

Implementation of the program to prevent accidents with sharps: a documentary analysis

Implementação do programa de prevenção de acidentes com materiais perfurocortantes: análise documental

Implementación del programa de prevención de accidentes con objetos punzocortantes: análisis de documentos

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ABSTRACT

Objective: to describe the implementation process of the program to prevent accidents with sharps in a public hospital. **Method:** a descriptive study, with retrospective documentary analysis, developed from the exploratory, selective and analytical reading of the contents present in records of the Specialized Service in Safety Engineering and Occupational Medicine. Data collection was performed by filling out a semi-structured form and the analyses were based on the program's adaptations to the guidelines set forth in Ordinance No. 1,748 of the Ministry of Labor and Employment. **Results:** the program's implementation process was completed in eight stages and met the directives set forth in the Ordinance. The program improved the conventional control measures and led to the adoption of engineering measures. According to the evaluation by the Management Commission, the program contributed to a reduction in the number of accidents. **Conclusion:** implementation of the program was successful, serving as a model for other Brazilian hospitals.

DESCRIPTORS: Governmental Regulation; Fidelity to Guidelines; Occupational Health Services; Penetrating Wounds Produced by Needles; Hospitals.

RESUMO

Objetivo: descrever o processo de implementação do programa de prevenção de acidentes com materiais perfurocortantes em um hospital público. **Método:** estudo descritivo, com análise retrospectiva documental, desenvolvido a partir da leitura exploratória, seletiva e analítica dos conteúdos presentes em registros do Serviço Especializado em Engenharia de Segurança e em Medicina do Trabalho. A coleta de dados foi realizada com o preenchimento de um formulário semiestruturado e as análises foram baseadas nas adequações do programa às diretrizes da Portaria nº 1.748 do Ministério do Trabalho e Emprego. **Resultados:** o processo de implementação do programa foi concluído em oito etapas e atendeu às diretrizes da Portaria. O programa aperfeiçoou as medidas de controle convencionais e levou à adoção de medidas de engenharia. Pela avaliação da Comissão Gestora, o programa contribuiu para a redução dos acidentes. **Conclusão:** a implantação do programa foi bem-sucedida, servindo como modelo para outros hospitais brasileiros.

DESCRIPTORES: Regulação Governamental; Fidelidade a Diretrizes; Serviços de Saúde do Trabalhador; Ferimentos Penetrantes Produzidos por Agulha; Hospitais.

RESUMEN

Objetivo: describir el proceso de implementación del programa de prevención de accidentes con objetos punzocortantes en un hospital público. **Método:** estudio descriptivo con análisis documental retrospectivo, llevado a cabo a partir de la lectura exploratoria, selectiva y analítica de los contenidos presentes en los registros del Servicio Especializado en Ingeniería de la Seguridad y Medicina del Trabajo. La recolección de datos se realizó mediante la cumplimentación de un formulario semiestructurado y los análisis se basaron en las adaptaciones del programa a las directrices de la Disposición nro. 1.748 del Ministerio de Trabajo y Empleo. **Resultados:** el proceso de implementación del programa se completó en ocho etapas y cumplió con las directrices de la Disposición. El programa perfeccionó las medidas de control convencionales y condujo a la adopción de medidas de ingeniería. Según la evaluación del Comité de Gestión, el programa contribuyó a la reducción de accidentes. **Conclusión:** la implementación del programa fue exitosa y sirve de modelo para otros hospitales brasileños.

DESCRIPTORES: Regulación Gubernamental; Adhesión a las Directrices; Servicios de Salud Ocupacional; Heridas Punzantes Producidas por Aguja; Hospitales.

INTRODUCTION

In Brazil, the hospital sector accounted for 53,524 cases of work-related accidents, that is, 9.74% (549,405) of the total reported in 2017⁽¹⁾. Among the types of accidents recorded in hospitals, occupational accidents due to percutaneous exposure stand out, due to the possibility of infection caused by blood-borne pathogens, transmitted through sharp materials (SMs)⁽²⁾.

In this context, health policies have been allied to prevent work-related accidents. The production of technical and regulatory standards assists in the development of actions for the surveillance and quality assessment of the workers' health programs⁽³⁾.

The main regulatory standards (*Normas Regulamentadoras*, NRs) applied in health institutions are NR 4, NR 5, NR 7, NR 9, NR 15, NR 17 and NR 32⁽⁴⁾. In general, these standards deal with the obligation to maintain programs/services in operation and to establish measures to protect workers' safety and health. However, NR 32 additionally establishes the adoption of preventive control measures (PCMs) in the health services⁽⁴⁾.

Strategies for the control of work-related accidents were expanded through Ordinance No. 1,748 of the Ministry of Labor and Employment on August 30th, 2011, annex to NR 32⁽⁵⁾. This standard defined guidelines for the preparation, implementation and evaluation of the Program for the Prevention of Accidents with Sharps (*Plano/Programa de Prevenção de Acidentes com Materiais Perfurocortantes*, PPAMP) and established the role of the employer and the Multidisciplinary Management Commission

(*Comissão Gestora Multidisciplinar*, CGM), responsible for the actions of the PPAMP⁽⁵⁾.

Since publication of the ordinance, there have been no research studies on the PPAMP implementation process in a large hospital, justifying conduction of this study. Thus, we present the following guiding questions: Which directives of Ordinance No. 1,748 were met by the hospital? Which were the control measures for the prevention of accidents with SMs adopted by the hospital?

Therefore, this study aimed at describing the PPAMP implementation process in a public hospital.

The scientific findings may serve as a comparative model, so that hospital managers can systematically analyze, expand or improve the planning of actions aimed at the prevention of accidents with SMs.

METHOD

This is a descriptive study, with retrospective documentary analysis, conducted in a large-size and general public hospital, which carries out research, teaching and assistance activities.

The hospital is located in the municipality of São José dos Campos, São Paulo. It is the largest reference hospital for urgency and emergency care with an "open door" system in Vale do Paraíba, a region comprising 39 municipalities in the state of São Paulo. In December 2019, 1,978 workers from different areas were working in the hospital.

It is noteworthy that this hospital is accredited by the National Accreditation Organization (*Organização Nacional de Acreditação*, ONA) and

that is also classified as an "Environment-Friendly" and "Child-Friendly" hospital. In 2011, it won the COREN-SP Award for Hospital Dimension Quality Management. In 2014, it received the state certificate as one of the "Best Hospitals in the State of São Paulo".

The hospital is linked to the Municipal Health Secretariat of São José dos Campos and is managed by the São Paulo Association for the Development of Medicine since 2006.

The institution has a Specialized Service in Safety Engineering and Occupational Medicine (*Serviço Especializado em Engenharia de Segurança e em Medicina do Trabalho, SESMT*) which aims at promoting health and protecting workers' integrity in the workplace. The SESMT consists of an occupational physician, an occupational nurse, a nursing technician, an occupational engineer, three occupational safety technicians and an administrative assistant.

In this hospital, the SESMT is responsible for storing the records produced by the CGM and for recording the PCMs adopted in the hospital. These two databases were used in this study because they hold information regarding the PPAMP pre-implementation (2007-2011) and post-implementation (2011-2019) periods.

The documents stored by the SESMT and consulted for this research were as follows: meeting minutes; implementation schedule; training report; report of the PCMs selected; accident analysis report and report of PPAMP's efficiency.

The data collection procedure was carried out in the premises of the SESMT, by a researcher

and from February to August 2020, with completion of a semi-structured form, prepared based on Ordinance No. 1,748⁽⁵⁾, and on the PPAMP implementation manual in Fundacentro's health services⁽⁶⁾.

The form had the following variables: a) preparation of a schedule and implementation of the PPAMP by the employer; b) constitution of the CGM; c) investigation, registration and analysis of work-related accidents with SPs; d) definition and priorities of the preventive actions; e) selection of the PCMs; f) training of the workers; g) systematic monitoring of the workers' exposure to biological agents; and h) evaluation of PPAMP's efficiency and of the number of occupational accidents with percutaneously exposure to PCBm.

Collection was carried out in two stages: Stage 1: Reading of the records that were accessed, selection of the relevant information and analysis of the records; Stage 2: Completion of the printed semi-structured form.

Data analysis was carried out from an exploratory, selective and analytical reading of the records, and adequacy of the PPAMP implementation with the directives set forth in Ordinance No. 1,748 was verified.

The research project was approved by the hospital's superintendent and approved by the Committee of Ethics in Research with Human Beings, opinion No. 3512327, as required by the National Health Council (*Conselho Nacional de Saúde, CNS*) and the Ministry of Health (*Ministério da Saúde, MS*), resolutions No. 466 of December 12th, 2012 and No. 510 of April 2016.

RESULTS

Reading and analysis of the documents from the hospital institution elucidated the PPAMP implementation process. Implementation of the PPAMP took place in eight stages and met all the guidelines required by Ordinance No. 1,748.

The implementation process was initiated in November 2011 and ended in November 2012. After completing the stages, the CGM continued to annually assess PPAMP's efficiency.

The records showed that there was expressive participation of workers and managers from different sectors of the hospital in the program's implementation process, including decision-making, together with the CGM members.

In the first stage of the implementation process, the superintendent, the employer responsible for the hospital, endorsed a schedule describing the PPAMP implementation process.

Subsequently, in the second stage, the superintendent appointed the CGM members, which consisted of 10 professionals. Representatives of the following sectors and commissions were included: SESMT; CIPA; Hospital Infection Control Services; Departments of Nursing, Clinical Medicine and Administration; Material and Sterilization Center; Purchasing and Material Standardization Sector. The person in charge for the Health Service Waste Management Plan was also included.

In the third stage, the CGM defined the process of investigation and registration of work-related accidents with SMs in the hospital. By analyzing the CGM records, it was identified that both activities were carried out by the

SESMT members and by specialist physicians appointed to assist the injured worker.

During the investigations, the records were made in the investigation form of the Information System for Notifiable Diseases; in the Work-related accident reporting form from the Ministry of Labor; in the internal report of occurrence analysis; and in the investigation for work-related accidents involving SMs. Records of the clinical course of action and post-accident prophylaxis were made in the occupational chart.

The information obtained was entered into a computerized database and made available for analysis and interpretation by the CGM. Monthly, the variables of interest were accessed to characterize the workers who were victims of accidents, the places, the circumstances of the occurrence of the accidents, the types of sharps, the safety devices and the adherence of the victims to the prophylactic serological follow-up after risky exposure to the human immunodeficiency virus infection, sexually transmitted infections and viral hepatitis. The SESMT labor nurse supervised the data tabulation process in the operating system.

Definition of the preventive priorities constituted the fourth stage of the implementation process. The CGM defined priorities based on the frequency analysis of the accidents occurred and the information presented by the workers. The location of the exposure sources in work environments was the information most reported by the workers and assisted in decision-making.

In the fifth stage of the implementation process, selection of the PCMs, consultation of the

SESMT database allowed knowing the PCMs adopted before implementation of the PPAMP. In summary, the conventional PCMs were adopted. On the other hand, the records issued by the CGM showed the predominance of engineering PCMs after the implementation of the program.

It was found that the PCMs implemented in other programs that already existed in the institution were integrated into the PPAMP and administered by the CGM. There are records of standardization of collectors for sharps disposal in care sectors, adoption of standard precautions, inspection with risk assessment in the hospital environment and practice of educational actions to prevent accidents. In addition, a flow of specialized medical care for injured workers and a therapeutic protocol for infection risk prophylaxis due to exposure to potentially contaminated biological material were identified.

With the implementation of PPAMP, there was an improvement in the PCMs. A checklist was created for visual inspection regarding the use of personal protective equipment and another for correct disposal in a collection box.

Sharps with a safety device (SSDs) were effectively introduced in the hospital. The main SSDs selected were the following: syringe with *Luer Lock* and retractable manual system; syringe with integrated protective cap; lancet with retractable needle; tube/needle set for blood collection; catheters with needle isolation device and automatic retraction.

Even after the addition of SSDs, some conventional syringes coexisted in some care sectors, to the detriment of non-adaptation of the new

materials to certain devices. These sectors were mapped and monitored by the CGM.

Selection of the SSDs was carried out by the CGM based on a careful analysis of the quality of the material sold by the suppliers. Routine surveys were carried out with the workers in order to verify the quality of the SSDs and assist in the standardization process for future purchases. After selection, the purchasing sector manager was responsible for acquiring the SSDs.

In the sixth stage, training of the workers, there was a record of training on various topics: handling and disposal of sharps with a safety device; administrative actions to reduce accidents; the main PCMs, among other mandatory topics planned by the Regulatory Standards (NRs). The training was conducted by companies supplying materials, the SESMT team and the Continuing Education team.

The training reports evidenced that the training was carried out at different moments, namely: at admission of the worker, during the workday and at annual institutional events, for example, the Internal Week for the Prevention of Occupational Accidents (*Semana Interna de Prevenção de Acidentes do Trabalho, SIPAT*) and Biosafety. In these events, the results of the prevention actions originated in the health service itself were presented.

As a didactic strategy, lectures and practical demonstrations of procedures using SMs were offered. Booklets, technical manuals and folders were also produced.

In general, the health professionals' compliance was expressive. However, there was a record of low adherence to periodic training

among physicians, interns and residents. Therefore, the institution developed a personalized training strategy, applied at the time of admission of these groups in the hospital and in the work sector. The delay in the professionals' adaptation to the SSDs was also highlighted, even after training, in addition to the suppliers' delay in promoting the training. The seventh stage of the PPAMP corresponded to the systematic monitoring of the workers' exposure to biological agents. It was observed that the monitoring was done through the analysis of indicators created by the CGM. Monthly and annually, the percentage of change in the frequency of accidents due to percutaneous exposure was analyzed and compared with the historical series of periods prior to the month analyzed.

A survey carried out by the CGM showed that, between 2007 and 2019, there were 884 occupational accidents with exposure to potentially contaminated biological material, by the "percutaneous route", considering all professional categories exposed to the biological agent. Nearly 355 (40.2%) accidents occurred in the PPAMP pre-implementation period (from January 2007 to October 2011) and 529 (59.8%) in the post-implementation period (from January 2007 to October 2011). The comparison between the mean percentages of accidents between the pre-implementation period (8.03%) and the post-implementation period (7.47%) showed a 0.56% reduction.

The evaluation of PPAMP's efficiency was the last stage in the implementation of PPAMP. After completing the first evaluation in 2012, the CGM continued to annually evaluate PPAMP's

efficiency in the following years. Each annual assessment generated a report containing a summary of all the results of the actions defined by the CMG and the frequency indicators of percutaneous accidents. PPAMP's efficiency was determined from the judgment of these indicators by the CGM.

According to the analyses carried out by the CGM, the PPAMP was efficient in reducing the number of accidents caused by percutaneous exposure. The rationale was justified by the change in the number of occurrences, due to the PCMs, especially by the SSDs selected, intensification of training, changes in the organizational practices and improvement in the investigative process.

DISCUSSION

The hospital's adherence to all the guidelines recommended by Ordinance No. 1,748 provides legal protection and contributes to safeguarding workers' health. Tax authorities require Brazilian employers to adhere to the guidelines defined in the NRs. Companies that do not adhere to the standards are subjected to the payment of indemnities and to the increase in the rates of occupational accident insurance⁽⁴⁾.

Completing all implementation stages of a program with legal requirements within 12 months requires planning and organization. Therefore, the expressive participation of representatives from different sectors of the hospital may have been a factor that contributed to meeting all the recommended requirements. The participatory management model adopted by the CGM, characterized by the openness given to the workers

in the decision-making process, can be another contributing factor in the implementation process.

Another aspect related to the workers' participation that should be mentioned is the safety culture. Participation can indicate strengthening of the safety culture in the institution and the commitment of these participants to the PPAMP. The behavior of people within an organization is related to the probability of an accident occurring⁽⁷⁾; thus, it is important that the safety culture is improved within the health institutions⁽⁸⁾ through involvement of the workers in the decisions about their safety.

Implementing a program requires organizational change. This implies new work processes that can represent a challenge for the actors involved. On the other hand, the workers' involvement in the decision-making process can be presented as a facilitator in the implementation of a program that requires new work processes⁽⁹⁾.

When preparing the schedule and implementing it, the deadline set by Ordinance No. 1,748 was met: 120 days after the publication date. The schedule is an important tool for evaluating the improvements in PPAMP's performance⁽⁵⁾. It enables workers and inspectors to monitor the execution of tasks planned at each stage of the implementation process.

It is expected that, with implementation of the PPAMP, by reducing the risk of accidents, the work environment will be safer for the workers. International studies carried out with similar programs indicate a significant reduction in the number of accidents caused by percutaneous

exposure, due to adherence to the occupational safety standards^(10,11).

The CMG was constituted in accordance with the provisions set forth in Ordinance No. 1,748⁽⁵⁾. The multidisciplinary characteristic of the CMG allowed sharing responsibilities among the members and contributed to the definition of preventive strategies from the perspective of diversified technical and scientific training. The management of a preventive program by a CMG was an innovation of the Ordinance.

The fact that most of the commission's members are health managers suggests the strengthening of the program's scope in the respective areas of activity of these managers, whether through leadership capacity or exercising authority over the workers.

The institution has a set of investigative instruments considered relevant in the notification process, characterization of percutaneous accidents and post-accident serological follow-up. Investigation of the accidents requires technical capacity and differentiated skills on the part of the investigator. In this aspect, the SESMT professionals are trained to exercise this function. This represents a positive point, as the quality of the records depends on a good investigation⁽¹²⁾.

Another positive point is the number of instruments used to record data related to the accidents. In addition to the files and forms offered by the governmental agencies, an internal bulletin for the occurrence analysis and a personalized form to record the characterization of work-related accidents involving sharps were created.

This set of collection instruments allowed elaborating a robust database for data analysis and the creation of monitoring indicators. Thus, it can be suggested that there was an improvement in the investigative process, after implementation of the PPAMP, given the need to adapt the instruments to the registration and analysis models adopted by the CGM.

Thus, the accident analysis method used by the CGM is consistent with what is required by the Ordinance⁽⁵⁾ and with what is recommended by the Reference Center for Workers' Health (*Centro de Referência em Saúde do Trabalhador*, CEREST)⁽¹³⁾.

The CEREST recommends following the Accident Analysis and Prevention Model (AAPM), which aims at understanding situations involving accidents, based on concepts of activity ergonomics, safety engineering and work psychology, among others. The AAPM systematizes information regarding sociodemographic and professional characteristics, circumstances of the accidents and adherence to serological monitoring⁽¹³⁾.

It is common to use frequency indicators to define priorities. The indicators are tools that assist managers in the decision-making processes, defining priorities and managing good health practices⁽¹⁴⁾.

In this sense, the analysis of the indicators used by the CGM allowed knowing the hospital environments that present the greatest risk for the occurrence of an accident and identifying weak points in the PPAMP operational processes. And, with that starting point, rearrange the processes and define priority preventive actions.

The PCMs identified in the PPAMP pre-implementation period were already expected for the findings of this study, as they are measures recommended in some NRs and provided for in the Occupational Health Medical Control Program, NR-07, and in the Environmental Risk Prevention Program, NR-09, of the hospital.

Regarding integration of the PCMs into the PPAMP, it is a new approach that allows the CGM to monitor all preventive actions carried out in the hospital environment.

Based on the characteristics of the PCMs selected in the PPAMP, it can be asserted that the CGM chose to follow the control hierarchy model, based on occupational hygiene. It is a model that focuses its actions on eliminating risk from the environments through administrative controls and engineering controls⁽⁶⁾.

All the PCMs, adopted by PPAMP, are indicated to prevent accidents^(15,16).

In general, the training of workers has been used as an instrument to reduce percutaneous accidents in preventive programs⁽¹⁷⁾. Periodic training, which includes content related to universal precautions, handling of SMS, identification of risks in the environment and proper completion of records, have proved to be a protective factor against accidents and seroconversion for HIV, Hepatitis B and Hepatitis C^(10,17).

The content selected for the training and conducted by the sharps suppliers and the hospital was compatible with what the legislation recommends. According to Ordinance No. 1,748⁽⁵⁾, the workers must be trained periodically before adopting any preventive control measures.

The institutional events created opportunities for conducting periodic training. As it must be conducted annually, the SIPAT brings together a large contingent of workers, which is a strategic moment for training them. In the Biosafety events, contents related to the occurrence and prevention of accidents with SMs are taught, including the use of PPE, adherence to universal precautionary strategies, etc. All of these contents are recommended in workers' health events⁽¹⁸⁾.

The educational materials for self-learning were fundamental so that the workers could be trained according to the pace and time available for study.

When planning the training of workers, the profile of each professional category, working conditions and the way in which the work process is organized must be taken into account. These aspects demand personalized training strategies.

The difficulties observed in the institutional documents point to the need to adjust the SSD purchase time with training in order to improve cost-effectiveness. Allowing the SSDs to be made available for use, prior to training, can contribute to an increase in the number of accidents and to a lower cost-effectiveness ratio of the SSDs^(11,19).

The systematic monitoring process of exposure to biological agents must be carried out through monitoring indicators⁽⁵⁾. Effective systematic monitoring provides support for planning and carrying out preventive actions. In this aspect, to represent the PPAMP monitoring indicators, a comparison was made

between the annual historical series of the mean percentage of accidents by percutaneous exposure and the analysis of the period after implementation of the preventive measures.

It is considered efficient when, through strategic actions, the PPAMP is able to reduce the occurrence of accidents due to percutaneous exposure⁽⁶⁾.

Periodic evaluation of PPAMP's efficiency may indicate the need to modify the program's operational processes. Therefore, evaluation of PPAMP's efficiency must be carried out annually, when there is a change in the working conditions or when the monitoring indicators determine it.

International studies with characteristics similar to the PPAMP, through robust statistical analyses, have shown that the program's efficiency concerns the PCMs, responsible for reducing the frequency of accidents^(10-11,19).

Based on the comparisons of the frequency of accidents, the CGM considered the PPAMP implemented as efficient. However, it is necessary to be careful in asserting that there was an improvement in effectiveness of the PPAMP only by analyzing the absolute and relative values. In this aspect, calculation of the accident incidence rates is the most suitable means to measure the effectiveness of the prevention actions. However, in terms of statistical analysis, it is necessary to consider the need to incorporate analytical tests, such as analysis of interrupted time series, a gold standard method to assess the longitudinal effect of interventions in health services⁽²⁰⁾.

CONCLUSION

The documents produced by the CGM and by the SESMT team provided a description of the entire PPAMP implementation process, in order to allow the model to be reproduced in other interested institutions.

The PPAMP was implemented in 12 months and met all the guidelines set forth in Ordinance No. 1,748. The process was managed by the CGM and took place in eight stages. The workers' expressive participation supported the CGM in decision-making and, consequently, implementation of the program.

The efficiency analysis carried out by the CGM considered that the PPAMP was responsible for the reduction in the number of accidents with SMS.

Regarding the PCMs, it was identified that, before implementation of the PPAMP,

conventional control measures were adopted, while in the post-implementation period there was predominance of engineering control measures.

This study presents the PPAMP implementation process, whose model includes preventive interventions, aimed at large-size hospital workers, built in the perspective of the Brazilian legislation.

The innovations brought by Ordinance No. 1,748 were perceived as an advance in dealing with accidents, due to the inclusion of new control measures in the hospital environment and the constitution of a CGM. However, it is suggested to carry out analytical studies to verify the longitudinal effect of the PPAMP interventions.

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