

THE EFFECTIVENESS OF WORKSHOPS IN HEARING HEALTH EDUCATIONAL ACTIONS DEVELOPED WITH WORKERS EXPOSED TO NOISE

A eficiência de oficinas em ações educativas na saúde auditiva realizadas com trabalhadores expostos ao ruído

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ABSTRACT

Purpose: the effectiveness' analysis of workshops on hearing health as proposed educational actions in health workers exposed to noise. **Methods:** intervention study of 15 male worker exposed to noise in a food industry. Stages: (1) assessment of hearing profile, (2) application of the questionnaire "Beliefs and attitudes about hearing protection" (NIOSH, 1996) – version A; (3) formulate and conduct three workshops covering some aspects of participatory methodology, with the following themes: anatomy-physiology of hearing, effects of noise, prevention, diagnosis of had noise induced hearing loss, consequences of PAIR, noise and its control, use of ear protections. (4) questionnaire application - version B for workshops evaluation. They were compared with seizure or retention of knowledge through the differences in scores found in questionnaires version A and version B. **Results:** among investigated workers (15), the average working average working time was 31,5 years, all males showed that 40% had noise induced hearing loss bilaterally. After application of the workshops there was a statistically significant improvement in tree thematic areas, namely: a) Perception of susceptibility to developing a hearing loss, b) Perceived benefits of preventive action and c) Changes in behavioral intentions. **Conclusion:** the pedagogical design of the Participatory type contributed to the reflection of the workers about preserving your hearing and health in the noise. Using the questionnaire of beliefs and attitudes led to the identification of issues that need to be addressed in other educational activities.

KEYWORDS: Noise Effects; Occupational Health; Noise, Occupational; Hearing Loss, Noise Induced; Health Education

■ INTRODUCTION

Although noise is present in a lot of occupational environments, its effects are difficult to notice because they are not immediate, but increase through time and may cause irreversible damages to hearing. At present, noise is one of the most potential risks to workers' health, either in industry facilities and other labor activities^{1,2}.

As a result, it becomes essential to establish Health Programs, in the industrial context, which emphasizes the adoption of preventive measures for preservation of workers' hearing, avoiding Noise-Induced Hearing Loss (NIHL)^{3,4}.

The goal of a Hearing Prevention Program – HPP, in work, is to establish actions so the work environments become healthier, safer and more pleasant, and it has as primary goal to reduce, and even eliminate the NIHL⁵⁻⁷.

Among the aspects that compound a Hearing Prevention Program in work are the actions to control the oto-aggressive agents, to monitor hearing and educational actions, the focus of this study, which the proposition aims the awareness of workers and employers about the consequences

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of the aggressive agents in labor facilities and the necessary preventive measures⁷.

It is comprehended by health educational actions the offer of conditions to people develop the sense of responsibility by their health and their community's health⁸.

Regarding the approached themes as part of the Educational Actions in HPP, authors suggest to broach aspects related to the hearing system functioning, hearing importance, life quality and the reflexes of the hearing alterations in social and professional scope, under active strategies, objective and integrative, promoting space for speech and listening, in addition to exchange of information^{5,7,9-11}.

The success of the educational actions directed to workers will depend on the choice of the methodological resources to be used. According to the literature, there are three main educational patterns: (1) Traditional Pattern: which valorizes, mainly, the educational content transmission. In this pattern, the relation with the tutor is authoritarian and it is up to the apprentice to receive and repeat the contents until learning, being necessary to obey the rules without analysis and discussion; (2) Conductor Pattern, which occurs when the tutor has as attitude to value the results or skills reached by the individual and the emphasis relays on results. The tutor is seen as instructor and his relation with the apprentices is authoritarian, but persuasive. This pattern, however, is criticized because do not teach the apprentice to analyze his own reality and do not encourage him to adopt critical and creative attitudes; (3) Participative Pattern, which the pedagogical option emphasizes the process and highlights the transformation of people and groups, emphasizing the interaction between people and their reality and the development of the intellectual capacity and social awareness. The concerning of the tutor is on developing the capacity to observe, analyze, question the reality and the problems, looking for solutions or answers appropriated to change them. This pedagogy is also known, in health area, as problem maker and participative, occurring in the way as common education^{10,11}.

Based on the Participative Model, authors suggest educational workshops as strategies which aim to induce critical thoughts in people. It is an intervention method that has a therapeutic dimension, encouraging the individuals to have space to speech and listen, allowing them to express their feelings with a pedagogical feature of information exchange in which the participants learn and teach with each other. The experts and the population are individuals who, from the reality they live, look for comprehend it, to reveal it and to change it. Thus, modifying the

reality, the individuals also will get change, acting individually and collectively in problems solution¹¹.

Thereby, the actions in promotion of health, when occur in spaces of collective discussion, induce workers' knowledge, valorizing their experiences and existence, mobilizing the process of changing the behavior¹²⁻¹⁵.

Based on these ideas, the aim of this study was to analyze the effectiveness of workshops in hearing health as a proposal of educational actions for workers exposed to noise.

■ METHODS

This study was approved by the Committee of Ethics of the Tuiuti University of Paraná under protocol nº 12/08.

It is an intervention study, by conducting educational workshops as part of the HPP and the application of questionnaires pre (A) and post (B) intervention, to evaluate the results.

The field of study was a small food industry, which produces popcorn and corn snacks in the city of Curitiba – PR.

The criterion of inclusion was to work in the industry and to air the willing to participate in the three workshops. To the interested individuals was hand in the Consent Form (CF). As criterion of exclusion, it was considered if the worker did not attend one of the workshops or did not sign the CF. Among a total of 30 workers in the industry, 22 agreed to participate in the research. Although, some workers did not finish their participation in the three workshops due to factors as: disconnection of the company (three workers), vacation (two workers), not attending one of the workshops (two workers).

It was included in this study 15 workers (50% of the company employees), all of them exposed to noise over 85 (dB) during eight hours a day, in the sections of package, barrel, extruder and frying. All men, average age among 19 and 46 years old (average 31.5 years old; standard deviation of 6.1) and period of laboring from eight months to 30 years (average of 11.2 years and standard deviation of 9.4). Concerning the individuals' level of education, it was found as Secondary School incomplete 33.33%, Elementary School incomplete 26.66%, Secondary School complete 13.33% and Elementary School complete 26.66%.

The research procedures were divided in four stages:

1) Development of Hearing Evaluation on workers: it was developed the hearing evaluation to establish the relations between the hearing profile

and the improvement of the preventive content acquisition, once some authors consider that those workers who have already presented hearing loss tend to be worried more about their hearing health than those who still presented a normal hearing⁷. Then, it was developed the inspection of the external acoustic meatus, aiming to verify the presence of earwax or foreign bodies; pure tone threshold audiometry, in acoustic cabin with 14 hours of hearing rest and audiometer MAICO MA40 calibrated according to the international standards (ANSI). The frequencies evaluated via air were from 250Hz to 8.000Hz and when the threshold found was over 25 dBNA it was developed the research via the osseous of 500Hz to 4000Hz. The audiometry exams were classified following the Regulatory Norm n. 7 in its Annex I, in The Ministry of Labor. 2) Application of the pre-intervention questionnaire (A) on workers: it was used a validated questionnaire, semi-structure, with closed questions entitled "Beliefs and Attitudes about Hearing Protection", originated from NIOSH (1996)^{16,17} in the United States and translated to Portuguese in 2008⁵. 3) Conduction of three workshops as part of the educational actions of HPP: the strategy of the workshops was based on some aspects of the Participative Methodology. It was conducted three educational workshops every two weeks, at the industry headquarters during 30 minutes each with the following approach:

WORKSHOP 1 – Content: the hearing process, the effects of noise on hearing and on general health, the prevention of hearing problems. **Material:** prints corresponding to hearing physiology and to the effects of noise on hearing system. **Strategy:** the individuals were divided in groups and each of them received a folder containing suggestions of themes to be discussed in the workshop, the group created a poster collectively from a key word about one effect of noise on hearing; **WORKSHOP 2 – Content:** mapping the noise, identification of audiometry exams normal and with hearing loss and individually or collectively measures of hearing protection. **Material:** folders containing colored prints suggesting contents explaining the effects of noise on their health and their work, material for confection a collective poster. **Strategy:** divided in smaller groups, the individuals received pictures with the sectors of the industry so they could identify those considered noisier, after this, it was created a poster collectively with the illustration containing a scale in decibel to identify the sectors analyzed and with material containing preventive actions able to be implanted; **WORKSHOP 3 – Content:** the importance of the hearing protection, its use, cleaning and inconveniences. **Material:** different models of hearing protection. **Strategy:** the individuals in

smaller groups received different models of hearing protection for discussion of its placing, comfort and cleaning and they raised questions to the other groups answer.

4) Application of post-intervention questionnaire (B) on workers: it was used the version post-intervention (B) of the questionnaire "Beliefs and Attitudes about Hearing Protection", with questions about the same content of the pre-intervention questionnaire.

The questionnaires "Beliefs and Attitudes about Hearing Protection" evaluated the beliefs and the attitudes of the workers about hearing loss prevention and the use of hearing protection. The questionnaires (pre-intervention "A" and post-intervention "B") presented 28 questions, subdivided in 10 thematic areas in both questionnaires, namely: perception in obtain a hearing loss (questions one and 13), perception of the severity of the consequences of a hearing loss (questions two and 14), perception of a prevention action benefits (questions five, 16 and 24), perception of obstacles in preventive action (questions six, 17 and 25), tone down of important sounds (questions seven and 18), communication (eight, 19, 26), convenience and availability (three, nine, 20 and 27), intentions of behavior (10, 21, 28), social standards (11 and 22) and self-effectiveness (four, 12, 15, 23). The questionnaires are based on the "Likert Scale" (answers varying from "Absolutely agree" to "Absolutely disagree") with scores of one to five for each answer, and crescent levels of desirable or undesirable answers. After the punctuation by question, it was developed the sum of all scores by thematic area. The analysis was performed comparing the scores by thematic area reached by workers before (questionnaires pre-intervention "A") and after the conduction of the workshops (questionnaire post-intervention "B").

The data collected were analyzed and processed using the program SPHINX. The scores were estimated by theme area for the questionnaires A and B, applying the Wilcoxon Test to verify whether the results were significant.

It was also evaluated the data of the variables related to the questionnaire score such as the hearing profile and the level of education. It was used Fisher's Test, Wilcoxon Test and Spearman's Correlation Test. It was considered the significance level of 0.05 (5%).

■ RESULTS

It was observed when analyzing the hearing profile, that 40% of the 15 workers who participated in the study, presented suggestive hearing loss as NIHL, 40% presented hearing thresholds according

to the expected patterns and 20% presented non-suggestive hearing loss as NIHL. All workers have already used hearing protection for eight years, when the company began to provide it, being predominated the insertion pre-mold type (73.33%), of NRRsf 13 dB.

Before the conduction of the workshops it was applied the pre-intervention questionnaire "A" to

measure the awareness of beliefs and attitudes about hearing prevention that the workers have already presented. And, after the workshops, it was applied the questionnaire "B" to analyze the results about beliefs and hearing habits.

After the workshops, it was compared the scores by theme area, of the workers' group, applying the Wilcoxon Test, as shown in Table 1.

Table 1 – Comparison of general scores, by themes areas, between the questionnaires pre and post-intervention, using the Wilcoxon Test (N=15)

THEME AREA	QUESTIONNAIRES SCORES		P
	PRE	POST	
1. Perception of the susceptibility in obtain a hearing loss	115	93	0.0206*
2. Perception of the consequences severity a hearing loss	126	119	0.2622
3. Perception of a preventive action benefits	153	174	0.0046*
4. Perception of a preventive action obstacles: a) comfort	145	153	0.2132
5. Perception of a preventive action obstacles: b) tone down of important sounds	113	117	0.3452
6. Perception of a preventive action obstacles: c) communication	171	166	0.2719
7. Perception of a preventive action obstacles: d) convenience and availability	172	189	0.0653
8. Behavior intentions	145	176	0.0015*
9. Social Standards	110	110	0.8336
10. Self-effectiveness	211	195	0.2585
TOTAL	1439	2956	

* $p < 0.05$

It was verified significant differences, with the increase of information level after the workshops, for the themes areas: Perception of the susceptibility in obtaining a hearing loss, the Perception of the preventive action benefits and the Behavior intentions in using the hearing protection whenever they were in noisy facilities, in this global analysis.

The following analysis verified among the workers, those who presented an indicative score of improvement in acquiring the content (increase in the score of the questionnaire post-intervention in relation to the questionnaire pre-intervention), by theme area, after the workshops (Table 2).

Table 2 – Evincing of the workers who improved the content acquisition about hearing prevention, after workshops, by theme area (N=15)

THEME AREA	Complete Attendance	Relative attendance%
1) Perception of the susceptibility in obtain a hearing loss	11	73.33
2) Perception of the consequences severity a hearing loss	6	40.00
3) Perception of a preventive action benefits	12	80.00
4) Perception of a preventive action obstacles – comfort	8	53.33
5) Perception of a preventive action obstacles – tone down of important sounds	3	20.00
6) Perception of a preventive action obstacles – communication	4	26.67
7) Perception of a preventive action obstacles – convenience and availability	4	26.67
8) Behavior Intentions	13	86.67
9) Social Standards	3	20.00
10) Self-effectiveness	6	40.00

In all theme areas were found workers with improvement in acquiring the contents about hearing preservation. Among all, four areas presented 50% or more of workers with improvement in the acquisition of the contents: Perception of the susceptibility in obtain a hearing loss; Perception of the preventive action benefits; Perception of the obstacles in a preventive action – comfort and intentions of behavior.

The relation among the contents learning post-intervention was analyzed by using the questionnaire “B” with the workers’ hearing profile, but it was found no significant association by the Fisher’s test ($p= 0.5385$; level of significance 0.05).

The relation between the results of the questionnaire post-intervention with the workers’ level of education was analyzed by the Spearman’s Correlation Test, as following in Table 3.

Table 3 – Evincing of the Spearman's Correlation among the results form questionnaire B (post-intervention), by themes areas, and the workers' level of education (N=15)

THEMES AREAS	SPEARMAN'S CORRELATION (R)	p
1) Perception of the susceptibility in obtain a hearing loss	-0.0365	0.8971
2) Perception of the consequences severity a hearing loss	-0.2568	0.3556
3) Perception of a preventive action benefits	0.0577	0.8381
4) Perception of a preventive action obstacles – comfort	0.3519	0.1983
5) Perception of a preventive action obstacles – tone down of important sounds	0.1411	0.6160
6) Perception of a preventive action obstacles – communication	-0.1354	0.6305
7) Perception of a preventive action obstacles – convenience and availability	0.2514	0.3660
8) Behavior Intentions	0.3209	0.2436
9) Social Standards	0.2731	0.3247
10) Self-effectiveness	0.1493	0.5955

The correlation of the questionnaire by the average of all areas and the level of education resulted in $R= 0.3264$ and $p= 0.2351$, therefore, there was no significant correlation (significance level of 0.05).

■ DISCUSSION

This study evaluated the effectiveness of educational workshops directed to hearing health in male workers of a company in the food business in the city of Curitiba.

The action proposal looked for use the pedagogical aspects of the Participative Methodology in the construction of the workshops about workers' hearing health.

In the studied industry, among the workers (15) who participated in this research, it was found 40% of the audiograms suggestive of NIHL, but 100% of the workers used the hearing protection. It is believed that the use of the hearing protection has happening due to the increase of the company's managers' sensitization, mainly, after the modifications in legislation in 1998, which instituted Regulamentary Norms related to workers' Health (WH), Programs for Medical Control in Occupational Health (PMCOH), Programs for Prevention of Environmental Risks (PPER) and Programs for Hearing Prevention (PHP), in which are highlighted preventive actions and hearing health promotion. These normative changes also promoted more

effective use of the hearing protection on Brazilian workers due to the employers' inspection in accomplish the actual legislation¹⁸. Nevertheless, workers with NIHL are still found, what justifies more effective actions as part of the Hearing Preservation Program involving the control of risks agents for hearing in labor environment⁷.

Looking at the literature, it was verified Brazilian studies that found a smaller percentage of hearing alterations than the present study, among workers of food industry. A research developed with 49 workers exposed to noise in an oil extraction industry found 29% of the audiometry exams suggestive to NIHL¹⁹. And another study with 100 workers in a food industry found 31% of the audiograms suggestive to NIHL, a smaller percentage comparing to this study, although, with a bigger population²⁰.

Regarding the educational actions developed, the comparing results of the pre and post-intervention questionnaires (Table 1) showed that workers, in a global analysis, presented higher acquisition of content in the areas of perception of susceptibility in obtain a hearing loss, perception of the preventive actions benefits and intentions of using the hearing protection behavior whenever they were in noisy facilities.

This fact may justify itself by the emphasis given to these themes during the workshops, due to the interest of the workers. The theme about susceptibility to hearing loss was discuss in workshop 1, and the themes about perception of a preventive action

benefits and intentions of behavior, were approached in workshops 1 and 2. A different study⁵ assessed the educational actions developed with workers from a food company comparing the attitudes, intentions and behaviors of hearing protection, adopted pre and post-training, using the same questionnaire as this research, but comparing two workers' groups (with and without the hearing training), it was found significant results on the trained group on the areas referring to perception of benefits and preventive action obstacles.

And when analyzing individually how many workers improved their acquisition of the content by themes areas (Table 2), it was observed that in all the themes at least 20% of the workers got improved regarding the comparison of results from questionnaires pre and post-intervention. However, the areas of Perception on the susceptibility in obtain a hearing loss, Perception of a preventive action benefits and Intentions in using the hearing protection behavior, were outstanding.

According to literature, to promote health on labor environment in an effective way is essential to attach aspects that have been disregarded by professional, *e.g.*, the implementation of educational actions and its assessments²¹.

Educational actions in hearing health should include contents about the hearing functioning, types of hearing loss, causes and strategies of prevention. Also it is important to consider, that to implant strategies of prevention hearing losses, *e.g.*, the use of hearing protection, the opinion and perception of workers is important, making them actives in this process. Thus, it is possible a better workers' awareness about the importance of prevention²²⁻²⁴. The educational workshops collaborate to the awareness of protection against hearing loss noise induced connecting the idea that the worker is an agent of changes in his health and has knowledge

and experiences about his work. This questions if shared collectively, can interfere extraordinarily on the labor environment changing^{25,26}.

The level of education has been related in literature as an important factor for the success of the educational actions. The level of education found in this study was diversified, which suggests variability, without correlation to the acquisition of the content identified by the questionnaires (Table 3).

A research about the acceptability of individual hearing protection in a Curitiba industry²⁷ verified that the studied population had 10% of illiterates, 40% had the Elementary School and 50% the Secondary School. The author found low scores in the assessment of theme area intentions of behavior in using the hearing protection and it was given to the diversified function of the population's level of education.

■ CONCLUSION

The educational workshops showed themselves more efficient on the improvement of the contents acquisition related to the themes areas: perception of the susceptibility in obtain a hearing loss, perception of a preventive action benefits and intentions of behavior changing. In this study, factors as the workers' hearing profile and the level of education presented no significant association with learning the contents transmitted.

The themes that presented higher acquisition of the content were those which had more attention in the workshops and interest by the workers' group. The production of material during the workshops – as the creation of posters and collectives walls – was a well-accepted strategy by the group and certainly contributed to the workers' reflection about preservation of their hearing faced to noise as part of a Hearing Prevention Program.

RESUMO

Objetivo: analisar a eficiência de oficinas em saúde auditiva como proposta de ações educativas para trabalhadores expostos ao ruído. **Métodos:** estudo de intervenção, em 15 trabalhadores do sexo masculino, expostos ao ruído em uma empresa alimentícia. Etapas: (1) avaliação auditiva dos trabalhadores, (2) aplicação do questionário “Crenças e atitudes sobre proteção auditiva” (NIOSH, 1996) versão A na amostra, (3) elaboração e realização de 3 oficinas, contemplando alguns aspectos da metodologia participativa, com os temas: anatomofisiologia da audição, efeitos do ruído, prevenção, diagnóstico e consequências da Perda Auditiva Induzida por Ruído (PAIR), ruído e seu controle, utilização de protetores auriculares, (4) aplicação do questionário versão B para avaliação das oficinas. Comparou-se a apreensão de conhecimentos pelos trabalhadores por meio das diferenças de pontuação encontradas no questionário versão A e B. **Resultados:** entre os trabalhadores investigados, com tempo médio de trabalho de 31,5 anos, 40% apresentaram PAIR bilateralmente. Após a aplicação das oficinas houve uma melhora significativa em três áreas temáticas avaliadas: Percepção da suscetibilidade de adquirir uma perda auditiva, Percepção dos benefícios de uma ação preventiva e Mudanças nas intenções de comportamento. **Conclusão:** a concepção pedagógica do tipo Participativa adotada, contribuiu para a reflexão dos trabalhadores sobre a preservação de sua audição e saúde frente ao ruído. O questionário sobre crenças e atitudes permitiu a identificação de temas que necessitam ser abordados em outras Ações Educativas.

DECRITORES: Efeitos do Ruído; Saúde do Trabalhador; Ruído Ocupacional; Perda Auditiva Provocada por Ruído; Educação em Saúde

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