

# Impact of ergonomics risk among workers in clothes central distribution service in a hospital

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**Abstract.** Background: In health care services, the workers from laundry and linen services are exposed to various occupational hazards, including the ergonomic risk. Were decided to study the effect of ergonomic factors at work in the musculoskeletal system for employees in this sector. Methods: Cross-sectional study conducted in a mid-sized general hospital in Brazil. Site visit was conducted to apply recognition of occupational hazards and work activities flow. Medical evaluation of twenty-one workers was performed for designing the health status of them, focusing on orthopedic disorders. Results: Their activities are to distribute clothes in all units of hospital care in order to organize and maintain supplies. The principal complaints were back pain (43%) and shoulder pain (24%). The ergonomic risk happens due to repeated movements of lumbar flexion in sealing, raising the arms above shoulder level in storage and transportation of loads on the distribution of clean clothes. Conclusions: The complaints by workers are consistent with the overloads identified in the evaluation of jobs. It is recommended to adjust anthropometrically the sealing workplace; the availability of stairs; the implantation of trolleys with four swivel wheels; short breaks during the workday; and to stretch the muscles before and during work.

Keywords: ergonomics, musculoskeletal disease, hospital distribution system, occupational health

## 1. Introduction

Hospitals are places with complex kinds of services, where basic medical care is not the only feature that will determine their effectiveness. Besides the ultimate goal of clinical care of the patient, good quality and efficiency in service, comfort and safety, among others are expected [13].

The hospital hotelling provides a warm and pleasant atmosphere, in order to transmit safety and welfare to customers. It is structured in processes, services and conducts responsible for humanizing and improving the relationship between the patient and staff [8]. Under the auspices of the Hospital Hotelling, there are sectors as reception, customer services, laundry, cleaning and hygiene, nutrition [13].

The processing unit of the clothing of health services is considered an industry which aims at collecting, weighing, sorting, processing, fabricating, repairing and distributing clothing. It is necessary that they are under appropriate conditions of use, hygiene,

quantity, quality and conservation to all health service units [1]. The laundry is responsible for washing and disinfecting contaminated clothing used in some of hospital departments. Professionals in this sector are responsible for the wardrobe, with distribution and storage of clean clothes that circulate in the hospital. The clothes used in health services include sheets, pillowcases, blankets, towels, bedspreads, curtains, and clothing of patients, diapers, bandages, surgical drapes, masks, shoe covers, aprons, and caps, among others [12].

The processing of clothes used in health services encompasses the following activities: withdrawal of dirty linen in generating unit and its packaging; collection and transport of dirty linen to the processing unit; linen receiving, weighing, sorting and classifying; washing process, centrifugation, drying, calendaring or pressing or ironing clean linen; Also, separation, fold, pack clean linen; storage, transport and distribution of clean linen.

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The nature of the job performed by workers who work in hospitals can lead to disorders in the musculoskeletal system.

According to the Ministry of Health of Brazil, work related musculoskeletal disorders can cause great economical and social harm to workers and to society. These injuries can be result of ergonomic and psychosocial factors by organization and management of work, such as the type of equipment used, poor fitness machines and furniture, adoption of incorrect postures and positions, and ill-suited local conditions that generate discomfort, shift work/night shifts, monotony or excessive pace of work [6].

This study aims at evaluating the impact of ergonomics risk among workers in clothes central distribution service in hospital. Through the findings and suggested measures to minimize this risk, our goal is to contribute to the promotion and protection of workers' health.

## 2. Method

A Cross-sectional study was performed in the laundry and line services of a medium-sized general hospital in the metropolitan region of Sao Paulo, Brazil, in operation since 1945.

The environmental assessment of ergonomic risk was carried out through visits to the workplace to a preliminary recognition of occupational risks and design work flowchart.

Two checklists were applied to evaluate the ergonomic risk:

- a) Couto's checklist for simplified evaluation of the biomechanical factor in the risk for upper limb musculoskeletal disorders related to work [9]. From questions on job characteristics simple answers (yes or no) are given, after setting a sum score. Higher results are negative and interpreted as follows: 0 to 3 points, absence of biomechanical factors (no risk), 4 to 6 points, biomechanical factor negligible (no risk) to 7 to 9 points, biomechanical factor of moderate importance (unlikely but possible), 10 to 14 points, significant biomechanical factor (risk), 15 or more points, biomechanical factor really means (high risk);
- b) To evaluate the risk of low back pain, were applied the simplified checklist for evaluating published by Couto [9]. From questions on job characteristics are given simple answers (yes or no), after setting a sum score. The

higher the result the lower the risk of developing low back pain interpreted as follows: 0 to 3 points, very high risk of low back pain, 4 to 5 points, high risk of low back pain, 6 to 7 points, moderate risk of low back pain; of 8 to 10 points, low risk of low back pain, 11 or 13 points, very low risk of low back pain.

The study was based on twenty-two employees of the sector. During regular occupational exam, workers answered questions about their clinical status focused on complaints related to the musculoskeletal system.

## 3. Results

The laundry and linen service in the hospital is composed by 21 professionals called chambermaids. Their workday is 40 hours per week on daily shifts of 8 hours plus lunch break for one hour. There is day off once a week. On average, each employee performs 12 to 36 extra hours per month due to absences and delays from co-workers.

Their real task is to deliver garments in all units of hospital care in order to organize and maintain the supplies. The technical skills required for performing this function are complete elementary school, at least 1-year experience and specific knowledge about hospital housekeeping routines.

### 3.1. Production flowchart

The collecting and washing of dirty clothes produced by clinical procedures and use of patients during hospitalization is performed by an outsourced company. The delivery of clean laundry is done at night and is received by an employee of the clothes central distribution. It is his/her responsibility to check the shipment received, verify the weight of trolleys full of material and write down the information. During the process, all materials should be checked. Each trolley full of clothing reaches an average of 250kg.

On the day shift, the linen is stored on shelves in a storage room by other chambermaid responsible for this job. Another full conference is made. The kits are assembled and sealed. These, after sealed, are sent to sterilization.

The supplies are placed in trolleys for delivery in the various sectors of the hospital. Each worker carries an average of two trolleys per trip. They are responsible for organizing the material delivered in

cabinets and shelves on each visited area. On average, 4 to 5 trips per shift for delivery of material are done by each one of them.

Workers know previously about the amount needed by each specific sector, but deliveries on request, regardless the time, can be done. Sometimes it is necessary to deliver supplies or prepare kits for sterilization during the night shifts. In any case, checking the closets during the delivery schedule for provisioning is a routine.

### 3.2. Workplace and description of activities

The sector is located on the basement of the building. There are three rooms: first one called "sealing", where there is a folding table and machine for sealing kits of clean clothes in a two-squared meter room; the second, with six squared meters called "storage room", where there are shelves for storing clothes and kits for hospitals sectors; and the third room, with eight squared meters and a small hallway, where trolleys which will be used to transport clean clothes inside the hospital, and the scale for weighing the trolleys are kept.

#### 3.2.1. Weighing room

The biomechanical factor risk of injury in upper limb is significant (10 points) and the risk of developing low back pain is high (05 points). Several factors in work performance are associated with this characterization: physical overload for performing movements overweight about 20kg, poor posture with static loading of joints to perform the tasks and repetitive movements mainly in conference / weighing.

#### 3.2.2. Storage room

The biomechanical factor risk of injury in upper limb is significant (11 points) due to repeatability. 150 pieces are stored per shift per employee. Also, poor posture in working with static loading of joints, in addition to lifting the arms above the line of the shoulders are required in this job.

The risk of developing low back pain is moderate (07 points), mainly for handling loads away from the trolley and static upper limbs posture.

#### 3.2.3. Sealing room

The biomechanical factor risk for injury in upper limb is significant (10 points) due to working postures with stress on joints, static position of the neck and arms, repeatability (folding 70 pieces / employee / shift kit and sealing 15 kits / employee / shift for surgical and obstetrician centers).

The risk of developing low back pain is moderate (7 points) as a result of the suspended arms, static position of the trunk associated to rotation movement.

Table 01 provides a summary of the assessment of risk for musculoskeletal disorders in jobs in this sector.

Table • 1  
Completion of the ergonomic risk assessment of the situation of work on certain areas of the body, as applied checklists, São Paulo, 2011

Sector	Checklist	
	Upper limb risk	Low back pain risk
Weighing room	Significative	High
Storage room	Significative	Moderate
Sealing room	Significative	Moderate

The materials and personal protective equipment are provided by the company. Employees receive uniforms, rubber gloves, disposable face masks, protective caps and shoes with steel toe.

### 3.3. Results of medical inquiry

One of out the 22 employees is on long-term leave from work due to a surgery on the lumbar spine. Brazilian Social Security recognized the illness as work-related. Concerning the ones who are working, the profile of studied participants is predominantly female (14 in 21), with a mean age of 35 years (22y to 52y). There is a variation between five months and 120 months of working time activity in this company.

The complaints reported are presented in Table 2. Only two chambermaids didn't report any.

Table 2  
Distribution of data about complaints reported by the research participants, São Paulo, 2011.

Complaint	N	%
Low back pain	9	42,9%
Shoulder pain	5	23,8%
Knee pain	2	9,5%
Arm pain	2	9,5%
Loss of strength in hands	1	4,8%
No complaints	2	9,5%

There are reports of four typical work accidents: blunt injury in the ankle by trauma, hand contusion, ankle sprain and blunt-cut injury. The mechanism of lesion is related with trolley manipulation. Three employees have work-related occupational illnesses being two wrist tendinitis and one tendinitis of the supraspinatus.

#### 4. Discussion

Brazilian Labor Legislation governing the regulation of ergonomics at work (NR 17) [4] establishes parameters that allow the adaptation of working conditions to the psychophysiological characteristics of workers. These guidelines can be extended to the processing services of clothing, especially regarding the transport of garments coming from the redistribution of generating units and clean clothes to these units, since the loads carried by these workers are mounting and may cause considerable risks directly on the entire musculoskeletal system of employees.

The use of ergonomic tools is essential as a means of identifying and planning for implementation of preventive measures and promoting health, reducing illness and worsening the quality of life.

Once the collection and redistribution of clothing is made with almost all the workers standing and in motion, the recommendation to allow time and place for proper rest is essential to preserve the health of workers.

The Regulation Norm for Healthcare Services (NR 32) [5] recommends the use of devices to minimize the effort made by workers in the case of handling and transporting loads, this statement should be

expanded to the transport of hospital clothes. This standard regulatory guidance explicits the necessity of guiding the workers to adopt postures that help to preserve their physical integrity.

The results of this study demonstrate the possibility of relationship between musculoskeletal complaints among people and their activities at this clothes central distribution service. The inherent characteristics of the job associated with individual factors and unfavorable ergonomic conditions can collaborate in the occurrence of musculoskeletal disorders or contribute to injuries and aggravation of existing diseases. There are some cases already registered.

Guimarães and Julio [10] conducted a study through active participation from the laundry workers at hospital in order to identify their needs and suggestions for improvements. The authors suggested that ergonomic designs drawn and modified must have workers' collaboration. Their participation requires great physical and emotional demands, but they tend to minimize design errors and facilitate the accession to the implemented proposals.

The adoption of measures to improve working conditions in this sector is recommended:

- Modification of the equipment used for delivery of the linen by one which is less heavy and easier to handle, reduction of the strength required in this task. Besides, weighing could be done as a team;
- Use of stairs in the room for storage and packaging of the surgical kits in the higher shelves to minimize impacts by postures;
- Anthropometric adjust of the position of sealing to minimize dorsiflexion;
- Guidelines on postural orientation to the act of lifting and carrying weights;
- Rotation of chambermaids among sector activities;
- Implementation of short breaks during the workday, for recovery of overworked muscles;
- Distribution of clean linen on the floors at night leaving the day for supplies only on demand, because during the night elevators are less used, and the delivery of materials would be easier.

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