PUBLICAÇÃO OFICIAL DO NÚCLEO HOSPITALAR DE EPIDEMIOLOGIA DO HOSPITAL SANTA CRUZ E PROGRAMA
DE PÓS GRADUAÇÃO EM PROMOÇÃO DA SAÚDE - DEPARTAMENTO DE BIOLOGIA E FARMÁCIA DA UNISC

Revista de Epidemiologia e Controle de Infecção

Hospital Santa Cruz

ORIGINAL ARTICLE

Diagnosis to improve occupational safety in a hemodialysis service

Diagnóstico para aprimoramento do nível de segurança ocupacional em um serviço de hemodiálise

Diagnóstico para mejorar el nivel de seguridad laboral en un servicio de hemodiálises

https://doi.org/10.17058/reci.v10i4.14954

Received: *01/04/2020*
Accepted: *23/08/2020*
Available online: *04/10/2020*

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ABSTRACT

Background and Objectives: The exposure of health professionals to occupational risks due to reduced risk management can interfere with their work capacity and have a negative influence on public health. Therefore, this study aims to evaluate the biosafety risks in the hemodialysis sector of a university hospital (UH). **Methods:** This is a descriptive, cross-sectional and prospective study with a quantitative approach, carried out with 20 nursing professionals from August to October 2019, in a high-complexity university hospital. A checklist was applied, and its data was analyzed using the Epi-info software. The research complied with ethical aspects and was approved by the Research Ethics Committee of *Hospital das Clínicas de Pernambuco*. **Results**: The occupational risks of nursing professionals were evaluated in the hemodialysis sector, where 90% of workers are female. The physical and mental symptoms reported by professionals were characterized according to the time of exposure to risks in the sector. Individuals who worked for more than 10 years on hemodialysis had a higher frequency of symptoms, 64.44%, and 20.14% experienced fatigue. Regarding the frequency of exposure, it was highlighted that 31.36% of professionals were more exposed to ergonomic risks, associated with insufficient number of workers, exposure to a stressful environment and work overload. **Conclusion:** The research showed that nursing professionals are exposed to various types of risks and susceptible to occupational accidents. Health education is an essential tool for reducing these events in the hemodialysis service**.**

Keyords: *Containment of Biohazards. Occupational Exposure. Health Personnel. Epidemiology. Renal Dialysis.*

RESUMO

Justificativa e Objetivos: As exposições dos profissionais de saúde aos riscos ocupacionais por gestão de riscos reduzida podem interferir na capacidade laborativa, com influência negativa na saúde pública. Portanto, a pesquisa tem como objetivo diagnosticar os riscos de biossegurança no setor de hemodiálise de um hospital uni-

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versitário (HU). **Métodos:** Trata-se de um estudo descritivo, transversal e prospectivo de abordagem quantitativa realizado com 20 profissionais de enfermagem no período de agosto a outubro de 2019, em um hospital universitário de alta complexidade. Foram aplicados check-list e seus dados analisados por meio do programa Epi-info. A pesquisa atendeu aos aspectos éticos e foi aprovada no Comitê de ética do Hospital das Clínicas de Pernambuco. **Resultados:** Foram avaliados no setor de hemodiálise os riscos ocupacionais dos profissionais de enfermagem, onde 90% são do sexo feminino. Dentre os resultados foram caracterizados os sintomas físicos e mentais relatados pelos profissionais segundo o tempo de exposição aos riscos no setor, os indivíduos que trabalhavam a mais de 10 anos na hemodiálise apresentavam maior frequência de sintomas (64,44%), onde 20,14% sentem fadiga frequentemente. Quanto à frequência das exposições destacaram-se que 31,36% estão mais expostos ao risco ergonômico, caracterizado por número insuficiente de trabalhadores, exposição ao ambiente estressante e sobrecarga de trabalho. **Conclusão:** A pesquisa possibilitou evidenciar que os profissionais de enfermagem estão expostos a diversos tipos de riscos e suscetíveis aos acidentes ocupacionais. A educação em saúde é uma ferramenta essencial para redução desses eventos no serviço de hemodiálise.

Descritores: *Contenção de Riscos Biológicos Exposição Ocupacional. Pessoal da saúde. Epidemiologia. Diálise Renal.*

RESUMÉN

Justificación y objetivos: La exposición de los profesionales de la salud a los riesgos laborales debido a la reducción de la gestión de riesgos puede interferir con la capacidad de trabajo, con una influencia negativa en la salud **pública. Por** lo tanto, la investigación tiene como objetivo diagnosticar los riesgos de bioseguridad en el sector de hemodiálisis de un hospital universitario (HU). **Métodos:** Se trata de un estudio descriptivo, transversal y prospectivo con abordaje cuantitativo realizado con 20 profesionales de enfermería de agosto a octubre de 2019, en un hospital universitario de alta complejidad. Se aplicó una lista de verificación y se analizaron sus datos mediante el programa Epi-info. La investigación cumplió con aspectos éticos y fue aprobada por el Comité de Ética del Hospital das Clínicas de Pernambuco. **Resultados:** Los riesgos laborales de los profesionales de enfermería se evaluaron en el sector de hemodiálisis, donde el 90% son mujeres. Entre los resultados, los síntomas **físicos y** mentales informados por los profesionales se caracterizaron según el tiempo de exposición a riesgos en el sector, las personas que trabajaron durante más de 10 años en hemodiálisis tuvieron una mayor frecuencia de síntomas, 64.44%, donde 20.14% a menudo siente fatiga En cuanto a la frecuencia de las exposiciones, se destacó que el 31,36% está más expuesto al riesgo ergonómico, caracterizado por un **número insuficiente de** trabajadores, exposición al entorno estresante y sobrecarga de trabajo. **Conclusión:** La investigación mostró que los profesionales de enfermería están expuestos a varios tipos de riesgos y son susceptibles a accidentes laborales. La educación sanitaria es una herramienta esencial para reducir estos eventos en el servicio de hemodiálisis.

Palavras clave: *Contención de riesgos biológicos. Exposición ocupacional. Personal de Salud. Epidemiologia. Diálisis renal.*

INTRODUCTION

The concern with occupational risk arose after the HIV/AIDS epidemic in the 1980s, when safety standards in the workplace were established. Among the standards, the Regulatory Norm 32 (NR32) stands out. This norm was instituted in 2005 by the Ministry of Labor and Employment (MTE) and its purpose is to establish basic guidelines for safety measures and health protection of health service workers.[1,2]

The hospital environment is characterized as a high complexity space that provides health-related care. This environment has a high demand and offers a high number of services, which include laboratory and clinical services. Thus, it requires a multidisciplinary team to keep the institution functioning. Considering the risks and events that may affect professionals, data from the Ministry of Social Security referring to years 2012 to 2018 emphasized that the economic activities with the highest number of work accidents were related to hospital care (378,297 cases). These events make health professionals take work leaves due to accidents or occupational diseases.[3,4]

Among these work categories, nursing professionals stand out, as they act in health prevention, promotion and recovery.[3] Nursing care in the area of hemodialysis has its specificities, due to the large increase in the number of people affected with chronic diseases, requiring adequate technical support and specific knowledge to deal with the complexities of the sector. According to a study carried out in Germany, several factors can influence the well-being of professionals, such as budget cuts, understaffing and work overload.[5]

The hospital is considered an unhealthy place due to its demands and because the same environment contains patients with various infectious diseases. As a result, there are potential risks of exposure of health workers. Aiming to prevent these risks, Health Risk Management is relevant for monitoring and anticipating events and is a method of excellence for increasing safety.[6] Events must be identified to avoid negative outcomes. In general, tools for preventing errors and delivering quality services should be provided to professionals.[7]

Occupational accidents can transmit more than 20

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different types of pathogens. The human immunodeficiency virus (HIV), hepatitis B and C are the most common infectious agents in these situations.[7] The investigation of occupational risks in the hemodialysis sector is necessary because this sector deals with critically ill and chronic patients, and professionals are exposed to chemical, physical, accidental, ergonomic and biological risks.[8]

Despite the current and pre-established norms, preventive measures are often not incorporated into practice, as professionals do not recognize their vulnerability to infection. Activities on occupational risks and risk management are scarce, which directly affects their work capacity.[9]

To reduce occupational accidents, it is essential to carry out diagnosis to identify health risks for professionals and to support health education actions for all workers, aiming to increase knowledge about risks, improve compliance with biosafety rules, reduce occupational accidents and improve the quality of health services.[9]

Thus, the present study aimed to evaluate the biosafety risks in the hemodialysis sector of a university hospital (UH).

METHOD

This is a descriptive, cross-sectional and prospective study with a quantitative approach, carried out from August to October 2019 in a UH located in a capital in the Northeast Region of Brazil that offers services in various medical specialties. There are 22 hemodialysis clinics throughout the state, and the UH is responsible for treating patients with kidney diseases on outpatient or hospitalized hemodialysis therapy, with a capacity of 72 patients per week.

The study population was composed of 26 nursing professionals, 7 nurses and 13 nursing technicians and assistants, divided into day and night shifts. The professionals were approached during their shifts to answer the study check-list. Inclusion criteria were professionals who worked in the hemodialysis sector and who had at least one year of experience in the sector. The exclusion criteria were professionals on health leave and/or on vacation during the data collection period. Therefore, of the 26 professionals on the nursing team (11 nurses and 15 nursing technicians/assistants), 20 were interviewed (7 nurses and 13 nursing technicians/assistants) and six professionals refused to answer the interview.

A check-list questionnaire was applied for data collection. The questionnaire was adapted from the NR-32 and contained 24 questions, including independent variables (age, gender, civil status and level of education) and dependent variables (time working in the job, exposure to ergonomic, accidental, chemical, physical and biological risks, vaccination card, symptoms experienced, considering: headache, nausea, vomiting, dizziness, fatigue defined as an accumulation of psychophysical symptoms resulting from constant exposure to stressors, weight loss, memory loss, foot and ankle edema, flank pain, tremors, diarrhea, epigastric pain, dermatitis).

Data were stored in the Microsoft Office Excel program for processing and analyzed by descriptive statistics in the Epi-Info program, version 3.2.2 for Windows. This study complied with the determinations of Resolution 466/2012 of the National Health Council (CNS) and was submitted to the Research Ethics Committee of the *Hospital das Clínicas* through CAAE: 23769019.50000.8807 and approved under opinion number 3681308. The interviews occurred after the participants signed the Informed Consent Form.

RESULTS

The sample of this study consisted of 20 nursing professionals in the hemodialysis sector. Among the participants, most were female (90% - n=18) and were between 36 and 40 years old (35%), considered mature adult professionals (Table 1).

Table 1. Distribution of the characteristics of nursing professionals in the hemodialysis sector at a University Hospital in Recife, Pernambuco, in the year 2019.

Variables	N	%
Gender		
Female	18	90
Male	2	10
Age		
25-30	2	10
31-35	1	5
36-40	7	35
41-45	4	20
46-50	2	10
51-55	3	15
56 or more	1	5
Level of education		
High school	6	30
Higher education	14	70
Marital status		
Married	9	45
Divorced	2	10
Single	8	40
Stable union	1	5
Total	20	100

Source: Occupational Health and Work Safety Service, 2019.

As for the physical and mental symptoms reported by professionals and its association with the time of exposure to risks in the sector, it was found that individuals who worked for more than 10 years on hemodialysis had a higher frequency of symptoms (64.44%) and the most common symptoms were fatigue and headaches (Table 2).

The most frequent occupational accidents were ergonomic (31.36%) and accidental (22.46%) (Table 3).

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Table 2. Distribution of symptoms related to the time of experience in the hemodialysis sector in a University Hospital in Recife, Pernambuco, 2019.

Frequent Symptoms	N	%
1 to 5 years	7	15.56
Low back pain	1	14.29
Headaches	1	14.29
Fatigue	3	42.86
Memory loss	1	14.29
Tremors	1	14.29
21 years	3	6.67
Headaches	1	33.33
Fatigue	1	33.33
Dizziness	1	33.33
More than 10 years	29	64.44
Fatigue	7	24.14
Headaches	6	20.69
Epigastric pain	5	17.24
Dermatitis	2	6.90
Foot and ankle edema	2	6.90
Pain in the elbow	1	3.45
Pain in the spine	1	3.45
Pain in the flank	1	3.45
Pain in shoulders and hands	1	3.45
Sickness	1	3.45
Memory loss	1	3.45
Dizziness	1	3.45
More than 5 years	6	13.33
Headaches	3	50.00
Sickness	1	16.67
Fatigue	2	33.33
Total	45	100.00

Source: Occupational Health and Work Safety Service, 2019.

Table 3. Distribution of the frequency of occupational exposure of nursing professionals in the hemodialysis sector of a University Hospital in Recife, Pernambuco, in the year 2019.

	N	%
Ergonomic	74	31.36
Accidental	53	22.46
Chemical	49	20.76
Biological	41	17.37
Physical	19	8.05
Total	236	100

DISCUSSION

The data show that even with the current legislation, health professionals, especially nursing professionals, are exposed to occupational risks and accidents in the hemodialysis sector, which are worrying factors for this class of workers.[10] A similar study showed among its social data a predominance of women in hospital environments, even after the inclusion of men in the service. This is explained by the historical context, as until the middle age care was a task performed exclusively by women.[11]

Most participants in the present study were mature adults, who are possibly more susceptible to risks, as was also found in other studies.[12] This is due to the complexity of the sector, the frequent contact with organic fluids, the time of work and the stress of the profession.

The results of a study[13] have shown some factors that are associated with occupational accidents, such as length of service and time working in institution, absence of Personal Protective Equipment (PPE), lack of training, high workload and work overload, emotional disturbances, overconfidence, and possible human failures in the procedures. In the present study, the hemodialysis sector is predominantly composed of professionals who had been working for more than 10 years in the same environment. Several authors[13] associate professional recklessness with the experience and practice acquired over several years, which may lead professionals to develop a posture of overconfidence that predisposes to occupational accidents.

The professionals in the present study are frequently exposed to all occupational risks. This can lead to changes in the health of these professionals, reduce their work capacity, cause absences from work and consequently increase the demand for other professionals. Therefore, it is important to develop collective and individual interventions to reduce these exposures and to meet the needs regarding the necessary supplies for the protection of these workers and for the minimization of risks.

The analysis of the most frequent symptoms reported by the interviewees shows that fatigue and headaches frequently affect professionals in the hemodialysis sector. This diverges from a recent study[14] that found that the most frequent symptoms were related to musculoskeletal disorders. It is possible that this difference[15] occurs because professionals in the sector are frequently exposed to ergonomic risks, such as stressful environment, work overload and understaffing. These data reveal the fragility of this work category, which was also evidenced by a similar study. This can be explained by the exposure to stressors, such as the scarcity of human resources and work supplies, the complexity of assistance, deviations of function, double shifts, and ergonomic risks such as an inadequate work environment, repetitive work and physical effort, which results in a reduction in the work capacity of these professionals.[16]

The findings of the present study demonstrated that 24.14% of professionals who worked for more than 10 years in the sector experienced fatigue. A recent study showed that 42.53% of the professionals had residual fatigue, which was corroborated by previous studies that found that the fatigue may be correlated with the work shifts and the current condition of the labor market, which requires high work demands and more than one employment bond for the professional to have an adequate financial life. These factors can reduce the quality of life of these professionals.[17]

Another factor found by researchers[18] was the significant association between residual fatigue and a reduced ability to work, with negative effects on the state of alertness and surveillance, possibly representing a risk factor and being the only predictor of mental he-

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alth. The data obtained in this study showed that actions and measures are necessary and should include better staffing and adequate resting time to improve rates among professionals in the hemodialysis sector, which is characterized by a high risk, mainly due to procedures and contact with fluids.

According to a study,[19] 59.6% of the professionals in the nursing category have already had an accident at work. This was demonstrated in an evaluation conducted in the hemodialysis sector, with a supervised visit to assess the NR, and the results showed non-compliance to the occupational risk measures. This may be directly correlated with the frequency of exposures in the present study.

Ergonomic risks are related to the activities developed in the work environment and may affect the psychophysiological well-being of the worker.[20] Data from a similar study[21] showed that ergonomic risks are frequent and are associated with the psychological state of the professionals, with stress as the main factor for further deterioration in health.

According to the results of a study carried out in the UH Pedro Ernesto in the state of Rio de Janeiro, most occupational accidents occurred during or at the time of a procedure (84%).[22] The data obtained in this research showed that accidental risks were characterized by the physical area and inadequate lighting, discontinuity of the floor and difficulties in the space, especially regarding the storage of wheelchairs for patients who have walking difficulties. These factors can increase accidental risks among professionals.

The occupational exposure to biological material is still a worrying factor, since there is direct contact with fluids that are potentially infectious. Similar data were identified in another study, where 18.6% of nursing professionals at an oncology hospital in the state of São Paulo experienced an accident with biological material.[23]

Since physical exposures are less frequent, the data in a study emphasized the importance of checking the noise limit to which the nursing workers are exposed. This evaluation showed that, although the dialysis machines and the environment generate noise, the lack of maintenance of the air conditioning produced continuous noise and risk of biological contamination. A similar study[25] showed that noise can cause auditory problems, sleep disorders, fatigue, irritability, impaired concentration, and headaches, which are experienced by 44.20% of nursing professionals. These results may be correlated with the data obtained in the present study, which found fatigue and headaches as the most frequent symptoms.

Among all the risks and exposures experienced by professionals of the nursing team, educational actions are of paramount importance to improve the sector. Professionals report that the work environment has already improved; however, the data obtained in this study showed that it is still necessary to reduce these risks.

Given the above, it is necessary to create an action plan including permanent education, as the nurse is responsible for identifying these risks and developing preventive measures along with the managers of the work sector; elaboration of risk maps and flowcharts with procedures in case of accidents; training of these professionals to act appropriately to avoid occupational accidents; articulation with hospital managers; creation of a report with non-conformities, to improve this factor and increase financial investment, so that an adequate and safe environment can be provided for employees, raising the awareness on the importance of adhering to safe practices.

Finally, it is possible to state that the refusal of some professionals to participate in the interview can be pointed out as the main limitation of this study.

ACKNOWLEDGMENTS

To the Occupational Safety Service (**SOST**).

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AUTHORS CONTRIBUTIONS

Larissa Gomes, Viviane Araújo e Maria Conceição contributed to the conception, design of the article, analysis and writing of the article and final approval;

Mariana Luiza e Cristiane Macedo contributed to the planning and design of the article, review and final approval of the article;

All authors have approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.

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