



EVALUATION OF NURSES KNOWLEDGE ABOUT FEBRILE NEUTROPENIA IN CHILDREN WITH CANCER

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ABSTRACT

Objective: To evaluate nurses' knowledge regarding febrile neutropenia in pediatric patients diagnosed with malignant neoplasia. **Method:** Cross-sectional and descriptive study with a quantitative approach, carried out in two reference hospitals in pediatric oncology in Recife/PE. The sample included 20 nurses. The data were collected between September and October 2017, through the application of a semi-structured questionnaire, analyzed using the Statistical Package for the Social Sciences (SPSS) and presented with descriptive statistics resources. **Results:** It was found that 100% (n=20) of the sample was composed of females, 60% (n=12) had an age range of 30-39 years-old. Regarding knowledge about febrile neutropenia, 50% (n=10) participated in training courses on the topic, 25% (n=5) were correct between 50-60% of the applied questions and only 5% (n=1) got the questionnaire 100% correct. **Conclusion:** there was a high level of fragility in the nurses' knowledge about febrile neutropenia, showing that the search for knowledge is fundamental so that patients are better assisted and receive adequate and specialized treatment.

Keywords: Oncology Nursing. Pediatric Nursing. Nursing Care. Febrile Neutropenia.

INTRODUCTION

Infant-juvenile cancer affects individuals aged 0 to 19 years-old and includes a group of neoplasms with uncontrolled proliferation of abnormal cells, which can occur anywhere in the body. Unlike adult cancer, childhood and juvenile cancer is predominantly of an embryonic nature and generally affects the cells of the blood system and the supporting tissues⁽¹⁾.

In the past four decades, there has been significant progress in the treatment of cancer in childhood and adolescence. Currently, about 80% of children and adolescents affected by the disease can be cured, if it was diagnosed early, and if they have a good quality of life after treatment. In Brazil, there are an estimated 8,460 new cases of juvenile cancer between 2020 and 2022, more frequently in the South and Southeast⁽¹⁾.

Among the treatment modalities for cancer,

chemotherapy is the most indicated, in most cases, to achieve cure, control or palliation. This therapy involves the use of cytotoxic substances that interfere with the process of cell growth and division in order to eliminate tumor cells. However, because it is a systemic treatment modality, antineoplastic agents affect all cells in the body, especially cells with rapid proliferation^(2,3).

Depending on the time of exposure, the concentration of the drug and the general condition of the patient, febrile neutropenia (FN) can be a direct and serious consequence. It is characterized by changes in the patient's defense system and is defined when the neutrophil count is less than 1.0×10^9 u/L. The risk increases when the count is below 0.5×10^9 u/L in 48 hours, becoming a severe neutropenia and, when the values are below 0.1×10^9 u/L, the patient becomes susceptible to bacterial infections^(2,4).

The main symptomatology of the

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neutropenic patient is marked by an axillary temperature greater than 37.8°C. About a third of patients undergoing cancer treatment who develop neutropenia have fever. Therefore, it is considered an oncological emergency and should receive immediate clinical attention for the evaluation and administration of antibiotic therapy, as the infectious condition can rapidly evolve with hemodynamic instability and, if it is not properly treated, can evolve to death ⁽⁴⁻⁶⁾.

Despite the relevance and complexity of the theme, there is a shortage of literature and research results that reveal the perspective of those who live the care processes in the face of this existential facticity ⁽⁷⁾. Therefore, knowledge of adverse events and alternatives for control and prevention is essential for the management of patients undergoing chemotherapy. The identification of FN as an event of vital importance must be the focus of nursing care and, from this, the adoption of protective measures and health education strategies aimed at children and their families must be part of the care plan.

Considering that FN is one of the main challenges in child cancer care and can aggravate the condition of children undergoing chemotherapy treatment, the objective of the study is to assess nurses' knowledge about the subject, in order to reveal possible strengths and weaknesses that can assist in directing and implementing permanent education actions, improving the quality of nursing care and patient safety.

METHODOLOGY

This is a cross-sectional study of a descriptive character and with a quantitative approach, whose interview period took place from September to October 2017, in two public health institutions that are reference in the treatment of pediatric oncology, both located in Recife, Pernambuco.

The research population consisted of nurses who have worked for at least six months in the study sites, adopting as an exclusion criterion, participants who would be on vacation or with some type of leave during the collection period; however, there were no absent nurses. Therefore,

everyone participated in the interviews, a total of 20 nurses.

For data collection, two questionnaires elaborated and structured by the authors were used, based on literature with scientific and updated relevance ^(8,9). The first questionnaire was divided into two parts, the first one corresponding to the sociodemographic and professional characterization of nurses, with 13 multiple-choice questions comprising the following variables: sex, age, type of undergraduate, graduate, length of experience in the nursing area, length of experience in pediatric oncology, number of employment contracts and working hours. The second part corresponded to the knowledge of febrile neutropenia and its management, which was composed of five questions, whose answer list was "yes" or "no", with the following questions: "Have you participated in any training/update on pediatric oncology and/or on febrile neutropenia in the last year?", "Have you participated in scientific events on pediatric oncology in the last two years?", "Is there any discussion of clinical cases/scientific meetings with other health professionals regarding the theme at your work?", "Was the topic of febrile neutropenia addressed in your professional training course?", "Have you received any training on the topic of febrile neutropenia/oncology urgency at the institution where you work?".

The second questionnaire consisted of 16 questions that are referred to the qualification and professional improvement of nurses about FN. The answers were open and evaluated according to the Clinical Protocol and Therapeutic Guidelines for Aplastic Anemia, Myelodysplasia and Constitutional Neutropenias, approved by ministerial order SAS/MS nº 113, February 4, 2016 ⁽¹⁰⁾.

For data analysis, descriptive statistics were used, calculating absolute and relative frequencies, and the average of correct answers as a function of categorical variables was compared by the unpaired *t* test and by ANOVA, considering the statistical significance for the *p*-value <0.05. The data were initially computed in a database created in Microsoft Excel version 2016 and later exported and analyzed using SPSS (Statistical Package for the Social Sciences) software version 21.0.

The research was submitted to the Research Ethics Committee of the Hospital Universitário Oswaldo Cruz / Pronto Socorro Cardiológico de Pernambuco by respecting the rules established by Resolution CNS/MS nº 510, of April 7, 2016, which underlies the ethical precepts of research involving human beings. It received approval on September 1, 2017, with CAAE: 68729817.7.0000.5192.

RESULTS

It was observed as to the demographic and professional characteristics of the nurse, there **Table 1.** Distribution of the sociodemographic and professional profile of nurses who participated in the study. Recife (PE), Brazil. 2018.

Sociodemographic and professional characteristics	Health institution		Total N (20)	%(100)
	A	B		
Gender				
Female	14	6	20	100
Male	-	-	-	-
Age group				
20-29	2	0	2	10
30-39	7	5	12	60
40-49	3	1	4	20
50-59	2	0	2	10
Type of institution where they completed their graduation course				
Public institution	10	2	12	60
Private institution	4	4	8	40
Post-graduation				
Does not have it.	5	2	6	30
<i>Lato sensu</i> graduate program in progress.	3	1	3	15
Complete <i>Lato sensu</i> graduation.	6	3	9	45
<i>Stricto Sensu</i> Graduation (Master degree)	2	0	2	10
Length of experience in nursing				
1 – 2 years	1	1	2	10
2 – 3 years	1	0	1	05
3 – 4 years	1	0	1	05
More than 4 years	11	5	16	80
Length of experience in the pediatric oncology sector of the study institutions				
1 – 2 years	6	1	7	35
2 – 3 years	2	1	3	15
3 – 4 years	1	0	1	5
More than 4 years	5	4	9	45
Quantity of employment contract				
Only one	2	2	4	20
+ than 1	12	4	16	80
Weekly working hours at the institution				
30 hours	8	1	9	45
36 hours	2	1	3	15
40 hours	4	4	8	40

Source: It was elaborated by the authors.

Table 2 shows the distribution of characteristics related to continuing education in the area of pediatric oncology. It was found that 50% (n = 10) of the professionals reported participating in training or updating on the theme of FN. With regard to participation in pediatric oncology scientific events in the last two years,

was unanimity of the female sex, with a predominance of the age group between 30-39 years-old (n=12,60%). Regarding training in the nursing course, 45% (n=9) of the interviewees reported having completed a post-graduate course in *Lato Sense* and 80% (n=16) of the interviewees had more than four years of experience as a nurse, and an expressive number (n=9,45%) has worked for more than four years in the pediatric oncology services of the study. It was also observed that most nurses (n = 16, 80%) reported having more than one job, with weekly hours in the institutions ranging from 30 (45%) to 40 hours (40%). (Table 1).

55% (n = 11) of the sample reported they have not participated and the same frequency of participants have obtained qualification/training on the theme “Febrile Neutropenia/Urgency Oncology” through institutions in which they operate.

Table 2. Characteristics of professional training and continuing education of nurses in pediatric oncology service. Recife (PE), Brazil. 2018.

Characteristics	Institution		Total N(20)	%(100)
	A	B		
Have you participated in any training/updating on pediatric oncology/febrile neutropenia in the last year?				
Yes	9	1	10	50
No	5	5	10	50
Have you participated in scientific events on pediatric oncology in the last two years?				
Yes	5	4	9	45
No	9	2	11	55
Is there any discussion of clinical cases/scientific meetings with other health professionals regarding the topic at your work?				
Yes	6	1	7	35
No	8	5	13	65
Was the topic of febrile neutropenia addressed in your professional training course?				
Yes	3	1	4	20
No	7	3	10	50
Do not remember	4	2	6	30
Have you had any training on the topic "Febrile neutropenia/urgent oncology" at the institution where you work?				
Yes	6	5	11	55
No	8	1	9	45

Source: It was elaborated by the authors.

In view of hits and errors in the nurses' qualification and improvement test on the "complication addressed in this study", it was identified that the question that obtained the highest number of correct answers was related to

"nurses' actions in regard to FN"; however, the one that obtained the lowest number was for the "The most common primary site of infection in neutropenic patients". (Table 3).

Table 3. Hit rates in the qualification and improvement test of nurses on Febrile Neutropenia. Recife (PE), Brazil, 2018.

Questions	Hit	%	Error	%
How is febrile neutropenia defined?	11	55	9	45
Fever in neutropenic patients can be defined as: an axillary measurement of 38°C or three axillary measurements of 37.5°C in a 24-hour period?	9	45	11	55
Fever episodes in neutropenic patients should be treated as a medical emergency?	19	95	1	5
Should the clinical evaluation of febrile neutropenia in children initially consider epidemiological data and the present degree of infectious risk?	16	80	4	20
What should be done in the evaluation of febrile neutropenic patients?	10	50	10	50
The neutropenic patient's inflammatory response is preserved; so are the inflammatory manifestations evident?	16	80	4	20
Can the specification of febrile neutropenia in relation to the risk of infection determine which drug therapy will be used in the patient, its route of administration and possible outpatient treatment that is not necessarily hospitalized?	17	85	3	15
What are the risk variables for bacteraemia in neutropenic patients?	9	45	11	55
What is the most common primary site of infection in the neutropenic patient?	3	15	17	85
In neutropenic patients, are the etiological agents identified in the vast majority of febrile episodes?	13	65	7	35
When should antibiotic therapy be started on the neutropenic patient?	13	65	7	35
In neutropenic patients with persistent fever, is the antifungal treatment indicated?	15	75	5	25

To be continue...

Question	Hit	%	Error	%
Do hematological changes occur more frequently during the Nadir period?	15	75	5	25
Do patients with malignant hematological diseases or not undergoing chemotherapy only go through the neutropenia phase during the hospitalization period?	19	95	1	5
In case of neutropenia, are the consumption of undercooked, unpasteurized foods, nuts, dried fruits, food purchased from home sources, among others, prohibited?	15	75	5	25
What are the nurses' actions in the face of febrile neutropenia?	20	100	0	0

Source: It was elaborated by the authors.

In view of the sample distribution according to the percentage of correct answers about the qualification and improvement of nurses' knowledge about FN, it showed that only one nurse, obtained the highest rate of correct

answers, which was 90 to 100% of the questions. In relation to the highest percentage of correct answers, 50 to 60% ($n = 5$) was obtained by the applied questions. (Table 4).

Table 4. Sample distribution according to the percentage of correct answers about the qualification and improvement of nurses' knowledge about FN. Recife (PE), Brazil, 2018.

Percentage of hits	Nurses (N = 20)	
	N	%
< 50	04	20
50 – 60	05	25
60 – 70	04	20
70 – 80	04	20
80 – 90	02	10
90 – 100	01	5
Average	10,3	
Standard-deviation	2,4	
Maximum	18,0	
Minimum	7,0	

Source: It was elaborated by the authors.

Table 5 shows the average of correct answers. Having *Stricto Senso* post-graduation was the

only variable that showed statistical significance ($P = 0.030$).

Table 5. Distribution of the average number of hits about the qualification and improvement of nurses' knowledge about NF according to their training and professional performance. Recife (PE), Brazil, 2018.

Variables	Average of hits	P
Hospital		
A	11,0±2,26	0,106
B	9,25±2,25	
Graduation		
Public institution	10,86±2,41	0,061
Private institution	8,60±1,14	
Post-graduation		
He/she is not specialist in Oncology	9,25±1,83	0,030
Specialization in Oncology in progress	10,0±1,00	
Specialization in Oncology	10,43±2,44	
Stricto Senso	14,5±0,71	
Time of work in Nursing		
Up to 4 years	10,0±2,94	0,785
More than 4 years	10,37±2,31	
Time of experience in Pediatric Oncology		
Up to 4 years	10,18±1,99	0,812
More than 4 years	10,44±2,8	
Addressed Neutropenia in formation		
Yes	11,25±2,63	0,383
No	10,06±2,32	
Had Training at the Institution		
Yes	10,33±2,00	0,956
No	10,27±2,72	
Participated in Scientific Meetings		
Yes	10,15±2,48	0,717
No	10,57±2,29	

Source: It was elaborated by the authors.

DISCUSSION

Brazil has a total of 570,254 nurses with active enrollment in the Regional Nursing Councils (Coren), of these 26,407 are enrolled in the Coren of Pernambuco ⁽¹¹⁾. The demographic characteristics of the sample have pointed to the unanimity of female professionals, a finding concerning the national profile of nurses that reveals that almost 85% of nursing professionals are female. As for the age group, in line with the Federal Nursing Council (2017), 54.1% of nursing professionals are between 26 and 40 years-old, a context resulting from the expansion of technical and higher education institutions in the area in recent years ⁽¹²⁾.

Regarding the degrees, it was noticed that an expressive portion (30%) has no graduate education, an even more surprising result was observed in a study in the northeastern state of Sergipe, where researchers found that 80% (n=27) of nurses working in oncology services do not have any postgraduate degrees in the area ⁽¹³⁾.

The purpose of *lato* and *stricto sensu* postgraduate courses is to deepen specific knowledge that should, at least, be introduced in undergraduate courses, but what is perceived is the lack of these in the higher education courses. As a result, postgraduate courses provide greater quality in professional training and enable the management of complexities in the chosen area of specialization.

In this construct, most professionals had more than 4 years of experience in nursing services (80%) and in pediatric oncology services (45%), these points are important, especially due to the gap observed in the continuity of training, an experience allows the development of different approaches to recognizing and coping with problems. The longer training and professional experience gives greater dominance in the field of action, technical safety and control over situations that arise during nursing care, was found by researchers from Rio de Janeiro when observing the training and performance time of nurses and nursing technicians in palliative care services for cancer patients ⁽¹⁴⁾.

Regarding the characteristics of its formation and continuity, there is a lag in the approach of the theme in educational institutions (continuing

education) and also the failure of hospital institutions regarding professional training in the area (permanent education), a scenario unveiled by the fact that a significant number of professionals (45%) do not know how to correctly define the concept of febrile neutropenia and 50% do not know what should be done in the evaluation of the patient with febrile neutropenia, severe lapses for those working on the front line of assistance.

Within the scope of the Unified Health System (*Sistema Único de Saúde - SUS*), permanent health education (PHE) was institutionalized with ordinance n°. 1996/2007 ⁽¹⁵⁾ which launched guidelines for its implementation and aims at the interrelation of learning in the service, it is worthwhile that 65% of professionals reported that in their workplace there is no discussion of clinical cases in a team.

Permanent and continuing education are very important in the qualification of professionals due to the approach of themes with the objective of solving the doubts and problems found in the work reality. Consequently, it brings greater quality to assistance in all aspects.

Regarding complications related to chemotherapy, infection is the most common cause, and the most important risk factor is neutropenia. In this process, nursing plays a fundamental role, as the professionals are directly inserted in the patients' daily lives, who are qualified and can identify signs of infection or observe changes in patients' vital patterns early ^(16, 17). In this manuscript, this situation was worrying, since most nurses do not know the risk factors for septicemia and the most common primary site of infection in neutropenic patients (55% and 85%, respectively).

Fever episodes in neutropenic patients are one of the most important and frequent undesirable effects of chemotherapy. They are associated with high rates of morbidity and mortality when antimicrobial therapy is not promptly instituted. Thus, fever in a neutropenic patient should be treated as a medical emergency. Among neutropenic patients, the percentage of those ones who will have fever reaches 60% and 20%, for neutropenic patients with neutrophil it counts <100 cells/mm³ who will have bacteremia. These patients may present

septic shock within a few hours after the onset of the fever, that is, complicating it in an instant⁽¹⁸⁾.

The evaluation of the febrile neutropenic patient must be objective and quick, but complete. One should look for subjective symptoms and inflammatory signs in the places commonly considered infection sites: periodontic region, esophagus, lungs, perianal and perineal region, skin, bone marrow aspiration sites, venous and/or CSF puncture sites, catheters, periungual region and pharynx. Due to the damage caused to the mucous membranes by chemotherapy agents, the gastrointestinal tract is the most common primary site of infection^(18, 19).

Regarding the beginning of antibiotic therapy in neutropenic patients, and the indication for antifungal treatment in these patients with persistent fever, the success rate was 65% and 75%, respectively. Antibiotic therapy should be introduced immediately after an agile, objective and complete evaluation. In more than 80% of cases, bacteria are responsible for episodes of fever in neutropenic patients, and these bacteria are, in most cases, gram positive, although gram negative bacteria can also occur⁽²⁰⁾.

Therefore, a broad spectrum antimicrobial scheme, covering gram-positive and gram-negative, including *Pseudomonas aeruginosa*, should be instituted. The chosen antimicrobial regimen must reach effective serum levels of the drug, present low toxicity and simplicity of administration⁽²⁰⁾.

Knowledge about dietary indications is important because it can prevent possible infections, and reduce the number of bacteria and microorganisms that could be found in food. According to Nascimento (2016)⁽¹⁹⁾, hand hygiene significantly reduces the potential risk of contamination, with hand contamination being one of the most common causes of pathogen transport. So for a lower risk of infection in food, it is necessary to clean them properly and also perform hand hygiene before handling food and thus offer it to patients⁽²¹⁾.

Regarding the nurse's actions in the face of febrile neutropenia, all interviews were

successful. The performance of the nursing team is very important, as it is the professionals who are directly inserted in the daily living of patients promoting general well-being, therefore able to identify signs of infection or observe changes in patients' vital patterns⁽²¹⁾. In order to provide adequate nursing care, it is necessary to have specific skill and knowledge, to detect complications early and to intervene appropriately and in a timely manner, since the delay in appropriate care in this problem will cause harm to the patient.

CONCLUSION

In view of the results obtained, it is observed that the occurrence of febrile neutropenia requires the presence of highly qualified health professionals and holders of the best practical, as well as theoretical, knowledge based on scientific evidence. The data show a great discrepancy in knowledge of the theme, where about 20% of the sample obtained hits below 50%.

In this perspective, it is emphasized the need for nurses to seek new knowledge, through specialization, training or specific training in oncology. In addition, it is essential that hospital institutions keep their professionals constantly updated and improved, so that they can promote comprehensive, humanized care with evidence-based practices in the population of children diagnosed with cancer, who are undergoing chemotherapy, at risk to develop a febrile neutropenia. Since the best averages of correct answers were significantly associated with the presence of postgraduate professionals.

Despite the limitations related to the cross-sectional methodology and the small sample, the results of this study are important, insofar as they point to issues that should be reflected on by hospital managers and training institutions, as well as by professionals concerned with improving care to the population affected by this pathology.

AVALIAÇÃO DO CONHECIMENTO DOS ENFERMEIROS SOBRE NEUTROPENIA FEBRIL EM CRIANÇAS COM CÂNCER

RESUMO

Objetivo: Avaliar o conhecimento dos enfermeiros diante da neutropenia febril em pacientes pediátricos com diagnóstico de neoplasia maligna. **Método:** Estudo transversal e descritivo com abordagem quantitativa, realizado em dois hospitais referência em oncologia pediátrica de Recife/PE. A amostra contou com 20 enfermeiros. Os dados foram coletados entre setembro e outubro de 2017, por meio da aplicação de um questionário semiestruturado, analisados através do *Statistical Package for the Social Sciences* (SPSS) e apresentados com recursos de estatística descritiva. Resultados: Verificou-se que 100% (n=20) da amostra foi composta pelo sexo feminino, 60% (n=12) apresentaram faixa etária de 30-39 anos. Em relação ao conhecimento acerca da neutropenia febril, 50% (n=10) participaram de cursos de capacitação/atualização sobre o tema, 25% (n=5) acertaram entre 50-60% das questões aplicadas e apenas 5% (n=1) acertaram 100% do questionário. **Conclusão:** observou-se um elevado índice de fragilidade no conhecimento dos enfermeiros sobre a neutropenia febril, mostrando-se fundamental a busca de conhecimento para que, assim, os pacientes sejam mais bem assistidos e recebam um tratamento adequado e especializado.

Palavras-chave: Enfermagem Oncológica. Enfermagem Pediátrica. Cuidados de Enfermagem. Neutropenia Febril.

EVALUACIÓN DEL CONOCIMIENTO DE LOS ENFERMEROS SOBRE NEUTROPENIA FEBRIL EN NIÑOS CON CÁNCER

RESUMEN

Objetivo: evaluar el conocimiento de los enfermeros delante de la neutropenia febril en pacientes pediátricos con diagnóstico de neoplasia maligna. **Método:** estudio transversal y descriptivo con abordaje cuantitativo, realizado en dos hospitales referencia en oncología pediátrica de Recife/PE-Brasil. La muestra contó con 20 enfermeros. Los datos fueron recolectados entre septiembre y octubre de 2017, por medio de la aplicación de un cuestionario semiestruturado, analizados a través del *Statistical Package for the Social Sciences* (SPSS) y presentados con recursos de estadística descriptiva. **Resultados:** se verificó que el 100% (n=20) de la muestra fue compuesta por el sexo femenino, el 60% (n=12) presentó franja de edad de 30-39 años. Respecto al conocimiento acerca de la neutropenia febril, el 50% (n=10) participó de cursos de capacitación/actualización sobre el tema, el 25% (n=5) acertó entre 50-60% de las cuestiones hechas y solo el 5% (n=1) acertó 100% del cuestionario. **Conclusión:** se observó un elevado índice de fragilidad en el conocimiento de los enfermeros sobre la neutropenia febril, por lo tanto, es fundamental la búsqueda de conocimiento para que así los pacientes sean mejor asistidos y reciban un tratamiento adecuado y especializado.

Palabras clave: Enfermería Oncológica. Enfermería Pediátrica. Atención de Enfermería. Neutropenia Febril.

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