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EFFECT OF THE ASSOCIATION OF TWO EDUCATIONAL INTERVENTIONS ON STUDENTS' KNOWLEDGE ABOUT HYPODERMOCLYSIS: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Objective: to ass the effect of associating the problematization methodology with practical demonstration on nursing students' knowledge about hypodermoclysis.
Method: this is a quasi-experimental study with 20 students in their final year of the undergraduate course in nursing at a public higher education institution, located in Viçosa, Minas Gerais, Brazil. Students participated in two educational interventions focused on teaching hypodermoclysis, one using problematization methodology and the other the practical demonstration of the puncture technique. The effect of the interventions on students' knowledge was assessed using a previously validated questionnaire applied before the first intervention and after the second intervention. The results were compared using the McNemar test.
Results: students' mean age was 24.7 (±1.7) years, with a predominance of females (75.0%). It was found that, of the 12 questions assessed about theoretical and practical knowledge of hypodermoclysis, 10 (83.3%) showed an increase in correct answers after educational interventions ($p<0.05$). Students' mean score in self-assessment on their ability to explain the procedure (before: 0.9 points; after: 7.7 points) and perform the technique (before: 2.1 points; after: 8.1 points) was significantly higher after educational interventions ($p<0.001$).
Conclusion: the number of correct answers by nursing students on theoretical and practical questions about hypodermoclysis and self-assessment was greater after participating in educational interventions, which demonstrates a positive effect of the association of problematization methodology and practical demonstration as a teaching strategy on this topic.

DESCRIPTORS: Nursing. Nursing Students. Hypodermoclysis. Educational Technology. Epidemiological Studies. Knowledge.

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EFEITO DA ASSOCIAÇÃO DE DUAS INTERVENÇÕES EDUCATIVAS NO CONHECIMENTO DE ESTUDANTES SOBRE HIPODERMÓCLISE: ESTUDO QUASE-EXPERIMENTAL

RESUMO

Objetivo: avaliar o efeito da associação da metodologia da problematização com a demonstração prática no conhecimento de estudantes de Enfermagem sobre hipodermóclise.
Método: estudo quase-experimental com 20 estudantes do último ano do curso de graduação em Enfermagem de uma instituição pública de ensino superior, localizada em Viçosa, Minas Gerais, Brasil. Os estudantes participaram de duas intervenções educativas com foco no ensino da hipodermóclise, uma utilizando a metodologia da problematização e a outra a demonstração prática da técnica de punção. O efeito das intervenções sobre o conhecimento dos estudantes foi avaliado a partir de um questionário previamente validado aplicado antes da primeira intervenção e depois da segunda intervenção. Os resultados foram comparados pelo teste de McNemar.
Resultados: a média de idade dos estudantes foi de 24,7 (±1,7) anos, com predomínio do sexo feminino (75,0%). Verificou-se que, das 12 questões avaliadas sobre o conhecimento teórico e prático da hipodermóclise, 10 (83,3%) apresentaram aumento de acertos após as intervenções educativas ($p<0,05$). A pontuação média dos estudantes na auto avaliação sobre a capacidade de explicar o procedimento (antes:0,9 pontos; após:7,7 pontos) e executar a técnica (antes:2,1 pontos; após:8,1 pontos) foi significativamente maior após as intervenções educativas ($p<0,001$).
Conclusão: o número de acertos dos estudantes de Enfermagem nas questões teóricas e práticas sobre hipodermóclise e a auto avaliação foi maior após a participação nas intervenções educativas, o que demonstra efeito positivo da associação da metodologia da problematização e da demonstração prática como estratégia de ensino sobre essa temática.

DESCRITORES: Enfermagem. Estudantes de enfermagem. Hipodermóclise. Tecnologia educacional. Estudos epidemiológicos. Conhecimento.

EFECTO DE LA ASOCIACIÓN DE DOS INTERVENCIONES EDUCATIVAS EN EL CONOCIMIENTO DE LOS ESTUDIANTES SOBRE LA HIPODERMOCLISIS: ESTUDIO CUASIEXPERIMENTAL

RESUMEN

Objetivo: evaluar el efecto de asociar la metodología de problematización con la demostración práctica sobre el conocimiento de los estudiantes de enfermería sobre la hipodermoclisis.
Método: estudio cuasiexperimental con 20 estudiantes del último año de la carrera de enfermería de una institución pública de educación superior, ubicada en Viçosa, Minas Gerais, Brasil. Los estudiantes participaron de dos intervenciones educativas enfocadas a la enseñanza de la hipodermoclisis, una utilizando la metodología de la problematización y la otra una demostración práctica de la técnica de punción. El efecto de las intervenciones sobre el conocimiento de los estudiantes se evaluó mediante un cuestionario previamente validado aplicado antes de la primera intervención y después de la segunda intervención. Los resultados se compararon mediante la prueba de McNemar.
Resultados: la edad promedio de los estudiantes fue de 24,7 (±1,7) años, con predominio del sexo femenino (75,0%). Se encontró que, de las 12 preguntas evaluadas sobre conocimientos teóricos y prácticos de la hipodermoclisis, 10 (83,3%) mostraron aumento de aciertos después de las intervenciones educativas ($p<0,05$). La puntuación media de los estudiantes en la autoevaluación sobre su capacidad para explicar el procedimiento (antes:0,9 puntos; después:7,7 puntos) y realizar la técnica (antes:2,1 puntos; después:8,1 puntos) fue significativamente mayor después de las intervenciones educativas ($p<0,001$).
Conclusión: el número de respuestas correctas de los estudiantes de enfermería a preguntas teóricas y prácticas sobre hipodermoclisis y autoevaluación fue mayor después de participar en intervenciones educativas, lo que demuestra un efecto positivo de la asociación de la metodología de problematización y la demostración práctica como estrategia de enseñanza en este tema.

DESCRIPTORES: Enfermería. Estudiantes de Enfermería. Hipodermoclisis. Tecnologia Educacional. Estudios Epidemiológicos. Conocimiento.

INTRODUCTION

Hypodermoclysis is a technique used mainly in geriatrics and palliative care. It consists of isotonic fluid and/or medication administration subcutaneously to perform electrolyte replacement and/or drug therapy[1]. It stands out as a technique that presents advantages in relation to intravenous medication administration, especially in relation to low cost, greater comfort and lower occurrence of complications[2–4]. Among the possible complications are local reactions such as edema, obstruction, erythema, cellulitis, hematoma and induration, considered, for the most part, reversible and rare in occurrence[1–2].

In clinical practice, it is observed that nursing professionals must perform hypodermoclysis; however, despite being an old and safe technique, it is still little known and used. Different studies demonstrate that nursing professionals still show little knowledge or adeptness of this technique, making it necessary to explain this knowledge during the professional training process to expand its use and promote greater safety[5–6]. A survey conducted with 119 nursing students from a university in Bahia identified that only 44% of students in the last semester of the course knew the terminology and technique of hypodermoclysis[7].

In this context, it is clear that nursing students' qualification is important to be able to safely incorporate this technique into their future professional practice. To this end, it is essential that undergraduate courses provide the technical-scientific framework necessary for students' training. The use of different teaching methods, such as active methodologies, can be considered a powerful strategy for acquiring knowledge and developing professional skills such as autonomy, clinical reasoning and problem-solving through reflection, study and research[8–10].

There are several active methodologies that can be used in teaching. Professors must choose the best teaching strategy that anchors practice based on scientific evidence. Thus, among the different effective options for health teaching, previously used as a research object, the problematization based on the Maguerez Arch stands out[11]. This methodology is divided into five interconnected stages: reality observation, survey of the key points of the problem, theorization, solution hypotheses and application to reality. From observing a problem, students are led to seek and build their knowledge and thus achieve transformation in the teaching-learning process[12]. Therefore, there is an approach among students of care practice based on the need for decision-making focused on individuals' and communities' biopsychosocial aspects[9].

It is important to highlight that, in consolidating the teaching-learning process about hypodermoclysis, practical knowledge is also considered fundamental, since it is a technique that needs to be carried out in professional-patient contact and that there is a distinction between knowledge and to do. The literature points to nurses as the main responsible for carrying out the technique, highlighting care as the essence of nursing actions[13]. Thus, it is necessary and important for students to have contact with this content based on the use of theoretical-practical teaching methods.

Given the benefits of this fluid infusion technique for many patients as well as the deficiencies in nurses' training process regarding this topic, it was proposed to carry out this intervention study with the objective of assessing the effect of two educational interventions with a non-traditional approach. It is believed that the association of two educational interventions aimed at teaching hypodermoclysis can produce changes in students' level of knowledge and promote greater visibility to a topic that is little explored.

In this context, this study asks: can the association of problematization methodology with practical demonstration influence nursing students' knowledge about hypodermoclysis? Thus, this study aimed to assess the effect of associating the problematization methodology with practical demonstration on nursing students' knowledge about hypodermoclysis.

METHOD

This is a quasi-experimental study, of the before and after type, which assessed the effect of the association of two methodologies (the problematization methodology with practical demonstration) on nursing students' knowledge about hypodermoclysis (variable of interest). The study did not include a comparison group, each student served as their own control.

The study was conducted at a public higher education institution located in southeastern Brazil. This institution annually receives students approved in the unified selection process to enter the undergraduate course in nursing, with 50 places being offered annually.

The study population was made up of students in their final year of the undergraduate course in nursing (n=28). Those aged 18 or over were included. Students who had previously participated in specific training on hypodermoclysis were excluded, however, none met this criterion. In the end, non-probabilistic, intentional sample was composed of 20 (71.4%) nursing students who attended the department and participated in educational interventions in February 2022.

Two educational interventions were carried out: the first based on problematization methodology and the second based on the practical demonstration of the puncture technique and hypodermoclysis management. All students participated in both interventions at the same time and each participant was considered their own control. Knowledge about hypodermoclysis was measured before the start of educational interventions, immediately after completing characterization data (pre-test) and after the end of practical demonstration (post-test).

To carry out educational interventions, students were randomly divided into three groups, with up to eight students in each. Randomization took place by drawing, carried out by a member external to the research. The three groups remained in the same room, but with a distance of approximately two meters between them. The researcher in charge passed on the information to all groups at the same time, and each group had an assistant researcher responsible for helping to conduct the entire process. Separation into small groups occurred in order to allow better interaction between students, greater reflection on the Maguerez Arch stages and better visualization of practical demonstration. Interventions were carried out in a single day, lasting 600 minutes, as shown in Figure 1.

The first educational intervention was carried out following the five Maguerez Arc stages: reality observation; survey of key point; theorization; solution hypothesis; and application to reality[14].

In the reality observation stage, the main researcher distributed to all students a clinical case previously constructed and validated by nurses with agreement Content Validity Index of 1.0[15]. Students were instructed to carry out a critical and reflective reading of the case. The clinical case's central problem consisted of the need for home treatment of symptoms using an alternative route of drug administration due to the impossibility of using oral and intravenous routes for an elderly patient with a traumatic history of multiple hospitalizations. Furthermore, it involved discussions about the cultural, psychological, affective, social, bioethical and financial aspects related to denial of hospital admission.

During the key points stage of the clinical case, the researcher transcribed all the points listed by each group onto a whiteboard. Key points were consolidated in a learning question, elaborated in agreement between all three groups, namely: what strategies can be used by the multidisciplinary team, in comprehensive care, ensuring comfort, autonomy and respecting the family context and patient subjectivity?

Then, we proceeded to the theorization stage. At this stage, students were encouraged to search the scientific literature for information to respond to the key points identified in the clinical case. The researchers provided access to physical books and computers. After the study period, the evidence found by the groups was presented, mediated by the researcher.

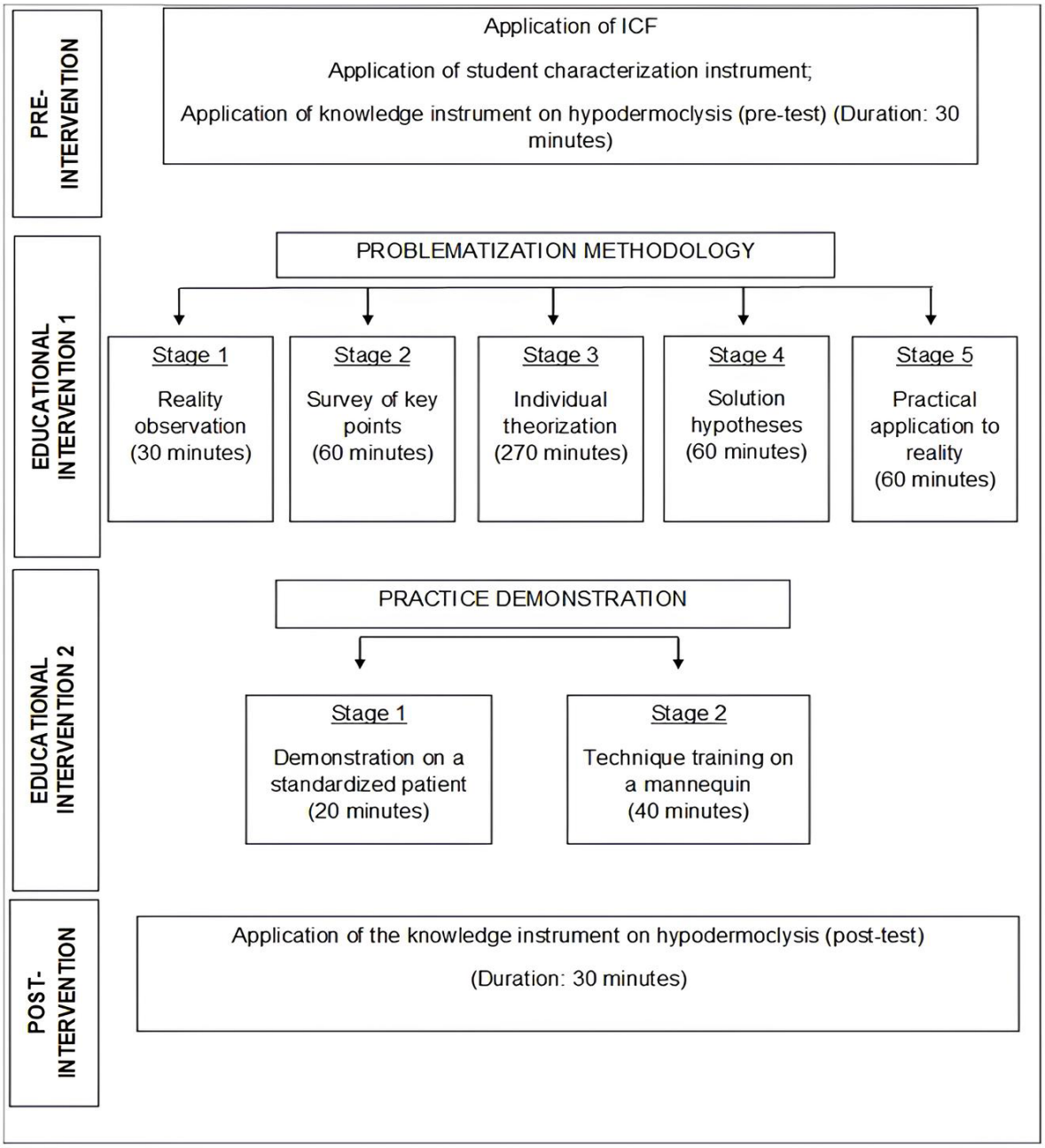

Figure 1 – Flowchart of the study operational stages. Viçosa, MG, Brazil, 2022.

At the end of theorizing, the researcher wrote down on a whiteboard the hypotheses for solutions to the problem situation, suggested by each group. During the educational activity, due to the impossibility of taking students to a real practice setting, it was not possible to apply reality on site. However, the groups presented solution hypotheses detailing their planning so that they could be carried out by students during their undergraduate internship or professional life.

After completing the Maguerez Arch, the second educational intervention took place, divided into two stages. In the first stage, hypodermoclysis management in a standardized patient was demonstrated, with an access to the abdominal site carried out by an assistant researcher. To this end, the materials tray, procedure gloves, antiseptic solution, gauze or cotton, equipment, 0.9% saline solution of 500 ml, needle for medication aspiration 40 x 12 mm, extender, 3 and 5 ml, catheter on needle (Abocath) 20G to 24G, transparent film, micropore hypoallergenic tape or adhesive tape for fixation were used.

The second stage of this intervention was aimed at training technical skills in hypodermoclysis on simulation mannequins. At this stage, the Adult Bisexual Mannequin–SD-4000–Sdorf Scientific was used. Students accessed the different sites available: deltoid, anterior chest, scapular, abdominal and lateral aspect of the thigh. Each student performed at least one access.

For each student, information related to sociodemographic characterization and knowledge about hypodermoclysis was collected. Participants were characterized according to age (in years), sex (female/male), race/color (white/black/brown/yellow/other/undeclared), marital status (single/married/stable union/other), previous training – technical or higher in any area (no/yes – specify).

Knowledge about hypodermoclysis was assessed using a previously validated instrument[16]. This instrument is composed of structured questions that address knowledge about hypodermoclysis theory and practice, such as: what is hypodermoclysis? Indications, absolute and relative contraindications, puncture sites, possible complications, professionals responsible for puncture prescription, device used in puncture, maximum time the device remains needled and not needled, maximum volume infused in 24 hours. At the end, the instrument presents a student's self-assessment regarding the ability to explain the procedure to another person and carry it out, ranging from 0 to 10 points: 0-not able and 10-capable). The instrument was applied before the beginning of the first educational intervention (problematization methodology) and after the end of the second intervention (practical demonstration), in order to allow the comparison of students' correct answers at both moments.

Data were double entered into Microsoft Excel® package and analyzed using the Statistical Package for the Social Sciences (SPSS version 23). For the general assessment of the responses obtained, all questions were corrected according to the template present in the instrument used for data collection. A descriptive analysis of participant characteristics and the answers obtained to the questions on knowledge of hypodermoclysis was carried out. Categorical variables were expressed using absolute and relative frequencies. Quantitative variables were presented based on measures of central tendency and variability (mean and standard deviation or median and interquartile range), according to the normality of data distribution.

The effect of the educational intervention on nursing students' work was assessed using the McNemar test, based on the number of correct answers per question, comparing the answers obtained before and after the educational intervention. Analysis of students' self-assessment of their ability to explain and execute the procedure was carried out by comparing the mean scores indicated by participants at two moments (before and after the educational intervention), using paired Student's t-test. The statistical significance level of p-value <0.05 was adopted.

The study followed the ethical principles of Resolution 466/2012 of the Brazilian National Health Council, and was approved by the Research Ethics Committee of the proposing institution, under Protocol 5.249.949. Students who agreed to participate in the research signed the Informed Consent Form, guaranteeing data confidentiality and anonymity.

RESULTS

As for participant profile characterization, it was evident that, among the 20 students, the mean age was 24.7 (±1.7) years. Table 1 shows other characterization data.

Regarding students' knowledge about the theoretical and practical aspects of hypodermoclysis, it was found that, of the 12 questions assessed, 10 (83.3%) showed an increase in correct answers between the questionnaire applied before and after the intervention (p<0.05), as shown in Table 2.

Table 1 – Nursing student sociodemographic characteristics. Viçosa, MG, Brazil, 2022. (n=20).

Variables	n (%)
Sex	
Female	15 (75.0)
Male	5 (25.0)
Race	
White	12 (60.0)
Black	2 (10.0)
Brown	5 (25.0)
Undeclared	1 (5.0)
Marital status	
Single	18 (90.0)
Married/stable Union	2 (10.0)
Technical level training prior to graduation	
No	18 (90.0)
Yes	2 (10.0)

Table 2 – Comparison of the number of correct answers by nursing students on questions about hypodermoclysis before and after the educational intervention. Viçosa, MG, Brazil, 2022. (n=20).

Variables	Before the intervention n(%)	After the intervention n(%)	p-value*
Theoretical aspects of hypodermoclysis			
What is hypodermoclysis	18 (90.0)	20 (100.0)	0.006
Indications	1 (5.0)	8 (40.0)	0.039
Absolute contraindications	–	8 (40.0)	<0.000
Relative contraindications	–	8 (40.0)	<0.001
Practical aspects of hypodermoclysis			
Puncture sites	2 (10.0)	16 (80.0)	<0.001
Possible complications	2 (10.0)	2 (10.0)	1.000
Responsible for prescription	5 (25.0)	20 (100.0)	<0.001
Responsible for puncture	4 (20.0)	15 (75.0)	0.003
Device used in puncture	6 (30.0)	16 (80.0)	0.002
Needle device dwell time	1 (5.0)	18 (90.0)	<0.001
Non-needling device dwell time	–	19 (86.4)	<0.001
Maximum volume to be infused in 24 hours	6 (30.0)	11 (55.0)	0.180

*McNemar test.

With regard to students' self-assessment in relation to the ability to explain the procedure to another student and the ability to perform the procedure, it was found that the educational intervention with the problematization methodology and hypodermoclysis puncture practical demonstration presented positive and statistically significant results (p<0.001) in the development of these skills, as shown in Table 3.

Table 3 – Comparison of nursing students' self-assessment means in relation to the development of skills related to hypodermoclysis before and after the educational intervention. Viçosa, MG, Brazil, 2022. (n=20).

Variables	Before the intervention m(±SD)	After the intervention m(±SD)	Mean Diff (95%CI)	p-value*
Ability to explain the procedure to another student	0.9 (±1.4)	7.7 (±1.5)	-6.7 (-7.5-5.9)	<0.001
Ability to perform the procedure	2.1 (±3.0)	8.1 (±1.4)	-6.0 (-7.3-4.7)	<0.001

*Paired Student's t-test.

DISCUSSION

The positive effect of the association of different methodologies used to acquire knowledge about hypodermoclysis' theoretical and practical aspects can be proven by the increase in the number of correct answers to the questions and students' positive self-assessment after participating in the interventions. In nursing, the use of active teaching and learning methodologies is still a challenging process, but with significant impacts. Breaking traditional education requires skills, competencies and, above all, the desire to innovate. To this end, it is necessary for professors to learn and use new methodologies with progressive pedagogical approaches that help developing teaching capable of modifying nurses' actions in their daily practice[17].

Different studies with students in the health field address the positive aspects of active methodologies for the professional training process. Among nursing students at a college in the North of Minas Gerais, 91.9% said they learned better with classes/activities that use active methodologies[18]. For 94% of medical students at a public university, active methodologies provide greater interaction between colleagues and, consequently, greater learning effectiveness[19].

In this study, the methodological resources used were the problematization methodology based on the Maguerez Arc and the practical demonstration of the hypodermoclysis puncture technique. As it is considered a methodology that aims to solve real problems through actions that involve reasoning, reflection and decision-making, problematization has been incorporated into undergraduate courses in the health area. The purpose of this is to allow students to put themselves in the shoes of future professionals who aim to transform the reality they encounter[20]. For future nurses, it is seen as a way of analyzing the adversities present in a given context, developing strategies capable of resolving them and intervening through planned actions, in addition to allowing greater student interaction, leading role and participation[20–21]. It is also worth highlighting the versatility of this methodology, having a positive effect on teaching different topics such as indwelling bladder catheterization[11], nursing ethics[22] and educational health planning[20].

Another resource used to encourage student learning was the practical demonstration of the hypodermoclysis puncture technique in the laboratory. A survey carried out with nursing students in Rio Grande do Sul concluded that practical classes in the field and in the laboratory are among the techniques/methods/teaching resources that most facilitate learning[17]. Similarly, a qualitative study showed that students highlight the importance of practical classes, as practical learning materializes learning and highlights how necessary it is for professional training[23]. Practical training positively impacts the training process of future nurses, favoring the development of clinical skills, professional competence and the acquisition of an ethical attitude towards patient care[24].

Considering the underutilization of hypodermoclysis even in situations where there is greater benefit for patients[25], for there to be a change in reality, it is necessary to acquire theoretical knowledge, develop practical skills and change professionals' ethical stance, both the team and nursing team, as well as the medical team, responsible for prescribing hypodermoclysis. Such changes can be

encouraged by the strategies adopted in the proposed interventions[24,26]. Objectively, it was possible to see that the interventions used had a positive effect on students' knowledge. Theoretical aspects such as the conceptual definition and practical aspects such as who is responsible for prescription were questions with 100% success in post-test.

Despite the positive effect of the interventions, it is noteworthy that, in the comparison between the pre- and post-test, there was no significant difference in the number of students who answered the question regarding possible complications correctly. The fact that students have not progressed in getting this question right raises concern and reinforces the importance of approaching this topic in moments of theoretical reflection, such as the moment of theorization, with the explanation made by the professor as well as on another opportunity, with other methodologies. The purpose is to allow assimilation of this content, as decisions on how to proceed in these situations are necessary for professional nurses when caring for patients.

Despite having low occurrence and severity, nurses must recognize possible complications such as edema, heat, redness or pain at puncture site and intervene effectively, either by reducing the speed of the infusion or by removing the access[27–28].

Furthermore, the question regarding the maximum volume to be infused in 24 hours also did not show a significant difference between the pre- and post-test, although many students, after participating in the interventions, realized they were wrong. It is believed that this lack of significance is related to the fact that there is not the same maximum volume for all puncture sites, but rather different values depending on the punctured site, which may generate greater doubt[1].

In addition to statistical analysis, it is worth highlighting that some questions still remained weaknesses in nursing students' knowledge, achieving only 40.0% correct answers after the interventions. These questions refer to indication, absolute contraindications and relative contraindications. Although the prescription of hypodermoclysis is considered a responsibility of the medical team, the nurse must be aware of its indication, so that its use in patients who may benefit from this technique is not neglected. Although the technique is indicated for patients undergoing palliative care, an international study demonstrated that patients in the terminal stage of the disease had fewer benefits and greater occurrences of adverse events. This reinforces the importance of professionals' knowledge to carry out a careful assessment of patients' condition before subjecting them to the procedure[29]. Furthermore, it is emphasized that family members must participate in the decision-making process regarding treatment with the hypodermoclysis technique. Therefore, care team, including nurses, must be able to provide guidance to family members in a clear and evidence-based manner in order to facilitate the decision-making process[30].

Hence, the appropriation of specific nursing knowledge about the theoretical and practical aspects of hypodermoclysis can help the development of safe assistance with greater benefits for patients indicated for this technique. It is noteworthy that the scientific literature points out that teaching hypodermoclysis practice should be encouraged in universities, in order to favor the training of qualified professionals to carry it out[3].

One of the limitations found refers to study design. As it is considered a quasi-experimental study, the absence of a control group is evident; therefore, the results must be interpreted with caution and new studies with an experimental design must be encouraged. Furthermore, the short time interval between the interventions and questionnaire application to assess knowledge can be considered a limitation, as it is not possible to verify whether students' knowledge would remain the same at different times. However, it should be noted that the specific assessment of students' knowledge can be assessed by comparing the results obtained before any intervention and after completion of the second educational intervention.

CONCLUSION

The educational interventions carried out in the research had a positive impact on students' knowledge, with an improvement in the number of correct answers and self-assessment of participants in questions about hypodermoclysis after participating in the study. Thus, it is clear that the association of the problematization methodology and the practical demonstration of the technique is an important tool for the teaching-learning process on this topic.

During nursing care, it is essential that professionals have adequate knowledge to perform the technique in a safe and comfortable manner. Therefore, the adoption of different methodologies can contribute to better learning during nurse training and rational use of the technique/procedure.

In this context, the importance of rethinking the way of teaching stands out, especially topics that include technical skills combined with clinical reasoning. The inclusion of active methodologies as teaching strategies about hypodermoclysis for undergraduate course in nursing can be beneficial, as they allow students to interact and reflect, facilitating the understanding and appropriation of the content covered, which will result in greater safety during assistance. Furthermore, given the low availability of articles on the subject, the contribution of this study to the advancement of technical-scientific knowledge in the area of research stands out.

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NOTES

ORIGIN OF THE ARTICLE

This study is part of a dissertation – "*Efeito da associação da metodologia da problematização com a demonstração prática no conhecimento de estudantes de enfermagem sobre hipodermóclise*", presented to the Graduate Program in Health Sciences, at the *Universidade Federal de Viçosa*, in 2024.

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APPROVAL OF ETHICS COMMITTEE IN RESEARCH

Approved by the Ethics Committee in Research of the *Universidade Federal de Viçosa*, Opinion 5.249.949/2022, Certificate of Presentation for Ethical Consideration 51987621.0.0000.5153.

CONFLICT OF INTEREST

There is no conflict of interest.

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