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Oncological emergency: the work of nurses in the extravasation of antineoplastic chemotherapeutic drugs

Emergência oncológica: atuação dos enfermeiros no extravasamento de drogas quimioterápicas antineoplásicas

Emergencia oncológica: actuación del enfermero en la extravasación de drogas de quimioterapia antineoplásica

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Abstract

Objective: To investigate the work of nurses in the extravasation of antineoplastic chemotherapeutic drugs. **Methods:** A cross-sectional study with a quantitative approach was performed with a sample of 21 nurses in a referral cancer hospital. Data were collected with a semi-structured questionnaire from October to November 2015 and analyzed through simple and percentage frequency. **Results:** Nurses had sufficient knowledge about risk factors, prevention, and recognition of signs and symptoms of occurrence of extravasation of chemotherapeutic drugs. However, the same was not observed regarding questions about classification of antineoplastic drugs and interventions aimed at the occurrence of this health condition. **Conclusion:** The results found are important, as they point to questions that must be reflected upon by hospital managers and educational institutions, apart from professionals concerned with the improvement of health care for the population affected by such disease.

Keywords: Extravasation of therapeutic materials and diagnoses; Antineoplastic drugs; Nursing care.

Resumo

Objetivo: Investigar a atuação dos enfermeiros no extravasamento de quimioterápicos antineoplásicos. **Métodos:** Estudo transversal, com abordagem quantitativa, realizado em um hospital de referência em oncologia, com uma amostra de 21 enfermeiros. Os dados foram coletados por meio da aplicação de questionário semiestruturado, nos meses de outubro e novembro de 2015, analisados por meio da frequência simples e percentual. **Resultados:** Os enfermeiros evidenciaram conhecimento suficiente quanto aos fatores de risco, prevenção e reconhecimento de sinais e sintomas da ocorrência de extravasamento por quimioterápicos. No entanto, o mesmo não foi verificado quanto às questões relacionadas a: classificação das drogas antineoplásicas e intervenções voltadas à ocorrência do agravo. **Conclusão:** Os resultados encontrados são importantes, vez que apontam para questões que devem ser refletidas por gestores hospitalares e de instituições formadoras, assim como profissionais preocupados com a melhoria da assistência à população acometida por essa patologia.

Palavras-chave: Extravasamento de materiais terapêuticos e diagnósticos; Antineoplásicos; Cuidados de enfermagem.

Resumen

Objetivo: Investigar la actuación de los enfermeros en la extravasación de quimioterápicos antineoplásicos. **Métodos:** Estudio transversal, cuantitativo, realizado en un hospital de referencia en oncología, con una muestra de 21 enfermeros. La recolección de datos se produjo entre octubre y noviembre de 2015, mediante la aplicación del cuestionario semiestructurado; analizados por frecuencia simple y percentual. **Resultados:** Los participantes demostraron suficiente conocimiento acerca de los factores de riesgo, la prevención y el reconocimiento de los signos y síntomas de la ocurrencia de extravasación por la quimioterapia. No fueron consultados para cuestiones relacionadas con: clasificación de los fármacos antineoplásicos e intervenciones dirigidas a la ocurrencia del agravo. **Conclusión:** Los resultados de este estudio son importantes y apuntan para cuestiones que deben ser reflejadas por los gerentes de hospitales y centros de formación, así como los profesionales que se preocupen con la mejoría de la asistencia a la población afectada por esta enfermedad.

Palabras clave: Extravasación de Materiales Terapéuticos y Diagnósticos; Agentes Antineoplásicos; Atención de Enfermería.

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INTRODUCTION

Cancer is the name given to describe malignant tumors located in different parts of the body; its malignant cells can be disseminated due to the constant and fast cell division process. The World health Organization (WHO) indicates that 27 million incident cases and nearly 17 million deaths due to cancer are expected to occur in 2030. In Brazil, estimates point to the occurrence of 600,000 new cases of cancer in 2016. Which means that this disease is an important cause of mortality, representing a great public health problem.[1,2]

Among the types of treatment of neoplasms, chemotherapy has the highest incidence of cure.[3] It is a method that uses chemical compounds known as chemotherapeutic drugs. When applied to cancer, antineoplastic or antiblastic chemotherapy increases the survival rate of individuals affected by this disease, even those with very advanced tumors.[4]

However, some antineoplastic agents can cause dermatological toxicity resulting from extravasation, defined as the intravenous infiltration of such substances into the tissues surrounding the area punctured. Such extravasation is considered to be an emergency, due to the capacity of certain agents to cause harm to patients, which can range from painful erythematous edemas, in the case of irritating drugs; to lesions with necrosis, requiring debridement and skin grafts, in the case of vesicant drugs. This complication can occur in approximately 6% of patients that undergo intravenous antineoplastic chemotherapeutic treatment.[3,5]

An oncological emergency is defined as a situation that can occur during the development of this disease, including complications resulting from cancer itself or the side effects of therapy, when fast interventions are required, preventing the imminent risk of life or permanent lesions. It can begin insidiously and take months to develop or manifest itself in hours, resulting in devastating implications, when it is not always possible to prevent it. Thus, knowledge about oncological emergencies is essential for immediate interventions that can prevent lesions in patients.[6]

The *Conselho Federal de Enfermagem* (COFEn - Federal Nursing Council) has established that nurses are responsible for the planning, organization, supervision, execution and assessment of all nursing actions in clients undergoing antineoplastic chemotherapeutic treatment. Thus, nursing professionals also have the responsibility to promote the safety and maintenance of quality of care, participating in the education of its team and patient care.[7]

With regard to the work of such professionals in the prevention and handling of extravasation, it is important to provide effective health care to patients when the peripheral venous network is used for the treatment with antineoplastic drugs. Abilities and specific knowledge are required so that the early detection of complications and interventions can be performed quickly, as delays in appropriate care will result in harm to patients.[8]

According to the national curricular directives, higher education institutions recommend that an individual be qualified as a general nurse, considering that this professional, when entering the job market with insufficient skills related to the health/disease process, in the sphere of health care and interventions aimed at meeting the needs of cancer patients,[9] will require additional specialized learning through postgraduate courses.

In view of this instigating context, we should emphasize the importance of research on knowledge about interventions for the effective promotion of health care and management work regarding the complexity of extravasation of antineoplastic drugs. This is because the current situation requires nurses to develop critical and reflective thinking. Thus, the present study aims to investigate nurses' knowledge about extravasation of antineoplastic drugs and their work in oncology.

METHODS

An exploratory cross-sectional study with a quantitative approach was performed at the *Centro de Oncologia* (CEON - Oncology Center) and *Centro de Oncohematologia Pediátrica* (CEONHPE - Pediatric Onco-Hematology Center) of the *Hospital Universitário Oswaldo Cruz* (HUOC - Oswaldo Cruz University Hospital) of the Pernambuco State University. They are located in the city of Recife, Northeastern Brazil, a regional referral center in oncology services.

All the nurses (n = 21) who had worked in oncology sectors for at least six months in the day shift and who agreed to participated and signed an Informed Consent Form were included in this study.

The data collection instrument was a structured questionnaire developed by the authors, based on the search for relevant, updated national and international literature,[3,10-12] divided into the following two parts: 1) Questions about the characterization of individuals (sex, age, undergraduate studies, specialization, Master's degree, length of time working in oncology and chemotherapy, training for extravasation, number of jobs and weekly working hours); and 2) Test of knowledge with multiple choice questions, when respondents had to choose a correct answer among the alternatives given. Questions were about the classification of antineoplastic drugs, signs and symptoms of extravasation, main risk factors for extravasation, factors that influence the severity of extravasation, preventive actions, sequence of areas for peripheral venipuncture, care provided when extravasation occurs, and application of cold and hot compresses after extravasation, according to the antineoplastic drug. This questionnaire was applied by researchers, on a scheduled day and time between October and November 2015.

The questionnaires were tabulated and analyzed through simple and percentage frequency. The means of correct answers were assessed according to work sector, type of institution where undergraduate course was taken, specialization, length

of time working with antineoplastic drugs and number of weekly working hours, using Student's *t*-test and showing the differences in means and 95% confidence intervals. The database was organized and statistical calculations were performed with the SPSS software version 21.0 and subsequently compared with the literature.

This research project is in accordance with Resolution 466/12 from December 12th 2012 issued by the *Conselho Nacional de Saúde/Ministério da Saúde* (CNS/MS - Ministry of Health/National Health Council). It was approved by the Research Ethics Committee of the Oswaldo Cruz University Hospital/State of Pernambuco Cardiology Emergency Center on September 9th 2015 (CAAE number 45920115.4.0000.5192).

RESULTS AND DISCUSSION

The sample was comprised of 21 nurses. The characterization of professionals shown in Table 1 indicated the predominance of females (n: 19) performing nursing work in the oncology sector. This fact corroborates the predominance of the historical attribute of nursing as a profession almost entirely performed by women since its initial activities.[13] With regard to age, more than half of the nurses (n: 14) were aged less than 40 years and, of these, 12 were in the 30-to-39-year age group.

As observed in Table 1, 12 participants had graduated from private institutions, a fact justified by the expansion of higher education in Brazil, This occurred especially in private institutions, thus clarifying the market distribution of higher education. Data show that, during a period of six years, there was an increase of 218% in the number of undergraduate nursing courses in private institutions, totaling 582 courses, of which 18% are public (held at federal universities) and 82% are private.[14]

In terms of development/improvement of studies, 17 participants reported they had concluded a specialization and four also mentioned their course in the area of oncology was ongoing; two nurses said they had a Master's degree.

Specializations are frequently sought by nurses, meeting the essential qualification needs of those dealing with cancer patients, as specific qualification in this area aimed at cancer care provides these professionals with a unique profile with critical attitudes towards care constructed from the scientific thinking of their activities. Thus, nurses in the area of oncology must have such specialization, as the exercise of their activities requires great ability to understand each circumstance, without losing oneself in solutions and diagnoses without a scientific foundation.[9]

Technological innovations and scientific productions enable nurses to increase their knowledge and redirect their health care techniques towards the previously described needs. Consequently, it is essential that institutions emphasize the means to promote constant qualification, training courses and guidance for their professionals, especially regarding the management of complications resulting from chemotherapeutic treatment.[15]

The following indicators were used to characterize nurses in terms of their experience with the theme analyzed: length of time working as a nurse; length of time working with oncology and chemotherapeutic drugs. A total of 18 nurses had been working as nurses for three or more years and, most of which were in the chemotherapy sector (n = 10). On the other hand, the majority of the sample (n = 13) had been working with oncology and chemotherapeutic drugs for up to two years.

Although scarcely explored by the literature on Nursing in Brazil, the definition proposed by an American nursing theorist was regarded as reference for the indicators used in the present study. She affirms that facing the conditions and situations of patients is not the experience required; instead, this experience involves nurses' reflection on the circumstances found to improve decision-making to an unconscious and intuitive level at each moment.[16]

Thus, the fact that nurses had worked for up to two years with oncology and chemotherapeutic drugs, although apparently short, can be associated with the high frequency of situations experienced, causing them to reflect more on their practice and providing them with experience as a result.

Like other practical disciplines, nursing is not merely an applied field, in the sense that its practice is complex, varied and underdetermined. Good practice requires nurses to develop ethical and skillful behavior and to perform a good clinical assessment based on scientific evidence and technological development.

Length of time working as a nurse can be an indication of their time of experience and relative maturity, as it reflects knowledge and aptitude in a certain period. In this sense, nursing clinic experience is essential for quality of care. A study confirmed that the individual level of education of nurses and the number of years working with nursing are associated with nursing clinic experience.[17]

With regard to the number of jobs, 14 nurses had more than one, according to Table 1. Additionally, 13 nurses were found to perform their tasks during a period of 40 weekly working hours. However, 20 of these professionals work more than 60 weekly hours due to another employment relationship. This number of working hours is one of the complaints about the required working time, which is 30 weekly hours for nurses.

The health of these workers can be harmed by the excessive workload and lack of social and family contact, causing them to be vulnerable to stress.[18] The high number of working hours in nursing has been indicated as a factor that interferes with quality of care for users and workers' safety.[19]

Several complications during the treatment with antineoplastic drugs can be prevented or minimized through systematized and individualized nursing care that promotes patient participation in the proposed therapy.

Nurses working with chemotherapy are responsible for the organization, health care planning, nursing team training

Table 1. Socio-professional characteristics of nurses by work sector. City of Recife, Northeastern Brazil, 2016

Socio-professional characteristics	Work sector		Total (n = 21)
	Chemotherapy	Infirmary	
Sex			
Female	12	7	19
Male	1	1	2
Age			
20-29	2	0	2
30-39	8	4	12
40-49	2	3	5
50-59	1	1	2
Type of institution where undergraduate course was taken			
Public	4	5	9
Private	9	3	12
Specialization			
Yes	10	7	17
No	3	1	4
Master's degree			
Yes	0	2	2
No	13	6	19
Length of time working with nursing			
Up to 2 years	3	0	3
3 or more years	10	8	18
Length of time working in oncology			
Up to 2 years	8	4	12
3 or more years	5	4	9
Length of time working with chemotherapeutic drugs			
Up to two years	9	4	13
≥ 4 years	4	4	8
Training on extravasation of chemotherapeutic drugs			
Yes	7	3	10
No	6	5	11
Number of jobs			
One	7	0	7
More than one	6	8	14
Weekly number of working hours			
30 hours	4	3	7
36 hours	1	0	1
40 hours	8	5	13

and comprehensive care for patients and family members, a process that facilitates the identification of complications from extravasation, prevention and management, reducing harm to patients and contributing to their safety.[20]

A total of 47.6% of correct answers was found regarding the classification of vesicant or irritating antineoplastic drugs (Table 2). Understanding the properties of chemotherapeutic drugs is essential to achieve effective quality of care for patients

under treatment. This type of therapy has harmful vesicant or irritating characteristics which can exacerbate such experiences, which are most frequently based on health care involving technical procedures aimed at maintaining the safety of their administration.[20]

Professionals' knowledge about this classification is key, as an adequate emergency intervention is required when there is an extravasation, especially if the drug is vesicant, due to the high risk of irreversible lesions.[21] This fact further corroborates the importance of updates on this theme for nurses working in chemotherapy services.[9]

Antineoplastic drugs are categorized as vesicant when the extravasation causes the formation of vesicles, tissue destruction and, in some cases, necrosis. In contrast, although there is no infiltration, irritating antineoplastic drugs can cause dermatological changes such as burning and pain, without the formation of necrosis in tissues, thus being considered as less severe than the vesicant drugs.[3]

The immediate identification of characteristics of extravasation is a key aspect in the prognosis of a lesion.[20] In the present study, the percentage of correct answers found was 76.2% for the identification of pain, erythema, local edema, reduction or lack of venous return and decrease in the speed of infusion or even its interruption as the main sign and symptoms of extravasation. Such knowledge is essential, as the initial action is the interruption of drug infusion when there is a suspicion or occurrence of extravasation. Even if the type of pain cannot be identified with the patient's report and the blood return unexpectedly stops, this should be regarded as extravasation.[22]

A total of 90.5% of correct answers was observed for risk factors for extravasation. The following factors can lead to this: inadequate choice of device for puncture; alterations in the veins such as fragility and sclerosis; inadequate area for puncture; nutritional alterations; and limb conditions (previous antineoplastic or radioactive therapy in the punctured area, lymphadenectomy, edema, previous neuropathy), among others. The recognition of such factors is the best strategy to reduce the risks of administration, guaranteeing quality nursing care.[3,11]

Regarding the prevention of extravasation, the percentage of correct answers was high (85.7%), showing that preventive care and the identification of risk factors are known by the majority of professionals.

Aiming to achieve a successful therapy, the following were identified as the main actions associated with prevention: to adequately select the area of venipuncture, prioritizing larger veins; not to "tap" the vein; to instruct patients to avoid excessive movements; to be certain about the area before administering the antineoplastic drug; to maintain the punctured area under constant observation during the infusion period; to instruct patients about signs and symptoms of extravasation; not to administer vesicant drugs for more than 60 minutes in a peripheral vein.[10]

For the nursing practice to be performed safely, systematized practice must be based on prevention, especially with regards to the implementation of active interventions when there are complications during the administration of antineoplastic drugs. Nurses are responsible for the analysis and follow-up of risk factors and interventions on them, including educational actions for the better physical and overall adjustment of patients and the efficiency, safety and responsibility of the administration of such drugs.[23]

Regarding knowledge about the factors that influence the severity of tissue lesions, nurses obtained 76.2% of correct answers. Severity is associated with the drug's vesicant potential, concentration, extravasated amount, duration of exposure in the tissue, punctured area, venous device and needle insertion technique, and individual tissue responses. With the extravasation of this drug and depending on the area infiltrated, there is the possibility of tendons, nerves and even major blood vessels to be impaired. When affecting the joints at a considerable amount, functional harm to limbs can occur.[24]

Table 2. Percentages of correct answers in the test of knowledge about prevention and intervention for extravasation of antineoplastic drugs. City of Recife, Northeastern Brazil, 2016

Knowledge about prevention and intervention for extravasation of antineoplastic drugs			**Nurses (n = 21)**	
Questions	**Correct**	**%**	**Wrong**	**%**
How to classify antineoplastic drugs?	10	47.6	11	52.4
What are the signs and symptoms of extravasation of antineoplastic drugs?	16	76.2	5	23.8
What are the main risk factors for extravasation of antineoplastic drugs?	19	90.5	2	9.5
What are the preventive actions for extravasation of antineoplastic drugs?	18	85.7	3	14.3
What are the factors that influence the severity of extravasation?	16	76.2	5	23.8
What is the sequence of area for peripheral venipuncture?	5	23.8	16	76.2
Order the health care procedures provided when there is extravasation.	5	23.8	16	76.2
When should cold or hot compresses be applied after extravasation, according to the antineoplastic drug?	7	33.3	14	66.7

This type of occurrence usually requires greater hospitalization time and multiprofessional care to prevent psychological and/or physical harm or even permanent lesions. Regarding physical aspects, the most frequent are as follows: hardened lesion in the infiltrated area, localized fibrosis, hyperemia and pain.[20]

There was a gap in knowledge about theoretical-practical questions among the interviewed nurses, thus showing the need for effective continuing education as a strategic plan for better health care. This lack is evidenced by the analysis of the sequence of area for peripheral venipuncture, when participants obtained a low number of correct answers (23.8%).

The intravenous way is safer and more frequently used for the administration of chemotherapeutic drugs; thus, several veins can be used for infusion. The following order is primarily recommended: forearm, hand dorsum, fist and antecubital fossa.[5]

To avoid complications in patients receiving chemotherapy, vascular access must be selected carefully, aiming to provide maximum protection to joints, tendons and nerves, thus preventing harm to patient limbs. As a result, vascular access must be selected from the distal to the proximal region. However, the hand dorsum, as it has little subcutaneous tissue and a great amount of tendons, is not recommended for vesicant drug infusion, as extravasations in these areas are usually more complicated.[5]

In addition to possible complications in the chemotherapeutic treatment, nurses need to have knowledge for an immediate intervention on extravasation. In the present study, a low level of correct answers (23.8%) was found for care provided during an extravasation, confirming the findings that 92.8% of the interviewed professionals could not describe the adequate way to handle adverse events, actions of clinical assessment or pharmacological/non-pharmacological treatment.[15]

In the occurrence of extravasation, a fast and correct intervention significantly decreased the risk of lesions and discomfort for patients.[15] In addition to the immediate intervention, the presence of extravasation reduces possible costs of treatment, such as situations that require physiotherapy, surgical intervention or other complementary practices. Moreover, it should be emphasized that one of the most critical consequences is the delay in chemotherapeutic treatment, which affects patient prognosis. As a result, the suspicion or occurrence of extravasation must be approached as an emergency.[11]

Another theoretical-practical point analyzed was the application of hot or cold compresses after extravasation, according to the antineoplastic drug. In this aspect, the percentage of correct answers was 33.3%. It should be emphasized that hot compresses are recommended for the following types of antineoplastic drugs: vinca alkaloids (vincristine, vimblastine and vinrelbine), etoposide, teniposide and oxaliplatin; just like cold compresses are recommended for anthracyclines (doxorubicin, daunorubicin, epirubicin and idarubicin), among others.[10]

The application of hot compresses enables vasodilation, facilitating the increase in cytostatic absorption and distribution. In contrast, the mechanism of action of cold compresses is based on vasoconstriction, with the reduction in the speed of drug infusion in the tissues, thus decreasing the affected area.[22] However, there is no scientific evidence that cold compresses promote a reduction in the formation of lesions, as their benefits can be restricted to alleviating local discomfort.[25]

When counting the results of percentage of correct answers, the highest frequency of nurses interviewed (n = 7) showed values below 50% (see Table 3). This fact is due to the low level of knowledge about the classification of antineoplastic dugs and theoretical-practical questions about the correct sequence of area of venipuncture, care provided upon extravasation, and application of cold and hot compresses in such occurrences.

Table 3. Sample distribution according to percentage of correct answers

Percentage of correct answers	Nurses (n = 21)	
	N	%
< 50	07	33.4
50 - 60	05	23.8
60 - 70	02	09.5
70 - 80	01	04.8
80 - 90	04	19.0
90 - 100	02	09.5

The types of therapy available for oncology require professionals to have a critical and reflective approach that meet the current demands. However, there are gaps in the qualification of nurses, so that neither the interaction between theory and practice is recommended, nor are the abilities required for their qualified performance revealed.[9] Therefore, in many occasions, such practice is permeated by insecurity and malpractice.[26]

In order to minimize these gaps and qualify professionals, hospital institutions must enable means for the qualifications and updates required for specialized practice with quality through continuing education.[9] However, in the institution analyzed, this activity was scarcely performed and only ten nurses reported having received training on extravasation of antineoplastic drugs. This is an alarming situation because oncology is an area which is continually changing, requiring professionals involved to receive constant updates.

These data corroborate the findings from two studies performed in oncology institutions. One of them, conducted in the

state of Paraná, Southern Brazil, showed that of all seven nursing professionals interviewed, only one reported having received training. The other study was performed in two institutions of the state of Paraíba, Northeastern Brazil, and it revealed that only 25% of professionals received qualification to work with chemotherapy, while the other 75% reported not having been trained at all.[27,28]

As this is a complex activity, lack of specific training and updates on chemotherapeutic treatment care for patients can increase the risk of possible errors and, consequently, adverse events that expose the health of patients.[27]

The results on Table 4 show a statistically significant difference in means of correct answers, according to work sector and type of institution where participants took their undergraduate course. Those who work in the chemotherapy sector showed a higher mean. These data can be justified by the fact that all nurses in chemotherapy sectors are more in contact with antineoplastic drugs.

Comparing the means of correct answers for the type of institution where the undergraduate course was taken, nurses who had graduated from public universities obtained a higher mean, when compared to those graduated from private ones.

Seeking to meet the demand for health service production, the area of nursing has followed the trend towards expansion of qualification courses, promoted by two important regulating landmarks: the *Plano Nacional da Educação* (PNE - National Education Plan) and the *Lei das Diretrizes e Bases da Educação Nacional* (LDB/61 - Law on National Education Directives and Foundations), when education began to be available for private initiative, leading to the significant increase in the number of such institutions in Brazil.[29,30]

It has been argued that nurses' academic qualification, which prioritizes the inseparability among teaching, research and science outreach, is scarcely promoted in private institutions. This strategy is in agreement with the current complex health practice demands, which are constantly changing. Thus, managers and political leaders are expected to reflect on the possible impact that the theory-practice dissociation can have on quality of nursing and health care of the population,[31] from which the adoption of measures aimed at changing this situation will result.

With regard to the relevant results of the type of institution where the undergraduate course was taken and the mean of correct answers, it should be noted that there were no statistically significant differences between the test result and having a specialization in oncology. Although this was not an objective of the present study, such result draws attention to the need for the assessment of specialization programs.

Finally, regarding the length of time working with chemotherapeutic drugs, the fact that statistically significant differences were not found could be associated with the similar size of both groups analyzed, just like the number of weekly working hours. It should be emphasized that authors could not find other studies that were methodologically comparable to these results in the literature.

Table 4. Comparison of means from the test of knowledge about prevention and intervention on extravasation of antineoplastic drugs, according to socio-professional characteristics of the sample. City of Recife, Northeastern Brazil, 2016

Socio-professional characteristics	Correct answers			
	Mean (SD*)	≠ Mean	95%CI	*p***
Work sector				
Chemotherapy	6.13 (1.36)	2.51	0.84-4.18	0.005
Infirmary	3.62 (1.98)			
Type of institution where the undergraduate course was taken				
Public	5.67 (1.93)	1.92	0.12-3.72	0.038
Private	3.75 (1.96)			
Specialization				
Yes	4.53 (2.12)	0.22	2.32-2.76	0.858
No	4.75 (2.50)			
Length of time working with chemotherapeutic drugs				
Up to 2 years	4.31 (1.88)	0.69	1.34-2.72	0.485
≥ 4 years	5.00 (2.56)			
Number of weekly working hours				
30-36 hours	4.00 (2.21)	0.92	1.09-2.93	0.349
40 hours	4.92 (2.10)			

* Standard deviation; ** Student's *t*-test.

CONCLUSION

In the light of the objective of the present study, the nurses comprising this sample showed sufficient knowledge about risk factors, prevention and identification of signs and symptoms of occurrence of extravasation by chemotherapeutic drugs. However, the same was not observed for questions related to classification of antineoplastic drugs and interventions aimed at the occurrence of extravasation. The means of correct answers were significantly associated with the work sector and type of institution where the undergraduate course was taken.

Despite the limitations related to the cross-sectional methodology and the small sample size, the results of the present study are important in the sense that they point to questions that must be reflected upon by hospital managers and higher education institutions, apart from professionals concerned with the improvement in health care for the population affected by this health condition.

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