Article

Hypodermoclysis As a Care Tool: Algorithm Construction and Validation*

* Article derived from the Master's Thesis "Construção e validação de algoritmo para eleger pacientes adultos ao uso da hipodermóclise" presented at the Universidade Federal do Rio Grande do Norte, Brazil. Available at: https://repositorio.ufrn.br/handle/123456789/32655

Joyce Viana Barbosa
https://orcid.org/0000-0001-6705-5960
Universidade Federal do Rio Grande do Norte, Brasil
joycebarbosa.enf@gmail.com

Milka Leandro Saldanha Toscano
https://orcid.org/0000-0002-9935-0427
Universidade Federal do Rio Grande do Norte, Brasil
milka.saldanha07@gmail.com

✉ ***Dayara Ainne de Sousa Araújo***
https://orcid.org/0000-0002-0593-2443
Universidade Federal do Rio Grande do Norte, Brasil
dayara-ainne@hotmail.com

Maysa Mayran Chaves Moreira
https://orcid.org/0000-0002-9576-9036
Universidade Federal do Rio Grande do Norte, Brasil
maysa.mayran@gmail.com

Walkiria Gomes da Nóbrega
https://orcid.org/0000-0002-4176-8687
Secretaria de Saúde Pública do Rio Grande do Norte, Brasil
walenf@gmail.com

Quenia Camille Soares Martins
https://orcid.org/0000-0002-4036-2423
Universidade Federal do Rio Grande do Norte, Brasil
queniacamillesm@gmail.com

Received: 04/04/2024
Submitted to peers: 27/05/2024
Sent to peers: 11/06/2024
Approved: 28/06/2024

DOI: 10.5294/aqui.2024.24.3.5

Para citar este artículo / To reference this article / Para citar este artigo
Barbosa JV, Toscano MLS, Araújo DAS, Moreira MMC, Nóbrega WG, Martins QCS. Hypodermoclysis as a care tool: algorithm construction and validation. Aquichan. 2024;24(3):e2435. DOI: https://doi.org/10.5294/aqui.2024.24.3.5

Theme: Healthcare technologies

Contributions to the field: Hypodermoclysis is an alternative method for the infusion of medications and fluids; it is indicated when oral medications are not viable, the venous network is weak, volume replacement is required in cases of mild to moderate dehydration, and the patient can be kept at home. Thus, the development of the algorithm standardizes the use of this technology, in addition to benefiting patients in various clinical situations. Furthermore, it supports decision-making regarding its use in a more cautious manner; consequently, it makes the health system and programs more efficient in promoting, protecting, and restoring health.

Abstract

Introduction: Hypodermoclysis is an alternative method for administering medications and fluids. From this perspective, decision-making tools are useful for systematizing care. **Objective:** To develop and validate the content and appearance of an algorithm to guide eligibility for hypodermoclysis in adult patients. **Materials and methods:** Methodological study, developed between April and December 2020, in two stages: Construction of the algorithm and validation of content and appearance. In the first stage, a scoping review was constructed to identify and map the evidence on the eligibility/indication criteria for adult patients to use hypodermoclysis. In the second stage, the Delphi technique was used to evaluate the tool. The consensus among the judges was measured by the content validity coefficient. The item with more than 80% agreement was considered valid. **Results:** The algorithm uses three dimensions to assess the eligibility criteria for the use of hypodermoclysis in adults, focusing on the main absolute contraindications, such as anasarca, severe thrombocytopenia, and whether there is a need for rapid volume replacement. The content validation reached a total value of 0.95, while the appearance was 0.93, both in Delphi II. After the proposed changes, 100% of the judges recommended the use of the algorithm. **Conclusions:** The instrument produced and validated in this study constitutes a safe tool for care, because it reinforces the use of evidence-based praxis, as it is an instrument capable of bringing the theoretical field closer to the practical.

Keywords (Source: DeCS)
Hypodermoclysis; subcutaneous infusions; quality of health care; primary nursing; validation study.

La hipodermoclisis como herramienta asistencial: construcción y validación de un algoritmo*

* Artículo derivado de la tesis de maestría "Construção e validação de algoritmo para eleger pacientes adultos ao uso da hipodermóclise" (Construcción y validación de algoritmo para elegir pacientes adultos para la utilización de hipodermoclisis), presentada en la Universidade Federal do Rio Grande do Norte, Brasil. Disponible en: https://repositorio.ufrn.br/handle/123456789/32655.

Resumen

Introducción: la hipodermoclisis es un método alternativo para la administración de medicación y fluidos. Desde esta perspectiva, las herramientas de toma de decisiones son útiles para sistematizar la atención. **Objetivo**: desarrollar y validar el contenido y apariencia de un algoritmo para guiar la elegibilidad de la hipodermoclisis en pacientes adultos. **Material y método**: estudio metodológico, realizado entre abril y diciembre de 2020, en dos etapas: construcción del algoritmo y validación de contenido y apariencia. En la primera etapa, se realizó una revisión de alcance para identificar y mapear la evidencia sobre los criterios de elegibilidad/indicación de pacientes adultos para el uso de hipodermoclisis. En la segunda fase, se utilizó la técnica Delphi para evaluar la herramienta. El consenso entre los jueces se midió mediante el coeficiente de validez del contenido. Se consideró válido un ítem con más del 80 % de concordancia. **Resultados**: el algoritmo utiliza tres dimensiones para evaluar los criterios de elegibilidad para el uso de la hipodermoclisis en adultos, centrándose en las principales contraindicaciones absolutas, como la anasarca, la trombocitopenia grave y la necesidad de reposición rápida de volumen. La validación del contenido alcanzó un valor total de 0,95, mientras que la apariencia fue de 0,93, ambas en Delphi II. Tras los cambios propuestos, el 100 % de los jueces recomendó utilizar el algoritmo. **Conclusiones**: el instrumento elaborado y validado en este estudio es una herramienta segura para la atención, ya que refuerza el uso de prácticas basadas en la evidencia, al ser un instrumento capaz de acercar el campo teórico al práctico.

Palabras Clave (Fuente: DeCS)
Hipodermoclisis; infusiones subcutáneas; calidad de la atención de salud; enfermería primaria; estudio de validación.

Hipodermóclise como ferramenta do cuidado: construção e validação de algoritmo*

* Este artigo é derivado da dissertação de mestrado "Construção e validação de algoritmo para eleger pacientes adultos ao uso da hipodermóclise", defendida na Universidade Federal do Rio Grande do Norte, Brasil. Disponível em: https://repositorio.ufrn.br/handle/123456789/32655.

Resumo

Introdução: a hipodermóclise é um método alternativo para a administração de medicamentos e fluidos. Nessa perspectiva, as ferramentas de tomada de decisão são úteis para sistematizar o cuidado. **Objetivo:** desenvolver e validar conteúdo e aparência de um algoritmo para orientar na elegibilidade da hipodermóclise em pacientes adultos. **Materiais e método:** estudo metodológico, desenvolvido entre abril e dezembro de 2020, em duas etapas: construção do algoritmo e validação de conteúdo e aparência. Na primeira etapa, foi construída revisão de escopo para identificar e mapear as evidências sobre os critérios de elegibilidade/indicação de pacientes adultos para o uso da hipodermóclise. Na segunda etapa, para a avaliação da ferramenta, utilizou-se da técnica Delphi. O consenso entre os juízes foi mensurado pelo coeficiente de validade de conteúdo. Julgou-se válido o item com mais de 80 % de concordância. **Resultados:** o algoritmo utiliza três dimensões para avaliar os critérios de elegibilidade do uso da hipodermóclise no adulto, focado nas principais contraindicações absolutas, como anasarca, trombocitopenia grave e se há necessidade de reposição rápida de volume. A validação do conteúdo atingiu o valor total de 0,95, enquanto a aparência foi de 0,93, ambos na Delphi II. Após as alterações propostas, 100 % dos juízes recomendaram a utilização do algoritmo. **Conclusões:** o instrumento produzido e validado neste estudo constitui ferramenta segura para a assistência, pois reforça o uso das práxis baseadas em evidências, por ser instrumento capaz de aproximar o campo teórico do prático.

Palavras-chave (Fonte DeCS)
Hipodermóclise; infusões subcutâneas; qualidade da assistência à saúde; cuidados de enfermagem; estudo de validação.

Introduction

The use of hypodermoclysis (HDC) as a method for administering medications and fluids has shown greater levels of acceptance in infusion therapy. Its use is indicated as an alternative technique when oral medications are unfeasible, there is weakness of the venous network, in volume replacement in mild to moderate dehydration, and when there is the possibility of keeping the patient at home (1, 2).

The technique consists of inserting a catheter (needled or not) in the subcutaneous space. Fluids and drugs are absorbed into the tissue using simple diffusion forces, as the tissue is composed of dense connections and adipose tissue, harboring blood vessels, lymphatics, glands, and nerves, which allow the solution to reach the intravascular space (3).

Subcutaneous infusion is an effective technique for administering fluids and has a favorable safety profile without serious complications. In addition, the use of this route is less costly and invasive than other access routes for infusion therapies. Moreover, the use of HDC must be carefully evaluated, considering the characteristics of patients, prescribed medications, and technical capabilities (4).

Thus, HDC is mainly used in the fields of geriatrics and palliative care, due to the impaired venous access and the clinical conditions these patients present. This technique appears as an option for controlling symptoms, combating dehydration, and hydroelectrolyte replacement, that is, in the maintenance therapy, to contemplate the clinical efficacy expected from a route of parenteral administration (5, 6).

Despite HDC being recognized as an effective technique, with minimal complications, research conducted in Spain exposed some reasons for not using this route by professionals and lists the lack of experience due to lack of knowledge of it as one of the main justifications. Added to this is the lack of protocols and guidelines both for selecting patients and applying the technique (7).

From this perspective, it is understood that, from a clinical point of view, decision-making tools are useful to standardize and aggregate criteria about the care that will be provided. Thus, resulting in possible benefits such as high rates of accuracy and diagnostic efficiency, increased patient safety, support for decision-making, decreased incidence of errors and improved outcomes (8).

In this way, the tools stand out in helping with more effective communication, establishing the relationship between the professional and the patient to understand preferences, values and needs, in addition to transferring knowledge about the treatment, risks, benefits, and alternatives to make clinical decisions. Therefore, management focuses on the results of cost-benefit analyses and financial planning for the implementation of a system that assists in sustainable decision-making to meet health demands (9, 10).

Thus, the development of protocols/algorithms and guidelines for better use of hypodermoclysis can benefit not only elderly or oncology patients, as most studies suggest, but also can help in the treatment of various clinical situations, such as patients with Acquired Immunodeficiency Syndrome (AIDS) and end-stage congestive heart failure, among others (11).

Furthermore, the construction of this algorithm follows the logic of evaluating health technologies since its objective is to support decision-making regarding the use of technology in a more cautious way and, consequently, makes the system and the health programs more effective in promoting, protecting, and restoring health (12).

Given the importance of designing and implementing instruments for standardizing care, the following research question emerged: What elements are needed to develop and validate the content and appearance of an algorithm that guides the eligibility of adult patients for the use of HDC?

From the above, the objective of this study was to develop and validate the content and appearance of an algorithm to guide the eligibility of HDC in adult patients.

Materials and Methods

This is a methodological study, consisting of two distinct stages, which were guided by the methodological framework of psychometrics by Pasquali (13). This type of study enables the development, validation, and evaluation of instruments and techniques for the research context (13).

The study took place from April to December 2020, in two stages: i) Construction of an algorithm to choose adult patients to use Hypodermoclysis; and ii) Validation of content and appearance by judges, using the Delphi technique.

For the first stage of the research, a scoping review was constructed, whose objective was to identify and map the evidence on the eligibility criteria/indication of adult patients for the use of hypodermoclysis available in different databases, portals of national and international theses and dissertations, with the aim of synthesizing and scientifically subsidizing the content of the algorithm, which was later developed by using the Bizagi Modeler software.

The validation process of the content and appearance of the algorithm was conducted through the judgment and analysis of judges selected for research. For the search and selection of judges, the Lattes Platform on the National Council for Scientific and Technological Development of Brazil portal was used, based on the advanced search by subject to identify nurses who could act as specialists.

The adapted Fehring model was used to screen the judges. The model gives a score of 14 points; however, a minimum score of 5 points was assigned to this selection. Thus, 38 judges were intentionally identified. That said, an invitation letter was sent to the judges via email to explain the content of the research and the importance of their participation. Based on the positive feedback from these judges, the Free and Informed Consent Form (TCLE) was sent electronically. Then the algorithm was sent via the Google Forms software.

The material sent to the judges was presented in a Likert scale format, with variation for judgment of "adequate", "partially adequate," and "inadequate". For each of the items, a value of 1 to 3 was established, in which 1 was attributed to the item considered "inadequate," 2 to "partially adequate," and 3 to "adequate." It was decided to use the Delphi technique to enable the validation process and subsequent refinement.

Hence, two rounds of validation were necessary; at each stage, the verification calculation of the content validity coefficient (CVC) and the level of accordance was performed, according to Pasquali (13). Namely, both the content and appearance of the algorithm were validated based on the 12 criteria indicated: Behavior, objectivity, simplicity, clarity, relevance, precision, variety, modality, typicality, credibility, extent, and balance.

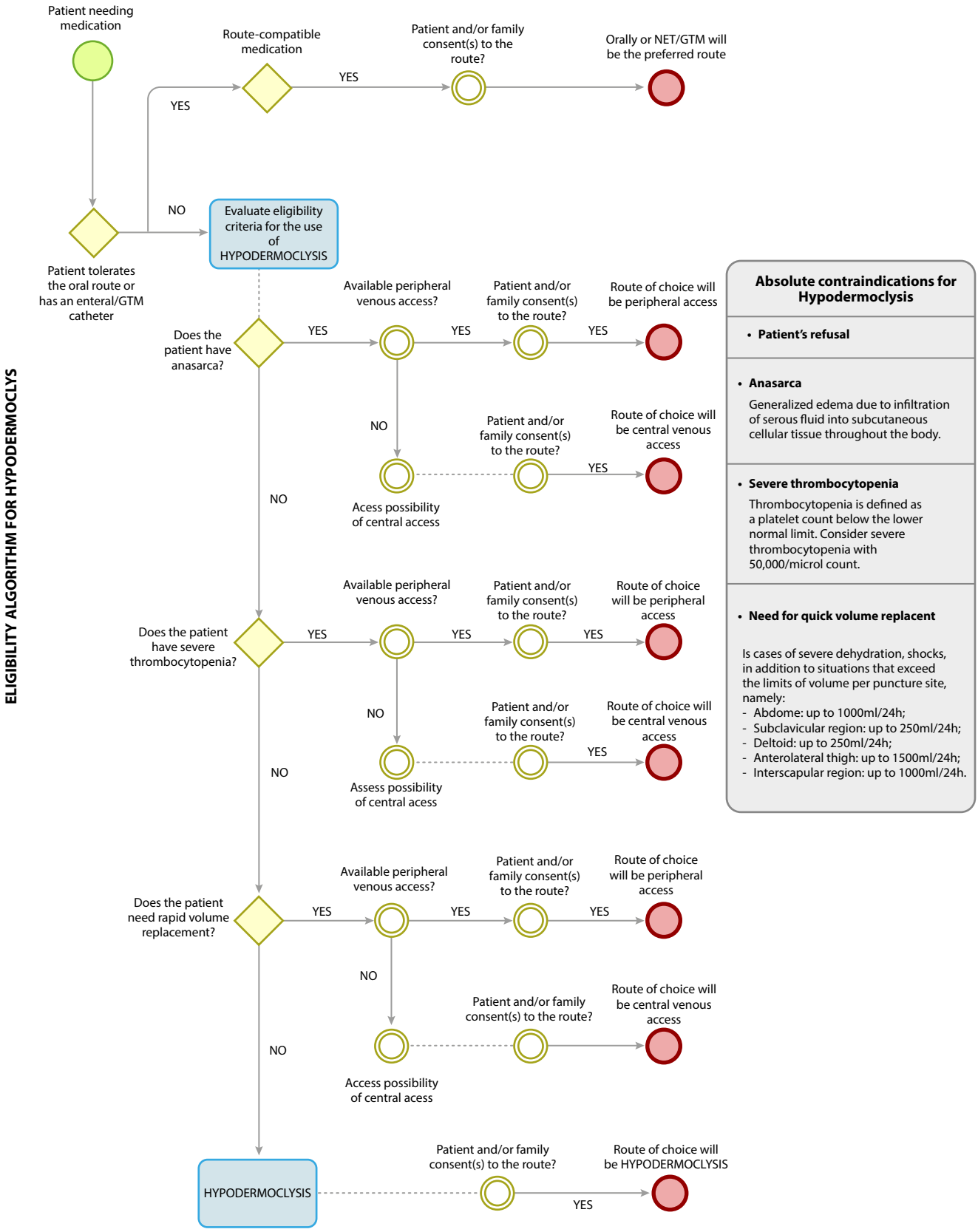
The data obtained from the judges' assessment were entered into an Excel spreadsheet, and the scores assigned to each judged item were verified. Based on the judges' evaluation, the CVC was verified. Therefore, the item that reached a CVC equal to or greater than 80 % was considered valid. Based on the suggestions made by the judges, a careful evaluation was performed, and the appropriate recommendations and justifications were presented.

The research included the ethical precepts in research with human beings approved by the Research Ethics Committee of the College of Health Sciences of Trairi of the Universidade Federal do Rio Grande do Norte under Opinion number 39785520.6.0000.5568 on November 16, 2020. Furthermore, it followed the International Ethical Guidelines for Research Involving Human Subjects of the Council for International Organizations of Medical Sciences, in collaboration with the World Health Organization (14).

Results

From the theoretical foundation offered by the scoping review, the elaboration and disposition of the items for the construction of the algorithm presented in Figure 1 took place. In it, the elements were systematized to reach a feasible proposal for the patient who needs a route of drug administration, and it presented HDC as a possible alternative for treatment continuity.

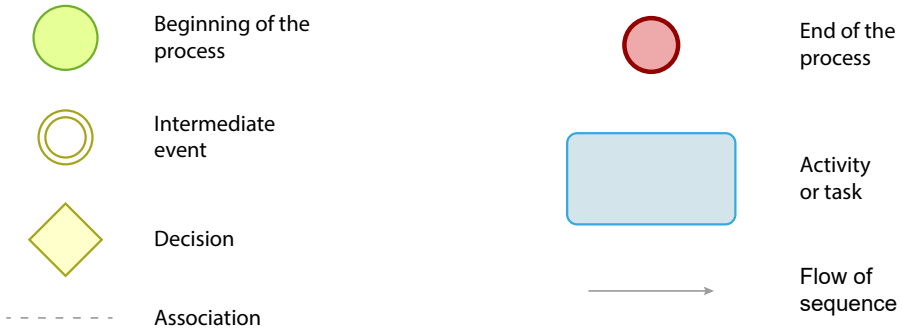
Figure 1. Eligibility Algorithm for Hypodermoclysis in an Adult Patient. Natal/RN 2021



Source: Bizagi Process Modeler freeware.

Figure 2 presents the legend for understanding the eligibility algorithm for HDC.

Figure 2. Key to the eligibility algorithm for hypodermoclysis in an adult patient. Natal/RN 2021



Process modeling symbol notation
Fonte: Bizagi Process Modeler Freeware

Source: Bizagi Process Modeler freeware.

After systematizing the contents in the review of the scope and construction of the algorithm, the process of validating the content and appearance began. The Delphi I round had the participation of 11 judges. Of these, 8 (72.7 %) were female, and 3 (27.3 %) aged between 30 and 49 (mean = 38.2). Of the participants, 4 (36.4 %) work mainly in teaching, 4 (36.4 %) perform their activities in care, and 3 (27.2 %) combine teaching and care.

In the Delphi II stage, the number of evaluators who participated was 8, as 3 of the 11 judges who participated in stage I did not return within the established period, and according to the eligibility criteria, they were excluded from this stage.

Therefore, the sample consisted of 6 (75 %) women and 2 (25 %) men, aged between 30 and 49 according to Delphi I (mean = 37.7). At this stage, 3 (37.5 %) worked mainly in teaching, 3 (37.5 %) combined teaching and assistance, and 2 (25 %) performed their activities only in care. Thus, the time in which the judges have been working with the theme ranged from 6 to 20 years.

Even with the concordance value (CVC ≥ 0.8) being valid in the Delphi I stage, the judges' suggestions were evaluated for permanence and proposition for improvement, through relevance analysis. Table 1 presents the recommendations and justifications.

After the adjustments suggested by the judges, the algorithm was sent again with the necessary changes and the table with the answers and suggestions.

Thus, for validation of the content and appearance of the topics that comprise the algorithm, all items obtained agreement within the established level (CVC≥0.8). In the first round, it was possible to obtain a concordance index for the analyzed questions, in which the total CVC for content was 0.92 and appearance was 0.89. Regarding the overall estimate, the instrument had a CVC of 0.95 for content and 0.93 for appearance.

Table 1. Judges' suggestions regarding the Delphi I round and adopted definitions. Natal / RN, 2021

Judges' Suggestions	Situation of the Items (Accepted/Not Accepted)	Answers To Suggestions
Content Validation		
Inserting the possibility that the patient already has a nasoenteral catheter (NEC) or gastrostomy tube (G-Tube)	Accepted	-
Making it clear in the description of the algorithm that the criteria are for indicating hypodermoclysis in adult patients	Accepted	-
If the anasarca is not complete, the SBGG manual suggests puncture in places that are not so edematous, infraclavicular region for example	Accepted	-
It is not clear why the central access route does not have the item referring to "consent"	Accepted	-
I suggest the inclusion of exceptions, such as the need for mixed routes, as in the case of the patient who is able and needs peripheral venous access, but also receives intermittent SC medication (which allows the installation of hypodermoclysis)	Not accepted	It is considered that the suggestion of the item requires the inclusion of other activities that go beyond the proposed objective
I suggest adding "consent" regardless of the route of drug administration.	Accepted	-
Appearance Validation		
I suggest that the description next to the diamond is inside the picture	Not accepted	Such suggestion is not feasible due to the properties of the Bizagi Softwere.
Correcting: Consent	Accepted	-
The algorithm guides the user in choosing access, but the way the access routes are ordered seems to leave hypodermoclysis as the last option. And, in my opinion, it could be an option as soon as the oral route is discarded.	Accepted	-
I suggest adopting a linear algorithm	Not accepted	The capacity of the Software and the number of items do not allow this adjustment.
Pictures and drawings could be more notable for better visualization	Not accepted	The elements arranged in the algorithm followed the symbol notations and default settings of the software.
Central access: I suggest describing "central venous access"	Accepted	-
The line towards "no" in the need for volume replacement is out of line with the other propositions	Accepted	-

Source: Prepared by the authors.

It was possible to verify the increase in CVC values compared to the Delphi I round. Furthermore, it was shown that the constructed algorithm is valid, that is, it is relevant to be used in healthcare environments that use HDC.

Discussion

The construction and validation of an algorithm to guide the eligibility of HDC in adult patients was developed with methodological rigor to allow scientific knowledge to be accessible to nursing professionals who work in care spaces where it can be used. Its construction allowed to summarize the main available evidence, and from that, base the dissemination of knowledge about the technique, in addition to contributing to decision making and, consequently, more qualified nursing care (3,15).

It is understood that the development and implementation of care standardization instruments, such as algorithms, guide nursing actions, which has a positive impact on care practices, with systematized recommendations based on quality and patient safety. This ensures that patients receive adequate, timely, and qualified care, as it is a theoretical-practical support tool (16, 17).

Therefore, for validation of content and appearance, it was decided to apply the Delphi technique, as it is a tool that allows evaluation of information systematically, in the effort of expert consensus (evaluating judges or specialists) on a defined theme (13, 18).

Regarding the judges participating in the content and appearance validation of the algorithm, a predominance of teaching activities was identified and those who reconcile teaching with assistance. Thus, the construction of a standardization instrument aims to increase the capacity of health services to use evidence in favor of more effective policies, linking new scientific knowledge and its application in care to produce beneficial results (19).

It is also clarified that the experts' contributions were the result of their clinical experience on the subjects. The methodological framework states that these modifications are relevant in validation studies because even when dealing with subjective assessments, such changes allow for a better understanding of the content and appearance, clarity, as well as simplifying the reading, facilitating the interpretation and objectivity of the instrument (13, 18).

In addition, group discussions on complex issues are conducted by experts, called "judges," in an interactive and structured process. In this way, they become capable of understanding and evaluating the situations presented in the algorithm that contributed with relevant and pertinent suggestions to evaluate the instrument. Evidence-based knowledge and practical experience from everyday life are gathered in a structured way, which makes it possible to judge the viability of the instrument (20).

It is noteworthy that the psychometric model used has been widely employed in nursing research since Pasquali's methodological framework encourages the construction of an instrument capable of assessing what is expected. Thus, methodological studies aim to obtain and organize reliable, accurate and applicable data in different realities that deal with people eligible for HDC (13, 21).

In the process of validating the content and appearance of the algorithm, two Delphi validation stages were necessary to reach the final version of the instrument. This process of adapting the material made it more grounded and will facilitate its use by the nursing team. It is important to highlight that the technological tools that standardize assistance have the capacity to transform the provision of care, regardless of the sector in which it is used. Thus, it contributes to improving the quality of care and enhancing the experience individually and collectively (22).

Thus, the final Delphi stage of validation reached suitability values both in content and appearance in all criteria, as they contemplated the indices recommended by the reference adopted in this study, which was 0.8 according to Pasquali (13).

Furthermore, as a limitation of the study, the impasse of HDC being a more widespread technique in palliative care stands out, and thus the studies limit the profile of the patient who uses it, which may imply limitations of the findings presented.

As for the validation process, the difficulty of initial contact with the judges is highlighted, since most of the participants found in the advanced search of the lattes platform did not provide the e-mail in this tool. In addition, the loss of judges on the research panel can be mentioned as a limitation, due to the delay in returning the material sent to them.

Conclusions

The algorithm for electing adult patients to use HDC was built and validated through the judges' assessment and reached levels of agreement and adequacy according to the requirements established and foreseen in the reference used. It is noteworthy that the experts' contributions were essential, since they provided the construction of an instrument suitable for the reality of care, with the use of more coherent flows and terms.

It is understood that the use of this algorithm will contribute to safer nursing care, as it reinforces the use of evidence-based praxis because it is an instrument capable of bringing the theoretical and practical fields closer together. Moreover, it contributes to the appreciation of the work performed by nurses, by allowing a continuous process of care. In addition, the material produced has the potential to favor the use of a simple, inexpensive and effective technique—HDC.

Conflict of interest: None declared.

References

1. Kodru A, Koloper Z, Gveric-Krecak V, Krečak I. PB2350: Safety and efficacy of hypodermoclysis in patients with hematological cancers. HemaSphere. 2022;6:2219-20. DOI: https://doi.org/10.1097/01.HS9.0000852224.28483.25
2. Adem S, ALMouaalamy N. Effectiveness and safety of hypodermoclysis patients with cancer: A single-center experience from Saudi Arabia. Cureus. 2021;13(3):e13785. DOI: https://doi.org/10.7759/cureus.13785
3. Fürst P, Lundström S, Klepstad P, Strang P. Continuous subcutaneous infusion for pain control in dying patients: Experiences from a tertiary palliative care center. BMC Palliat Care, 2020;19(172). DOI: https://doi.org/10.1186/s12904-020-00681-3
4. Bolela F, Lima R, Souza AC, Moreira MR, Lago AJO, Simino GPR et al. Cancer patients in palliative care: Occurrences related to venipuncture and hypodermoclysis. Rev Latino-Am Enfermagem. 2022;30:e3624. DOI: https://doi.org/10.1590/1518-8345.5825.3624
5. Coutinho JSL, Mendonça ET, Braga LM, Salgado PO, Ercole FF, Toledo LV. Problematization methodology's impact on nursing and medical students' knowledge about hypodermoclysis: Quasi-experimental study. Rev Latino-Am Enfermagem. 2024;32:e4131. DOI: https://doi.org/10.1590/1518-8345.7006.4131
6. Coelho TA, Wainstein AJA, Drummond-Lage AP. Hypodermoclysis as a strategy for patients with end-of-life cancer in home care settings. Am J Hosp Palliat Care. 2020;37(9):675-82. DOI: https://doi.org/10.1177/1049909119897401
7. Cabañero-Martínez MJ, Ramos-Pichardo JD, Velasco-Álvarez, García-Sanjuán S, Lillo-Crespo M, Cabrero-García J. Availability and perceived usefulness of guidelines and protocols for subcutaneous hydration in palliative care settings. J Clin Nurs. 2019;28(21):4012-20. DOI: https://doi.org/10.1111/jocn.15036
8. Choudhury A. Toward an ecologically valid conceptual framework for the use of artificial intelligence in clinical settings: Need for systems thinking, accountability, decision-making, trust, and patient safety considerations in safeguarding the technology and clinicians. JMIR Hum Factors. 2022;9(2):e35421. DOI: https://doi.org/10.2196/35421
9. Jayakumar P, Moore MG, Furlough KA, Uhler LM, Andrawis JP, Koenig KM et al. Comparison of an artificial intelligence–enabled patient decision aid vs educational material on decision quality, shared decision-making, patient experience, and functional outcomes in adults with knee osteoarthritis: A randomized clinical trial. JAMA Netw Open. 2021;4(2):e2037107. DOI: https://doi.org/10.1001/jamanetworkopen.2020.37107
10. Suha AS, Sanam TF. Exploring dominant factors for ensuring the sustainability of utilizing artificial intelligence in healthcare decision making: An emerging country context. Intern J Informa Manag Data Insig. 2023;3(1):100170. DOI: https://doi.org/10.1016/j.jjimei.2023.100170
11. Broadhurst D, Cooke M, Sriram D, Gray B. Subcutaneous hydration and medications infusions (effectiveness, safety, acceptability): A systematic review of systematic reviews. Plos One. 2020;15(8):e0237572. DOI: https://doi.org/10.1371/journal.pone.0237572
12. Berridge C, Turner NR, Liu L, Karras SW, Chen A, Fredriksen-Goldsen K. Advance planning for technology use in dementia care: Development, design, and feasibility of a novel self-administered decision-making tool. JMIR Aging. 2022;5(3):e39335. DOI: https://doi.org/10.2196/39335
13. Pasquali L. Instrumentação psicológica: fundamentos e práticas. Porto Alegre: Artmed; 2010.
14. Council for International Organizations of Medical Siences (CIOMS). International ethical guidelines for biomedical research involving humans' subjects. Geneva: WHO; 1993.
15. Feng J, Phillips RV, Malenica I, Bishara A, Hubbard AE, Celi LA et al. Clinical artificial intelligence quality improvement: Towards continual monitoring and updating of AI algorithms in healthcare. npj Digit Med. 2022;5(66). DOI: https://doi.org/10.1038/s41746-022-00611-y
16. Atalan A, Şahin H, Atalan YA. Integration of machine learning algorithms and discrete-event simulation for the cost of healthcare resources. Healthcare. 2022;10(10):1920. DOI: https://doi.org/10.3390/healthcare10101920
17. Yelne S, Chaudhary M, Dod K, Sayyad A, Sharma R. Harnessing the power of AI: A comprehensive review of its impact and challenges in nursing science and healthcare. Cureus. 2023;15(11):e49252. DOI: https://doi.org/10.7759/cureus.49252
18. Araújo MP, Maciel EL, Lima OC, Garcia AS, Monteiro ME, Prado TN. Aplicativo SARA para tratamento de pessoas com tuberculose: estudo metodológico. Acta Paul Enferm. 2023;36:eAPE03391. DOI: https://doi.org/10.37689/acta-ape/2023AO03391
19. Goodman KE, Morgan DJ, Hoffmann DE. Clinical Algorithms, Antidiscrimination laws, and medical device regulation. JAMA. 2023;329(4):285-6. DOI: https://doi.org/10.1001/jama.2022.23870
20. Spranger J, Homberg A, Sonnberger M, Niederberger M. Reporting guidelines for Delphi techniques in health sciences: A methodological review. Z Evid Fortbild Qual Gesundh wesen (ZEFQ). 2022;172:1-11. DOI: https://doi.org/10.1016/j.zefq.2022.04.025
21. Cassiano AN, Silva CJDA, Nogueira ILA, Elias TMN, Teixeira E, Menezes RMPD. Validação de tecnologias educacionais: estudo bibliométrico em teses e dissertações de enfermagem. R Enferm Cent O Min. 2020;10. DOI: https://doi.org/10.19175/recom.v10i0.3900
22. Rege S, Malik AM, Ward M, Hong J. Checklists in community care: Reducing differences in care delivery between regular and relief staff to improve consistency and client experience. BMJ Open Quality, 2020;9(2):e000809. DOI: https://doi.org/10.1136/bmjoq-2019-000809

Joyce Viana Barbosa, Milka Leandro Saldanha Toscano,
Dayara Ainne de Sousa Araújo,
Maysa Mayran Chaves Moreira, Walkiria Gomes da Nóbrega,
Quenia Camille Soares Martins

Hypodermoclysis As a Care Tool: Algorithm Construction and Validation*

La hipodermoclisis como herramienta asistencial: construcción y validación de un algoritmo*

Hipodermóclise como ferramenta do cuidado: construção e validação de algoritmo*

Aquichan
vol. 24, no. 3, e2435, 2024
Universidad de La Sabana,
ISSN: 1657-5997
ISSN-E: 2027-5374

DOI: https://doi.org/10.5294/aqui.2024.24.3.5