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Research Article
Artigo de Pesquisa
Artículo de Investigación

Nursing professionals' perceptions and challenges regarding difficult peripheral venipunctures in oncology

Percepções e desafios de profissionais da enfermagem sobre punção venosa periférica difícil na oncologia

Percepciones y desafíos de los profesionales de enfermería relativos a la punción venosa periférica difícil en oncología

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ABSTRACT

Objective: understanding the perceptions and challenges of the nursing team regarding difficult peripheral venipuncture in adults in oncology. **Method:** a descriptive, cross-sectional study with a qualitative approach, approved by the Research Ethics Committee, carried out with 17 nursing professionals from the oncology unit of a university hospital between January and May 2022, through semi-structured interviews analyzed by Bardin's content, using Iramuteq software to explore the textual corpus. **Results:** five three subcategories were obtained: risk factors, clinical competence, feeling, and aptitude about difficult peripheral venipuncture, with a divergence between nurses and technicians in the latter. **Conclusion**: different perceptions of difficult peripheral venipuncture were identified between nursing technicians and nurses. Among the challenges were the technical skills and clinical factors to be observed in the face of difficult peripheral venipuncture.
Descriptors: Neoplasms; Oncology Nursing; Catheterization, Peripheral; Work Performance; Clinical Competence.

RESUMO

Objetivo: compreender as percepções e os desafios da equipe de enfermagem a respeito da punção venosa periférica difícil em adultos na oncologia. **Método:** estudo descritivo, transversal, com abordagem qualitativa, aprovado pelo Comitê de Ética em Pesquisa, realizado com 17 profissionais de enfermagem da unidade de oncologia de um hospital universitário entre janeiro e maio de 2022, por meio de entrevistas semiestruturadas analisadas por conteúdo de Bardin, com uso do *software* Iramuteq para exploração do corpus textual. **Resultados:** foram obtidas cinco três subcategorias: fatores de risco, competência clínica, sentimento e aptidão sobre punção venosa periférica difícil, com divergência entre enfermeiros e técnicos nesta última. **Conclusão**: identificou-se diferentes percepções sobre a punção venosa periférica difícil foi diferente entre os técnicos de enfermagem e enfermeiros. Entre os desafios, foram citados as competências técnicas e os fatores clínicos a serem observados frente a punção venosa periférica difícil.
Descritores: Neoplasias; Enfermagem Oncológica; Cateterismo Periférico; Desempenho Profissional; Competência Clínica.

RESUMEN

Objetivo: comprender las percepciones y desafíos del equipo de enfermería relativos a la punción venosa periférica difícil en adultos en oncología. **Método:** estudio descriptivo, transversal, con enfoque cualitativo, aprobado por el Comité de Ética en Investigación, realizado con 17 profesionales de enfermería de la unidad de oncología de un hospital universitario entre enero y mayo de 2022, a través de entrevistas semiestructuradas analizadas mediante el análisis de contenido de Bardin, utilizando el *software* Iramuteq para explorar el *corpus* textual. **Resultados:** se obtuvieron cinco clases y tres subcategorías: factores de riesgo, competencia clínica, sentimiento y aptitud ante la venopunción periférica difícil, hubo divergencia entre enfermeros y técnicos en esta última. **Conclusión:** se identificaron diferentes percepciones sobre la punción venosa periférica difícil entre técnicos en enfermería y enfermeros. Entre los desafíos se mencionaron las competencias técnicas y los factores clínicos que hay que observar ante una punción venosa periférica difícil.
Descriptores: Neoplasias; Enfermería Oncológica; Cateterismo Periférico; Rendimiento Laboral; Competencia Clínica.

INTRODUCTION

Cancer is a serious global public health problem due to its high morbidity and mortality rates[1]. In Brazil, around 704,000 new cases of cancer are expected for each year from 2023 to 2025[2]. Among the types of treatment, intravenous chemotherapy is the most widely used and the Peripheral Intravascular Catheter (PIVC) plays an important role in all stages of treatment, from initial to palliative care[3].

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Since it is an outpatient and/or inpatient treatment, the therapeutic regimen dictates the need for intermittent peripheral venipuncture. PIVC has advantages due to its ease and speed of insertion, low cost, wide range of indications, and lower risk of infection and thrombosis[4,5]. Peripheral venipuncture (PV) can be challenging for professionals caring for adult cancer patients, since exposure of the vein to long cycles of antineoplastic treatment leads to loss of vasorelaxant effects, anti-inflammatory and reparative functions, resulting in significant endothelial dysfunction[6].

Difficult Peripheral Venipuncture (*Punção Venosa Periférica Difícil*, PVPD) occurs in between 10% and 24% of adults[4]. It is defined as more than two puncture attempts (even reinsertion of the needle without removing it from the vessel) or a more than one-minute cannulation period. An unsuccessful procedure is described in the presence of resistance, redness, edema, and absence of venous return through the cannula[4,7].

The occurrence of this event is associated with the patient's clinical conditions and the procedure, the repercussions of which impact physical and psychological damage[7]. PVPD can also be responsible for delays in treatment, loss of dose, indication of a central venous catheter, or feelings of professional frustration, where studies show that antineoplastic chemotherapy treatment is an independent risk factor for PVPD[8,9].

Given the complexity and frequency of the problems associated with PVPD in cancer patients, there is an urgent need to investigate how the nursing team perceives and faces these challenges in their daily lives[10], given that infusion therapy is a daily procedure of nursing care within chemotherapy. However, obtaining difficult peripheral venous access is not yet described as a competence of the technician or nurse in COFEN Resolution No. 569/2018[11], which establishes nursing practices in chemotherapy.

Considering these aspects, understanding the challenges and perceptions faced by the nursing team during this procedure is essential, as these aspects can provide valuable information for the development of strategies and interventions that improve clinical practice, contributing to the design of specific training programs and the improvement or creation of clinical guidelines, minimizing complications and improving the patient experience.

In this context, this study aimed to understand the perceptions and challenges of the nursing team regarding difficult peripheral venipuncture in adults in oncology.

METHOD

This is a descriptive, cross-sectional study with a qualitative approach, designed in accordance with the Consolidate Criteria for Reporting Qualitative Research (COREQ) instrument, developed to support researchers in terms of the quality and transparency of the information collected[14]. Descriptive research aims to describe the characteristics of a particular phenomenon or population, focusing on the discourses and interpretation of themes related to the singular reality or multiple realities of the study participants[15].

A High Complexity Oncology Care Unit (*Unidade de Assistência em Alta Complexidade em Oncologia*, UNACON), located at the University Hospital in the city of Belém, state of Pará, was the study setting. The chemotherapy service was inaugurated in 2012 and authorized in May 2017, according to Ordinance No. 851/2017[16]. This service offers clinical oncology consultations, mastology, urology, and palliative care. According to data from 2015 and 2016, the demand for care was 1,700 patients and 2,555 chemotherapy sessions per month. The physical structure of the UNACON has six beds, 16 armchairs, and a multi-professional team made up of doctors, psychologists, nutritionists, social workers, pharmacists, and nurses (24 nurses and 38 technicians), in addition to three oncology nurses.

In this service, the retractable device (active needle protection technique) and the needle protection device (technique susceptible to needle protection) are the two types of PIVC provided by the institution. PVPD was considered the outcome when there were two or more PV attempts[4].

The study population comprised nursing professionals, nursing technicians, and nurses involved in the care of cancer patients undergoing chemotherapy. The inclusion criteria were: nursing professionals working in the direct care of cancer patients undergoing chemotherapy for more than six months in the research setting, who had institutional employment (permanent) or postgraduate (nursing residents). Professionals who were away from work (on some kind of leave or vacation during the collection period) were excluded.

The management of the setting under study, UNACON, provided a list of nursing staff active during the research collection period, to meet the proposed research objective. The initial approach took place in person, with a prior explanation of the research and its objectives, and if the participant signaled their interest in participating, an

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appointment was made according to their availability/convenience. The sample was delimited by convenience, in which all the staff in the sector were recruited: 17 nursing professionals, including nurses and nursing technicians. The approach was face-to-face and there were no withdrawals or refusals from the study.

Data collection took place from January to May 2022, in the chemotherapy, emergency care, and oncology hospitalization services, during the morning and afternoon shifts.

Participants were recruited by invitation before or after their workday. The approach was carried out individually and privately, within the service itself, to guarantee greater confidentiality of information and privacy. A semi-structured script drawn up by the authors was used, with eight open questions related to the topic. No pilot test was carried out. The script (instrument) included questions about the professional's perceptions of what PVPD is, its risk factors, how the professional works in the routine of the service, whether they feel able to perform PVPD, as well as the needs for in-service education.

The interviews were carried out in a single moment per participant, lasting an average of nine minutes. The testimonies were recorded on a digital device, with the participants' authorization, and then transcribed in full into Microsoft Word *Software*®. There was no need to repeat any of the interviews. After the transcripts were finished, the participants were able to read them for approval, but there were no suggestions for corrections or comments.

It should be noted that none of the participants had a direct relationship with the main researcher and all the interviews were conducted solely by the researcher, who had no professional or personal relationship with the institution, thus avoiding any conflict of interest in the study. The results obtained in this research will be presented as *feedback* to the institution and participating professionals at a scientific event at the institution.

For data analysis, the content analysis technique proposed by Bardin[13] was used, divided into three stages: 1) Pre-analysis – Reading and re-reading the descriptions obtained from the interviews; 2) Exploration of the material – phase in which the material analyzed will be categorized according to its meaning so that the thematic categories/units can be elaborated; 3) Treatment of the results obtained and interpretation.

No command lines were inserted to subdivide the *corpus* by nursing technician and nurse categories, due to the small number of participants interviewed. The lexicographic textual analysis was carried out using the software Interface de *R pour Analyses Multidimensionnelles de Textes et de Questionneires* (Iramuteq®), which organized the words found into classes, in descending order according to the frequency (*f*) of occurrences generated from the chi-square test (X^2). The software was also used in the second stage of the content analysis technique, using *Reinert*'s Descending Hierarchical Classification Method (DHC), which was chosen to be analyzed by occurrence, based on text segments (TS).

Satisfactory performance was considered to be TS > 70% and chi-squared ≥ 4, with a significance level of 5% ($p< 0.05$)19. In this exploration stage, with the aid of the software, were obtained the classes that were adjusted, interpreted, and inferred by the researchers for the final definition of the categories.

The research protocol was approved by the Human Research Ethics Committee of the institution involved, with the participants agreeing to and signing the Free and Informed Consent Form.

To ensure the anonymity and confidentiality of the participants, an alphanumeric identification code was used: (N) for nurse and (TE) for technician, followed by the sequential number of the interviews (TE01, N01, TE02, N02...N05, TE12).

RESULTS

A total of 17 nursing professionals took part in the study, with their characterization shown in Table 1.

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Table 1: Characterization of the participants (n=17). Belém, PA, Brazil, 2022.

Characteristics		**n (%)**
Age – Mean (Min-Max) ± DP: 36.41 (25-50) ± 7.41		
Professional Category	Nurses	06 (35.29)
	Nursing Technician	11 (64.71)
Gender	Female	15 (88.24)
	Male	2 (11.76)
Self-declared skin color	White	3 (17.65)
	Brown	10 (58.82)
	Black	4 (23.53)
Marital status	Single	3 (17.65)
	Married	13 (76.47)
	Divorced	1 (5.88)
Income (minimum wages)	> 3	17 (100)
Schooling	High School	5 (29.41)
	Incomplete Higher Education	1 (5.88)
	Complete Higher Education	11 (64.71)
Degree	Rating	2 (11.76)
	Specialization	8 (47.06)
	Master's Degree	1 (5.88)
	Not applicable	6 (35.29)
Time in the profession	< 1 year	1 (5.88)
	6-10 years	7 (41.18)
	> 10 years	9 (52.94)
Time working in oncology	< 1 year	2 (11.76)
	1-2 years	1 (5.88)
	2-5 years	5 (29.41)
	6-10 years	7 (41.18)
	> 10 years	2 (11.76)

The profile of the participants showed that the majority of the professionals were female nursing technicians, with an average age of 36.41 years, brown, married, with an income of over three minimum wages, with complete higher education and specialization. The participants said they had more than ten years of experience in nursing and between six and ten years in oncology.

In the qualitative analysis, the corpus was fragmented into 329 text segments (TS), using 80.24% (264 TS) of the interview content. The words found were presented in descending order according to their frequency (*f*) as per the chi-square test (X^2) (Figure 1).

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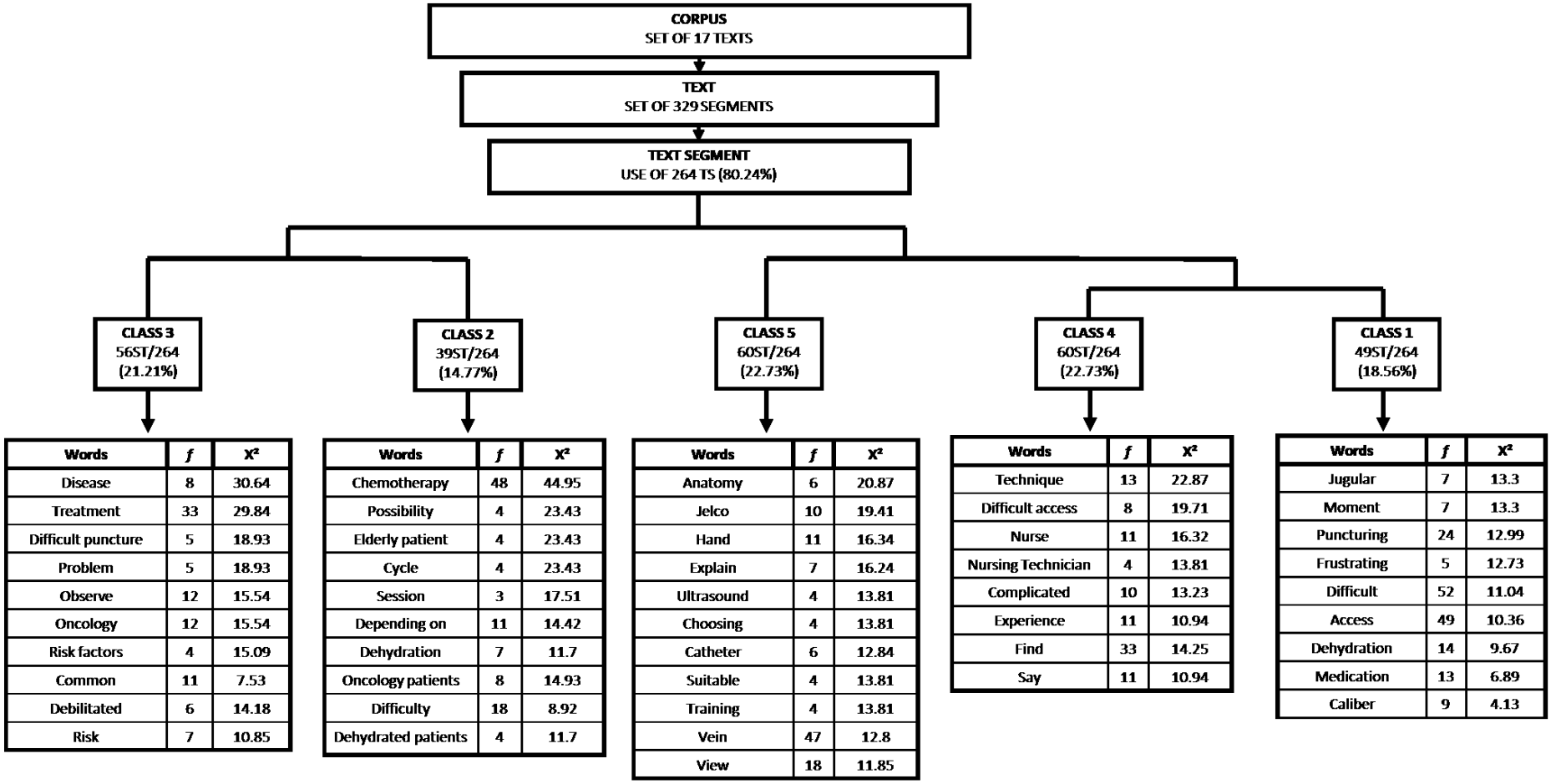

Words	*f*	X^2
Disease	8	30.64
Treatment	33	29.84
Difficult puncture	5	18.93
Problem	5	18.93
Observe	12	15.54
Oncology	12	15.54
Risk factors	4	15.09
Common	11	7.53
Debilitated	6	14.18
Risk	7	10.85

Words	*f*	X^2
Chemotherapy	48	44.95
Possibility	4	23.43
Elderly patient	4	23.43
Cycle	4	23.43
Session	3	17.51
Depending on	11	14.42
Dehydration	7	11.7
Oncology patients	8	14.93
Difficulty	18	8.92
Dehydrated patients	4	11.7

Words	*f*	X^2
Anatomy	6	20.87
Jelco	10	19.41
Hand	11	16.34
Explain	7	16.24
Ultrasound	4	13.81
Choosing	4	13.81
Catheter	6	12.84
Suitable	4	13.81
Training	4	13.81
Vein	47	12.8
View	18	11.85

Words	*f*	X^2
Technique	13	22.87
Difficult access	8	19.71
Nurse	11	16.32
Nursing Technician	4	13.81
Complicated	10	13.23
Experience	11	10.94
Find	33	14.25
Say	11	10.94

Words	*f*	X^2
Jugular	7	13.3
Moment	7	13.3
Puncturing	24	12.99
Frustrating	5	12.73
Difficult	52	11.04
Access	49	10.36
Dehydration	14	9.67
Medication	13	6.89
Caliber	9	4.13

Figure 1: Class dendrogram and word list. Belém, PA, Brazil, 2022.

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After processing the information in the software, the concepts and ideas were analyzed and interpreted, guided by the objective of the study, and the five classes ordered hierarchically by Iramuteq were processed, inferred, and interpreted. Considering the occurrence of significant words and the texts from the participants' reports, the scenarios were identified and the central theme was inferred in each of the emerging classes.

As a result, five classes were obtained which gave rise to three categories: risk factors, clinical competence, feeling, and aptitude about PVPD, in which the latter showed divergence between nurses and technicians (Figure 2).

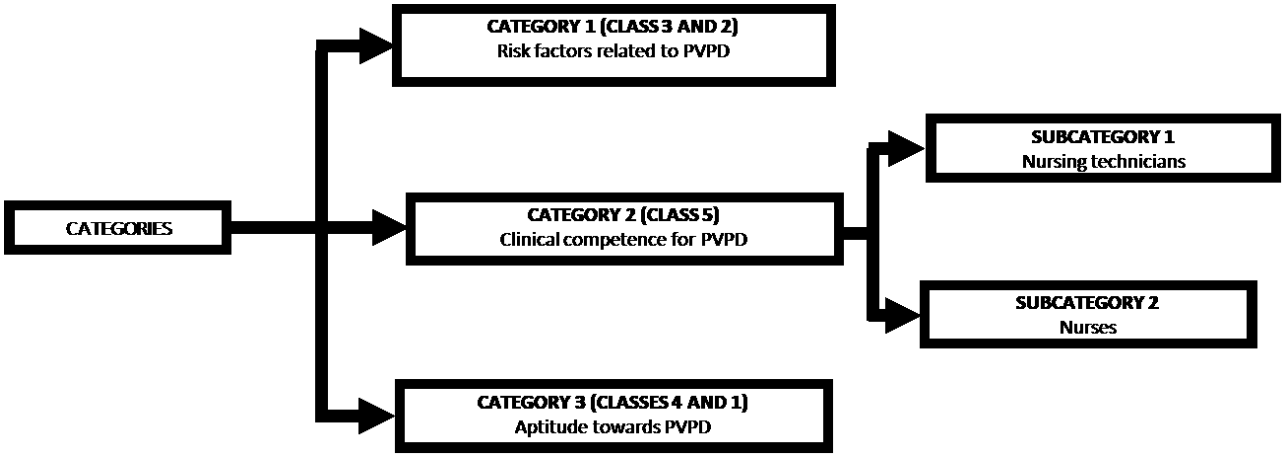

Figure 2: Thematic categories of the study. Belém, PA, Brazil, 2022.

Below are some excerpts representing each class identified to better express the feelings expressed.

Category 1 (Class 3 and 2): Risk factors related to PVPD

This class showed the professionals' perception of the factors related to PVPD, in which cancer patients, the elderly, and those who are debilitated, dehydrated, obese, and undergoing chemotherapy are the most common to present the issue.

> *The loss of weight, slimming, dehydration, the elderly, the use of vesicant medications such as chemotherapy, some antibiotics. (N 01)*
>
> *Edematous patients with breast cancer who have undergone lymphadenectomy and only have one limb to be punctured. (N 02)*
>
> *Oncology patients, in particular, usually have this difficulty due to their condition, as they have undergone several chemotherapies. (TE 05)*

Category 2 (Class 5) Clinical competence in PVPD

The clinical competence of each category in the nursing team on the subject was evident, as statements emerged that led to the creation of subcategories 1 (Nursing technicians) and 2 (nurses), emphasizing technical skills (practice) and scientific knowledge, respectively. Subcategory 1 showed:

> *We try until the last moment. And so priority is given in these cases to peripheral access with a 24-gauge jelco, which is what we usually manage, among these difficulties. (TE 04)*
>
> *Besides insistence, choosing the right material, you have to observe a lot when making the venous access, checking visually, palpating, so that we can make this access successful. (TE 06)*
>
> *I don't usually give it too many tries, at most, I know I can't, but about five or six, and then I call another colleague. (TE 01)*

In subcategory 2, the nurses talked about care management, focusing on patient orientation and delegating PV to the most experienced technician.

> *First of all, orientation, which has to start in the doctor's office, water intake helps a lot. Secondly, you have to explain to the patient all the difficulties that will occur during treatment. (N 02)*

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> *We make a point of not trying to puncture more than twice. I've seen that the risk of a professional making a mistake on the third attempt is over seventy percent because they get very nervous after having made two mistakes. (N 03)*

Category 3 (Class 4 and 1) feelings and recognition of the nursing professional's aptitude in relation to PVPD:

> *It's happened a few times, not least because that's our routine, seeing the patient with difficult access. And we feel somewhat powerless. (TE 01)*
>
> *"Emotional exhaustion, like you try once and you don't succeed, twice and you don't succeed, so it ends up being exhausting for me in particular. (TE 05)*
>
> *We feel very sad because we keep puncturing the patient, and we know that it's two punctures per professional, but there are situations where the patient needs it and asks for it. (TE 09)*
>
> *There was a whole program "for" that patient, right? And then, because I failed, because I couldn't... very... very frustrating, because it involves the patient's condition. (N 03)*
>
> *I don't feel bad, I believe it doesn't just depend on me, it depends on the patient too and we look for other alternatives. (N 01)*

An important finding in this category concerns nurses, most of whom reported that they did not feel able to perform PV on cancer patients with PVPD, as they did not have the necessary practice in their daily lives to perform the procedure.

> *It's not a practice that I do very often, I don't have any experience in it directly, it's not a routine for nurses, at least not in our service. (N 01)*
>
> *I don't have much practice in making these punctures,*
>
> *that's why I often know the theory, but I don't consider myself a*
>
> *person capable "of" making difficult punctures. (N 06)*

On the other hand, the nursing technicians confirmed their ability and safety when performing PVs.

> *Yes, we do training here, so I feel capable, I've been working in the area for a long time too. (TE 01)*
>
> *Oh, I consider myself [...] I already have many years of chemotherapy. So I believe that this experience I have has made me able to face any puncture. (TE 03)*

DISCUSSION

In this study, the perceptions and challenges of PVPD and the characteristics of nursing professionals were similar to those found in a multicenter study[20] regarding the subject with 450 nurses working in four hospitals in Italy. In this study, the participants were predominantly female (61.6%), with an average age of 41.5 years (±10.4) and an average length of service of 15.8 (±11.4) years.

In category 1, nursing professionals here assertively reported many associated risk factors. A meta-analysis[4] pointed to factors related to: 1) demographic and anthropometric variables; 2) medical and health conditions (diabetes, kidney problems, use of parenteral drugs, cancer chemotherapy); 3) variables related to the vein or vascular access (visibility and palpability of the vein, diameter of the vessel, previous history of difficulty) and 4) variables related to the professional performing the technique. It was also noteworthy that obesity appeared as a statistically significant risk factor with an OR of 1.48; 95%CI (1.03 to 1.93; p = 0.016) data congruent with those presented in this study.

A Norwegian study[21], using focus groups, described the experiences and challenges faced by nursing professionals in carrying out PVPD. Three categories were addressed: 1) factors related to the patient and professional-patient interaction; 2) factors related to professionals and working conditions; and 3) development of competences. It has been shown that clinical assessment and safe decision-making when performing PVPD improve with professional experience. Good communication between the patient and the professional is essential.

Category 2 dealt with clinical competences in PVPD. It is known that PV is a complex procedure due to the need to use good practices in preparing the skin, assessing the venous network, choosing the device, mastering anatomy and physiology, and manual dexterity, among others[22,23]. However, this CC is not defined among the nursing categories.

Collegiate Board Resolution (*Resolução da Diretoria Colegiada*, RDC) No. 45/2003[24] mentions the responsibility of the nursing team involved in the administration of parenteral solutions by current legislation, highlighting that nurses should carry out PVPD. However, the legislation does not provide details, it only states that nurses must carry out all nursing activities and that they are responsible for the most technically complex nursing care[25].

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In 2018, COFEN approved the Technical Regulation on the Role of Nursing Professionals in Antineoplastic Chemotherapy, which states that the nurse should administer chemotherapy, without defining responsibility for PV (COFEN Nº569/2018). To this end, it is necessary to qualify the nursing team to perform this function, especially the nurse, given the particularities of the medicines used, since failures can lead to serious incidents[5,26].

Uncertainties and/or suppression of steps in the PV technique have been considered risk factors for errors in the drug administration process[27]. In oncology, the administration of irritating and vesicant drugs increases the risk of complications in the case of vessels compromised by the disease or treatment[5], especially in those undergoing multiple PVs[4].

One specificity mentioned by a participant was PV in mastectomized women with axillary dissection. Currently, it has been proven that there is no good evidence that PV can favor lymphedema, the incidence of which was similar between the ipsilateral arm (4.4/10,000) and the contralateral arm (7/10,000). The following order of approach is suggested: contralateral arm, ipsilateral arm, or insertion of a central venous device rather than making further attempts on the contralateral arm or resorting to sites such as the foot veins[28].

Regarding feelings about unsuccessful PV and recognition of the nursing professional's ability to perform PVPD (category 3). Failed attempts to obtain venous access can compromise the patient's trust in the nursing team[21]. Here, the nurses did not declare themselves capable of performing PVPD, unlike the nursing technicians. This shows that this competence is routinely delegated, even though addressing PV is part of nurses' training[20].

It is therefore recommended that experienced professionals should carry out PVPD, since specialized teams minimize risks and increase patient satisfaction. Furthermore, this can reduce the costs of materials and human resources[29]. It should be noted that some of the participants who worked as nursing technicians also had a degree in nursing.

Study limitations

This study was carried out with professionals working in a specific reality which may limit the generalizability of the findings. In this sense, an analysis of the perceptions and challenges of this public regarding PVPD can subsidize new management strategies to mitigate risks and enhance patient safety.

FINAL CONSIDERATIONS

Through this study, it was possible to identify that the nursing team's perception of difficult venipuncture was different between the categories of nursing technician and nurse.

The feelings and challenges faced in terms of clinical skills when dealing with this condition were reported, as well as the self-assessment of nurses' ability to perform PV when delegating this procedure to nursing technicians, who showed greater technical skill.

This highlights the need for broader analyses of the subject to support professional practice and promote assertiveness in PVPD.

REFERENCES

1. Kocarnik JM, Compton K, Dean FE, Fu W, Gaw BL, et al., Cancer Incidence, Mortality, years of life lost, years lived with disability, and disability-adjusted life years for 29 cancer groups from 2010 to 2019: a systematic analysis for the global burden of disease study 2019. JAMA Oncol. 2022 [cited 2023 Oct 15]; 8(3):420-44. DOI: https://doi.org/10.1001/jamaoncol.2021.6987.
2. Ministério da Saúde (Br). Instituto Nacional do Câncer José Alencar Gomes da Silva. Estimativas 2023: Incidência de Câncer no Brasil. Rio de Janeiro: MS; 2022 [cited 2023 Oct 15]. Available from: https://www.inca.gov.br/publicacoes/livros/estimativa-2023-incidencia-de-cancer-no-brasil
3. Wang S, Liu Y, Feng Y, Zhang J, Swinnen J, Li Y, et al. a review on curability of cancers: more efforts for novel therapeutic options are needed. Cancers. 2019 [cited 2023 Oct 16]; 11(11):1782. DOI: https://doi.org/10.3390/cancers11111782.
4. Rodríguez-Calero MA, Blanco-Mavillard I, Morales-Asencio JM, Fernández-Fernández I, Castro-Sánchez E, de Pedro-Gómez JE. Defining risk factors associated with difficult peripheral venous cannulation: a systematic review and meta-analysis. Heart Lung. 2020 [cited 2023 Oct 10]; 49(3):273-86.DOI: https://doi.org/10.1016/j.hrtlng.2020.01.009.
5. Oliveira A, Costa P, Graveto J, Costa F, Osório N, Cosme A, et al. Nurses' peripheral intravenous catheter-related practices: a descriptive study. Rev Enf Ref. 2019 [cited 2023 Oct 15]; (21):111-20. DOI: https://doi.org/10.12707/RIV19006.
6. Terwoord JD, Beyer AM, Gutterman DD. Endothelial dysfunction as a complication of anti-cancer therapy. Pharmacol Ther. 2022 [cited 2023 Oct 12]; 237:108116. DOI: https://doi.org/10.1016/j.pharmthera.2022.108116.
7. Paterson RS, Schults JA, Slaughter E, Cooke M, Ullman A, Kleidon TM, et al. Peripheral intravenous catheter insertion in adult patients with difficult intravenous access: a systematic review of assessment instruments, clinical practice guidelines and

escalation pathways. Emerg Medicine Australasia. 2022 [cited 2023 Oct 15]; 34(6):862–70. DOI: https://doi.org/10.1111/1742-6723.14069.

8. Moreira MR, De Souza AC, Villar J, Bolela F, Viana AL, Pessalacia JDR. Characterization of patients under palliative care submitted to peripheralvenipuncture and hypodermoclysis. R. Enferm. Cent. O. Min. 2020 [cited 2023 Oct 20]; 10:4032. DOI: https://doi.org/10.19175/recom.v10i0.4032.
9. Piredda M, Biagioli V, Barrella B, Carpisassi I, Ghinelli R, Giannarelli D, Marinis MG. Factors affecting difficult peripheral intravenous cannulation in adults: a prospective observational study. J Clin Nurs. 2017 [cited 2023 Oct 17] ;26(7-8):1074-84. DOI: https://doi.org/10.1111/jocn.13444.
10. Frota NM, Galindo Neto NM, Barros LM, Pereira FGF, Melo GAA, Caetano JÁ. Hypermedia on peripheral venipuncture: effectiveness in teaching nursing students. Rev Bras Enferm. 2018 [cited 2023 Oct 10]; 71(6):2983-9. DOI: https://doi.org/10.1590/0034-7167-2017-0205.
11. Conselho Federal de Enfermagem (Br). Resolução COFEN Nº 569/2018. Aprova o Regulamento Técnico da Atuação dos Profissionais de Enfermagem em Quimioterapia Antineoplásica. Brasília: Gráfica COFEN. 2018 [cited 2023 Oct 15]. Available from: https://www.cofen.gov.br/resolucao-cofen-no-0569-2018/.
12. Aued GK, Bernardino E, Peres AM, Lacerda MR, Dallaire C, Ribas E do N. Clinical competences of nursing assistants: a strategy for people management. Rev Bras Enferm. 2016 [cited 2023 Oct 15]; 69(1):142-9. DOI: https://doi.org/10.1590/0034-7167.2016690119i.
13. Bardin L. Análise de conteúdo. Lisboa (Pt): Edições 70; 2011.
14. Souza VRS, Marziale MHP, Silva GTR, Nascimento PL. Translation and validation into Brazilian Portuguese and assessment of the COREQ checklist. Acta Paul Enferm. 2021 [cited 2023 Oct 15]; 34:APE20212631. DOI: https://doi.org/10.37689/acta-ape/2021AO02631.
15. Yin RK. Pesquisa qualitativa do início ao fim. Porto Alegre (RS): Penso; 2016.
16. Ministério da Saúde (Br). Portaria Nº 851, de 8 de maio de 2017. Habilita o Hospital Universitário João de Barros Barreto, como Unidade de Assistência de Alta Complexidade em Oncologia - UNACON, com sede em Belém - PA. Brasília: MS, 2017 [cited 2023 Oct 15]. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/sas/2017/prt0851_09_05_2017.html.
17. Hennink M, Kaiser BN. Sample sizes for saturation in qualitative research: a systematic review of empirical tests. Soc Sci Med. 2022 [cited 2023 Oct 10]; 292:114523. DOI: https://doi.org/10.1016/j.socscimed.2021.114523.
18. Acauan LV, Abrantes CV, Stipp MAC, Trotte LAC, Paes GO, Queiroz ABA. Use of the Iramuteq® software for quantitative data analysis in nursing: a reflective essay. Reme rev. min. Enferm. 2020 [cited 2023 Oct 12]; 24:e-1314. Available from: https://www.researchgate.net/publication/344858610_USE_OF_THE_IRAMUTEQR_SOFTWARE_FOR_QUANTITATIVE_DATA_ANALYSIS_IN_NURSING_A_REFLECTIVE_ESSAY.
19. Piredda M, Fiorini J, Facchinetti G, Biagioli V, Marchetti A, Conti F, et al. Risk factors for a difficult intravenous access: a multicentre study comparing nurses' beliefs to evidence. J Clin Nurs. 2019 [cited 2023 Oct 10]; 28(19-20):3492–504. DOI: https://doi.org/10.1111/jocn.14941.
20. Gjerde E, Moen A, Henni SH. Registered nurses' experiences and the challenges they face in relation to peripheral venous cannulation. Sykepleien Forskning. 2021 [cited 2023 Oct 15]; 16:e-86808. DOI: https://doi.org/10.4220/Sykepleienf.2021.86808en.
21. Infusion Nurses Society. Infusion Nursing: Standards of Practice. J Infus Nurs. 2021 [cited 2023 Oct 16]; 44(4)S113-8. DOI: http://www.dx.doi.org/10.1097/NAN.0000000000000396.
22. Webster J, Osborne S, Rickard CM, Marsh N. Clinically-indicated replacement versus routine replacement of peripheral venous catheters. Cochrane Database Syst Rev. 2019 [cited 2023 Oct 20]; 1(1):CD007798. DOI: https://doi.org/10.1002/14651858.cd007798.pub5.
23. Agência Nacional de Vigilância Sanitária – Anvisa (Br). Resolução rdc n.º 45, de 12 de março de 2003. Dispõe sobre o Regulamento Técnico de Boas Práticas de Utilização das Soluções Parenterais (SP) em Serviços de Saúde. 2003 [cited 2023 Oct 20]. Available from: https://www.saude.mg.gov.br/images/documentos/RES_045.pdf.
24. Conselho Federal de Enfermagem (Br). Lei do exercício profissional n° 7.498, de junho de 1986. Rio de Janeiro: Gráfica COFEN; 1986 [cited 2023 Oct 20]. Available from: https://legislacao.presidencia.gov.br/atos/?tipo=LEI&numero=7498&ano=1986&ato=b30ITQE5MBpWTbd9.
25. Carollo JB, Andolhe R, Magnago TSB de S, Dalmolin G de L, Kolankiewicz ACB. Medication related incidents in a chemotherapy outpatient unit. Acta paul enferm. 2017 [cited 2023 Oct 12]; 30(4):428–34. Available from: https://pesquisa.bvsalud.org/portal/resource/en/biblio-885850.
26. Lima EL de, Valente FBG, Souza ACS e. Occurrence of errors in the preparation and administration of medications in emergency care unit. Rev Eletr Enferm. 2022 [cited 2023 Oct 10]; 24:68956. DOI: https://doi.org/10.5216/ree.v24.68956.
27. Naranjo J, Portner ER, Jakub JW, Cheville AL, Nuttall GA. Ipsilateral intravenous catheter placement in breast cancer surgery patients. Anesth Analg. 2021 [cited 2023 Oct 16]; 133(3):707–12. DOI: https://doi.org/10.1213/ANE.0000000000005597.
28. Conselho Nacional de Saúde (Br). Resolução Nº 573/2018. Recomendações do Conselho Nacional de Saúde à proposta de Diretrizes Curriculares Nacionais (DCN) do curso de graduação Bacharelado em Enfermagem. Brasilia (DF): CNS; 2018 [cited 2023 Oct 16]. Available from: https://conselho.saude.gov.br/resolucoes/2018/Reso573.pdf.
29. Marinho AM, Sabino FHO, Monteiro DAT, Filgueira VDSA, Azevedo GN, Toffano SEM. Difficult peripheral venous puncture in adults: integrative review. Rev. enferm. UERJ. 2019 [cited 2023 Oct 18]; 21(27):e42567. DOI: http://dx.doi.org/10.12957/reuerj.2019.42567.

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