair protecting the external genitalia. The labia minora are opened when the girl squats and the tissues inside the hymenal ring are exposed; in addition, the proximity of the anal orifice to the vagina allows the transfer of fecal bacteria to the vulvovaginal area. Likewise, masturbation may be a contributing factor.[12,13]

Vaginal sepsis in adolescents has increased its incidence in the health area of the Mataguá polyclinic in recent years, so it was decided to conduct this study to assess the effectiveness of an educational intervention managed by community nurse specialists to modify risk factors for vulvovaginitis in adolescents.

## Method

A quasi-experimental study was conducted during the year 2020, with the participation of adolescents between 12 and 19 years of age from the Family Medical Clinic - 15 (CMF-15) of the Mataguá polyclinic, belonging to the municipality of Manicaragua, in Cuba. The study population consisted of 48 adolescents; it was not necessary to apply sampling since we worked with 100% of those involved belonging to the aforementioned health area. Inclusion, exclusion, and exit criteria were established, which are described below:

- **Inclusion criteria.** Adolescents who gave consent to participate in the study and who received approval from their legal guardians.
- **Exclusion criteria.** Failure to complete the data collection instruments.
- **Exit criteria.** Failure to participate in all of the work sessions held.

The research was conducted with the prior request for informed consent from all participants and their legal guardians. In addition, the research project was evaluated and received the approval of the institution's ethics committee. Likewise, the present manuscript received the consent of the scientific board to be published.

The general data of the participants were obtained through a form that was applied before the intervention, through which information was collected regarding age, characteristics of the home, and the school they attended. Later, to determine the level of knowledge of the adolescents regarding the presence of vulvovaginitis, a ten-question questionnaire was applied, including six open and four closed questions. This was validated by its previous application in a sample similar to that of the study.

Based on the responses and the theoretical cores detected as deficient, an educational intervention was designed. The methodology used was mainly based on the following educational techniques: my name, dramatization, group dynamics, video debates, and practical demonstrations. For the execution of the activities, two groups of 24 adolescents were organized; the selection of the members of each group was done randomly by listing the names in alphabetical order. Once the groups were formed, 12 work sessions were planned and carried out for six months (two sessions per month) in the social circle of the same village, on alternate Saturdays, with a duration of 50

minutes each. The content of this strategy was evaluated before its application by 15 experts using Barraza's method.

Once the strategy had been implemented, the questionnaire was applied again, which made it possible to evaluate the level of knowledge of the adolescents concerning the topic in question. The assessment of the effectiveness of the educational intervention applied was carried out three and six months later. The data were computed and processed using the SPSS 15.0 statistical package for Windows, by calculating absolute and relative frequencies, as well as percentages.

In addition, for a better understanding of the information, it was presented in tables and statistical graphs. For the analysis and interpretation of the results, percentage analysis was used, and nonparametric statistical tests such as chi-square of goodness of fit for difference of proportions and McNemar were applied to determine changes in respondents' answers before and after the educational intervention. Test statistics (x2) and their associated significance (p) were determined taking the following as criteria:

**p > 0.05:** No significant difference
**p < 0.05:** Significant differences exist
**p < 0.01:** Highly significant differences exist

Since we were dealing with two paired samples (the individual seen as his or her control before and after the intervention) and quantitative response variables, we used the Wilcoxon non-perimetric test to determine significant differences and, therefore, whether the intervention had an effect.

## Results

The predominant age group in the sample was 12-14 years old with 25 adolescents, representing 52.10% (Table 1).

**Table 1.** Distribution of CMF-15 adolescent girls by age group

| Age group | No. | % |
|---|---|---|
| 12-14 years | 25 | 52.10 |
| 15-17 years | 14 | 29.20 |
| 18-19 years old | 9 | 18.70 |
| **Total** | **48** | **100** |
| | $X^2 = 8.37$ | p = 0.015 |

Source: Survey

When the presence of overcrowding was analyzed among the CMF-15 adolescent girls in the initial survey, it was found in 39 of them (81.30 %).

Table 2 describes with whom the adolescent girl slept concerning the number of bedrooms in the house, before and after the educational intervention. A total of 81.30 % of the adolescents lived in a bedroom with more people. After the educational intervention, this behavior was modified in 37 adolescents (77%), while 11 (23%) continued with the same behavior.

**Table 2.** Distribution of adolescent girls according to who they slept with before and after the educational intervention

| Who does the teenager sleep with? | Before | | After | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Alone | 9 | 18.7 | 37 | 77 |
| Accompanied | 39 | 81.3 | 11 | 23 |
| **Total** | **48** | **100** | **48** | **100** |
| | | | $X^2 = 31.0$ | p = 0.000 |

Source: Survey

Table 3 shows the links with in-house: 42 of the adolescents (87%) attended institutions of this type at the time of the study, and only 6 (12.70%) were not linked to them.

**Table 3.** Linkage of CMF-15 adolescents to in-house institutions

| Enrolled in boarding schools | No. | % |
|---|---|---|
| Yes | 42 | 87.50 |
| No | 6 | 12.50 |
| **Total** | **48** | **100** |
| | $X^2 = 27.0$ | p = 0.000 |

Source: Survey

The knowledge of the adolescents about the correct hygiene of the genitalia before and after the educational intervention is shown in Table 4, where it is observed that, before the intervention, 33 adolescents, representing 68.70 %, performed it incorrectly, and 15 (31.20 %) performed it correctly. After the intervention, 100 % knew and performed hygiene correctly.

**Table 4.** Knowledge of CMF-15 adolescent girls about correct genital hygiene

| Knowledge about correct genital hygiene | Before | | After | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Correct | 15 | 31.25 | 48 | 100 |
| Incorrect | 33 | 68.75 | 0 | 0 |
| **Total** | **48** | **100** | **48** | **100** |
| | | | X2 = 31.0 | p = 0.000 |

Source: Survey

The frequency of genital hygiene was another factor to be evaluated before and after the educational intervention. According to the results obtained, 40 adolescents (83 %) performed genital hygiene with the wrong frequency before the intervention; after the intervention, 100 % managed to perform genital hygiene with the correct frequency.

Concerning the results of the question about having previously received educational talks on the subject of vulvovaginitis, only 5 adolescents, representing 10.40 %, had received some guidance on the subject before the educational intervention.

The effectiveness of the educational intervention to modify risk factors for vulvovaginitis in adolescents was verified by the researchers at the end of the intervention. The intervention was effective in all the adolescents: 3 months after the intervention was implemented, the level of knowledge remained the same in the adolescent population, as it was at 6 months.

Often, overcrowding of the home or disregard for the vulnerability of adolescent girls to vulvovaginal conditions means that they share rooms, and even beds, with adults; this often explains the origin of sepsis due to indirect contact of the genitals of adolescent girls with the normal secretions of adults.[9]

Due to its anatomical characteristics, the genital apparatus is exposed to various diseases, among them[10,11] vulvovaginitis, which has been recognized in recent years as one of the most frequent, so sleeping in the company of others is recorded as an important risk factor that was modifiable when carrying out the educational work, achieving that most of the adolescents slept alone at the end of the intervention.

Another factor that tends to influence the occurrence of vulvovaginitis in adolescents is attendance at boarding institutions, due to the hygienic conditions of the sanitary facilities and the characteristics of the water used, in line with other studies conducted.[13]

Also, the literature consulted suggests that changes in the pH of the vagina due to an imbalance between lactobacilli and microflora, allowing the predominance of pathogenic germs, are conducive to infection. In addition, the vaginal flora is also affected by the action of antibiotics, douching, alkaline secretion during menstruation, alkaline soaps, poorly controlled diabetes, use of oral contraceptives, sexual activity, use of tight-fitting nylon or lycra clothing and poor hygiene habits, which coincides with the data obtained in the study. Therefore, it was possible to improve the level of knowledge of the adolescents on the correct hygiene of the genitals by adequately explaining the anatomophysiological reasons favoring infection, always promoting genital hygiene from front to back, to avoid the dragging of germs that are common from the anal region to the vulva.[7]

Some authors state that excessive personal hygiene increases the frequency of sepsis; others affirm that in adolescents these rules are not followed. We found significant differences between both stages of the research, which coincides with other works reviewed.[8,10]

The adolescents' lack of information on the subject of vulvovaginitis risk factors was due to scheduling problems, since often the time established by the health personnel in the area did not coincide with the adolescents' available schedule; other times due to lack of observance because they did not feel threatened by this entity in their family environment or because they were unaware of the implications that this could have on their present and future health. Our criteria coincided with those put forward by other authors.[12]

## Conclusions

The educational intervention managed by community nursing specialists aimed at modifying risk factors for vulvovaginitis in

adolescents at the Family Medical Clinic 15 in Mataguá, Cuba, was effective in the entire population studied.

## References


1. **Ortiz-Movilla R, Acevedo-Martín B.** Infantile vulvovaginitis. Rev Pediatr Aten Primaria [internet]. 2011 [cited 19 April 2022]; 13(52): 601-9. Available at: https://cutt.ly/teFAO3Kh
2. **Andres-Domingo P.** Vulvovaginal disorders (bartolinitis, leucorrhea, trauma, vaginosis and sexually transmitted infections). Adolescere [internet]. 2019 [cited 19 April 2022]; 7(1): 26-38. Available at: https://cutt.ly/WeFAAm4F
3. **Ecuador E. Montenegro-Moran EE, De la Torre-Chávez J, Hernández-Velásquez K, Saltos-Calvache M.** Prevalence of vaginal infections in adolescents. Pol. Con [Internet]. 2017 [cited 19 April 2022]; 2(7): 807-20. Available from: https://cutt.ly/ueFASxan
4. **Sánchez-Gaitán E.** Management of vulvovaginitis in primary care. Revista Médica Sinergia [Internet]. 2018 [cited 19 April 2022]; 3(8): 13-20. Available from: https://cutt.ly/leFADbAE
5. **Zapata-Martínez JF, Pérez-Muñoz A, Tirado-Otálvaro AF, González JD, Velásquez-Vergara SM.** Risk factors associated with vaginal infections and squamous intraepithelial lesions in female university students in Medellín - Colombia. Enferm. glob. [Internet]. 2018 [cited 19 April 2022]; 17(50): 86-106. Available from: https://doi.org/10.6018/eglobal.17.2.275881
6. **Cabezas Tunja KJ, Zambrano Macías C.** Risk factors associated with vulvovaginitis in women of reproductive age. Pentaciencias [Internet]. 2023 [cited 13 August 2024]; 5(3): 167-82. Available from: https://doi.org/10.59169/pentaciencias.v5i3.531
7. **Núñez J, Romano A, Medina M, Cardozo RA.** Changes suggestive of human papillomavirus infection in students of a public university. Actual Med [internet]. 2021 [cited 13 August 2024]; 106(812): 30-7. DOI: http://dx.doi.org/10.15568/am.2021.812.or04
8. **Guashco BH, Jiménez AL.** Knowledge about human papillomavirus in female students of Nursing Career. QhaliKay [Internet]. 2023; 7(1): 26-33. Available from: https://cutt.ly/JeFAGNOQ
9. **Romero FP, Ramírez VE, Muñoz OM, Muñoz MP, González LC, Orellana CC, et al.** Human Papillomavirus anogenital lesions. Prevalence study in unvaccinated children and adolescents. Andes pediatr. [Internet]. 2023 [cited 13 Aug 2024]; 94(1): 29-36. Available from: http://dx.doi.org/10.32641/andespediatr.v94i1.3534
10. **Sánchez-Malo MJ, Hidalgo-Sanz J, Hernández-Tejedor C, García-Ventura M, Ferrer-Lozano M, Labarta-Aizpún JI, De Arriba-Muñoz A.** Growth hormone deficiency: influence of puberty on response to treatment. Annals of Pediatrics [internet]. 2021 [cited 19 Apr 2022]; 96(3): 221-29. DOI: https://doi.org/10.1016/j.anpedi.2021.04.003
11. **Duran-Cañarte AL, Nicole-Yuleidy AQ, Menéndez-González MG.** Vaginal Infections and Risk Factors in Women of Reproductive Age: How Much Does It Affect? Science Domain [Internet]. 2022 [cited 19 Apr 2022]; 8(2): 289-309. DOI: https://cutt.ly/feFAJcJJ
12. **López-Villacís NK, Aveiga-Flores ME, Castro-Acosta N del C.** Knowledge about sexual and

reproductive health in adolescents. DC [Internet]. 2020 [cited 14 Aug 2024]; 6(4): 35-49. Available from: https://cutt.ly/peFALyVe

13. **López OMÁ, Castellanos CE, Salazar MJ, et al.** Level of knowledge about sexual and reproductive health in adolescents aged 12 to 18 years from the Plan de Allende community. Rev Mex Med Forense [Internet]. 2023 [cited 13 Aug 2024]; 8(1): 55-74. Available from: https://cutt.ly/oeFAZyxq

DOI 10.51422/ren.v23i1.470

Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez | Revista de Enfermería Neurológica

Original article

# Medición del neumotaponamiento con manómetro para prevenir la neumonía asociada a ventilación mecánica en el CEMENAV

# Measurement of cuff pressure using a manometer to prevent ventilator-associated pneumonia at CEMENAV

Olga Nieves Bonilla Beltrán Eduardo Sánchez Sánchez Joel Martínez Martínez

## Resumen

**Introducción:** Las Infecciones Asociadas a la Atención a la Salud (IAAS) son un problema relevante de salud pública. La Neumonía Asociada a la Ventilación Mecánica (NAVM) es una de las infecciones que se adquiere de forma frecuente. El neumotaponamiento asegura el funcionamiento adecuado de la vía aérea, evitando fugas, broncoaspiraciones o extubación del paciente.

**Objetivo:** Analizar el impacto del control del neumotaponamiento con el uso del manómetro en la disminución de la neumonía asociada a la ventilación mecánica en los pacientes hospitalizados en la Unidad de Cuidados Intensivos Adultos (UCIA) del Centro Médico Naval.

**Metodología:** Se realizó un estudio descriptivo, transversal, prospectivo y cuantitativo, con 157 controles de presión de neumotaponamiento en 32 pacientes adultos con ventilación mecánica en la UCIA del Centro Médico Naval. La recolección de datos incluyó análisis estadístico descriptivo de los resultados obtenidos en la medición al inicio de turno y antes de la aspiración de secreciones, confirmación de neumonía mediante cultivos bronquiales y aprobación ética para riesgo mínimo.

**Resultados:** Se registraron 157 mediciones de neumotaponamiento. Las presiones bajas (< 19 mmHg) predominaron (59 %) y se asociaron con un 13 % de infecciones, mientras que las presiones normales (20-30 mmHg) presentaron una menor incidencia de infecciones (8 %). La mayoría de los pacientes fueron mujeres, con mayor prevalencia en el rango de edad de 65 a 75 años. Las bacterias más frecuentes identificadas fueron Acinetobacter baumannii (16 %), Pseudomonas aeruginosa (10 %), Klebsiella pneumoniae (7 %) y Aspergillus niger (5 %).

**Discusión:** El estudio resalta que el control adecuado del neumotaponamiento con manómetro reduce la incidencia de NAVM. Hallazgos microbiológicos y demográficos refuerzan diferencias institucionales, mientras el rango crítico de ventilación mecánica (6-12 días) subraya la importancia de estrategias preventivas para pacientes intubados.

Citation: Bonilla Beltrán ON, Sánchez Sánchez E, Martínez Martínez J. Measurement of cuff pressure using a manometer to prevent ventilator-associated pneumonia at CEMENAV. Rev Enferm Neurol. 2024;23(1): pp. 31-41.

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Received: December 10, 2023
Accepted: July 5, 2024

**Conclusión:** En la UCI es importante disminuir los riesgos de neumonía asociada a ventilación mecánica debido al incremento en la resistencia a los antibióticos. Así mismo, es necesario implementar medidas preventivas que disminuyan dicha incidencia. Se identificó que el personal de salud realiza sus mediciones de manera táctil.

**Palabras clave:** Control, presión, neumotaponamiento, neumonía, ventilación mecánica.

## Abstract

**Introduction:** Healthcare-associated infections (HAIs) represent a significant public health issue. Ventilator-associated pneumonia (VAP) is one of the most common infections acquired in this context. Cuff pressure management ensures proper airway function, preventing leaks, aspiration, or patient extubation.

**Objective:** To analyze the impact of cuff pressure control using a manometer on reducing Ventilator-Associated Pneumonia in mechanically ventilated patients hospitalized in the Adult Intensive Care Unit at the Naval Medical Center.

**Material and Methods:** A descriptive, cross-sectional, prospective, and quantitative study was conducted with 157 cuff pressure controls in 32 adult patients under mechanical ventilation in the Intensive Care Unit of the Naval Medical Center. Data collection included a descriptive statistical analysis of measurements taken at the beginning of shifts and before secretion aspiration, pneumonia confirmation through bronchial cultures, and ethical approval for minimal-risk research.

**Results:** The study analyzed 32 mechanically ventilated patients, recording 157 cuff pressure measurements. Low pressures (<19 mmHg) were predominant (59%) and associated with 13% of infections, while normal pressures (20-30 mmHg) showed a lower infection rate (8%). Most patients were women, with the highest prevalence in the 65-75 age range. The most frequently identified pathogens were Acinetobacter baumannii (16%), Pseudomonas aeruginosa (10%), Klebsiella pneumoniae (7%), and Aspergillus niger (5%).

**Discussion:** The study highlights that proper cuff pressure management using a manometer reduces VAP incidence, with lower infection rates in normal pressures (8%) compared to low pressures (13%). Microbiological and demographic findings underscore institutional differences, while the critical mechanical ventilation range (6-12 days) emphasizes the need for preventive strategies for intubated patients.

**Conclusion:** In the ICU, reducing the risks of VAP is crucial due to increasing antibiotic resistance. Preventive measures must be implemented to decrease this incidence. It was observed that healthcare personnel often rely on tactile methods for cuff pressure measurement.

**Keywords:** control, pressure, endotracheal tube intracuff inflation, pneumonia, mechanical ventilation.

## Introduction

Health Care Associated Infections (HAI) are a relevant public health problem of great economic and social importance, which constitutes a challenge for institutions and health personnel responsible for their care[1]. Therefore, hospital-acquired infections are the cause of the highest morbimortality rates, since they affect the life and health of people, resulting in disability or death, in addition to generating high economic costs in hospitals[2].

Nosocomial pneumonia is one of many infections that hospitalized patients frequently acquire. Specifically, VAP is identified at the clinical level as an infectious complication of pneumonia[3]; most critically ill patients require orotracheal intubation to isolate the airway and ensure effective mechanical ventilation. Airway care is a very important part of the critical care nurse's role[4].

During endotracheal tube placement in mechanical ventilation therapy, knowing how to control the appropriate pressure levels in the endotracheal balloon is an essential aspect to maintain airway care and favor the survival of this type of critically ill patient[11,12]. Inadequate control in pressure management leads to various complications, either due to excess or lack of pressure, according to the standards suggested in the various guidelines.

Many of the complications of mechanical ventilation are related to inappropriate endotracheal tube cuff pressure. In this context, it is a priority for the nursing staff to know and apply the appropriate methods to regulate and control cuff pressure during orotracheal intubation, with the aim of preventing the incidence of VAP in patients hospitalized in the ICU. Airway surveillance constitutes an important part of the nursing staff's duties in the intensive care area. Therefore, a crucial aspect of airway management is the control and maintenance of adequate pneumotach pressure of the orotracheal tube[5]. The control of cuff pressure involves all care to ensure the proper functioning of the tracheal cuff, which seals the trachea creating two distinct compartments between the upper and lower airway[6].

Providing safety for critically ill patients is vital, and nurses play a very important role, as they are the ones who provide daily patient care. There are preventive packages that include a wide range of activities and procedures suitable for preventing and protecting patients from healthcare-related adverse events.

Among such care is the control of cuff pressure, which acts as an obstacle between the walls of the trachea, exerting pressure provided by the air inside the balloon of the endotracheal tube[17]. The Clinical Practice Guideline for the prevention, diagnosis and treatment of VAP and the Zero Pneumonia protocol, within its recommendations, refer that maintaining a pressure of 20 to 30 cm $H_2O$ or 18 to 25 mmHg is considered normal inflation; in addition to monitoring every 6 hours to quickly identify pressure deviations, which allows for their rapid correction[18,19].

Despite advances in medical equipment, palpation estimation is the fastest technique and is the one currently used in intensive care units[13]. The tactile estimation method of inflation may not be the most appropriate method to achieve the correct pressure.

To accurately regulate the cuff pressure, the use of digital or hand-held devices that provide reliable figures is recommended. Measurement with a manometer is most recommended in critical care units[20]. In this context, it is a priority for the nursing staff to know and apply the appropriate methods to regulate and control cuff pressure during orotracheal intubation.

Therefore, the aim of the present study was to analyze the impact of cuff pressure control with the use of a manometer in the reduction of VAP in patients hospitalized in the adult intensive care unit of the Naval Medical Center.

## Methodology

A descriptive, cross-sectional, prospective and quantitative study was carried out, in which 125 cuff pressure controls were performed in 32 adult patients with mechanical ventilation admitted to the ICU of the Naval Medical Center.

The sample was calculated by convenience. Patients admitted to the ICU during the three months prior to data collection were considered. Following the inclusion, exclusion, and elimination criteria, 32 patients were eligible. Inclusion criteria included patients over 18 years of age, of either sex, hospitalized in the adult intensive care unit, with invasive mechanical ventilatory support by orotracheal intubation or tracheostomy and without previous diagnosis of pneumonia associated with mechanical ventilation. On the other hand, exclusion criteria considered those patients with underlying respiratory pathologies (COPD, SARS-CoV-2, influenza), with noninvasive ventilatory support, hospitalization in other areas and positive bronchial culture results during monitoring. Likewise, elimination criteria were established, such as withdrawal of invasive ventilatory support due to clinical improvement or death during the study. The variables studied were defined and classified to facilitate their analysis. The presence of pneumonia associated with mechanical ventilation was conceptualized as a pulmonary complication developed after 48 to 72 hours of endotracheal intubation and was clinically diagnosed based on microbiological criteria and classified as a dichotomous variable (1: Yes, 2: No). The method for measuring cuff pressure was defined as the procedure used for this measurement, categorized as palpation or mechanical; for the present study, the latter was considered and its values determined by the established parameters.

Cuff pressure measurements were taken at the beginning of the working day and before secretion aspiration and oral lavage. A conventional manometer (consisting of an aneroid manometer, latex tubing, a three-way stopcock and a 5-10 ml syringe) designed specifically by the investigator for the study was used. The results were classified into three categories: low (< 19 mmHg), normal (20-30 mmHg) and high (> 30 mmHg). In cases where the pressure was not within the appropriate range, adjustments were made to allow air to be insufflated until a safe pressure was reached. In the case that it was not adequate, an adjustment was made in the measurement with the sphygmomanometer until a safe range was reached. These adjustments were

made by the investigator at the beginning and end of each shift.

**Figure 1. Device for cuff pressure measurement.**

Parts that make up a three-way stopcock


Aneroid manometer

Connection of the manometer to the latex tube

Connect the external balloon of the endotracheal tube to the outlet cap of a three-way stopcock.

Integration of manometer, latex tube and three-way stopcock

A 5 or 10 ml syringe is attached to one of the lines of the valve and is used to blow air into the balloon.

Connecting the device to the endotracheal tube balloon

The external balloon of the endotracheal tube is connected to the outlet plug, while a 5- or 10-ml syringe is attached to line 1 to insufflate 4 to 5 ml of air, reaching a pressure of 20 to 30 mmHg. This adjustment ensures optimal balloon functionality and prevents complications associated with inadequate pressures.

Source: Prepared by the researcher

Data collection was carried out using a questionnaire of our own design that collected general patient data, service of origin, admission diagnosis, history of pneumonia, days hospitalized and with Mechanical Ventilation (MV), tube diameter, cuff pressure and bronchial culture results; this information was recorded in Microsoft Forms. Descriptive statistical analyses were performed in Microsoft Excel for Windows 2010, from which frequencies, percentages and graphs were obtained for the variables studied.

To confirm the presence of ventilator-associated pneumonia, bronchial secretion cultures were taken in the laboratory, which allowed validation of the clinical diagnoses.

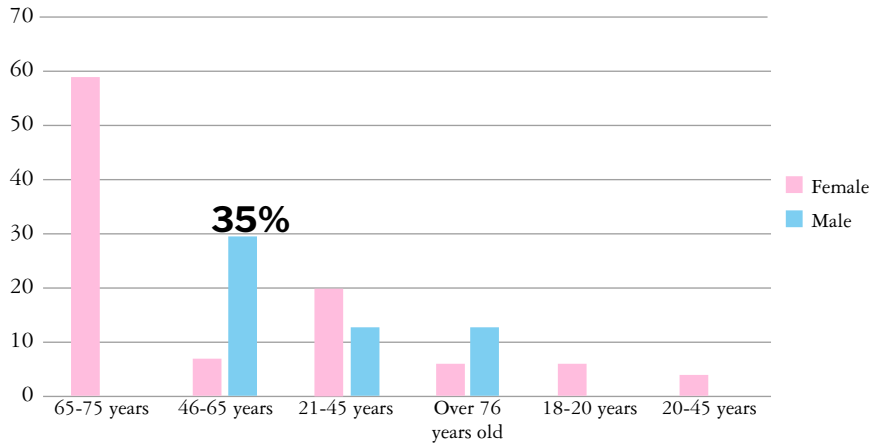
The study was approved by the Bioethics and Research Committee of the Naval Medical Center, as it complied with Mexican

legislation; in addition, data confidentiality and respect for ethical principles were guaranteed. It was considered minimal risk research, since it only included the measurement of cuff pressure, a routine procedure. Due to the physical impossibility of the patients to sign the informed consent, a waiver letter was used, supported by the prior consent signed by the family member or legal representative at admission, which covers invasive procedures, including cuff pressure measurement

## Results

During the study period there were a total of 32 patients admitted to the ICU with mechanical ventilation, of which the age range of 65-75 years, as well as female sex had a higher prevalence (Figure 2).

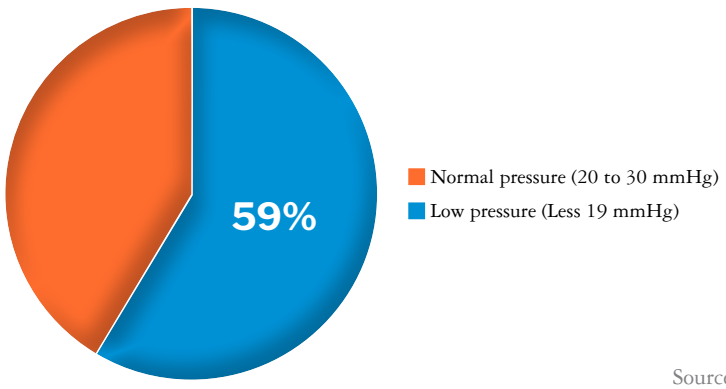
**Figure 2. Socio-demographic characteristics**




Source: Author›s own elaboration.

A total of 157 cuff pressure measurements were recorded with an average of 5 measurements per patient, 59 % of which corresponded to low pressures (< 19 mmHg), while the rest were distributed between normal (20-30 mmHg) and high pressures (> 30 mmHg) (graph 1).

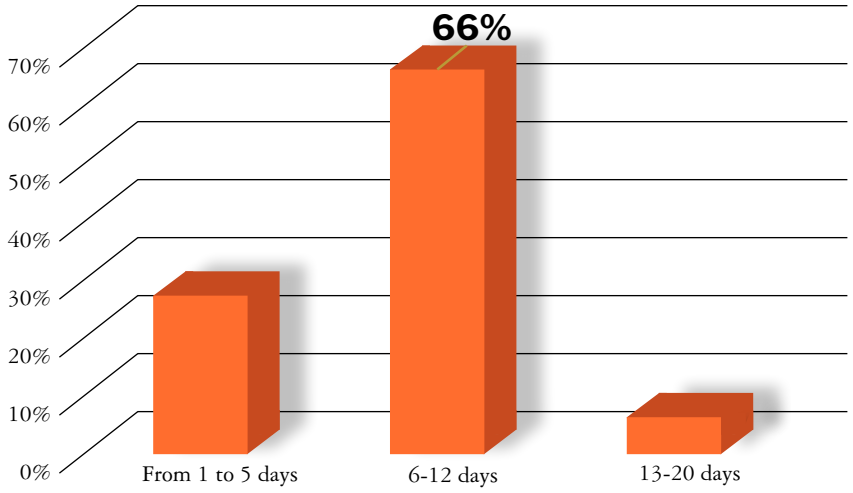
**Graph 1. Cuff pressure measurement results**




Source: measurement results.

The majority of patients (66%) were under MV for 6 to 12 days, while 27% were under MVA for 1 to 5 days, and only 6% remained for 13 to 20 days.

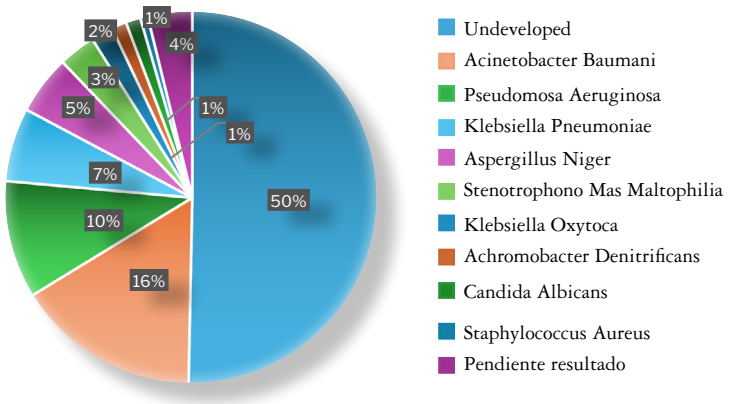
**Graph 2. Duration of mechanical ventilatory (MV)**




Source: measurement results.

A bronchial secretion culture sample was taken from all patients in the study 48 hours after admission to the ICU. Fifty percent showed no growth of any pathogen. However, of the remaining 50 %, 16 % developed *Acinetobacter baumannii*, 10 % *Pseudomonas aeruginosa* and 7 % *Klebsiella pneumoniae*.

**Graph 3.** Bronchial secretion sample result




A correlation of patients with low cuff pressure with the occurrence of VAP was performed, which shows that 63% of patients 20 presented low cuff pressure (< 19 mmHg), with 59% of the measurements in this category, and 13% of these associated with infections. On the

other hand, 37 % of the patients12 had normal pressure (20-30 mmHg), representing 41 % of the measurements, with a lower percentage of infections (8 %). In total, 157 measurements were performed in 32 patients, with an overall infection rate of 21%.

**Table 1.** Relationship between cuff pressure and bronchial secretion sample result

| *Pressure* | *Patients* | *%* | *Number of measurements* | *%* | *Infections* | *%* |
|---|---|---|---|---|---|---|
| **Low pressure** (under 19 mmHg) | 20 | 63% | 92 | 59% | 12 | 13% |
| **Normal pressure** (20 to 30 mmHg) | 12 | 37% | 65 | 41% | 5 | 8% |
| Grand total | 32 | 100% | 157 | 100% | 17% | 21% |

## Discussion

The data suggest that adequate control of cuff pressure by use of the manometer could contribute to decrease the incidence of VAP. Measurements in the normal range (20-30 mmHg) presented a lower association with infections (8 %) compared to low pressures (< 19 mmHg), where an incidence of 13 % was observed. This shows the importance of maintaining adequate pressure to reduce the risk of infectious complications in hospitalized patients under mechanical ventilation.

Ruiz and López[18] evaluated the accuracy of cuff pressure measurement using a manometer (King Systems Corporation, Germany) with pressure units in centimeters of water and a range from 0 to 120. They concluded that endotracheal balloon insufflation is often performed using subjective techniques, which makes it difficult to know the exact pressure exerted on the tracheal mucosa, a practice that could generate complications.

In the present study, the female gender was predominant, and the age range was between 65 and 75 years. These findings coincide with those reported by Miranda Pedrozo[26], who observed that patients over 70 years of age constituted the predominant age group and that the female gender had a higher incidence in his study population.

Regarding the microbiological results, Montelo Rodríguez *et al*.[6] found that Acinetobacter was the predominant microorganism, followed by *Klebsiella pneumoniae* and *Staphylococcus aureus*. However, in the present study, 50 % of the population did not present any pathogen in bronchial secretion culture. Among the remaining 50 %, *Acinetobacter baumannii* was identified in 16 % of the cases, *Pseudomonas aeruginosa* in 10 % and *Klebsiella pneumoniae* in 7 %. This highlights differences in the order of frequency and type of prevalent microorganisms according to the institution, which underlines the importance of the local context in microbiological studies.

Regarding the number of days on mechanical ventilation, 69 % of the patients studied were intubated for 6 to 12 days. These data agree with the conclusions of Arias *et al*.[16], who, in their update of the Zero Pneumonia project, reported that between 62% and 73% of cases of VAPV occur after the fourth day of intubation, with a higher risk between days 6

and 8. This reinforces the recommendations to reduce intubation time to reduce the incidence of this complication.

## Conclusion

The study showed that health personnel in the critical areas of this institution mostly use the digito-palpation technique to control cuff pressure, partly due to the lack of adequate devices for objective monitoring. This practice, based on subjective estimates, does not guarantee accurate pressure values, which may increase the risk of complications.

On the other hand, it was confirmed that the use of a manometer allows maintaining a balloon pressure between 20 and 25 mmHg, considered safe to prevent complications such as tracheal ischemia or tissue degeneration. This method, besides being reliable and economical, should be routinely implemented in cuff pressure monitoring to improve the quality of care and patient safety.

Ventilator-associated pneumonia can be prevented by implementing guidelines and protocols based on national and international standards. These recommendations include adequate monitoring of cuff pressure, hand hygiene, reduction of ventilation time and continuous training of critical care staff.

Finally, the routine use of devices to measure cuff pressure could optimize the control of tracheal pressures, allowing real-time detection of variations and reducing the risk of associated complications, thus improving patient safety in intensive care units.

## References

1. **Secretaría de Salud.** Panorama epidemiológico de las Infecciones Asociadas a la Atención de la Salud (IAAS). Red Hospitalaria de vigilancia epidemiológica (RHOVE). Gobierno de México; 2022. Available from: https://cutt.ly/ye3uYiiE
2. **Secretaría de Salud.** Manual para la implementación de los paquetes de acciones para prevenir y vigilar las infecciones Asociadas a la atención de la Salud (IAAS). Secretaria de Salud. Gobierno de México; 2019. Informe Nro. Primera Edición, 2019. Available from: http://www.calidad.salud.gob.mx/site/editorial/docs/manual_IAAS.pdf
3. **Sociedad Española de Medicina Intensiva Crítica y Unidades Coronarias (SEMICYUC).** Grupo de trabajo de enfermedades infecciosas. Estudio Nacional de Vigilancia de Infección Nosocomial en servicios de Medicina Intensiva (ENVIN-HELICS). Informe 2015. Madrid: SEMICYUC; 2015. Available from: https://cutt.ly/Ze3uAA9u
4. **Delgado F, Athié J, Díaz C.** Evaluación de la presión del globo traqueal insuflado por técnica de escape mínimo en el Hospital Ángeles Mocel. Acta méd. Grupo Ángeles. 2017;15(1):8-12. Available from: https://cutt.ly/be3L2ZrF
5. **Vera O, Mercado G, Centellas S, Valdez J.** Manejo integral de la vía aérea en pacientes críticos con Covid 19: recomendaciones. Rev. Méd. La Paz. 2021;27(1):70-81. Available from: https://cutt.ly/pe3ZhsZQ
6. **Garay Z, Vera A, Pitta, N, Bianco H, Ayala C, Almada P, Martínez C.** Impacto de las Neumonías Asociadas a la Ventilación Mecánica en la Mortalidad en una Unidad de Cuidados Intensivos Adulto. Revista del Instituto de Medicina Tropical. 2018;13(1):23-30.

7. **INEGI.** Estadísticas de defunciones registradas 2022. [Online]. 2022. Cited in March 2023.
8. **Instituto Mexicano del Seguro Social.** Guía de Práctica Clínica para Prevención, diagnóstico y tratamiento de la neumonía asociada a ventilación mecánica [Internet]. Available from: https://cutt.ly/Fe3ZjpVo
9. **Moreno M, Miliar De Jesús R.** Neumonía asociada a la ventilación mecánica un área de oportunidad en las unidades de terapia intensiva. Rev Enferm Infecc Pediatr. 2020;32(131):1626-30. Available from: https://cutt.ly/8e3ZmnFK
10. **Vásquez A, Reinoso S, Lliguichuzca M, Cedeño J.** Neumonía Asociada a la Ventilación Mecánica. Revista Científica Mundo de la Investigación y el Conocimiento. 2019;3(3):1118-39. Available from: https://doi.org/10.26820/recimundo/3.(3).september.2019.1118-1139
11. **Elorza J.** Valoración de los cuidados de enfermería en la prevención de la neumonía asociada a ventilación mecánica. Enfermería Intensiva. 2011;22(1):22-30. Available from: https://cutt.ly/le3ZWMjP
12. **Merlos V.** Presión con manómetro del neumotaponamiento del tubo endotraqueal en pacientes adultos en el servicio de urgencias.
13. **AMEIN.** Asociación Mexicana para el Estudio de las Infecciones Nosocomiales. 2022. Available from: https://amein.org.mx/iaas-pueden-prevenirse/.
14. **Granizo W, Jiménez M, Rodríguez J, Parcon M.** Conocimiento y prácticas del profesional de enfermería sobre prevención de neumonía asociada a ventilación mecánica. Archivo Médico Camagüey. 2020;24(3):6531. Available from: https://cutt.ly/Le3ZYApc
15. **Comisión Nacional de Arbitraje Médico.** Boletín CONAMED - OPS [Internet]. Organización Panamericana de la Salud/OMS; 2018; 3(17):7. Available from: https://cutt.ly/Te3ZUNam
16. **Arias S, Jam R, Nuvials X, Vázquez M.** Actualización de las recomendaciones del proyecto Neumonía Zero. Enfermería Intensiva. 2022;33(1):S17-S30. Available from: ISSN 1130-2399, https://doi.org/10.1016/j.enfi.2022.05.005.
17. **García E, Arizaga A.** Presión del balón de neumotaponamiento del tubo endotraqueal y manometría. Revista Española de Anestesiología y Reanimación [Internet]. 2014;61(9):530. Available from: 10.1016/j.redar.2013.06.018
18. **Ruiz F, López O.** Evaluar la precisión de las técnicas subjetivas de insuflación del globo endotraqueal. Revista Mexicana de Anestesiología [Internet]. 2014;37(2):71-6. Available from: https://cutt.ly/5e3ZAagf
19. **Rosales F.** Manejo de la presión del cuff en usuarios adultos con vía área artificial por profesionales de salud en Chile. Revista Chilena de Fonoaudiología [Internet]. 2021; 20:1-10. Available from: https://doi.org/10.5354/0719-4692.2021.58634
20. **Comité Ético de Investigación Clínica.** Exención de consentimiento informado para la realización de un proyecto de investigación. Departamento de Salud de Sagunto. 2016;1(1):1-6. Available from: https://cutt.ly/Ue3ZGPov
21. **Azulay A.** Los principios bioéticos: ¿se aplican en la situación de enfermedad terminal. An. Med. Interna (Madrid) [Internet]. 2001 Dic [Cited 27 Mar 2023];18(12):650-4. Available from: https://cutt.ly/ae3ZH2xZ
22. **López M, Pimentel C, Rivas E, Arredondo L.** Normatividad que rige la investigación clínica

en seres humanos y requisitos que debe cumplir un centro de investigación para participar en un estudio clínico en México. Acta pediátrica de México. 2021;37(3),175-82. Available from: https://doi.org/10.18233/APM37No3pp175-182

23. **Chimborazo G, Chimborazo J.** Cuidados Integrales de Enfermería en el manejo de tubo endotraqueal. RCIAMUC. 2023;7(3):58-67. Available from: https://doi.org/10.26820/reciamuc/7.(3).sep.2023.58-67
24. **Cotillo M, Matarín J.** Análisis del cumplimiento de 2 medidas para prevenir la neumonía asociada a la ventilación mecánica (elevación de la cabecera y control del neumotaponamiento). Enfermería Intensiva. 2014;25(4):125-30. Available from: 10.1016/j.enfi.2014.03.005
25. **Rosales L, Marín F, Monichi G, Miranda L.** Revisión de protocolos clínicos para el manejo del cuff en pacientes adultos con vía aérea artificial en hospitales públicos chilenos. Revista Chilena de Fonoaudiología. 2023;(1):1-11. ISSN 0719-4692 Available from: https://doi.org/10.5354/0719-4692.2023.69258
26. **Miranda Pedroso R.** La nueva pandemia COVID-19. Rev Cuba Med Int Emerg [Internet]. 2020[cited 4 Dic 2024];19(2). Available from: https://revmie.sld.cu/index.php/mie/article/view/737

DOI 10.51422/ren.v23i1.430

Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez | Revista de Enfermería Neurológica

Original article

# Correlation between depression and loneliness in the elderly individuals from Nextlalpan

# Asociación entre la depresión y la soledad en el adulto mayor de Nextlalpan

José María Díaz Rodríguez, Ariana Maya Sánchez, Xóchitl Hernández Espinoza, Benjamín López Nolasco

**Resumen**

**Introducción:** La depresión es un padecimiento caracterizado por la presencia de la tristeza, perdida del interés o placer, sentimientos de culpa o falta de autoestima, trastornos del sueño o del apetito, así como la sensación de cansancio y la falta de concentración. La soledad es un sentimiento que se genera cuando un individuo se siente incomprendido o rechazado, o cuando carece de compañía para llevar a cabo aquellas actividades que desea, sean físicas, intelectuales o emocionales.
**Objetivo:** Asociar el nivel de depresión y soledad en el adulto mayor de Nextlalpan.
**Metodología:** Investigación cuantitativa, correlacional, prolectiva y transversal; el muestreo fue no probabilístico por conveniencia. El instrumento empleado fue Geriatric Depression Scale de Yesavage para tamizaje de depresión.
**Resultados:** Se encontró que el 76.8 % de adultos mayores presentaron depresión leve; el 9.2 %, depresión moderada; y el 14.0 %, depresión severa.
**Discusión:** Al realizar la correlación entre las variables depresión y soledad no se encontró un vínculo importante, sin embargo, se mantiene relación entre otras variables como depresión y edad, y soledad y género.
**Conclusión:** El personal de enfermería debe identificar el conflicto que genera la depresión y la soledad, desarrollar intervenciones que contribuyan al decrecimiento de los niveles de depresión y soledad de los adultos mayores, y mejorar la calidad de vida de estos.

**Palabras clave:** envejecimiento, soledad, depresión.

Citation: Díaz Rodríguez JM, Hernández Espinoza X, Maya Sánchez A. Correlation between depression and loneliness in elderly individuals from Nextlalpan. Rev Enferm Neurol.2024;23(1): pp. 42-48.

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Received: May 27, 2023
Aceptado: October 24, 2024

## Abstract

**Introduction:** Depression is a condition defined by persistent sadness, diminished interest or enjoyment, feelings of guilt or low self-esteem, sleep or appetite disturbances, as well as a pervasive sense of fatigue and difficulty concentrating. Loneliness arises when an individual feels misunderstood or excluded, or lacks companionship to engage in desired activities, whether physical, intellectual, or emotional.

**Objective:** To examine the relationship between the degree of depression and loneliness in elderly individuals from Nextlalpan.

**Methodology:** This study employs a quantitative, correlational, prospective, and cross-sectional approach. The sampling method was non-probabilistic and based on convenience. The instrument used for depression screening was the Geriatric Depression Scale developed by Yesavage.

**Results:** The findings indicate that 76.8% of elderly individuals exhibited mild depression, 9.2% experienced moderate depression, and 14.0% suffered from severe depression.

**Discussion:** The correlation analysis between depression and loneliness did not reveal a significant association. However, relationships were observed between other variables, such as depression and age, as well as loneliness and gender.

**Conclusion:** Nursing professionals must recognize the underlying factors contributing to depression and loneliness, implement interventions that help reduce their prevalence among elderly individuals, and enhance their overall quality of life.


**Keywords:** Aging, loneliness, depression.

## Introducción

Aging has become an increasingly prominent phenomenon in our society. It is essential to recognize its significance, as elderly individuals are among the most vulnerable and socially marginalized groups.[1]

Depression is a disorder associated with decreased serotonin levels — a neurotransmitter responsible for regulating well-being-related emotions and sleep. This imbalance leads to changes in energy levels, manifesting as a range of disruptions characterized by persistent sadness and diminished motivation.[2]

Depression is characterized by persistent sadness, diminished interest or enjoyment, feelings of guilt or low self-esteem, sleep or appetite disturbances, as well as a pervasive sense of fatigue and difficulty concentrating. It results from intricate interactions among social, psychological, and biological factors. Individuals who have faced adverse life circumstances, such as unemployment, bereavement, or traumatic events, may experience heightened stress and dysfunction, further worsening their overall condition.[3]

Loneliness is an emotional state that arises when an individual feels misunderstood or excluded, or when lacking companionship to engage in desired activities, whether physical, intellectual, or emotional.[4]

According to De Jong Gierveld, individuals experience loneliness when they perceive deficiencies in certain relationships. The feeling of loneliness differs from the experience of "*being alone*", as the latter refers to a state of social isolation involving a voluntary withdrawal from one's social network, whereas loneliness is involuntary and closely linked to deficits in the perceived quality of social interactions. Social isolation is defined as an objective state in which contact with others is minimal, while loneliness represents a subjective condition characterized by a lack of desired affection and closeness.[5]

Although sociodemographic variables do not typically exert as strong an influence on loneliness as other factors, extensive evidence supports their role in identifying individuals who may be more susceptible to this emotional state. A review of various studies investigating the risk and protective factors associated with loneliness reveals that sociodemographic characteristics often function collectively, either amplifying or mitigating the likelihood of loneliness among older adults.[6]

This research is based on Callista Roy's adaptation model, which emphasizes positive responses to environmental changes.[7] The model categorizes stimuli into three types: focal, contextual, and residual, followed by a coping process within four adaptive modes—physiological function, role performance, self-concept, and interdependence—where the primary goal is to achieve adaptation.[8,9]

The aim of this study is to examine the relationship between depression and loneliness levels in elderly individuals from Nextlalpan.

## Metodology

A quantitative methodology with a correlational, prospective, and cross-sectional scope was employed. The sampling method was non-probabilistic and based on convenience, targeting elderly individuals from the State of Mexico, in Nextlalpan. A total of 120 participants were selected, consisting of 99 women and 21 men, aged 60 to 85 years, who were recruited from the health center and the elderly care home between July and December 2022.

The study was approved by the Research Ethics Committee of the Escuela Superior de Tlahuelilpan at the Universidad Autónoma del Estado de Hidalgo. Additionally, all participants provided informed consent.

For data collection, the Geriatric Depression Scale, developed by Yesavage and Brink in 1982, was utilized. This assessment consists of 30 items designed to measure the presence of depressive symptoms through direct questions; 20 of these assess symptom presence, while 10 are considered inverse items. The scale follows a dichotomous format, where respondents answer "*yes*" or "*no*". Scores range from 0 to 30, with higher values indicating an increased risk of depression, exhibiting a Cronbach's alpha reliability between 0.80 and 0.95.9

Another instrument utilized in this study was the ESTE-II Scale, designed to assess social loneliness. Developed in 1999 by Rubio and Aleixandre, it is derived from the ESTE-I Scale, which was created through a collaborative project involving the University of Granada, the Quality of Life and Aging Office, and IMSERSO (Institute for Older Adults and Social Services) in Spain. The scale consists of 15 items with three response options: always, sometimes, and never. It is divided into three factors:

- **Factor 1:** Perceived social support
- **Factor 2:** Use of new technologies by older adults
- **Factor 3:** Social participation index

Scoring levels are classified as low (0 to 10 points), medium (11 to 20 points), and high (21 to 30 points).[10] The scale demonstrates strong reliability, with a Cronbach's alpha of 0.909.

For statistical analysis, a comparative correlation was performed. The Pearson correlation test was employed to assess the statistical relationship between two continuous variables. The correlation coefficient ranges from +1 to -1, where 0 indicates no association between the variables. A positive correlation (greater than 0) suggests that as one variable increases, the other also increases. Conversely, a negative correlation (less than 0) implies that as one variable rises, the other decreases.[11]

## Results

The following sociodemographic variables were analyzed. Age distribution revealed that the predominant group fell within the 60–65 years range (35 women and 7 men), comprising 35% (*f* = 42) of the sample. The next most common age group was 66–70 years (26 women and 9 men), representing 29.2% (*f* = 35), followed by individuals aged 71–75 years (17 women and 2 men), making up 19% (*f* = 15.8) (Table 1).

**Table 1.** Age distribution

| *Variable* | *f* | % |
|---|---|---|
| 60-65 years | 42 | 35.0 |
| 66-70 years | 35 | 29.2 |
| 71-75 years | 19 | 15.8 |
| 76-80 years | 12 | 10.0 |
| Over 80 years | 12 | 10.0 |
| **Total** | 120 | 100 |

Source: Sociodemographic Variables (Díaz, 2022) *n* = 120

Regarding gender distribution, 82.5% were women (*f* = 99), while 17.5% were men (*f* = 21) (Table 2).

**Table 2.** Gender distribution

| *Variable* | *f* | % |
|---|---|---|
| Male | 21 | 17.5 |
| Female | 99 | 82.5 |
| **Total** | 120 | 100 |

Source: Sociodemographic Variables (Díaz, 2022) *n* = 120

According to the findings obtained using the Geriatric Depression Scale, 76.8% of elderly individuals (*f* = 92) exhibited mild depression, while 14% (*f* =17) suffered from severe depression, and 9.2% (*f* = 11) experienced moderate depression (Table 3).

**Table 3.** Depression levels

| *Variable* | *f* | % |
|---|---|---|
| Mild | 92 | 76.8 |
| Moderate | 11 | 9.2 |
| Severe | 17 | 14.0 |
| Total | 120 | 100 |

Source: Geriatric Depression Scale by Yesavage (Díaz, 2022), *n* = 120

According to the ESTE-II scale, 75.8% (n = 91) exhibited a low level of loneliness, while 20.9% (n = 25) experienced a moderate level, and 3.3% (n = 4) reported a high level of loneliness (Table 4).

**Table 4.** Loneliness levels

| *Variable* | *f* | % |
|---|---|---|
| Low | 91 | 75.8 |
| Moderate | 25 | 20.9 |
| High | 4 | 3.3 |
| **Total** | 120 | 100 |

Source: ESTE-II Loneliness Measurement Scale (Díaz, 2022), *n* = 120

In the correlation matrix, the p-values indicate statistical significance, with notable relationships observed between depression and age, as well as loneliness and gender. Meanwhile, the correlation between depression and loneliness

yielded a *p*-value of .000, indicating no significant association between these variables (Table 5).

**Table 5.** Pearson correlation matrix of depression, loneliness, age, gender, and occupation

| *Variable* | | *Depression* | *Loneliness* | *Age* | *Gender* | *Occupation* |
|---|---|---|---|---|---|---|
| Depression | Pearson correlation | 1 | .606 | -.017 | .102 | .129 |
| | *p*-value | | .000 | **.851** | .266 | .160 |
| Loneliness | Pearson correlation | .606 | 1 | -.034 | -.016 | .108 |
| | *p*-value | .000 | | .715 | **.867** | .240 |
| Age | Pearson correlation | .017 | .034 | 1 | .041 | .020 |
| | *p*-value | **.851** | **.715** | | .653 | .832 |
| Gender | Pearson correlation | .102 | .016 | .041 | 1 | .239 |
| | *p*-value | .266 | **.867** | .653 | | .009 |
| Occupation | Pearson correlation | .129 | .108 | .020 | .239 | 1 |
| | *p*-value | .160 | .240 | .832 | .009 | |

Source: Pearson Correlation Analysis (Díaz, 2022), $n$ = 120

According to the results, there is no significant association between depression and loneliness, as the correlation yielded $p$ = .000. However, these variables show significant relationships with other factors, such as depression with age ($p$ = .851) and loneliness with gender ($p$ = .867).

Furthermore, according to Callista Roy's Adaptation Model, the affected adaptive modes include the physiological mode, associated with the aging process, and the self-concept mode, which pertains to group identity, depression, and loneliness.[12]

## Discussion

Hernández-Gómez *et al*., in their study "*Loneliness and Aging*", mention that the feeling of loneliness is more prevalent among women and is associated with marital status. Similarly, the present research concluded that there is a strong correlation with the female gender ($p$ = .867).

Additionally, their study also found a statistically significant association in the bivariate analysis between feelings of loneliness and depression ($p$ < 0.0001), highlighting a tendency to conceal loneliness behind depressive symptoms, without recognizing it as a social risk that extends beyond the disease itself. However, in this investigation, no relationship was identified between these two variables, yielding a *p*-value of .000.[13]

Granados-Ramos *et al*., in their study "*Influence of Psychosocial Factors on Depression and Anxiety: Toward Healthy Aging*", found that 52% of participants had normal scores, while 34% experienced mild depression, 11% moderate depression, and 3% severe depression.

These results differ from the findings in the present research, where 76.8% exhibited mild depression, 9.2% moderate depression, and 14% severe depression. The discrepancies may be attributed to loss of vitality, changes in daily routines, and a decline in physical and cognitive functions.[14]

Llibre-Rodríguez *et al*., in their study "*Loneliness and Its Association with Depression, Anxiety, and Sleep Disorders Among Elderly Cubans During the COVID-19 Pandemic*", reported that the average age was 75 years, while the most

frequently observed age range in the analysis was 60–65 years.[15]

Valarezo-Carreón *et al*., in their article "*Influence of Loneliness on Cognitive and Emotional Well-Being in Elderly Individuals Residing in a Geriatric Institution*", utilized the Geriatric Depression Scale by Yesavage to determine the presence and severity of depression in their sample population.

The study found that 45% of the population exhibited established depression, followed by 40% with mild depression and 15% showing no signs of depression.

In contrast, the present study revealed that 76.8% experienced mild depression, while 14% had severe depression. However, it is important to note that Valarezo-Carreón *et al*.'s study had a larger sample size ($n$ = 35).[16]

## Conclusion

Nursing professionals must identify the challenges posed by depression and loneliness, taking appropriate action to develop interventions that help reduce their prevalence among older adults. These efforts are crucial in enhancing overall quality of life and promoting well-being.

Likewise, it is essential to implement interventions that challenge negative perceptions of aging in society, as well as to strengthen support networks within families, friendships, neighbors, community groups, and other social circles. These efforts can significantly help reduce levels of depression and loneliness among older adults.

Any model designed to support this population and address issues related to loneliness, depression, and quality of life must incorporate the variables described in this study when developing intervention strategies.

Depression and loneliness are pressing contemporary issues, often interconnected with other variables such as anxiety. Their association heightens the risk of these symptoms progressing toward the diagnosis of related mental disorders.

Prevalence data across all age groups, particularly among older adults, along with the range of associated challenges, highlight the need to prioritize these factors and develop effective interventions. This is especially crucial in contexts where loneliness and depression are visibly present.

## References


1. **Sosa Z, González D, Reboiras L.** Las dimensiones del envejecimiento y los derechos de las personas mayores en América Latina y el Caribe [Internet]. Santiago de Chile: CEPAL; 2021. 361 p. Available in: https://hdl.handle.net/11362/46730
2. **IMSS.** Depresión en el adulto mayor [Internet]. Acercando el IMSS al Ciudadano. [citado el 18 de marzo de 2024]. Available in: https://cutt.ly/Crrnrvss
3. **Organizacion Mundial de la salud.** Depresión [Internet]. 2021. Available in: https://cutt.ly/hrrntXjF
4. **Rubio Herrera R, Cerquera Còrdoba AM, Muñoz Mejia R, Pinzòn Benavides EA.** Concepciones populares sobre soledad de los adultos mayores de España y Bucaramanga. Divers Perspect en Psicol [Internet]. 2011;7(2):307–19. Available in: https://www.redalyc.org/articulo.oa?id=67922761008
5. **Palma Ayllon E, Escarabajal Arrieta MD.** Efectos de la soledad en la salud de las personas mayores. Gerokomos [Internet]. 2021;32(1):22–5. Available in: https://

gerokomos.com/wp-content/uploads/2021/03/32-1-2020-022.pdf

6. **Pinazo Hernandis S, Bellegarde Nunes M.** La soledad de las personas mayores. Conceptualización, valoración e intervención. 5a ed. Estudios de la Fundación Pilares para la autonomía personal. N.o 5. Estudios de la fundaciòn; 2018. 57–68 p.
7. **Hernandez Sampieri R, Fernandez Collado C, Baptista Lucio MP.** Metodologia de la investigacion. 6a ed. Mexico: Mc Graw Hill; 2014. 634 p.
8. **Polit D, Tatano Beck C.** Investigacion en enfermeria, fundamentos para el uso de la evidencia en la pràctica de la enfermerìa. 9a ed. España: Wolters Kluwer; 2018. 512 p.
9. **Smith Castro V.** Compendio de Instrumentos de Medición [Internet]. Instituto de investigaciones psicologicas, editor. Costa Rica: Universidad de Costa Rica; 2014. 307 p. Available in: https://cutt.ly/SrrnawEQ
10. **Pinel Zafra M, Rubio Rubio L, Rubio Herrera R.** Un instrumento de medición de soledad social: Escala ESTE II. Gabinete de Calidad de Vida y Envejecimiento. España: IMSERSO; 2018. p. 15.
11. **Castilla Serna L.** Manual practico de estadistica para las ciencias de la salud. 1a ed. Mexico: Trillas; 2013. 167 p.
12. **Riale Alligood M, Marriner Tomey A.** Modelos y teorías en enfermería. 9a ed. Elsevier; 2018. 616 p.
13. **Hernández Gómez MA, Fernández Domínguez MJ, Sánchez Sánchez NJ, Blanco Ramos MÁ, Perdiz Álvarez MC, Castro Fernández P.** Soledad y envejecimiento. Rev Clínica Med Fam [Internet]. 2021;14(3):146–53. Available in: https://revclinmedfam.com/article/soledad-y-envejecimiento
14. **Granados Ramos DE, Almanza Colorado L, López Sánchez JD, Álvarez Ramírez MM.** Influencia de factores Psicosociales en depresión y ansiedad. Hacia El envejecimiento saludable. Rev Enfermería Neurológica [Internet]. 2019;18(2):81–6. Available in: https://doi.org/10.51422/ren.v18i2.284
15. **Llibre Rodríguez JDJ, Noriega Fernandez L, Guerra Hernandez MA, Zayas Llerena T, Llibre Guerra JC, Alfonso Chomat RC, et al.** Soledad y su asociación con depresión , ansiedad y trastornos del sueño en personas mayores cubanas durante la pandemia por COVID-19. An la Acad Ciencias Cuba [Internet]. 2021;11(3). Available in: https://revistaccuba.sld.cu/index.php/revacc/article/view/1005/1237
16. **Valarezo Carrión JL, Silva Maldonado JC, Medina Muñoz RP.** Influencia de la soledad en el estado cognitivo y emocional en las personas de la tercera edad residentes en una institución geriátrica. Rev Espac [Internet]. 2020;41(14):2–11. Available in: https://www.revistaespacios.com/a20v41n14/a20v41n14p02.pdf

DOI 10.51422/ren.v23i1.448

Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez | Revista de Enfermería Neurológica

Case study

# Estudio de caso a persona con riesgo de perfusión cerebral ineficaz secundario a hemorragia intraparenquimatosa, basado en la filosofía de Virginia Henderson

# Case study of a person at risk of ineffective cerebral perfusion secondary to intraparenchymal hemorrhage, based on the philosophy of Virginia Henderson

Rocío Brenda Tolentino Pérez  Alejandro Escobar Silvia

## Resumen

**Introducción:** La hemorragia intraparenquimatosa es una patología que representa entre el 10 % y 15 % de los accidentes cerebrovasculares; causa una alta mortalidad o deja graves efectos neurológicos.

**Objetivo:** Desarrollar un estudio de caso a una persona con riesgo de perfusión cerebral ineficaz secundario a hemorragia intraparenquimatosa, basado en la filosofía de Virginia Henderson.

**Metodología:** Estudio observacional y cualitativo. Los datos se obtuvieron mediante un instrumento de valoración basado en las 14 necesidades básicas de Virginia Henderson. Se utilizó el método sistemático Proceso de Atención de Enfermería (PAE). Se realizó una revisión de la literatura a través de las bases de datos Pubmed, ScienceDirect, Scielo, Redalyc y Google académico. Se consideraron los lineamientos de la Ley General de Salud en Materia de Investigación NOM-012-SSA3-2012 y el uso de consentimiento informado.

**Presentación del estudio de caso:** Mujer de 41 años con diagnóstico de hemorragia intraparenquimatosa, postoperada, con craniectomía descompresiva e histerectomía. En la unidad de terapia intensiva adultos (UTIA) se encontró con elevación de presión intracraneal y datos de bajo gasto cardiaco, mediante medidas de neuroprotección como la hipotermia terapéutica.

Citation: Tolentino Perez RB, Alejandro Escobar S. Case study of a person at risk of ineffective cerebral perfusion secondary to intraparenchymal hemorrhage, based on the philosophy of Virginia Henderson. Rev Enferm Neurol.2024;23(1): pp. 49-66.

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Received: September 14, 2023
Accepted: June 4, 2024

**Aplicación del proceso de enfermería:** Se aplicaron las 5 etapas del PAE y se realizaron planes de enfermería para resolver necesidades alteradas.
**Plan de alta:** Se desarrolló un plan para darle continuidad a los cuidados proporcionados a la persona con secuelas neurológicas.
**Conclusiones:** A pesar de las bajas probabilidades de sobrevivencia, la atención brindada en la UTIA logró conservar la vida humana, aunque con secuelas neurológicas irreparables.

**Palabras clave:** Accidente cerebrovascular hemorrágico, hemorragia intracraneal, hipertensión intracraneal, hipotermia inducida, proceso de enfermería, cuidados de enfermería.

## Abstract

**Introduction:** Intraparenchymal hemorrhage is a pathology that accounts for 10-15% of strokes; it causes high mortality or leaves severe neurological effects.
**Objective:** To develop a case study of a person at risk of ineffective cerebral perfusion secondary to intraparenchymal hemorrhage, based on the philosophy of Virginia Henderson.
**Methodology:** Observational and qualitative study. Data were obtained using an assessment instrument based on Virginia Henderson's 14 basic needs. The systematic Nursing Care Process (NCP) method was used. A literature review was conducted through the Pubmed, ScienceDirect, Scielo, Redalyc, and Google Scholar databases. The guidelines of the General Health Law on Research NOM-012-SSA3-2012 and the use of informed consent were considered.
**Case study presentation:** 41-year-old woman diagnosed with intraparenchymal hemorrhage, postoperative decompressive craniectomy, and hysterectomy. In the adult intensive care unit (AICU) she was found with intracranial pressure elevation and low cardiac output data, using neuroprotective measures such as therapeutic hypothermia.
**Application of the nursing process:** The 5 stages of the NCP were applied and nursing plans were made to resolve altered needs.
**Discharge plan:** A plan was developed to provide continuity of care for the person with neurological sequelae.
**Conclusions:** Despite the low probability of survival, the care provided at the AICU managed to preserve human life, albeit with irreparable neurological sequelae.

**Keywords:** hemorrhagic stroke, intracranial hemorrhage, intracranial hypertension, induced hypothermia, nursing process, nursing care.

## Introduction

Cerebral Vascular Disease (CVD), also known as stroke, is caused by the occlusion or rupture of one of the small blood vessels of the brain, causing an inadequate cerebral blood supply. It is attributed to be one of the major causes of high rates of disability and mortality in those who suffer from this pathology.

According to AHA (*American Heart Association*) statistics, in 2020, worldwide, CVD caused 7.08 million deaths; of these 3.25 million were of ischemic origin, 3.25 million were due to intracerebral hemorrhage (ICH), and 0.35 million due to subarachnoid hemorrhage[1]. ICH accounts for 10-15% of all CVDs[2].

In Mexico, according to INEGI (*National Institute of Statistics and Geography*), CVD ranked sixth nationally in deaths with 18,632 deaths in 2021[3]. On the other hand, in 2022 the Mexican Ministry of Health reported that there are 118 cases of CVD per 100,000 inhabitants, inferring that 170,000 new patients are presented each year, of which 20% may die during the first 30 days, while 7 out of 10 will be left with sequelae that generate some disability[4].

In 2021, the Manuel Velasco Suárez National Institute of Neurology and Neurosurgery (INNNMVS) attended 580 people with CVD, of which 80% were due to cerebral infarction, 13% due to ICH, and the remaining percentage due to other unspecified causes[4].

Intraparenchymal hemorrhage is subclassified within hemorrhagic type CVDs and consists of extravasation of blood into the brain parenchyma due to an abrupt rupture of a small blood vessel in the brain from a non-traumatic source[5].

The pathophysiological mechanism begins at the moment of vascular rupture (between 1 and 10 seconds), which causes vascular changes and gives rise to hematoma formation (in < 1 hour), hematoma growth and finally causes the appearance of edema (between 1 and 5 days); This is due to the lysis of red blood cells which also release pro-oxidized Hb (hemoglobin) and degradation products (heme + iron) which are cytotoxic, resulting in brain damage (secondary injury).

Perilesional edema is vasogenic and cytotoxic, producing a mass effect, which contributes to an increase in intracranial pressure (ICP), leading to loss of cerebral autoregulation. This, in turn, leads to a reduction in cerebral blood flow and, consequently, to a decrease in cerebral perfusion pressure (CPP), since this depends on both MAP (mean arterial pressure) and ICP, thus running the risk of inducing an ischemic lesion.

Therefore, it is important to know how to immediately recognize signs and symptoms that could cause secondary injuries. In addition, specialist nurses implement timely interventions for the management of the critically ill person, which anticipate possible irreversible complications or even encephalic death. This requires extensive knowledge of neurology and neurological assessment and interventions. The nursing professional is the one who is at the bedside and interprets clinical data to anticipate and support the therapeutic decision.

Given the problem of hemorrhagic CVD, it was decided to develop a clinical case study to improve the care provided by the nursing staff to people suffering from this condition in an intensive care unit, to contribute to a

better life prognosis and reduce the neurological sequelae.

## Target

The main objective was to develop a case study of a person at risk of ineffective cerebral perfusion secondary to intraparenchymal hemorrhage, based on the philosophy of Virginia Henderson and using the systematized method of the Nursing Care Process (NCP) for its development.

## Methodology

One person was considered for the development of a case study related to the previously mentioned topic. A 41-year-old woman who was in the adult intensive care unit (AICU) of the INNNMVS with a medical diagnosis of intraparenchymal hemorrhage, decompressive craniectomy, and hysterectomy; she was on her third day in this unit with a low prognosis of survival and, in addition, she had induced hypothermia as a neuroprotective measure. To take the case and obtain information through an assessment, an informed consent form was used, which was authorized and signed by the family member in charge.

Bioethical aspects such as the principles of beneficence, non-maleficence, the right to health information, confidentiality, and privacy were considered in the elaboration of this assessment6. Likewise, the Helsinki Declaration was taken up again following the ethical principles for medical research on human beings. At the national level, it adhered to the provisions of the Regulations of the General Law on Health Research and, finally, it was coupled to the provisions of the Mexican Official Standard NOM-012-SSA3-2012, which establishes the criteria for the execution of health research projects involving human subjects.

A search of the current literature on induced hypothermia as a neuroprotective measure was carried out to confirm its benefits. The databases consulted were PubMed, ScienceDirect, Elsevier, Scielo, Redalyc, and Google Scholar. The Boolean operators AND and OR were used, and the keywords hemorrhagic stroke, intracranial hemorrhage, intracranial hypertension, induced hypothermia, nursing process, and nursing care. Similarly, NOT was used with the following words, by way of exclusion: ischemic stroke, subarachnoid hemorrhage, and traumatic intracerebral hemorrhage.

Subsequently, an exhaustive review of articles from the last 5 years was carried out. However, 5 were discarded because they did not meet the following inclusion criteria: non-traumatic intracerebral hemorrhage, therapeutic hypothermia, and adults. Finally, only 6 articles were selected, which are briefly described below:

1. A systematic review study published in 2023 with the title "*The utility of therapeutic hypothermia on cerebral autoregulation*", whose objective was a search for more recent information on the use of therapeutic hypothermia (TH) in acute brain injury and its impact. It was highlighted that it reduces edema, protects the blood-brain barrier, and improves behavioral outcomes. Its induction at an early stage could be counterproductive by increasing bleeding, as neuroprotective effects

would be reached to be observed after 12 hours post intracerebral hemorrhage (ICH). Finally, we found that TH can reduce late cerebral ischemia, but does not affect mortality[7].

2. A systematic review article published in 2019 called "*Therapeutic Hypothermia and Neuroprotection in Acute Neurological Disease*", whose purpose was to present the current status of TH in various acute neurological diseases. It showed that there is some protection only when TH is delayed 12 hours, as it may affect the procoagulant and thrombolytic systems, predisposing to bleeding in the acute period[8].
3. In 2019, a descriptive type of research under the name "*Neuroprotection in neurointensive medicine*", the purpose of which was to describe the relevant measures of neuroprotection in neurointensive care medicine and the benefits of TH, stated that it had not yet been possible to establish the effectiveness of introducing TH in different forms of brain damage, especially in ICH, despite the results of experimental animal studies being very promising[9].
4. On the other hand, Beker *et al.*[10], in their 2021 publication entitled "*Therapeutic hypothermia for intracerebral hemorrhage: Systematic review and meta-analysis of the experimental and clinical literature*", intending to search for available preclinical and clinical studies regarding the use of TH to treat ICH, identified 21 preclinical studies, of which 13 found an effect in favor of TH on cerebral edema; and 5 experimental studies in humans, in which only one determined that there was a significant reduction in cerebral edema after intracerebral hemorrhage.
5. The experimental preclinical study published in 2018 by Feifei *et al.*[11], entitled "*Therapeutic time window and regulation of autophagy by mild hypothermia after intracerebral hemorrhage in rats*", whose goal was to find the appropriate time window of mild TH and regulation of autophagy in rats with autologous ICH, concluded that TH of 33°C-35 °C of 48 hours induced in a group of rats was neuroprotective when introduced later than 6 or 12 hours, compared to the normothermic group.
6. Finally, the experimental research by Peng *et al.*[12] published in 2020 under the title "*Effect of mild hypothermia on behaviors of rats with intracerebral hemorrhage and the possible mechanism*", aimed to find the effect of mild hypothermia on the inflammatory response and angiogenesis in brain tissues of rats with ICH, determined that mild TH can reduce the inflammatory response of brain tissue, protect damaged nerve function, and probably antagonize brain inflammation and promote angiogenesis.

This study was based on the philosophy of Virginia Henderson because it is a humanistic proposal and focused on the 14 basic needs of the human being which constitute the model of nursing care[13]. In addition, this proposal allowed the development and application of an assessment instrument to collect not only clinical data but also holistic data, achieving the detection of physical, psychological, social, and spiritual problems; finally, it contributed to organizing the information collected practically.

A generalized assessment was carried

out to obtain objective and subjective information. Likewise, secondary sources were used, such as the clinical record and the interview with the family member. Subsequently, the data obtained were organized according to the structure of the instrument for the detection of health problems and the development of diagnoses using the PES format (Problem + Etiology + Signs and Symptoms). Then, specialized nursing interventions were planned and implemented to reduce the problems detected. Finally, the effectiveness of each intervention implemented was evaluated.

## Case study design

This case study was prepared using the systematized method of the NCP, which consists of five stages: assessment, diagnosis, planning, implementation, and evaluation.

A nursing clinical assessment instrument focused on the critically ill patient was applied. According to Virginia Henderson, it is structured according to the 14 basic human needs and allows data collection in an organized and hierarchical manner. Secondary sources were used to complement the information on the patient's state of health, such as the clinical record (imaging studies, laboratories, electrocardiogram), the clinical history, and the interview with the family member.

## Presentation of the case

*Person.* A 41-year-old woman, originally from Mexico City; she is single and professes the Christian religion. She has a bachelor's degree and works occasionally.

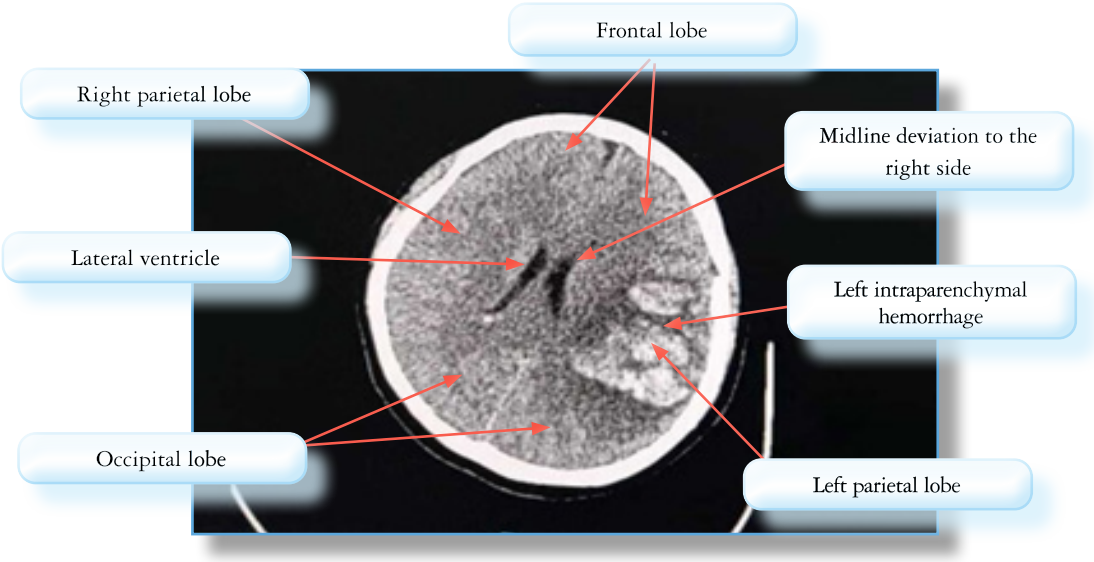
*Environment.* She lives alone in an apartment in an urban area of Mexico City. Her nuclear family (mother, father, and siblings) live in the same building. She has all the intra and extra-domiciliary services.

*Health.* Hereditary family history: 71-year-old mother with type II diabetes and hypertension; her father suffers from asthma; her younger brother suffers from bronchial spasm and she had a sister who died at the age of 6 years of leukemia. Non-pathological personal history: gyneco-obstetrics with 0 gestations, 0 miscarriages and hyperpolymenorrhea. No chronic degenerative history, allergies, trauma, or blood transfusions. There is no complete vaccination record. Personal pathological history: on two occasions, she suffered COVID-19 without complications; and abnormal uterine bleeding due to uterine myomatosis of large elements.

*Current situation.* On April 12, 2023, she was admitted to the Women's Hospital due to lipotimia secondary to transvaginal bleeding of one month's evolution, where a Hb level of 3.3 g/dL was determined; she was transfused with 3 erythrocyte concentrates and 1 package of fresh frozen plasma (FFP). Subsequently, the Hb increased to 5 g/dL. The hospital physicians performed a hysterectomy. The following day, she presented with a deviation of the labial commissure on the left side with right hemiparesis and dysarthria. She was evaluated by INNNMVS physicians and was admitted to the institution with the following vital signs: blood pressure of 140/80 mmHg, heart rate of 98 beats per minute, temperature of 37.9°C and capillary glycemia of 133 mg/dL. The NIHSS scale assigned 16 points. Finally, a cerebral CT

angiography showed an intraparenchymal hemorrhage in the frontal lobe and left parietal lobe with midline deviation (photo 1).

**Photograph 1.** Cerebral CT angiography




Source: Taken from the electronic clinical record. Photograph published under informed consent.

Photograph 1 shows a left frontoparietal intraparenchymal hematoma with extensive vasogenic edema in the frontal lobe, with a midline shift of 6 mm to the right.

After the finding, they admitted her to the AICU to manage her situation. Subsequently, the family authorized her to undergo an extensive left decompressive craniectomy on April 16, 2023. The medical diagnosis established in the critical area is intraparenchymal hemorrhage, decompressive craniectomy, and hysterectomy.

*Nursing.* It supports the person to regain or maintain their independence by developing their strength, knowledge, and will. In this specific case, the person-nurse relationship is one of substitution due to the lack of independence to meet basic needs.

The data from the initial clinical assessment conducted on April 21, 2024, structured according to the 14 basic needs model, are presented below:

**Need 1: *to breathe normally*.** On examination, the following vital signs were found: heart rate 41 bpm, respiratory rate 18 rpm, esophageal temperature 35.2°C, oxygen saturation 100%, invasive blood pressure (BP) 124/48 mmHg, manual BP 70/50 mmHg and MAP (mean) 56 mmHg. By transcranial Doppler: left CPP 71 mmHg and left ICP 18.9 mmHg. In neuromonitoring, measurement of the optic nerve sheath (ONS): right ICP 19 mmHg and left ICP 20 mmHg.

She is under sedation on the RASS scale of -5 points (very deep sedation) and BIS of 41 (general anesthesia). The skin is pale. She

has ventilatory support in stage 3 through an 8.0 mm I.D. caliber orotracheal cannula fixed in the dental arch at 20 cm, the pneumotach balloon has a pressure of 20 mmHg, has a closed suction system and is monitored with a capnograph: $ETCO_2$ of 32 mmHg; bronchial secretions are moderate, yellowish and thick. Mechanical ventilation in Pressure A/C mode, $FiO_2$ at 45 %, PEEP 5 $cmH_2O$, inspiratory time 1.2 s, flow trigger 2 L/min, inspiratory pressure 14 cmH2O. Inspiratory volume 525 ml, peak pressure 19 $cmH_2O$, and I:E ratio 1:1.8.

Arterial blood gases: pH 7.45, $pCO_2$ 38.3 mmHg, $HCO_3$ -26.5 mEq/L, $PaO_2$ 66.3 mmHg, EB 2.7 mEq/L, $SaO_2$ 92.5 % and lactate 1.5 mmol/L. A Kirby index of 147 mmHg is obtained (moderate acute respiratory failure). Respiratory workshop: arterial $O_2$ content 10.325 ml/dL, capillary $O_2$ content 11.202 ml/dL, venous $O_2$ content 8.961 ml/dL, arteriovenous $O_2$ difference 1.364 ml/dL and $O_2$ extraction rate 13.21 %.

Weak bilateral carotid pulses; with right jugular 7 French (Fr) caliber central venous catheter (CVC) installed on April 13, 2023, and covered with clear dressing with chlorhexidine cushion. Left jugular 7-gauge Fr bulb catheter installed on April 18, 2023, with $SJO_2$ 82 %, $O_2$ arterio-jugular difference 2.1 ml, lactate index 0, cerebral $O_2$ extraction 17.7 % (cerebral hyperemia).

Aortic, pulmonary, tricuspid, and mitral cardiac focus audible, but diminished and slow-paced. S1 and S2 perceived. Auscultation shows roncus-like pulmonary sounds in apices and low intensity in the basal area. Hemodynamic assessment by USG: Cardiac output (CO) 3.3 l/min. Serum electrolytes: Na 160.7 mEq/L, K 3.9 mEq/L, Cl 134.9 mEq/L, Ca 7.7 mg/dL, P 2.5 mg/dL and Mg 2.5 mEq/L. Blood biometry results: leukocytes 5.8 10/S/3/µI, neutrophils 5.4 10/S/3/µI, lymphocytes 0.3 10/S/3/µL, hemoglobin 8.36 g/dL and HTC 26.9%.

She has a left pedial arterial line installed with a #20 Gauge catheter, in which a 0.9% NaCl solution of 250 ml plus 100 IU of heparin is passed for 24 hours.

**Need 2:** ***adequate eating and drinking.*** Somatotype endomorph, height 1.55 m, weight 75 kg, and BMI 31.25 kg/m2 (grade I obesity). Capillary glycemia is 145 mg/dL. Grade II facial edema is observed. Oral mucosa are hydrated. She has a polymeric diet by enteral feeding by Levin-type nasogastric tube, 14 Fr caliber in left nostril, continuous infusion with 979 kcal and 46 grams of protein, total volume of 928 ml at a rate of 62 ml/h.

Blood chemistry: serum albumin 2.6 g/dL (hypoalbuminemia), TGO 93 U/L, TGP 64 U/L, GGT 445 mg/dL. She presents edema in upper and lower limbs with positive Godet's sign grade II.

The trilumen right jugular CVC is functional: the distal lumen has an infusion of 0.9% NaCl solution plus 3 g of $MgSO_4$ at 4.1 ml/h for 24 hours; medial lumen with fentanyl infusion of 1 mg in 100 ml of 0.9% NaCl at a dose of 1.6 mcg/kg/h; in the same lumen, an infusion of midazolam 100 mg in 100 ml of 0.9% NaCl at a dose of 0.33 mg/kg/h and in the proximal lumen, an infusion of norepinephrine with 8 mg in 100 ml of 0.9% NaCl at a dose of 0.017 mcg/kg/min; in the same lumen, dopamine 400 mg in 100 ml of 0.45% NaCl at a dose of 8.8 mcg/kg/h is administered. The following drugs are administered: Ceftriaxone 1 g intravenous (IV) c/12 h, paracetamol 1 g IV c/8 h for necessary reason, enoxaparin 60 mg subcutaneous c/24 h, vancomycin 1 g IV with start on April 21, 2023, and metoclopramide 10 mg by nasogastric tube.

In the trilumen left jugular bulb catheter: in the distal lumen pass NaCl solution 0.9 % 100 mL plus 1000 IU of heparin at 2 ml/h for patency.

Venous congestion assessment (VExUS system): IVC distensibility 16%, pulsatility index 40%, and renal resistance index 0.66.

The abdomen is globose due to adipose panniculus, soft and depressible. On abdominal auscultation, 2 peristaltic sounds per minute of very low intensity and little perception are perceived. On percussion, the upper quadrants have a dull sound, and a tympanic noise in the lower quadrants. Finally, the water balance of partial admissions is 1132 ml.

In the arterial line, she is infused with NaCl solution 0.9 % 250 ml plus 250 IU heparin for 24 hours. Hemodynamic monitoring: SPV 2 mmHg and PPV 4 %.

**Need 3:** ***normal elimination by all routes.*** Urinary catheter 16 Fr to shunt. Uretic elimination: 5820 ml in 10 hours and urine output of 7.76 ml/kg/h (polyuria); characteristics were amber yellow, density 1.005; creatinine 0.41 mg/dL, urea 53 mg/dL, BUN 25 mg/dL, uric acid 1.1 mg/dL, GFR = 127 ml/min/1.73m2. Partial output: -6395 ml. Partial water balance: -5263 ml. No bowel movements since admission to the unit.

**Need 4:** ***to move and maintain proper posture.*** Neurological assessment: anisochoric arreactive pupils with a right diameter of 2 mm and a left diameter of 4 mm. Examination of cranial nerves: I (olfactory), II (optic), VI (external ocular motor), VII (facial), VIII (cochlear vestibule), XI (accessory) and XII (hypoglossal) not assessable; oculocephalic reflex present for assessment of nerve III (common ocular motor) and IV (trochlear); bulbar reflexes absent (gag, cough, and swallowing); corneal reflex absent; spinociliary reflex absent; nerve V (trigeminal) with painful stimulation in supraciliary and maxillary region, without response. Examination of motor function: no response. Sensory function examination: absent. Hypotonic and spastic muscles. Scales: Ashworth 4 points, Daniels 0/5 points in the 4 upper and lower extremities, Katz index 6 points, and Braden 8 points.

**Need 5:** ***to sleep and rest.*** Index BIS 41 (general anesthesia). An alternating pressure air mattress with a bubble system is installed in her hospital bed.

**Need 6:** ***to choose appropriate clothing, dressing, and undressing.*** She has both a disposable and cloth diaper covering the genital region. She is wearing a hypothermic water circulation suit that covers from shoulders to feet.

**Need 7:** ***to maintain body temperature.*** She is under induced hypothermia employing a hypothermic suit programmed to 34°C, core temperature measurement is performed with an esophageal probe, reporting 35.2°C (mild hypothermia).

**Need 8:** ***to maintain body hygiene and skin integrity.*** Normal cephalic skull, scalp with alopecia secondary to trichotomy, left frontotemporoparietal surgical wound clean and faced with stitches; at the same site soft skin without tension is palpated, and no cranial bone is perceived. Dehydrated lips and the presence of whitish plaque in the oral mucosa are observed; in the sublingual region, there is a 1 mm laceration[2].

Presence of left lateral abdominal surgical wound between mesogastrium and hypogastrium region, 14 cm long, covered with gauze. There is a second surgical wound of 1 $cm^2$ with a small amount of serous discharge, similarly covered with gauze.

**Need 9:** ***avoidance of environmental*** **hazards** and avoidance of injury to others. On

admission to the AICU, the following scales were assessed: APACHE 26 points (55% mortality prognosis), CPOT 1 point (mild pain), BPS 3 points (objective pain), FOUR 0 points (arreactive coma), Downton 2 points (medium risk of falling) and SOFA 11 points (50% probability of mortality). Bronchial secretion culture: the presence of staphylococcus aureus, and CRP (C-reactive protein) in the blood is 7.8 mg/L.

**Need 10:** ***to communicate with others expressing emotions and needs.*** She is visited every day for 30 minutes by her brother.

**Need 11:** ***to practice their beliefs.*** A practicing Christian. She used to go to church every Sunday.

**Need 12:** ***to work in something rewarding for the person.*** She has a Bachelor's degree in Pharmaceutical Biological Chemistry and was a teaching assistant at the Faculty of Chemistry at the UNAM.

**Need 13:** ***to develop play and recreational activities.*** She was dedicated to taking care of her mother, who is an elderly person and suffers from chronic illness.

**Need 14: to learn to satisfy curiosity.** No data for assessment.

## Aplication of the nursing process

The following are some of the nursing intervention plans carried out on the individual. They are represented in a table for a better organization of the interventions.

### Intervention Plan 1

**Need 1: to breathe normally**

**Nursing diagnosis:** Risk of ineffective cerebral perfusion r/t cerebral blood flow supply above consumption (cerebral hyperemia).

**Objective:** To reduce the factors that contribute to the risk of ineffective cerebral perfusion to avoid cerebral ischemic injury.

| **Source of difficulty** Strength | **Level of dependence** 6 | **Nursing role** Substitute |
|---|---|---|
| **Interventions** | **Actions** | |
| 1. Neurological nursing assessment | - Assess the level of consciousness, pupils (size, shape, and response), vital signs; examination of cranial nerves, motor, and sensory function[13].<br>- Assess FOUR scale[13]. | |
| 2. Neurological monitoring | - Calculate the CFP with the following formula: PPC = PAM - PIC[14].<br>- Obtain ICP by measuring VNO[14].<br>- Set target CPP between 60-70 mm Hg[15,16]. | |
| 3. Hemodynamic management | - Optimize MAT: 90 to 110 mmHg using a vasoconstrictor drug, norepinephrine with doses of 0.05-0.1 µg/kg/min[17].<br>- Calibrate arterial line to obtain correct BP reading[18].<br>- Note the presence of Cushing's triad. | |
| 4. Management of $O_2$ | - Maintain core temperature reduction: 32 to 35°C through induced hypothermia and, thus, decrease brain $O_2$ consumption[19].<br>- Take jugular bulb blood gas after adjustments made[20].<br>- Establish $pCO_2$ targets adjusted to Mexico City level: 28 to 32 mmHg[19].<br>- In hypercapnia adjust ventilatory parameters: I:E ratio, increase RR, and minute volume[21,22]. | |
| 5. Neurocritical care | - Implement THE MANTLE mnemonic:<br>Temperature 36°C - < 37°C (central); Hb 8-12 g/dL; electrolytes and acid-base status: Na+ 135-145 mEq/L, pH 7.35-7.45, p50 26-28 mmHg; $SvJO_2$ metabolism > 55 %, $PtiO_2$ 18 mmHg, PPC 60-70 mmHg; SBP > 110 mmHg, glycemia 110-180 mmHg, target $PaO_2$ 80-110 mmHg; lung protective ventilation Vt 6-10 ml/kg, respiratory rate for $pCO_2$ 35-45 mmHg, driving pressure < 13 cm $H_2O$, plateau pressure < 24, mechanical power < 17 J/min; ICP < 22 mmHg, DNVO < 5.5 mm, PI < 1.2, serial CT[23]. | |

**Evaluation:** At 7 AM on April 22, 2023, a left CPP of 66 mmHg and a right CPP of 79 mmHg were reported through the neurological monitoring sheet using transcranial Doppler; the results of which show that cerebral perfusion improved compared to the data recorded in the previous shift.

## Intervention plan 2

**Need 1: to breathe normally**

**Nursing diagnosis:** Diminished intracranial adaptive capacity r/t loss of cerebral compliance secondary to extravasation of blood content to the left cerebral parenchyma m/b anisochoric pupils: right pupil 2 mm and left pupil 4 mm, TAM 57 mmHg, ICP by VNO right 19 mmHg and left 20 mmHg and left IP 1.4.

**Objective:** Restore cerebral compliance by lowering ICP to avoid further secondary lesions.

| **Source of difficulty** Strength | **Level of dependence** 6 | **Nursing role** Substitute |
|---|---|---|
| **Interventions** | **Actions** | |
| 1. Neurological monitoring | - Interpretation of transcranial Doppler variables:<br>A. ICP monitoring by ONS (optic nerve sheath diameter) formula = (5.69 x ONS) - 8.23[24].<br>B. Transcranial Doppler. ICP measurement with Bellner's formula: ICP = 10.93 x IP - 1.28[25]. | |
| 2. Management of cerebral edema | - Administration of an osmotic diuretic: mannitol at a dose of 0.5-1.4 g/kg over a maximum of 20 min[26].<br>- Use of hypertonic solutions: 3% NaCl at 0.1-0.2 ml/kg/h (maximum 1 liter per day)[26]. | |
| 3. Basic general measures to reduce ICP | - Keep the head of the bed at 30° in an aligned and neutral position of the body, avoiding neck flexion[27].<br>- Optimize blood pressure with a target > 90 mmHg: titrate norepinephrine until target is reached[17].<br>- Promote hyperventilation: decrease $PCO_2$ and maintain it between 26 and 30 mmHg, by increasing RR on the mechanical ventilator[28].<br>- Minimize stimuli that could induce cough reflex or Valsalva, such as aspiration of secretions by TOT[28,29].<br>- Optimize good sedation with BIS of 40 to 60 or target RASS using midazolam at maintenance doses of 0.03-0.2 mg/kg/h[16].<br>- Administer a barbiturate drug (pentobarbital or thiopental) if ICP does not improve with the interventions described above[27].<br>- Optimize good analgesia with fentanyl: maintenance dose at 0.07 - 5 µg/kg/h up to 10 µg/kg/h[15]. | |

**Evaluation:** The ICP reported at 7 am by measuring the left ONS was 19.6 mmHg and right ONS was 20 mmHg, neither of which parameters did not improve despite the interventions performed.

## Intervention plan 3

**Need 1: to breathe normally**

**Nursing diagnosis:** Decreased cardiac output r/t vasoplegia as a mechanism of shock m/b heart rate of 41 bpm, cardiac output of 3.3 liters per minute, blood pressure of 70/50 mmHg, MAP of 57 mmHg, generalized pallor, weak peripheral pulses and capillary refill of 3 seconds.

**Objective:** To favor the increase of cardiac output to improve hemodynamic status and, at the same time, meet the required demands of vital organs.

| **Source of difficulty** Strength | **Level of dependence** 6 | **Nursing role** Substitute |
|---|---|---|
| **Interventions** | **Actions** | |
| 1. Pharmacological control | - Administer positive inotropic drug to increase cardiac contractility: initiate dopamine doses at 5-10 µg/kg/min for a beta 1, inotropic and chronotropic effect[30].<br>- Titrate vasoconstrictor drug: perform noradrenaline increase of 0.1 to 0.3 µg/kg/min approximately every 5 minutes until the desired goal is reached[31]. | |
| 2. Vital signs monitoring | - Evaluate the HR recorded on the VS monitor and at the same time perform manual pulse-taking on the radial arterial for one minute[32].<br>- Interpretation of the arterial line waves recorded on the monitor and proceed to perform calibration of the monitor to avoid reading errors[33].<br>- Corroborate the BP by manual measurement with the sphygmomanometer[34].<br>- Observe the pulse oximeter plethysmography waveform and interpret the vascular status of the arteries (whether there is vasoconstriction or vasodilatation)[35]. | |
| 3. Cardiac Output (CO) Monitoring | - Ask the physician responsible for the ICU to measure the CO noninvasively (USG) and to provide the values obtained: $R^2$ = TSVI/2, Area = pi (π) x $r^2$, VS = area x ITV, and CO = VS x FC.<br>- Measure, calculate, and record the following parameters: CO and CI (cardiac index)[36]. | |

**Evaluation:** An improvement in hemodynamic status was observed, increasing the heart rate to 45 bpm one hour after the interventions and to 55 bpm in two hours; however, two hours later there was again a drop in heart rate, obtaining less than 50 bpm until 7 am.
Similarly, blood pressure had constant imbalances: at 2 hours with a BP of 150/80 mmHg, at 4 hours 80/60 mmHg, and at the end of the shift 180/90 mmHg.

## Intervention plan 4

**Need 1: to breathe normally**

**Nursing diagnosis:** Ineffective tissue perfusion r/t imbalance between blood flow supply and demand to vital organs (brain, kidney, and heart) m/b generalized pallor of the skin; slow, weak, and barely perceptible pulses and capillary filling of more than 3 seconds.

**Objective:** To improve perfusion at the tissue level to avoid cellular hypoxia and, consequently, multiple organ failure.

| Source of difficulty<br>Strength | Level of dependence<br>6 | Nursing role<br>Substitute |
|---|---|---|
| **Intervenciones** | **Acción** | |
| 1. Hemodynamic management | - Continuous hemodynamic and vital signs monitoring: heart rate, pulse, and blood pressure[37].<br>- Increase MAP from 65 to 75 mmHg by using a vasoconstrictor drug: norepinephrine at doses of 0.01-3.3 µg/kg/min and titrate the dose from 0.1 to 0.3 µg/kg/min every 5 min to dose response[31]. | |
| 2. Intravenous therapy | - Fluid response assessment[38].<br>a. Evaluate the PPV at the monitor.<br>b. To evaluate the distensibility of the IVC by Doppler USG.<br>- Administer intravenous crystalloid solution if responder with volume at 25-30 ml/kg/day. | |
| 3. Respiratory monitoring | - Take an arterial blood gas measurement: evaluate anaerobic metabolism through serum lactate[39].<br>- Venous blood gas sampling through the right jugular CVC to obtain venous saturation ($SvCO_2$)[39].<br>- Evaluate the CO Delta2[39]. | |

**Evaluation:** The interventions performed increased MAT to 103 mmHg post 1 hour, with an average of 100 mmHg over the 10 hours.
Capillary filling did not improve during the entire care, this was more than 3 seconds.

## Intervention plan 5

**Need 7: Maintain body temperature in normal ranges.**

**Nursing diagnosis:** Induced hypothermia r/t protection of the cerebral parenchyma m/b esophageal temperature of 35.1°C and skin cold to the touch.

**Objective:** To maintain induced hypothermia at < 35°C or according to protocol to restore normal ICP. Likewise, avoid secondary damage caused by excessive temperature decrease.

| Source of difficulty<br>Strength | Level of dependence<br>6 | Nursing role<br>Substitute |
|---|---|---|
| **Interventions** | **Actions** | |
| 1. Management of induced hypothermia | - Corroborate the correct installation of the esophageal probe for core temperature measurement40.<br>- Properly install the hypothermic suit and keep the temperature controlled between 32°C and 35°C[41].<br>- Monitor the recommended induction phase time (maximum 6 to 12 hours), maintenance (24 to 72 hours), and passive reheating (< 0.25° c/hour)[42]. | |
| 2. Temperature management | - Take axillary and esophageal temperature every hour and compare variabilities[43].<br>- Avoid elevated temperature or fever[44]. | |
| 3. Monitoring of side effects | - Assess the following laboratory findings: prolonged clotting times, decreased $pCO_2$, increased $pO_2$ and pH, high venous saturation, and decreased serum electrolytes (potassium, magnesium, calcium, and phosphorus)[45]. | |

**Evaluation:** During the shift, the core temperature fluctuated, reaching a maximum of 35.3°C and a minimum of 34°C. The temperature did not influence the decrease in ICP, since at the end of the shift the ICP per right ONS was 20 mmHg and the left ONS was 19.6 mmHg.

## Discharge plan

To follow up on the care provided, a discharge plan focused on hospital discharge based again on the 14 basic human needs was proposed.

| **Discharge plan** | |
|---|---|
| **Date of elaboration:** 26/May/2023.<br>**Diagnosis:** Intraparenchymal hemorrhage plus decompressive craniectomy. | **Addressed to:** To the family and primary caregiver (legal representative). |
| **Need 1: to breathe normally**<br>Airway care:<br>- Remember that, upon aspiration of secretions, it is necessary to stop the diet being administered to avoid bronchoaspiration.<br>- Perform aspiration of secretions once a day or in case of excessive secretions.<br>- The technique should be performed as cleanly as possible. | |
| **Need 3: normal elimination by all routes**<br>Bladder catheter care:<br>- Wash hands before and after handling the probe.<br>- Perform daily genital hygiene and drying with soap and water.<br>- Change the bag every 5 days according to the recommendation of the permanent nursing committee.<br>- Do not disconnect the bag, neither for emptying nor for hygiene.<br>- Drain the bladder catheter every time it is ¾ of its capacity.<br>- Keep the probe below waist level.<br>- Keep the collection bag above the ground to avoid contamination of the circuit.<br>- Report changes in urine or low amount of urine. | |
| **Need 4: to move and maintain proper posture**<br>- Perform passive exercises in the upper and lower limbs to promote joint mobility. | |
| **Need 9: avoidance of environmental hazards and avoidance of injury to others**<br>Warning signs:<br>- Decreased awake state.<br>- Difficulty breathing in ambient air.<br>- Temperature increase.<br>- Enlargement of the decompressive craniectomy site (left cranial parietal or left frontotemporoparietal region). | |
| **Name and category of the person performing:**<br>**Bachelor of Science in Nursing R.B.T.P.** | |

## Discussion

The results obtained in this observational and qualitative study are similar to those described by García *et al*.[14], who describe the case of a 40-year-old man with hemorrhagic CVD and determine that the patient becomes a chronic patient, as occurred in this study. Likewise, there is a narrative of a clinical case of a 38-year-old man with left intraparenchymal hemorrhage, in which it was decided to manage him in the AICU and he only remained for 7 days without major complications, in total he spent 21 days in the hospital[15]; this experience differs from our study subject, since she was hemodynamically unstable and had a low probability of survival.

Regarding the use of hypothermia, a retrospective study determined its use in those

with cerebral edema and concluded that it did not have a positive impact on neurological outcomes because people required more time on mechanical ventilation, which can cause pneumonia[16]; this could be consistent with the present study since the patient had a positive bronchial culture for gram-positive microorganisms, which was the cause of the respiratory problems presented.

Nursing interventions in a person in a neurocritical state secondary to intraparenchymal hemorrhage are still not well defined, due to the lack of current research available to support the effectiveness of specific interventions in this type of situation. The clear example described in this work is the neuroprotective measure of therapeutic/induced hypothermia, as there is no consensus on its application and effectiveness in reducing secondary injuries. For this reason, given that the nursing profession has not generated research on its role in this topic, recommendations proposed from the medical perspective, with the participation of nurses, were followed to develop the intervention plan for this case study.

## Conclusion

The main objective of this case study was achieved by using the NCP systematic method, following each of its stages. Likewise, the use of the 14 basic needs proposed by Virginia Henderson made it possible to describe the situation of a woman who was in an acute critical condition secondary to intraparenchymal hemorrhage.

The implementation of specialized interventions helped to improve survival. However, it is emphasized that nursing professionals specializing in critically ill adults generate quantitative and qualitative research regarding specific nursing interventions in persons with decreased cerebral perfusion or risk of decreased cerebral perfusion.

It is intended that this study will be considered in the future as a starting point for further improvement of the NCP, as well as for optimizing the quality of care provided by nurses in critical care units.

## References


1. **American Heart Association.** Heart disease and stroke statistics update, year 2022. [Online]. 2022 [accessed 2023 May 2]. Available at: https://cutt.ly/heRYiP8y
2. **De la Garza RS, Maldonado JA, Mendoza PL, Sánchez L.** Incidence of cerebrovascular disease in an Internal Medicine service. Med Int Mex. [Online]. 2018 [accessed 2023 May 2]; 34(6): 874-80. Available at: https://doi.org/10.24245/mim.v34i6.2062
3. **INEGI.** Statistics of deaths registered from January to June 2022 (preliminary) [On line]. Mexico: 2023 [accessed 2023 May 2] Available at: https://cutt.ly/8eRYdemy
4. **Secretaria de Salud.** En 2021, ictus o enfermedad vascular cerebral ocasionó más de 37 mil decesos en México [En línea]. México: 2022 [consultado 2023 mayo 2]. Available at: https://cutt.ly/MeRYzAff
5. **Piña KM, Álvarez KY, López B, Prevedello D, Cuellar AB.** Spontaneous intraparenchymal cerebral hemorrhage. Classification, evidence and recommendations of urgent neurosurgical management guidelines. In: Piña KM, Alvarez KY, editors. Manual of principles and controversies in neurotrauma and neurosurgical emergencies. Seville: Punto Rojo Libros; 2018. p 141-151.
6. **Folgado CJ.** Multimodal monitoring and

functional support of the neurocritically ill patient. Valencia: Ferrer; 2023.

7. **Liu H, Zhou M.** The utility of therapeutic hypothermia on cerebral autoregulation. J Intensive Med [Online]. 2023 [accessed 2023 May 1]; 3(1): 27-37. Available from: https://doi.org/10.1016/j.jointm.2022.08.004
8. **Kurisu K, Kim JY, You J, Yenari MA.** Therapeutic Hypothermia and Neuroprotection in Acute Neurological Disease. Curr Med Chemn [Online]. 2019 [accessed 2023 May 7]; 26(29): 5430-55. Available from: http://dx.doi.org/10.2174/0929867326666190506124836
9. **Kollmar, R.** Neuroprotection in Neurointensive Medicine. Med Klin Intensivmed Notfmed [Online]. 2019 [accessed 2023 May 7]; 114: 635-41. Available from: https://doi-org.pbidi.unam.mx:2443/10.1007/s00063-019-00608-8
10. **Baker TS, Durbin J, Troiani Z, et al.** Therapeutic hypothermia for intracerebral hemorrhage: systematic review and meta-analysis of the experimental and clinical literature. Int J Stroke [Online]. 2022 [accessed 2023 May 7]; 17(5): 506-16. Available at: https://doi.org/10.1177/17474930211044870
11. **Song F, Guo C, Geng, Y, Wu X, Fan W**. TTherapeutic time window and regulation of autophagy by mild hypothermia after intracerebral hemorrhage in rats. Brain Res [Online]. 2018 [accessed 2023 May 4]; 1690: 12-22. Available from: https://doi.org/10.1016/j.brainres.2018.04.005
12. **Peng Y, Lin Y, Hou X, Liao X, Liu J.** Effect of mild hypothermia on behaviors of rats with intracerebral hemorrhage and the possible mechanism. Nan Fang Yi Ke Ke Da Xue Xue Bao [Online]. 2020 [accessed 2023 May 9]; 40(9): 1359-64. Available from: 10.12122/j.issn.1673-4254.2020.09.21
13. **Pokorny ME.** Theories of nursing with historical significance. In: Raile, M. Models and Theories in Nursing. 10th ed. Barcelona: Elsevier; 2023. p. 12-28.
14. **Ming-Tao Y.** Multimodal neurocritical monitoring. Biomedical Journal [Internet] 2020 [accessed 2023 August 12]; 43(3): 226-30. Available from: 10.1016/j.bj.2020.05.005
15. **Piano A, Zurita S, Bernal B, Muñoz C**. Cerebral edema and intracranial pressure management. Revista Electrónica Anestesiar [Internet]. 2022 [accessed 2023 August 9]. Available at: https://cutt.ly/QeRZgPiw
16. **Pietro R, Torre M.** Nursing in Intensive Care. Buenos Aires: Panamericana; 2019.
17. **Ortiz-Prado E, Banderas León A, Unigarro L, Santillan P.** Oxygenation and Cerebral Blood Flow, Comprehensive Literature Review. Rev. Ecuat. Neurol. [Internet] 2018 [accessed 2023 Aug 11]; 27(1): 80-9. Available from: https://cutt.ly/WeRZhp1n
18. **Paz Martín D.** Analysis of the arterial pressure waveform in Anesthesiology and Intensive Care I. AnestesiaR Electronic Journal [Internet]. 2020 [accessed 2023 August 13]; 12(6): 4. Available from: https://doi.org/10.30445/rear.v12i6.858
19. **Rincón Flórez DF, Tejada Perdomo JH, Jairo Rodríguez J, Chaves Pineda JD.** Cerebral blood flow and cerebral metabolic activity. A view from anesthesiology. Revista Chilena de Anestesia [Internet]. 2021 [accessed 2023 August 12]; 50(6): 912-7. Available at: https://doi.org/10.25237/revchilanestv5008101043
20. **Grille P.** Invasive multimodal neuromonitoring in the neurocritical patient. Acta Colombiana de

Cuidado Intensivo [Internet] 2022 [accessed 2023 August 13]; 22(3): 217-26. Available from: https://doi.org/10.1016/j.acci.2021.05.001

21. **Armas Merino R, Gajewski P.** Evidence-Based Internal Medicine 2022/23. 4th ed. Empendium; 2022.
22. **Jover JL, García JP, Alentado MM.** Basic ventilator settings. Pressure, flow and volume curves. In: Soto AF. Manual de Ventilación Mecánica para Enfermería. 1st ed. Madrid: Panamericana; 2020. p. 109-16.
23. **Godoy DA, Murillo Cabezas F, Suarez JI, et al.** "THE MANTLE" bundle for minimizing cerebral hypoxia in severe traumatic brain injury. Crit Care [Internet]. 2023 [accessed 2023 August 13]; 27(13). 1-8. Available from: https://doi.org/10.1186/s13054-022-04242-3
24. **Sosa Remón A, Jerez Álvarez AE, Remón Chávez CE.** Ultrasonography of the optic nerve sheath diameter in intracranial pressure monitoring. Rev cuba anestesiol reanim [Internet]. 2021 [accessed 2023 July 21]; 20(3): e710. Available at: https://revanestesia.sld.cu/index.php/anestRean/article/view/710
25. **Piriz-Assa A, Abdo-Cuza A, De la Cruz HR.** Transcranial Doppler ultrasound to estimate intracranial pressure and cerebral perfusion pressure in neurocritical pediatric patients. Rev Cubana Pediatr [Internet]. 2022 [accessed 2023 August 13]; 94(2): e1597. Available at: https://revpediatria.sld.cu/index.php/ped/article/view/1597
26. **Acosta Egea S, Arriola Acuña LE, Pérez Marín D.** Initial approach to intracranial hypertension in adults. Rev.méd.sinerg [Internet]. 2020 [accessed 2023 June 11]; 5(9): e569. Available at: https://doi.org/10.31434/rms.v5i9.569
27. **Cook AM, Morgan Jones G, Hawryluk GWJ, Mailloux P, McLaughlin D, Papangelou A, et al.** Guidelines for the Acute Treatment of Cerebral Edema in Neurocritical Care Patients. Neurocrit Care [Internet]. 2020 [accessed 2023 August 13]; 32(3): 647-66. Available from: http://doi.org/10.1007/s12028-020-00959-7
28. **Schizodimos T, Soulountsi V, Iasonidou C. et al.** An overview of management of intracranial hypertension in the intensive care unit. J Anesth [Internet]. 2020 [accessed 2023 August 13]; 34(1): 741-57. Available at: 10.1007/s00540-020-02795-7
29. **Ferrando Martínez C, Goñi Bilbao I, Infante Garza M, García Sánchez A.** Influence of position changes and secretion aspiration on intracranial pressure in neurocritical patients. Evidentia [Internet] 2019 [accessed 2023 August 13]; 16(1). Available from: http://ciberindex.com/c/ev/e12073
30. **Vera Carrasco O.** Vasoactive and inotropic drugs in the treatment of septic shock. Cuad Hosp Clín [Internet]. 2016 [accessed 2023 August 15]; 57(1):51-8. Available at: https://cutt.ly/ReRZTer5
31. **Andaluz-Ojeda D, Cantón-Bulnes ML, Pey Richtera C, Garnacho-Montero J.** Vasoactive drugs in the treatment of septic shock. Medicina Intensiva [Internet]. 2022 [accessed 2023 August 15]; 46(S1): 26-37. Available from: 10.1016/j.medin.2022.03.001
32. **Moreno Sasig NG, Vélez Muentes JR, Campuzano Franco MA, Zambrano Córdova JR, Vera Pinargote RG.** Invasive and noninvasive monitoring in patients admitted to the ICU. Recimundo [Internet]. 2021 [accessed 2023 August 15]; 32: 278-92. Available at: https://doi.org/10.26820/

recimundo/5.(2).julio.2021.278-292

33. **Marín Turrubia L, Pérez Rubio I, Rubio Martínez R, et al.** Invasive blood pressure monitoring in an intensive care unit. Ocronos Journal [Internet]. 2023 [accessed 2023 August 15]; 6(9): 226. Available at: https://cutt.ly/yeRZU42M
34. **Nedel W, Vasconcellos A, Gunsch K, Rigotti P.** Accuracy and precision of oscillometric noninvasive blood pressure measurement in critically ill patients: systematic review and meta-analysis. Anaesthesiol Intensive The [Internet]. 2022 [accessed 2023 August 15]; 54(5), 425-31. Available from: https://doi.org/10.5114/ait.2022.123120
35. **Martínez-Sedas G.** The pulse oximeter: more information than we think. Rev Mex Anesthesiol [Internet]. 2023 [accessed 2023 September 16]; 47(1): 30-4. Available at: https://dx.doi.org/10.35366/114094
36. **Mejía Ruiz E, Roman Simón V, Montelongo FJ, Carmona Domínguez A.** Comparison of cardiac output measured through systolic volume in two-dimensional mode versus continuity equation in intensive care patients at Hospital General "Las Américas". Med crít (Col. Mex. Med. Crít.) [Internet]. 2019 [accessed 2023 July 13]; 33(1): 26-32. Available at: https://dx.doi.org/10.35366/86341
37. **González Miño C, Oulego Erroz I, Montero Yéboles R, Fernández-Barrio BC, Palanca-Arias D, Reyes Domínguez S, et al.** Hemodynamic assessment by ultrasound. Protoc diagn ter pediatr [Internet]. 2021 [accessed 2023 August 16]; 1: 483-97. Available at: https://cutt.ly/XeRZKzaF
38. **García-Regalado J, Padilla-Sandoval EA.** Volume response in clinical care: historical background and current therapeutic utility. Med Int Mex. [Internet] 2022 [accessed 2023 November 10]; 38(3): 617-33. Available at: https://doi.org/10.24245/mim.v38i3.4265
39. **Bes Miras S, Arauzo Casedas P, Escriban García A, Estiragués Cerdá M, Gómez García V, Arnaudas Casanueva M.** Objectives of hemodynamic monitoring in the critically ill patient. Ocronos Journal [Internet]. 2021 [accessed 2023 August 20]; 4(9): 128. Available at: https://cutt.ly/seRZZqiP
40. **Sekiguchi Y, Belval LN, Stearns RL, Casa DJ.** Internal body temperature monitoring. Sports Science Exchange [Internet]. 2019 [accessed 2023 August 28]; 29(192): 1-5. Available at: https://cutt.ly/ueRZXJVf
41. **Solís Aguayo DA, Meza Márquez JM, Peña Pérez CA, Carrillo Esper R.** Experience in a Third Level Hospital. Med. crít. (Col. Mex. Med. Crít.) [Internet]. 2018 [accessed 2023 August 30]; 32(5): 273-6. Available at: https://cutt.ly/feRZCFyg
42. **Rincón Flórez DF, Tejada Perdomo JH, Rodríguez JJ, Chaves-Pineda JD.** Cerebral blood flow and cerebral metabolic activity. A view from anesthesiology. Rev. Chil. Anest. [Internet]. 2021 [accessed 2023 August 30]; 50 (6): 912-7. Available at: https://revistachilenadeanestesia.cl/revchilanestv5008101043/
43. **Hart D, Rischall M, Durgin K, Donoghue M, Pham T, Wyatt T, et al.** Non-invasive zero-heat-flux technology compared with traditional core temperature measurements in the emergency department. The American Journal of Emergency Medicine [Internet]. 2020 [accessed 2023 August 30]; 38 (11): 2383-6. Available at: https://doi.org/10.1016/j.ajem.2020.08.071

44. **Pegoli M, Zurlo Z, Bilotta F.** Temperature management in acute brain injury: A systematic review of clinical evidence. Clinical Neurology and Neurosurgery. [Internet]. 2020 [accessed 2023 August 30]; 197(1): 106165. Available at: https://doi.org/10.1016/j.clineuro.2020.106165

45. **Romero C, Rovegno M, Vilches D, Darlic M, Fischer D, Reccius A, et al.** SOCHIMI Recommendations for Targeted Temperature Control in Adult Neurocritical Patients. Rev Chil Med Intensiva [Internet]. 2020 [accessed 2023 April 22]; 35(1):1-26. Available at: https://cutt.ly/NeRZNx4x