Ergonomic analysis of immunization activity in a Health Unit in Brazil

Bianca Eastwood Gruginski a, Leila Amaral Gontijo a, Cassio Vieira a, Fernanda Pereira Lopes Carelli a.

a Department of Production Engineering, Federal University of Santa Catarina, Florianópolis, Santa Catarina, BRAZIL.

Abstract: The purpose of this article is to evaluate the job of a local health center in Florianopolis, Santa Catarina, in order to propose actions to improve the interaction between man and his work. The demand was observed and crafted the cognitive overload of the activity of the vaccination room at a local healthcare center. To perform the analysis of this case study, qualitative aspects were evaluated by ergonomic analysis of the work and by applying the tool post NASA TLX activity. Techniques for data collection visits were made to observe describe and photograph the activity. Semi-structured interviews were made with employees of the area to identify the worker's profile, their perception of the work and what challenges faces in its activity. From the results it is suggested that a set of actions to adjust the flow of activities and to reduce the cognitive overload observed aiming to increase the comfort and security of servers as well as the efficiency and quality of services.

Practitioner Summary: Ergonomic evaluation of the establishments in the health sector is essential in order to propose environmental changes, organizational and in the activities carried out, aiming at improving working conditions, improved security and prevention of health problems. The health workers can suffer many pressures that may reflect in the dynamic and work practices. Identified some important aspects in the study, highlighting - the cognitive overload of activity, depending on the amount of information, questions and negotiations with patients. The ergonomic work analysis could be considered a tool to promote a structured look at different factors and aspects that relate to the activities of the workers.

Keywords: Ergonomics, Ergonomic Analysis of Work, Health Unit

1. Introduction

According to NIOSH (National Institute for Occupational Safety and Health, 2014), cases of occupational accidents and non-fatal occupational diseases in health facilities are among the highest of any industrial sector. In the field of mental health, studies have shown that health professionals have higher rates of suicide and substance abuse than in other professions and suffer high rates of depression and anxiety related to work. (National Institute for Occupational Safety and Health, 2014). In this context, the ergonomic evaluation of the establishments in this sector is essential in order to propose environmental changes, organizational and in the activities carried out, aiming at improving working conditions, improved security and prevention of health problems. This article aims to evaluate the job in the vaccination room of a local health unit in a city in southern Brazil, and its activities, through an ergonomic work analysis, in order to propose improvement actions of the interaction between the man and his work.

2. Method

Three observers accompanied the activities in vaccination room at different times. Activities were observed during the four-week period, around 24 hours of observation. The two workers were heard in the workplace, while performing their activities. It was also performed a semi-structured interview, recorded in digital media and transcribed for analysis, and was applied the NASA-TLX questionnaire to assess workload. Data on furniture and equipment available were collected and compared with those prescribed in the Manual of Procedures for vaccination of the Ministry of Health (2001).
3. **Analysis of the Results**

3.1 **Contextualization**

According to the Application Manual of NR 17 (regulatory standard 17) of the Ministry of Labor and Employment, Department of Labour Inspection (SIT / MTE) was described Global Analysis of Establishment, which refers to vaccine room, which is one of the sectors of the Health Center Trindade in Florianópolis / SC. His office hours are from 08:00 to 17:00 hours.

The Health Center is part of the Unified Health System, offering medical, dental and nursing services, as well as having medicinal garden pharmacy for dispensing medications and Education Groups in Health (Anti-smoking, insulin-dependent diabetics, Psychological Support, Oral Health for children and walking group). Its area of coverage, according to IBGE data (Brazilian Institute of Geography and Statistics, estimated for 2013), has a population of 22,160 inhabitants, 47.7% men and 52.3% women. Are classified as elderly (over 60 years) 10% of the population. Children (under 10 years) represent 7.5% of the total.

Their workers are servers of Florianópolis City Hall, governed by a specific statute. In April 2014, the Health Center Trindade provided care to 4,875 people. There were 1,032 medical consultations, 207 dental visits, 753 nursing consultations and 678 consultations of the Nucleus for Support of Family Health, composed of a group of professionals (social worker, nutritionist, psychologist, pediatrician, psychiatrist, geriatrician, physiotherapist and educator physical) that divide their workload in more than one health unit. Were performed 1,622 procedures nursing, and 2,219 vaccinations.

The services are offered exclusively to residents of the area covered. In search of assistance, users attends the Health Center, get a password from reception and awaits your call in a waiting room. After initial assessment of your demand and check your registration and address, the reception forwards the given sector. If your address is outside the coverage area, the user is oriented on which one health center should look for.

Currently the reception of health center is composed of two employees and has the task serve users, perform the delivery of examinations, and make appointment scheduling. However, due to the high flow of people often users enter the health center and go directly to areas without consulting the reception.

Unlike other sectors, the vaccination meets to the general public, regardless of the coverage area. So you do not initially go through sorting at the reception. The guidance is to remove a password directly at the entrance of the vaccine room, waiting for your call in the hallway.

The Vaccine Centre works in two shifts of four hours: 08:00 to 12:00 and 13:00 to 17:00 hours. Work in the sector two nursing technicians, one for each shift. There is a technique supervising nurse that does not directly participate in routine care, although it may do so in some situations, such as vaccination campaigns.

3.2 **Description of the Prescribed Task**

The sector’s activities are performed in the Vaccine Centre. Due to the nature of the products handled (vaccines), its temperature is controlled by the air conditioning system, creating thermally mild environment between 18 and 20 °C.

The room has a computer desk with retractable support for keyboard and rounded edges, pediatric stretcher, closet, sink with footswitch, metal countertop without height adjustment, two refrigerators two chairs, one for the server and one for the user. The seat padded for the worker and has lumbar backrest and armrests, adjustable. The computer has LCD monitor type, without height adjustment. There are two depots for disposal of materials, specific one for cutting pierce materials and other contaminated materials, where there is biological risk. The sector also has four coolers for accommodation and transport of vaccines, plus six digital thermometers.

The sector has no written rules or Standard Operating Procedure (SOP). It is prescribed to their workers:

- Answer the patients and their families or their accompanying;
- Accommodate them in the vaccine room;
- Perform record in computerized medical records and vaccination card;
- Make the application of the vaccine;
- Inform the potential symptoms and post-application necessary care.
• Register reports of injuries and rabies investigation.

Considering the number of vaccinations performed in June 2014, it is expected that the sector apply about 700 vaccines in the months without public vaccination campaigns. So each nursing technician apply about 350 vaccines / month, ie around 16 vaccines per shift. In the months with vaccination campaigns, to exceed 2,200 vaccines / month.

Dante do elevado número (cerca de 50 vacinas por turno), aloca-se mais um trabalhador para o setor. Não há pausas previstas para o setor. As atividades podem ser interrompidas para necessidades fisiológicas ou quando não houver mais pacientes na fila.

Given the large number (about 50 vaccines per turn), allocates up more workers to the sector. No breaks planned for the sector. The activities can be interrupted for physiological needs or when there is no patients waiting.

3.3 Activity description - Typical activity

The activities begin at 07:00 am, with the preparation of materials to be used during the day. After cleaning the cooler is placed recyclable ice and the digital thermometer. The temperature of the cooler must be stable at 2 to 8 °C before transferring vaccines that are applied during the day. The transfer of these vaccines for the cooler prevents constant opening the refrigerator, reducing the oscillation of temperature for the other stored vaccines, and facilitate worker access.

Frequently used supplies (bandages, needles, syringes, cotton, etc.) are organized on the metal table, where vaccines are prepared to be applied. Other materials less used during the day, which is stored in the closet, are checked. If there is any lack of supply, the worker must request their replacement.

After the preparation stage, at 08:00 hours begins service to the public.

A typical service can be divided into the following steps:

• Call password;
• Answering;
• Verification of identity document;
• Vaccination card verification, if any;
• If health center user, check differences between vaccination card and record in computerized medical record (this must be kept up to date);
• Registration of the vaccine in immunization card and computerized medical records;
• General guidelines regarding the vaccination schedule, delayed vaccines, vaccines nearby;
• Specific guidance on the vaccine to be applied (application site, possible side effects, post-vaccination care, how the adult should hold the child or dependent patient, etc.)
  • Hand hygiene;
  • Dressing preparation (s): cotton strip of tape / micropore;
  • Preparation of the vaccine (injectable):
    • Withdrawal of vaccine (s) of the cooler;
    • Syringe aperture;
    • Shake and verification of the vaccine;
    • Needling mounted syringe and aspiration of the vaccine;
    • Needle uncoupling;
    • Opening and new needle assembly;
    • Labeling of syringes (if multiple vaccines);
    • Guard to vaccines in the cooler.
  • Syringes prepared with vaccines are placed in small metal tray;
• Patient positioning near the a stretcher;
• Vaccine application (s): cleaning the site of application (if necessary), removal of needle cover, injection, dressing;
• Dispose of perforating and other materials used;
• Final Guidelines, if necessary;
• Call the next password and start new service.

The stages of care, checks, records and guidelines are performed in a sitting position at the computer. The other phases are performed standing.
The above description tries to illustrate the most common treatments. However, there is
great variability in each cycle. The time spent in the explanations to the user depends on the
complexity of vaccination status, understanding capacity and demand for additional information.
You may also need reassurance in cases of anxiety. The cycle time varies according to the
number and type of vaccine that will be applied. There were cases where there was no
vaccination, as in others, applied up to four vaccines in a single call (a mother picks up a single
password for all children).

The service time was recorded. Each cycle, which began with the call of a new password,
ranged from 47 seconds to 14 minutes. Between cycles, each time the technique opened the
door to the next patient it was observed that users who were in the hall requesting various
clarifications. The questions ranged from issues about vaccination ("There vaccine for yellow
fever today?" "I did not bring the card, I can vaccinate?") To the information on other services of
the health center.

With so many interruptions observed, it was requested that these occurrences were
recorded. In a single shift, occurred 16 temporary stops of the care (about one every 20
minutes). In addition to providing information on vaccination, there was guidance on dressings
application of medication, blood pressure measurement, replacement of disposable cups and
information about meeting that took place in the auditorium. The nursing technician was also
requested, on two occasions, to cover other sectors of the health center: room procedures and
material room.

In implementing the NASA TLX in vaccines room employees at the Health Center, the
overall weighted average 70 - equivalent to grade 4 - very high intensity of mental load.

3.4 Campaign periods

Every year are forecast periods that take place "vaccination campaigns." Are times when a
particular type of vaccine is offered to a specific population for a specified period. In this period,
in addition to the normal routine immunization demand, adds to the demand of the target
population of the vaccination campaign. For example, during the month of April, when the flu
vaccination campaign is carried out, 2,219 vaccine doses were applied, compared to the month
of June, after the end of the campaign, were applied 693 doses of vaccine, the demand has
tripled during the campaign.

In this period the strategy used by the service is always keep two professionals working
together in the vaccine room to be able to work this scheme, a professional no longer perform
its function elsewhere to cover the vaccination room exceptionally in this period. Yet this is a
period in which professionals, according reported in interviews, feel the pressure of time and the
demand overload more importantly.

4. Diagnoses

According to ergonomic analysis of work performed is observed that the identified demand
it is the cognitive overload in the activity. The diagnosis refers to physical and cognitive factors,
environmental factors and organizational factors.

From the perspective of the physical and cognitive factors is noticed that the activity is
mostly in a standing position, uninterrupted, with audience interaction, which requires a
readiness to guide users on procedures and clarification of doubts.

Already referring to environmental factors identifies that the structure of the vaccination
room features air conditioning, not having problems with ventilation, lighting and noise. The
furniture and the height of the workbench of the vaccine preparation are adequate in
comparison with the height of the employees.

Observing the organizational factors there is the possibility of promoting the organization of
vaccine room materials, and also to review the work flow through a resizing of activities and the
allocation of some activities for the reception health center.

5. Results

According to the ergonomic analysis of the work performed, was observed that the
identified demand it is the cognitive overload in the activity, confirmed by the information of
workers in the interviews and the application of NASA TLX questionnaire. Thus, the diagnosis
refers to the physical and cognitive factors, environmental factors and organizational factors. In
view of the physical and cognitive factors, showed that activity is mostly in a standing position, uninterrupted, with audience interaction, which requires commitment to guide users on procedures and clarification of doubts. Concerning the environmental factors identified, the structure of the vaccination room proved be adequate. Looking at the organizational factors there is the possibility of promoting the organization of vaccine room materials, also to review the workflow through a downsizing of activities and the allocation of some activities for the reception of the health center.

6. Discussion

The health workers can suffer many pressures that may reflect in the dynamic and work practices, as well as demographic and epidemiological changes, such as the increase number of users with chronic and psychiatric diseases, which require a better workers preparation. Health work increasingly involves a relationship ability with the patient that requiring skills from workers relational, of discourse and communication. (Oliveira, 2013). The feeling of overload and even psychological distress by workers in this area is often frequent. Like illness, physical or mental, related to work (Albuquerque, 2012). Identified some important aspects in the study, highlighting the cognitive overload of activity, depending on the amount of information, questions and negotiations with patients. In addition to the information overload, also noted the possibility of adjustments in workflow by sharing with other areas. It was observed that the ergonomic work analysis could be considered a tool to promote a structured look at different factors and aspects that relate to the activities of the workers and that often go unnoticed in the eyes of companies. In addition to providing planning changes that can generate a better worker quality of life in the workplace.

7. Proposals for Improvement

According to ergonomic analysis of work, one realizes that there are cognitive overload in the activity held in the vaccine room. Therefore, it is possible to suggest improvement alternatives to minimize the impacts on workers of this job, such as:

- Increase the number of workers in the vaccine room so that the two work shifts always have two people to perform the service to users. The proposal is that an employee to occupy the positions sitting performing the host activities, documentation of conference records and guidelines and other employee to occupy the positions standing conducting vaccination activities.
- Design a simple brochure, printed with the description of symptoms and major adverse reactions to deliver to the mothers and the elderly, in order to strengthen the transferred information and to minimize the time with the guidelines for users.
- Implement the 5’S tool, named for the first letter of 5 Japanese words: Seiri (use), Seiton (housekeeping), Seiso (cleaning), Seiketsu (standardizing) and Shitsuke (discipline), with the objective of organizing the mainly putting room the materials right at predetermined places.
- Install a day warnings panel at the front desk and assign responsibility for updating the information for vaccines room staff. The goal is that while waiting for care users can read the panel information and that it functions as a filter, preventing the unnecessary scrolling until the vaccine room.
- Describe the desired profile with the skills, knowledge, skills and attitudes required for the reception employees. The goal is to align to empower current and future hiring employees.
- Conduct training on care for the reception employees, in order to improve customer service and highlight the importance of the filter and sorting of users at the health center.
- Installing a wall next to the vaccination room to write guidelines for how vaccines available and not available clarifying any doubts of users and minimizing the burden of guidelines provided by the employees during the activity.
- Conduct a training for the employees of the vaccine on topics such as negotiation and customer service room to enhance the skills of the employees and make it quiet and natural the process of guidance and clarification of users.
- Involve employees in meetings vaccine room on new vaccines and vaccination campaigns and actions in order to engage them and to take the confidence about the process.
- Insert as prescribed activities of the vaccine room employees the responsibility to update the information on the wall and at the front panel, in order to ensure that the information is always up to date.
8. Final Thoughts

The study aimed to conduct an ergonomic work analysis on a workstation of vaccine room from a health center located in Florianópolis in Santa Catarina. Initially, we tried to work with pure ergonomic analysis, evolving to identify problems with the flow of activity and following the demand studied and observed was the cognitive overload of activity.

This evolution was occurring as the work was being developed which needs to became increasingly clear. So the demand worked in this analysis ergonomic work dealt with the cognitive overload of activity performed in the Health Center Vaccine room.

We identified some important aspects in the study, highlighting the cognitive overload of activity In addition to the information load, also noted the possibility of adjustments to the flow of activities, through a resizing with other areas.

Analyzing the job under study, there was the possibility of allocating more an employee to work in vaccine room as well as share some activities with the reception in order to perform a filter in the care and give greater flexibility and comfort for workers.

It was observed that the ergonomic work analysis can be considered a tool to promote a structured look at different factors and aspects that relate to the activities of the workers and that often go unnoticed in the eyes of companies. In addition to providing improved worker quality of life within your desktop.

References


