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ORIGINALES

Knowledge and practices of nursing workers on occupational risks in primary health care: an intervention trial

Saberes e práticas de trabalhadores de enfermagem sobre riscos ocupacionais na atenção básica à saúde: um estudo de intervenção

Conocimientos y prácticas de los trabajadores de enfermería sobre riesgos laborales en la atención primaria de salud: un estudio de intervención

Renata Vieira Girão Arcanjo [1]
Bárbara Pompeu Christovam [2]
Norma Valéria Dantas de Oliveira Souza [3]
Zenith Rosa Silvino [4]
Taiza Florencio da Costa [5]

[1] Master's degree in Health Care Sciences from Fluminense Federal University -UFF. Brazil.
[2] Diretor of the Center for Care and Research in Tuberculosis and Lung Diseases Professor Mazzine Bueno of Fluminense Federal University. Permanent Professor of the Professional Master's Program in Nursing Care and the Academic Master's Program in Healthcare Sciences of the EEAAC/UFF. Brazil.
[3] Diretor of the Nursing School of Estadual University of Rio Janeiro. Associate Professor of the Department of Medical-Surgical Nursing and permanent professor of the Stricto Sensu Postgraduate Program at the Nursing School at UERJ. Brazil.
[4] Titular Professor in the area of Nursing Administration at the Federal Fluminense University, working in graduation, specialization, Professional and Academic Master's and Doctorate. Brazil.
[5] Adjunct Professor of the Nursing School Aurora de Afonso Costa at Fluminense Federal University EEAAC/UFF. Member of the Research Group Citizenship and Management in Nursing EEAAC/UFF and Studies on the health of nursing workers - EEUSP. Brazil.

E-mail: renatavg@id.uff.br

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ABSTRACT:

Objective: To identify nurses' knowledge and practices about the occupational risks found in the primary health care units studied; And to evaluate the impact of the educational intervention on the nursing practices and knowledge of the experimental group.

Method: Quasi-experimental study with design pre-test/post-test with non-equivalent control group, with quantitative approach. The study was developed in two units of primary health care in the city of Niterói, with 14 participants. Two questionnaires were applied in September 2015. The work is approved by the Ethics in Research Committee.

Results: It is found a strong positive correlation between the implementation of educational intervention and improvement of knowledge (r = 0.858) and change in preventive practices (r = 0.992) about the occupational risks by nursing professionals in the experimental group.
Conclusion: The educational intervention constitutes effective strategy for the acquisition of knowledge and promotes the adoption of preventive practices.

Keywords: Nursing; Occupational Risks; Primary Health Care; Education Continuing.

RESUMO:
Objetivo: Levantar os saberes e práticas dos profissionais de enfermagem sobre os riscos ocupacionais encontrados nas unidades de atenção básica estudadas; e avaliar o impacto dessa intervenção educativa nos saberes e práticas da equipe de enfermagem do grupo experimento.
Método: Estudo quase-experimental com desenho pré-teste/pós-teste com grupo controle não equivalente com abordagem quantitativa. O estudo foi desenvolvido em duas unidades de Atenção Primaria à Saúde do Município de Niterói, no estado do Rio de Janeiro e contou com 14 participantes. Utilizaram-se dois questionários aplicados em setembro de 2015. O trabalho tem aprovação do Comitê de Ética e Pesquisa.
Resultados: Evidenciou-se uma correlação positiva forte entre a aplicação da intervenção educativa e a melhora dos saberes (r=0,858) e mudança nas práticas preventivas (r=0,992) acerca dos riscos ocupacionais pelos profissionais de enfermagem do grupo experimento.
Conclusão: A intervenção educativa constitui-se estratégia eficaz para a aquisição de saberes e propicia a adoção de práticas preventivas e de promoção da saúde.

Palavras chave: Enfermagem; Riscos ocupacionais; Atenção Primaria à Saúde; Educaçao permanente.

RESUMEN:
Objetivo: Identificar los saberes y prácticas de los enfermeros sobre los riesgos laborales encontrados en las unidades de atención primaria estudiadas y evaluar el impacto de la intervención educativa en los saberes y prácticas de la enfermería del grupo experimental.
Método: Estudio cuasi-experimental con un diseño pre-test / post-test con grupo de control no equivalente con un enfoque cuantitativo. El estudio fue desarrollado en dos unidades de Atención Primaria de Salud del Municipio de Niterói, en el estado de Río de Janeiro, y contó con 14 participantes. Se utilizaron dos cuestionarios aplicados en septiembre de 2015. El trabajo tiene aprobación del Comité de Ética e Investigación.
Resultados: Se encontró una fuerte correlación positiva entre la aplicación de la intervención educativa y la mejora del conocimiento (r = 0,858) y el cambio en las prácticas preventivas (r = 0,992) sobre los riesgos ocupacionales por los profesionales de enfermería en el grupo experimental.
Conclusión: La formación de los profesionales es una estrategia eficaz para la adquisición de conocimientos y promueve la adopción de prácticas preventivas.

Palabras clave: Enfermería; Riesgos Laborales; Atención Primaria de Salud; Educación Permanente.

INTRODUCTION

The Ministry of Social Security, in its statistical yearbook, revealed that during the year of 2013 the economic activity sector "Health and Social Services" presented a total of 70,602 cases of occupational accidents and presented the second largest participation in typical accidents[(1)]. This is not only true in developing countries. By 2013, in the United States one in five reported nonfatal work-related accidents occurred among workers in the health care and social care industry[(2)].

These data are alarming for the need for action on behalf of workers who are exposed to occupational hazards in the workplace. One category of workers in particular who undergoes daily risks is the nursing team. Nursing workers are potentially exposed to occupational hazards by the type and frequency of procedures performed.

It is understood the importance of discussing occupational hazards with the nursing team in order to provide information that will lead professionals to reflect on their self-care, as well as to claim for better working conditions[3].

Studies on occupational hazards are developed mostly in the hospital setting, mainly in university hospitals, and the production in Primary Health Care is still scarce, not covering the professionals in this sector, who need protection measures and intervention on the risks to which they are exposed to[4,5].

Due to Brazil's economic situation reflected in the current situation of health facilities, structural reforms in the units have been made unfeasible, and in the meantime, one must think of low cost strategies, but with effectiveness to reduce occupational risks in the work environment.

One proposal of intervention adequate to the mentioned challenges is the Permanent Education in Health, since it intends to promote changes in the development of the health professionals by undertaking an articulated work between the management spheres, the health services, the institutions of health, teaching and social control institutions[6].

This study is the evaluation of the results obtained after the implementation of an educational intervention on occupational hazards in Primary Health Care with nursing professionals. To guide the development of the study, the following hypotheses were delineated: H_1: There is improvement in the knowledge and change in the practices of the nursing professionals who belonged to the experimental group after the implementation of educational intervention in a Primary Healh care setting; H_0: The knowledge and practices of the nursing professionals of the experimental group after the implementation of educational intervention is the same as the control group.

The objectives delimited for the study are: To understand the knowledge and practices of the nursing professionals about the occupational risks found in the primary health care units studied; and to evaluate the impact of this educational intervention on the knowledge and practices of the nursing team of the experiment group.

METHODS

Quasi-experimental study with design pre-test/post-test with non-equivalent control group, with quantitative approach. In this model, the research participants are not randomly assigned to the groups. Both groups are pre-tested and post-tested. However, only the experimental group is exposed to treatment. The control group receives the treatment after these steps in the form of delayed treatment [7].

This research was developed in two units of primary health care in the city of Niterói: the Policlínica Comunitária in Jurujuba (PCJ) and the Programa Médico de Família in Jurujuba (PMFJ). The research participants (n = 14) were all the professionals who belong to the nursing team of the two Units.

As a data collection instrument, two questionnaires constructed on a Likert scale were used. The first instrument was the pre-test questionnaire, which collected the information about professionals' knowledge and practices in relation to occupational risks, and after the intervention was performed the post-test questionnaire. Data were collected from September 14th to September 24th, 2015.

The nursing professionals took part in the educational intervention in the units where they work. The educational intervention was designed as a training course, entitled "Occupational Risks in Primary Health Care: Prevention Strategies for the Nursing Team". The educational intervention was carried out in one of the offices. The resources used were data-show for the projection of slides and videos and in addition to other materials used to carry out the intervention, professionals also earned a guide book containing 43 pages with all the information that was offered during the course. The booklet was elaborated with predominant visual information, without too much written text. The educational intervention lasted for 2 hours.

All ethical aspects related to human research contained in the Resolution 466/2012 of the National Health Council were respected[8]. The work was approved by the Ethics and Research Committee of HUAP/UFF under the CAAE number 50319015300005243/2015.

The data collected were treated using two softwares, *SPHINX*® version 2011 and *IBM SPSS Statistics*. In order to analyze the data resulting from the application of the Likert Scale, the answers were organized into a database in *Microsoft Excel*® version 2010, and then imported into each one of the softwares.

SPHINX® software performed univariate and bivariate statistical analysis of the data on the socio-occupational profile of the participants, type of occupational risk and measurement of the dependent variables. or descriptive analysis, the average was used as the central tendency index (in the case of this study, M = 210 for the dependent variable *knowledge*, and M = 159.6 for practices), and the standard deviation (which in the case of this study was of SD = 101.5 for the dependent variable knowledge, and SD = 80.5 for the dependent variable practices) and the analysis of variance as indices of variability.

To calculate the variance between the pre and post-test samples analyzed in the experiment and control groups, the following formula was used: $S^2= \Sigma (X- \overline{x})^2/N-1$.

Considering s^2 = Variance; Σ = Summation, that is, the sum of all terms in the equation after the summation signal; x = total of each term of the set; $\overline{x}$ = the average of the set; n = The size of the sample.

In order to test the hypotheses of study, two bivariate statistical tests were adopted: the Pearson Correlation Test (Test r), to test the hypotheses; and the Variance Analysis Test (ANOVA), to evaluate the mean differences between the pre-test and the post-test of the experimental and control groups. The level of significance adopted for the Test r was α = 0,05. The confidence interval is 95%, the degree of freedom was df = 6. In this context, with confidence interval (CI) of 95%.

In order to answer the research hypotheses, the Pearson Correlation Test (r Pearson) was used to verify the existence or not of statistical significance between the results of the pre and post test of the experimental group (H1), and the results of the of the experimental group when compared to the control group in relation to the dependent variables knowledge and preventive practices (H0). Taking as reference the table of critical values for the Pearson correlation coefficient, which in this study is 0.754 for the critical r. Thus, if the value of the *calculated r* > *critical r* there is evidence of a significant correlation between the analyzed data, thus H1 is ACCEPTED; if the value

of *calculated r* < *critical r*, it is concluded that the correlation between the analyzed data is statistically insignificant and H0 is consequently REJECTED.

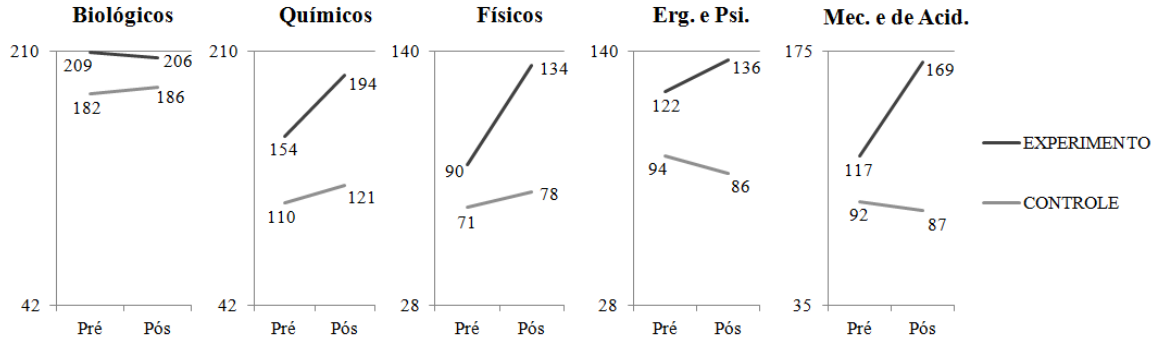
ANOVA analysis was performed using the IBM SPSS Statistics software. Each question was individually analyzed by the software comparing the pre-test questionnaire to the post-test. Each question generated an output which is the product generated after the statistical analysis. The tables generated by the software compared the response variation of the experiment and the control group. When the variation of the responses occurred generating a $p \leq 0.05$ only in the experiment group, and did not occur in the control group, there was statistical significance, which is to say that the cause of the variation in the intervention group is correlated to the intervention performed.

RESULTS

The total study sample consisted of n = 14 participants (100%), of these, n = 7 (50%) participants were allocated in the experiment group, and n = 7 (50%) participants were allocated to the control group. The gender of the deponents was predominantly female (n = 13) in relation to the male (n = 01). The age of the professionals ranged from 31 to 57 years old.

With regard to the working day, the hours worked by the professionals are heterogeneous, distributed in forty hours a week (n = 10, 71.4%), thirty hours a week (n = 2, 14.3%) and twenty hours (n = 2, 14.3%). Only two professionals have another job (n = 2, 14.3%). The graph below presents the results of the professionals' responses related to their knowledge regarding occupational hazards in the pre- and post-test.

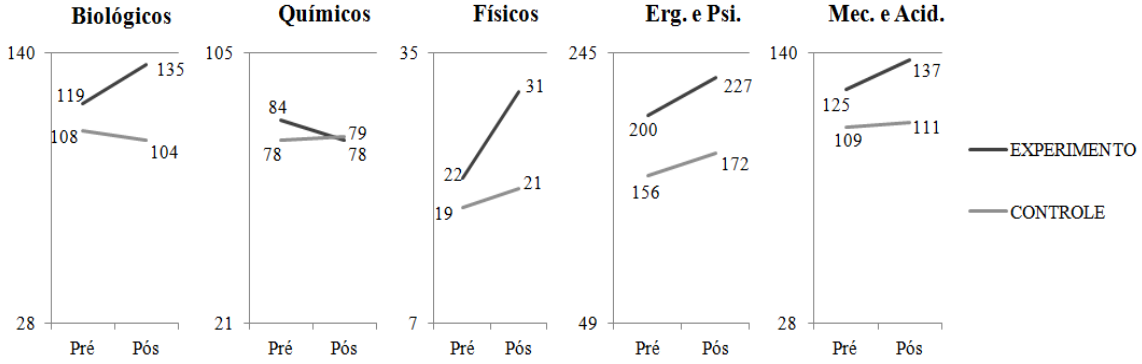
Graph 1. Comparison of the knowledge of the experiment and control groups in the pre-test and in the post-test



Source: Designed by the author

Through the questionnaires it was possible to identify the knowledge and practices of nursing professionals in the pre and post-test between the experimental and control groups. The principal way to evaluate the effectiveness of the intervention is to compare improvements that were presented in the intervention group after the educational intervention, that were not projected in the control group, giving the intervention, the transforming character. Evaluating the practices separately, the answers of the professionals in the pre- and post-test are presented in graph 2.

Graph 2. Comparison of the practices of the experiment and control groups in the pre-test and in the post-test



Source: Designed by the author

The *IBM SPSS Statistics* software generated 44 tables comparing the results between the experiment and control groups. After calculations, it was evidenced that 11 questions presented statistical significance ($p \leq 0.05$) only for the experiment group.
The questions concerning biological risks were not statistically significant. The answers of the pre-test questionnaire in relation to the biological risks indicated high scores in the questions of knowledge and preventive practices before the intervention was carried out.

Chemical risks presented significance in four questions. Ergonomic and psychosocial risks demonstrated statistical significance in two questions. Physical risk generated significance in three questions. Regarding mechanical and accident hazards, two questions were statistically significant.

The Pearson test was used to calculate the correlation coefficient between the dependent variables knowledge and practices and the application of the educational technology, based on the scores resulting from the application of pre and post-test. The degree of correlation attributed to the analyzed variables was classified according to the assumptions of the Test, where: the closer the value of r is to 1 (regardless of if + or -), the greater the statistical relationship between the variables and, the closer r is from 0, the lower the strength of this relationship.

From the scale of the correlation levels of the dependent variables according to the amplitude of Person's r, there was a strong positive correlation between the application of the educational intervention and the improvement of knowledge ($r = 0.858$) and change in the preventive practices ($r = 0.992$) about occupational risks by the nursing professionals of the experimental group, who work in Primary Health Care, after its implementation.

When examining the result of the correlation coefficient of the knowledge variable for the experiment group, it was evidenced that the relationship between the average of the pre and post-test scores is statistically significant, because the value of the calculated **r** for this variable of $r = 0.858$ was greater than the critical **r** value = 0.754. In the preventive practices variable, a significant correlation was also observed between the pre- and post-test average, due to the value of the calculated **r** value = 0.992 being greater than the critical value used as reference. Thus, there is sufficient evidence, at a significance level of 5%, to conclude that there is a significant linear

correlation related to the improvement in knowledge and change in the preventive practices of nursing professionals who participated in the experiment group after the application of the educational intervention. Therefore, H1 is accepted**.**

When comparing the post-test results of the dependent variables of the experimental group with the results obtained in the control group, from the analysis of the Pearson correlation coefficient, there was no linear correlation between the groups, since the value of the calculated **r** for the groups was r = 0.133, being lower than the critic **r** value, which leads to the decision of rejecting H0**.**

DISCUSSION

At all levels of the hierarchical scale that aggregate the nursing team, there are work situations that expose the professionals to risks, both of occurrence of occupational accidents and also the development of occupational diseases. The lack of occupational risk management strategies makes the professional vulnerable in the performance of their duties, considering the problems resulting from the lack of investments in biosafety in the nursing workforce[9].

Regarding the occupational risks to which nursing professionals are exposed in this study, it is observed that all occupational risk categories are present in the work of nurses, technicians and nursing auxiliaries, however, the nature of the present risk factors is diverse.

In relation to biological risks, the intervention was more effective in relation to the practices, than in relation to the knowledge. However, in relation to this category of risk, there were no questions that demonstrated statistical significance. The questions answered in the pre-test generated scores as high as the questions in the post-test questionnaire.

The nursing professionals participating in the research had a greater degree of knowledge about the category of biological risks before the intervention, than on any other category of risk addressed. Thus, the variation of responses between the pre- and post-test was not enough to reach statistical significance, in other words, the scores of the professionals in the experiment group were already considered satisfactory in the pre-test. The scores generated by the responses of the professionals in the control group were also considered satisfactory.

Biological risks are more evident in research on occupational hazards, since these risks are directly associated with the practices developed by health workers[3,10]. The constant exposure of health professionals to biological agents worries due to the peculiarities of the procedures performed in the health care of the people and also by the conditions in which the work is performed[11].

In chemical risks we can observe the effectiveness of the educational intervention for the questions related to knowledge. In the analysis of significance carried out in all the questions, it was observed that four questions of chemical risks presented statistical significance. The topics were related to the knowledge of the risks of handling alcohol 70%, and also on the hygiene of surfaces with the same substance. The utilities of the product were presented and the importance of the hygiene of the environment after care of patients and also of the hygiene of the hands were also debated.

The 70% ethyl alcohol is considered hazardous chemical residue by the Brazilian Regulatory Standard for its flammable, toxic, and reactive properties. And the nursing team for its direct action in the storage, use and disposal needs to receive effective guidance for the promotion of their health and prevention of accidents and diseases[12]. Another problem shown by the literature is the poor correlation of the factors that correspond to the chemical risks, some professionals attribute to chemical risks, factors classified as biological risks and physical risks; which again demonstrates the lack of knowledge of this occupational risk by the nursing team[9].

Another study showed that some professionals know and distinguish adequately the chemical risks, however, it points out the lack of resources for effective protection, such as personal protective equipment, including masks, procedure gloves, which exposes the professionals to these risks[13].

In this way, it is believed that the chemical agents are capable of causing damage to the health of the professionals that are not noticed by them, causing the nursing team to become familiar with them in their work routine, disregarding damages and underreporting accidents with these agents.

The results on the ergonomic and psychosocial risks demonstrated the effectiveness of the educational intervention both for questions related to knowledge and in questions related to practice. The intervention offered support for the prevention of occupational accidents and diseases through resources available in the unit. The topics where the significance occurred were related to heavy physical effort and its consequences, as well as the use of communication and protection strategies when dealing with service users in situations of conflict.

Nursing work is repetitive, demands physical effort and weight lifting, when associated with mental stressors become risk factors for the occurrence of work-related psychosocial diseases. Another factor related to nursing work is the lack of information about the problem, leading people not to early diagnose the symptoms caused by exposure to ergonomic and psychosocial risks, which in many cases aggravates the clinical condition[14].

In the scope of primary health care, nursing professionals coexist with the expectation to solve problems and at the same time with the impossibility of offering answers to the population due to the lack of working conditions. The damage results in physical and mental fatigue, leading to the physical symptoms generated by stress. Vulnerability to violence in primary care stems from the work process, the health needs of the individuals and communities, and the risk of exposure to aggression, among other factors[11,4].

In the survey carried out by the Federal Nursing Council and the Fundação Oswaldo Cruz to meet the profile of 1.6 million nurses, nursing technicians and nursing auxiliaries in the country, 19% of the respondents show that there is violence in the places they work, and 71 % say there is little security. 66% have already suffered some kind of occupational burnout, whether because of exposure to the risk of aggression, overwork or lack of structure to perform their duties [15].

In relation to physical risks, the intervention proved to be effective both in relation to practices and in relation to knowledge. All statistically significant questions were related to noise in the workplace. It was also identified that the nursing team is not

aware of the physical risks and relates them to situations that affect the integrity of the physical / organic body, a fact already described in the literature, where the professional unties the physical risk of agents such as noise, vibration, radiation, extreme temperatures (cold and heat), abnormal atmospheric pressure, and others[9].
In Primary Health Care noise is intermittent not being sufficient to cause hearing loss and therefore its consequences are often extra-auditory, such as headache, insomnia, stress, lack of concentration, among others. In combination, these stressors increase the risk of work-related accidents and can have multiple effects on workers' health and well-being [16].

The mechanical and accident risks showed that the experimental group obtained better performance when compared to the control group, both in the questions related to the knowledge and in the practice questions. The intervention was effective for this category of risks. The subjects which presented Statistical significance were related to fire prevention in the units.

Among the factors predisposing to occupational accidents by the nursing team are the lack of physical structure, lack of human and material resources to perform health work, lack of guidance regarding ways of preventing work-related accidents, among others [17].

> *Health professionals, specifically those in Basic Care, do not identify risks in the workplace and exposure to them in the activities they perform. In this way, prevention is the most effective strategy to avoid health problems and, therefore, it is necessary for companies to structure consistent standards of monitoring and control of safety, health and the environment, as well as that workers are trained to recognize the occupational risks to which they are exposed and the preventive measures of individual and collective protection to be adopted [3].*

Another fact that can be observed in all risk categories is the difference to less of the scores presented by the control group, compared to the experimental group in the pre-test. This pattern was evidenced both in relation to practices and in relation to knowledge. As the intervention was not randomized according to the different hours in which the professionals were available to participate in the intervention, it was chosen to classify as the experiment group the first seven professionals who took the course, and the other seven professionals were then classified as control group.

The justification of this study for this occurrence is the profile of the professionals that composed the two groups. The control group consisted mainly of nursing assistants (n = 4) followed by nursing technicians (n = 2) and nurse (n = 1), differently from the experiment group whose sample consisted of n = 5 nursing technicians in = 2 nurses. This difference of the professional category within the groups was considered responsible for the difference shown.

Another author presents some usual problems in data collection, and reports that changes in the responses of a group that has not received intervention can be explained as the Hawthorne Effect, which occurs when an individual participating in an experiment responds differently simply by being part of the experience. An explanation for the alteration of responses would be the state of anxiety provoked by the new situation experienced by the experienced; and the change in responses is also explained by the fact that the participant is receiving more attention than he or she

would normally receive. Therefore, changes in the responses of the control group are perfectly expected and occur in the most varied studies[18].

The study answered the hypothesis of research and confirmed the alternative hypothesis (H1), which determined the existence of improvement in knowledge and change in the practices of nursing professionals in the experimental group, after the implementation of educational intervention in basic care. The study refuted the null hypothesis (H0), where the knowledge and practices of nursing professionals in the experiment group, after the implementation of educational intervention, remained the same as in the control group.

These results are considered satisfactory and demonstrated the achievement of the expected results in the study. In addition to proving that practical interventions, viable, without high costs and applicable to the reality of institutions, can be effective. Small initiatives, but of a scientific and serious nature, can bring changes in these workplaces so marked by inequalities and disregard of basic norms. The main individual of these transformations must be the qualified professional to carry out their duties with the guarantee of their rights.

CONCLUSION

The determinants that can lead the health worker to illness or occupational accident due to exposure to occupational hazards correspond to a set of individual and institutional conditions, among which the knowledge and practices are only two of them, since the structural resources produce greater susceptibility to the aggravations in question. Thus, there is no way to think about interventions and / or prevention measures aimed at the worker alone, without considering the situations that interfere externally, such as political, economic, cultural and health institution managers, who can support and direct workers, for greater or lesser self-protection.

The study reached all its objectives and answered the hypotheses of the research, confirming the alternative hypothesis, and refuting the null hypothesis. The results were satisfactory and demonstrated the efficacy of the educational intervention, performed through accessible resources, not being costly for institutions. This study encourages the reproduction of this method for testing other educational interventions of a varied nature, improving the interventions in order to offer content focused on the specificities of the work environment.

This research contributed to health and safety in the work of the professionals of the units by offering useful knowledge to their health. Once it is put into practice, it will enable the reduction of exposure to occupational hazards. It also benefited the units, which have more qualified professionals for the work in health, knowing the strategies to avoid accidents and the development of occupational diseases.

The results of this study also enabled the production of new knowledge for the Health and Nursing area, related to the health of the workers who work in primary health care. And they will be able to guide the application of the strategies used in this study in other primary health care units. The research strengthened the Group of Studies and Research in Citizenship and Management in Nursing of the Federal Fluminense University, in the line of research on Occupational Safety and Health Management, which assisted the production of this study.

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