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Original Article

Organizational influence on the occurrence of work accidents involving exposure to biological material[1]

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Objectives: to analyze work accidents involving exposure to biological materials which took place among personnel working in nursing and to evaluate the influence of the organizational culture on the occurrence of these accidents. Method: a retrospective, analytical study, carried out in two stages in a hospital that was part of the Network for the Prevention of Work Accidents. The first stage involved the analysis of the characteristics of the work accidents involving exposure to biological materials as recorded over a seven-year period by the nursing staff in the hospital studied, and registered in the Network databank. The second stage involved the analysis of 122 nursing staff members' perception of the institutional culture, who were allocated to the control group (workers who had not had an accident) and the case group (workers who had had an accident). Results: 386 accidents had been recorded: percutaneous lesions occurred in 79% of the cases, needles were the materials involved in 69.7% of the accidents, and in 81.9% of the accident there was contact with blood. Regarding the influence of the organizational culture on the occurrence of accidents, the results obtained through the analysis of the two groups did not demonstrate significant differences between the average scores attributed by the workers in each organizational value or practice category. It is concluded that accidents involving exposure to biological material need to be avoided, however, it was not possible to confirm the influence of organizational values or practices on workers' behavior concerning the occurrence of these accidents.

Descriptors: Work Accidents; Occupational Hazards; Organizational Culture; Nursing.

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Influência organizacional na ocorrência de acidentes de trabalho com exposição a material biológico

Objetivos: analisar os acidentes de trabalho com exposição a materiais biológicos, ocorridos entre trabalhadores de enfermagem, e avaliar a influência da cultura organizacional sobre a ocorrência desses acidentes. Método: trata-se de estudo retrospectivo, analítico, realizado em duas etapas em um hospital de ensino integrante da Rede de Prevenção de Acidentes de Trabalho–Repat. Na primeira etapa foram analisadas as características dos acidentes de trabalho com exposição a material biológico registrados entre os trabalhadores de enfermagem do hospital estudado e registrados na banco de dados da Repat, durante sete anos. Na segunda etapa, foram analisadas as percepções sobre a cultura da instituição de 122 trabalhadores de enfermagem, alocados nos grupo-controle (trabalhadores não acidentados) e no grupo-caso (trabalhadores acidentados), ambos compostos por 13 enfermeiros e 48 auxiliares e/ou técnicos de enfermagem. Resultados: 386 acidentes foram registrados, as lesões percutâneas ocorreram em 79% dos casos, as agulhas foram os materiais envolvidos em 69,7% dos acidentes e em 81,9% dos acidentes houve contato com sangue. Quanto à influência da cultura organizacional sobre a ocorrência de acidentes, os resultados obtidos na análise dos dois grupos não demonstraram diferenças significativas entre os escores médios, atribuídos pelos trabalhadores, para cada categoria de valor ou prática organizacional. Conclusão: conclui-se que os acidentes com exposição a material biológico precisam ser evitados, no entanto, não foi possível constatar a influência dos valores e práticas.

Descritores: Acidentes de Trabalho; Riscos Ocupacionais; Cultura Organizacional; Enfermagem.

La influencia de la organización en la ocurrencia de accidentes de trabajo con exposición a material biológico

Objetivos: analizar los accidentes de trabajo con exposición a material biológico entre el personal de enfermería y evaluar la influencia de la cultura organizacional en la ocurrencia de accidentes de este tipo. Método: estudio retrospectivo, analítico, desarrollado en dos etapas en un Hospital de la Red para la Prevención de Accidentes. En la primera etapa, se analizaron las características de los accidentes de trabajo con exposición a material biológico entre el personal de enfermería del hospital, ocurridos a lo largo de siete años, registrado en la base de datos. En el segundo paso, se analizaron las percepciones sobre la cultura de la institución de 122 profesionales de enfermería asignados al grupo control (no lesionadas trabajadores) y al grupo de casos (los trabajadores lesionados). Resultados: 386 accidentes fueron reportados; las lesiones percutáneas en el 79% de los casos, las agujas fueron los materiales que intervienen en el 69,7% de los accidentes y el 81,9% de los accidentes hubo contacto con sangre. En cuanto a la influencia de la cultura organizacional en la ocurrencia de accidentes, los resultados obtenidos del análisis de los dos grupos no mostraron diferencias significativas entre las puntuaciones medias asignadas por los empleados para cada categoría de la organización o en la práctica. La conclusión es que los accidentes con exposición a material biológico deben ser evitados. Sin embargo, no fue posible verificar la influencia de los valores de la organización y las prácticas sobre el comportamiento de los trabajadores ante la ocurrencia de accidentes de este tipo.

Descriptores: Accidentes de Trabajo; Riesgos Laborales; Cultura Organizacional; Enfermería.

Introduction

Work in the health sector is carried out in places where there is constant exposure to risk factors which harm those who work there. Among the harms that affect the health of professionals in this sector, authors highlight work accidents (WA), which happen to workers' bodies abruptly or insidiously, as a result of abrasions suffered or provoked through exposure to the work involved in the health services[1].

The problem of WA involving the exposure of health workers to biological materials is a worldwide concern.

It is estimated that healthcare personnel in the United States suffers 365,000 injuries per year - that is, 1000 a day[2].

Work accidents (WA) are defined as those that occur through the exercise of work, provoking bodily harm or functional disturbance, which causes death or permanent or temporary loss or reduction of ability to work. In health work, WA can result from factors related to the particular characteristics of activities of caring for human beings, with occupational violence and physical, chemical, biological, psycho-social, ergonomic and organizational factors all standing out[3]. What stands out in the present study is the exposure of hospital workers to biological risks, due to the large number of work activities that expose these workers to contact with biological material, which can lead to illnesses like Acquired Immunodeficiency Syndrome and Hepatitis[4].

The biological agents are represented by bacteria, fungi, bacilli, parasites, protozoa and viruses, which can penetrate into the host's body via the respiratory, cutaneous or digestive systems and which, to produce an infection, depend on other factors, such as the micro-organisms' virulence and numerical sufficiency, as well as finding a susceptible host. The following materials are considered hazardous biological fluids: blood, organic liquid containing blood or potentially infectious liquids such as semen, vaginal secretions and synovial, peritoneal, pericardial or amniotic fluids or liquids. Sweat, tears, feces, urine and saliva are biological liquids that do not carry risk of occupational transmission of HIV[4].

Accidents involving exposure to blood commonly occur through a skin wound, comprising the penetration, through the skin, of a needle or surgical/medical item that is contaminated with pathogens; contact with the ocular or oral mucosa or broken skin, such as dermatitis or an open wound; and contact of biological fluids with intact skin[5-6]. The consequences of occupational exposure to pathogens transmitted by biological material are not only related to infection. Each year, thousands of health workers are affected by psychological traumas that last days or even months, while they wait for the results of serological exams. Consequences include alterations in sexual practices, the side-effects of the prophylactic drugs, and loss of employment[5].

The use of personal protective equipment (PPE) is recommended for the prevention of exposure to biological material, alongside the adoption of safety measures, which include: hand-washing before and after patient contact, between two or more procedures carried out on the same patient, after taking off gloves, and after contact with contaminated or potentially contaminated equipment; using gloves during procedures which involve contact with blood, body fluids, secretions, excretions, mucosa, broken skin and during the handling of contaminated articles; using masks, eye protection and aprons in situations in which blood or secretions may splash, or direct contact with a contaminated patient; never re-sheathing needles; carrying sharps carefully and disposing of them into rigid, puncture-proof recipients, made available in appropriate, visible and easily-accessible places[7].

In Brazil, the high number of work accidents among healthcare workers, the absence from work of affected staff, and the cost of prophylactic treatment called the attention of the Ministry of Work and Labor which, responding to requests from professional associations, produced a specific standard for Health and Safety at Work in Healthcare Institutions, Regulatory Standard NR 32[8].

To exchange information, carry out collaborative research and program measures for preventing work accidents in hospitals involving exposure to biological material, the Network for Preventing Work Accidents – REPAT [9] was set up, which benefits from the participation of researchers from Brazil and abroad, undergraduate and post-graduate students, and occupational health teams from hospitals all over Brazil. The content of its website was produced based on the results of research from both Brazil and abroad, and includes a form available for download for recording WAQ, making it possible to collect data about the occurrence and causes of accidents, the actions taken by the hospital, and the characteristics of the workers who are victims of the accidents, including their vaccination situation, serological exams and prophylactic treatment carried out.

Not only are they caused by varying risk factors existing in work environments, the occurrence of WA may be aggravated by workers´ negative behaviors, such as not using gloves during invasive procedures[10]. In turn, the behavior of workers, managers and the institution itself is determined by the organizational culture, comprised of values, beliefs and the diverse dimensions of the enterprise, such as the work organization and management strategies, objectives, and style it adopts[11-12].

The culture is the organization´s foundation, representing values and beliefs the workers share, which are reflected in organizational traditions and habits. The organizational culture represents a pattern of basic suppositions held by a group and transmitted to new members as the correct way to act[13].

Considering the inter-relation between organizational culture and the workers´ behavior, this study was undertaken to analyze the influence of the values and work practices in a hospital on the occurrence of occupational accidents involving biological materials among nursing staff, seeking responses to the following research question: is the occurrence of work accidents involving biological material influenced by the values and practices that characterize the healthcare institution´s culture?

Thus, this study´s objectives were to analyze the occurrence, characteristics and causes of work accidents involving exposure to biological materials among nursing staff; and to evaluate the influence of the organizational culture on the occurrence of work accidents involving biological material among nursing staff.

Method

This is a retrospective, analytical, case-control study, carried out in two stages, at a teaching hospital located in the state of São Paulo, a member of the Network for the Prevention of Work Accidents - REPAT.

Stage 1: analysis of work accidents involving exposure to biological material

In the period September – December 2010, the researchers examined the records of Work Accidents involving exposure to biological materials among nurses, nursing assistants and healthcare assistants between 2003 and 2009 in the hospital and logged into the REPAT databank. The data was analyzed according to frequency and presented in tables. The average number of staff in the hospital in question is 4494, 1736 of whom belong to the nursing team.

Stage 2: evaluation of organizational culture

Objectives were to investigate the organizational values and practices that characterize the culture of the hospital in the study and to identify the relationship between the organizational culture and the occurrence of these accidents. To this end, the researchers analyzed how two groups of nursing workers perceived the institution´s culture. The control group was comprised of nursing workers who had not suffered accidents with biological materials in the period 2003 – 2009, and the case group was made up of nursing workers who *had* had work accidents in the same period and whose data was analyzed in the first stage of this research. Both groups were comprised of 61 workers (13 nurses, 48 nursing assistants and health care workers), selected through random stratified sampling[14].

All workers were interviewed in their respective workplaces. The following were used as inclusion criteria: professionals who were not away from work in the period of data collection, and who voluntarily consented to participate in the study by signing the Informed Consent Forms. The data was collected during the months of January – April 2011, by means of an instrument involving information about the workers (age, sex, marital status, education level, place of work) and using the Brazilian Instrument for Evaluating Organizational Culture - IBACO[15] – which was elaborated by Brazilian researchers based on the Hofstede model[10] with the aim of identifying values and practices that make up an organization´s culture from the workers´ perspective.

The IBACO[15] instrument presents 55 statements, related to four types of organizational values: values of cooperative professionalism (VCP), values of hierarchical rigidity (VHR), values of competitive and individualist professionalism (VCIP) and values associated with employees´ satisfaction and well-being (VES). In addition, the instrument presents 39 statements, related to three categories of organizational practice: practices of external integration (PEI), practices of rewarding and training (PRT) and practices of promotion of interpersonal relationships (PPR).

The VCPs are related to valuing workers who carry out tasks efficaciously and competently, demonstrating a collaborative spirit, dedication, professionalism and initiative, thus contributing to the achievement of the organization´s goals. The VHRs are values that define the organization as a centralized, authoritarian system, which impedes professional growth and recognition of the human element. VCIPs have to do with valuing individuals´ competence and performance in carrying out tasks to obtain established results, disregarding the collective work. VESs are related to valuing the workers´ well-being, satisfaction and motivation[15].

The PEIs are related to strategic planning practices, decision-making and attendance to the organization´s external clients. PRTs are linked to systems for rewarding and training and meeting the needs of internal clients. PPRs refer to actions that promote interpersonal relations among the workers and their satisfaction, favoring internal cohesion. To analyze the data, it is necessary to calculate the average scores the workers attributed to each factor, so as to obtain the score for the organization

as a whole. The scores can vary from one to five; the higher the score, the greater the extent to which the organizational value or practice measured by that factor is present in the evaluated organization[15].

The data collected was organized in a database using Excel for Windows, and transported to the program SPSS 16.0 to calculate the average scores for each category of values and practices that characterize the culture of the institution being studied, being analyzed with descriptive statistics. The research project received approval from the HCFMRP/USP Research Ethics Committee (number 5154/2010). The regulations of Resolution 196 on ethical standards for research involving human beings were followed[16].

Results

Occurrence of accidents involving biological material

During the period 2003 – 2009, 386 work accidents involving exposure to biological material (WABM) were recorded among nursing staff. It is worth highlighting that nursing staff members comprise 32.4% of the workforce in the hospital studied. It may be observed that the majority of records are related to female workers (87.3%), with the greatest concentration in the age range 20 – 49 years (84.2%), with 45.4% being married and 38.4% single. 72.8% of the WA happened to assistant nurses, 20.5% to nurses, and 6.7% to health care assistants.

The data showed that the accidents happened in different sectors of the hospital, with most incidents occurring in pediatrics (11.6%), surgery (9.1%), medical clinics (8.5%), intensive care units (7.2%) and the unit specialized in the treatment of infectious diseases (6.2%). Needle-stick injuries and other percutaneous wounds accounted for 79% of the WA, followed by exposure of mucosae (15.3%) and contact with skin (5.7%). Needle-stick injuries were the most frequent type of accidents recorded (69.7%). In 81.9% of the accidents there was contact with blood and, in 5.9%, there was contact with body fluids. In 5.4% of the WABMs, this data was unknown. In 72.5% of the WA, the fingers were the most frequently affected body part. It is worth noting that, in 9.6% of the accidents, the eyes were affected, which should arouse reflection on the appropriate use of eye protection, in line with regulation NR32[7].

Values and practices that characterize organizational culture

In the period studied, this study´s case group was made up of 61 workers who had suffered work accidents in the institution involving biological materials. Among them, the researchers noted a predominance of women (88.5%), of workers between the ages of 31 and 50 (68.8%), and of married people (52.5%); 36 workers (59.1%) had finished high school and 51 (83.6%) stated that they did not have a second job*.

Among the workers who had not had accidents and who made up the control group, (also comprising 61 nursing workers), it was observed that 82% were female, 65.6% were between 31 and 50 years old, 50.8% were married, 32.8% had finished university and 75.4% did not have a second job. These 122 individuals responded to the IBACO[15].

Based on the responses given by the nursing workers in the control group, an average score of 2.59 was ascertained for values of cooperative professionalism; 2.90 for values related to hierarchical rigidity and the centralization of power in the institution; 2.14 for values of individual professionalism and competition at work; 2.12 for values related to workers' well-being and motivation. As regards organizational practices, the following average scores were obtained: 3.31 for practices of external integration; 1.91 for practices of rewarding and training and 2.60 for practices related to the promotion of interpersonal relationships in the hospital.

The perception of those nursing workers who had suffered work accidents involving biological fluids (case group) demonstrated average scores of 2.72 for values of cooperative professionalism; 2.80 for values related to hierarchical rigidity and centralization of power in the institution; 2.17 for values referring to individual professionalism and competition at work; 2.13 for values related to workers' well-being and motivation. In relation to organizational practices, an average of 3.52 was ascertained for practices of external integration; 1.90 for practices of rewarding and training and 2.59 for practices related to promoting interpersonal relations in the institution. Thus, there was no significant difference between the groups´ scores.

Discussion

Over the seven years studied, 386 work accidents involving exposure to biological material were recorded.

* Due to low salaries, it is common for nursing staff in Brazil to have two jobs. Translator's note

Particular attention is drawn to the fact that these accidents should not happen, as they are preventable. Of the WABMs registered, 74.2% occurred among nursing workers, principally among nursing assistants, in the different sectors of the hospital. Skin lesions (cuts, punctures, nicks) occurred in 79% of cases, with needles being the material involved in 69.7% of the accidents. In the majority of accidents there was contact with blood, indicating the possibility of contamination and the transmission of illnesses like AIDS and Hepatitis B.

These results corroborate the data found in the literature. Various studies have observed that accidents involving biological materials occur predominantly among nursing workers and involve contact with blood and skin wounds caused by needles, exposing the health care professionals above all to the risk of occupational infection by the Hepatitis B and HIV viruses[17-21].

For the prevention of occupational accidents and illnesses among health care professional, the principal Brazilian regulation is NR32, which possesses three major concerns. The first is the continuing training of the workers; the second defines the programs which deal with the risks; and, lastly, the third concern determines the measures of protection against occupational risks[22].

Regarding the institution´s culture, the analysis of the average scores related to the hospital´s organizational values demonstrates that the nursing workers from both groups perceive the existence of a rigid hierarchy and centralization of power in the institution; they believe there to be competition between the workers and difficulty in developing team work practices; they consider that well-being and motivation at work are values that are reasonably or little valued in the hospital. In relation to organizational practices, satisfaction in the work and promotion of interpersonal relations are practices which are reasonably adopted in the institution in the perception of the workers, while practices of training or rewarding workers are little emphasized in the hospital in the workers´ opinion.

Hence, this investigation´s results reveal that the values and practices characteristic of hospital culture present elements related to a rigid, hierarchical organizational structure where power is centralized and, consequently, it is difficult to develop teamwork. In addition, one can verify the existence of individualism and competition between the nursing workers; lack of interest in the workers´ well-being, not considering their needs; and the need to improve interpersonal relations in the institution.

These elements are directly related to the traditional model of work organization and management adopted by the hospital, based on authority and characterized by a hierarchized and vertical structure, in which there is predominant emphasis on the organization and work processes, with excessive control of procedures; centralization of the decision-making process and fragmentation of activities; the formalization of communication and interpersonal relations, and the devaluing of individuals – characteristics still present in a great many public health institutions in Brazil[23]. This data corroborates the results of studies undertaken in 76 countries[11], which made it possible to elaborate theoretical assumptions related to the different dimensions of organizational cultures. These dimensions are dynamic and interdependent and represent the practices and values that characterize organizations´ cultures. Among these dimensions, the following stand out: process-oriented cultures versus results-oriented cultures; orientation around work rather than workers; weak control of work, rather than strong control of work in the organizations.

According to these authors, organizations oriented around processes and work possess rigid structures, centralization of power, high levels of work specialization, formalization of relations and communication difficulties; there is strong control of the processes and the workers, who suffer pressure from the managers in carrying out their tasks, do not participate in decision-making processes and feel that their personal problems are not important to the organization. In organizational cultures oriented to results and to the worker, on the other hand, there is a reduction of hierarchical levels, sharing of decisions, and concern about the workers´ needs, expressed by valuing individuals´ well-being and satisfaction.

Since its inception, the organization of work in health care and nursing has been founded on the social division of activities and in the valuing of the organization, the processes, standards and routines - which has led to the fragmentation of care. In this process, nurses have taken on the role of team managers, controlling the work in an impersonal manner, in a process of domination over other workers[24].

The social division of work in nursing and authority create distancing and conflicts among the workers[25], which makes it difficult to achieve cooperation between health care professionals and for staff to develop teamwork or interdisciplinary practices, as verified in the institution. This work context provokes dissatisfaction and demotivation in the work and hinders professional

growth, due to its failure to value individual abilities and competencies. In addition, all these factors impair the quality of patient care. Further, these work conditions can contribute to illnesses among the workers.

Conditions that are unfavorable to individuals´ liberty and control of work can generate insecurity, fear, despair and psychological suffering in the workers, triggering situations of anxiety, depression and other psychiatric problems, such as burnout syndrome, resulting from the sum of the difficulties faced on a daily basis and the interaction of these factors with workers´ individual characteristics[26]. However, comparing the results of this study´s case group and control group, it may be ascertained that significant differences were not observed between the average scores attributed by the subjects to each category for organizational values and practices. This fact demonstrates that, despite reflecting aspects related to the organization and management of work in healthcare, it was not possible to establish a direct relation between the hospital´s organizational values and practices and the occurrence of work accidents involving biological material in that context.

Conclusions

Despite Brazilian legislation, and despite the existence of internationally recommended standard precautions, work accidents involving exposure to biological materials among nursing workers continue to be a reality present in the hospital studied, and effective strategies need to be adopted to prevent them.

The relationship between the organizational culture and the model for management and organization of work adopted by the institution indicates that the organizational values and practices permeate the hierarchical rigidity and the devaluation of the workers, intensifying the fragmentation of the care, and impeding the achievement of quality in health care. The results do not indicate a direct link between the organizational culture and the occurrence of occupational accidents in the institution, so that the influence of organizational values and practices on the workers´ behavior vis-à-vis the occurrence of work accidents involving biological material cannot be verified.

This study provides subsidies for restructuring processes and work practices in the hospital setting and results in advances in scientific knowledge of nursing.

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