

CRITERION FOR ACQUISITION, PRESERVATION AND DISPOSAL OF MATTRESSES IN HEALTH INSTITUTIONS

CRITÉRIOS PARA AQUISIÇÃO, CONSERVAÇÃO E DESCARTE DE COLCHÕES EM INSTITUIÇÕES DE SAÚDE

CRITERIOS PARA LA ADQUISICIÓN, CONSERVACIÓN Y ELIMINACIÓN DE COLCHONES EN LAS INSTITUCIONES DE SALUD

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ABSTRACT

This was a quantitative, descriptive study that aimed to identify the criteria for acquisition, preservation and disposal of mattresses used in hospitals and institutions for the aged. The study included 11 hospitals and seven institutions for the aged. Data were collected through a questionnaire with objective questions regarding the characteristics of the institution, acquisition, preservation and disposal of mattresses, which were answered by health professionals. Most institutions acquired mattresses through direct purchase from the supplier (72%) and performed periodic assessment of the integrity of the mattress and the covering (94%) during the concurrent cleaning of the patient units. Regarding the final destination of hospital mattresses, 11% were discarded in contaminated waste and 11% in common residue; in institutions for the aged, 17% stored mattresses in the institution, 17% donated them, and 17% were collected and discarded mattresses for outsourced services. Study participants expressed difficulty and unfamiliarity regarding the maintenance and disposal of mattresses, so it is pertinent that regulators establish specific standards for the control of this hospital equipment.

Keywords: Nursing; Waste Management; Environment; Homes for the Aged; Hospital Services.

RESUMO

Estudo quantitativo, descritivo que teve como objetivo identificar os critérios para aquisição, conservação e descarte de colchões utilizados em hospitais e instituições de longa permanência para idosos. Participaram do estudo 11 hospitais e sete instituições de longa permanência para idosos. Os dados foram obtidos por meio de questionário com questões objetivas referentes à caracterização da instituição, à aquisição, à conservação e ao descarte de colchões, que foi respondido por profissionais de saúde. A maioria das instituições adquiriu colchões por meio de compra direta do fornecedor (72%) e realizava avaliação periódica da integridade do colchão e do seu revestimento (94%) durante a higienização concorrente da unidade do paciente. Quanto ao destino final dos colchões, 11% dos hospitais descartavam em resíduo contaminado e 11% em resíduo comum; já nas instituições de longa permanência para idosos, 17% armazenavam os colchões na própria instituição, 17% realizavam doação e 17% tinham os colchões recolhidos e descartados por serviços terceirizados. Os participantes do estudo expressaram dificuldade e desconhecimento quanto à manutenção e descarte dos colchões, portanto, é pertinente que órgãos reguladores instituam normas específicas para o controle desse dispositivo médico-hospitalar.

Palavras-chave: Enfermagem; Gerenciamento de Resíduos; Meio Ambiente; Instituição de Longa Permanência para Idosos; Serviços Hospitalares.

RESUMEN

Estudio descriptivo cuantitativo que realizado con el objetivo de identificar los criterios para la adquisición, conservación y eliminación de colchones usados en hospitales e instituciones para ancianos. El estudio incluyó 11 hospitales y siete instituciones para personas de edad. Los datos fueron recogidos a través de un cuestionario con preguntas objetivas sobre las características de la institución, la adquisición, conservación y eliminación de los colchones. Según los profesionales sanitarios que contestaron el cuestionario la mayoría de las instituciones había comprado los colchones directamente del proveedor (72%) y realizaba una evaluación periódica de la integridad del colchón y del cotín (94%) durante la limpieza diaria de la unidad del paciente. En 11% de los hospitales los colchones se eliminaban en residuos contaminados y en otros 11% en residuos comunes; en las instituciones para personas de edad el 17% almacenaba sus colchones en la institución, un 17% los donaba y otros 17% contrataba a terceros para que los recogiesen y desechasen. Los participantes del estudio expresaron dificultad y desconocimiento sobre el mantenimiento y la eliminación de colchones y por ello es pertinente que los organismos reguladores establezcan normas específicas para el control de este dispositivo médico hospitalario.

Palabras clave: Enfermería; Administración de Resíduos; Meio Ambiente; Hogares para Ancianos; Servicios Hospitalarios.

INTRODUCTION

The inpatient environment can contribute to the transmission of pathogenic microorganisms, by housing them on the surfaces of furniture next to the patient. The literature highlights some important items that, when disposed of, favor the spread of bacteria, such as mattresses, pillows, flooring, doorknobs, chairs, and others.¹

Among fomites, the mattress is the one that sustains the closest patient contact. The mattress is defined by the Brazilian Association of Technical Standards as a durable item, with the goal of providing human rest.² However, studies show that this medical device has high potential for harboring and spreading pathogens.^{3,4}

In this context, we highlight the importance of cleaning and disinfecting routines for mattress surfaces to reduce and destroy microorganisms, as well as other care such as: keeping the mattress covered and regularly verifying the integrity of that covering, because the existence of damage to the mattress covering facilitates the passage of pathogenic microorganisms into its interior, which can be a factor for transmission of infectious diseases.⁵

The Regulatory Standard n. 32, responsible for the guidelines for safety and health in the work environment in health facilities, establishes that "the mattresses should be covered with washable and waterproof material, allowing easy cleaning and disinfection"⁶ and that coverings "cannot present holes, tears, grooves or recesses".⁷ With regard to this, the standards do not regulate the frequency of replacement of the mattress, nor do they regulate inspection routines or proper disposal.

According to the National Health Surveillance Agency (ANVISA), health services wastes are classified into the following groups: A – potentially infectious waste; B – chemical waste; C – radioactive waste; D – common waste; and E – sharps waste.⁸ However, there is no specification of the category to which the mattress belongs, interfering with the final destination of that hospital device, creating a challenge for companies that are responsible for the collection and disposal of this product.

The mattresses are a major concern for health services managers, since their disposal produces large volumes of waste and there is no specific legislation governing their use, as well as due to the high replacement costs for this medical product.

Thus, considering the lack of scientific literature relevant to the topic, and the importance of identifying strategies that enhance the management of healthcare services' waste with less impact on the environment, we claim the relevance of this study. We aimed to identify the criteria for acquisition, preservation and disposal of mattresses used in hospitals and long-term care facilities (LTCF) for the elderly.

METHODS

This was a quantitative, descriptive study conducted in hospitals and long-term care facilities (LTCF) for elderly in a municipality located in the north of Paraná.

Inclusion criteria for the selection of health facilities participating in the study were: to have inpatient beds, to have the registration at the City Health Board and/or at the National Registry of Health (CNES / DATASUS). A total of 19 hospitals and 11 LTCF met the inclusion criteria: among these, 11 hospitals and seven LTCF agreed to participate. The study subjects were professionals directly related to the management of mattresses: the director of the institution or a professional indicated by the manager.

The authors developed the questionnaire for data collection. This was composed of 21 objective questions. Of these, two were related to the **characteristics** of the institution (nature and number of beds); four were related to **mattress acquisition** (purchase process, frequency of purchase, mattress composition; reason for the choice of that composition); 11 were related to **preservation** (if the integrity assessment of the mattress and covering occurred during cleaning routine, bed setup or during a specific routine; periodicity of the mattress and covering evaluation; if the institution used a covering, the type of covering material; reason for selection of this covering; professional that performs the assessment; if the cleaning routine was conducted by the institution or if it followed the standards of Health Surveillance; products used for sanitizing mattresses and covering); and four were related to **disposal** (if the institution replaced the coverings; in which situations replacement of mattress occurred; periodicity of replacement; and the destiny of unusable mattresses). We stress that more than one option could be selected for questions related to the acquisition, preservation and disposal of mattresses.

In accordance to the National Health Council Resolution 466/12, which regulates research involving human subjects, a prior authorization was required from directors of hospitals, along with a Statement of Informed Consent Form (SICF) that fit the inclusion criteria. After approval by the Research Ethics Committee (protocol 16.541/CAAE 0390.7712.1.0000.5231), an interview was scheduled, by phone or in person with the respondent, in accordance with the availability of each participant. In this initial contact, the purpose of the study, the questionnaire for data collection, and ethical implications were explained.

At the time of data collection, the subjects were reformed about the study and any doubts were clarified. After this, the participants were asked to read and sign the SICF in duplicate. Of these, one was delivered to the respondent and the other was maintained in the possession of the researcher.

Data were collected from October of 2012 to February of 2013. Statistical analysis of data was performed in *Microsoft Excel 2012*[®], according to the calculation of absolute frequency and simple percentage.

RESULTS

The study population consisted of 11 hospitals and seven LTCF, 36% of which were public hospitals, 36% private hospitals and 27% philanthropic institutions; 57% of the LTCF were philanthropic and 42% were private. As for the number of beds, 36% of the hospitals had 50 beds, 36% had 50 to 150 beds, and 27% had more than 150 beds. In relation to LTCF, 57% reported 10 to 20 beds, and 42% had more than 30 beds

Regarding the training of these professionals, all questionnaires delivered to the hospitals were answered by nurses. These individuals, at the time of interview, were members of the Hospital Infection Control Commission (55%), occupied the post of directors of nursing (36%) or were nurses involved with direct patients care (9%). On the other hand, at the LTCF, 42% of respondents were general coordinators, 28% were nurses, and 28% were social workers.

Regarding the purchase of mattresses, 54% of hospitals acquired them through direct purchase from the supplier, 27% through a bidding process, and 9% through donations. In the LTCF, 71% acquired them through direct purchase from the supplier, 14% through bidding, and 14% through donation. The donations came from the social contribution and from patients' relatives. As to the timing of mattress acquisition among hospitals, a period of one to five years prevailed (72%), but 9% of hospitals mentioned a period less than one year, 9% reported a time from six to ten years, and 9% more than ten years. All of the LTCF (100%) reported purchasing the mattresses within a time of one to five years. The criteria cited by the health services in choosing the mattress to be acquired are described in Table 1.

Table 1 - Criteria used for health services for mattress purchase. Municipality of Northern Parana, 2012

Criterion for mattress purchase	Hospital Facility		Long-term care facility for elderly	
	N*	%	N*	%
Strength / durability of the material	10	55	05	28
Users' comfort	08	44	05	28
Mattresses cleaning process	07	39	05	28
Other	01	05	01	5,0

Source: author. *N=18, questions allowed more than one answer.

With regard to the mattress composition, 73% of hospital mattresses used only polyurethane foam, 18% only viscoelastic foam, and 9% both polyurethane foam and viscoelastic foam. Among the LTCF, 72% used only foam mattresses; 14% only polyurethane foam mattresses and/or spring mattresses; and, 14% both polyurethane foam and viscoelastic foam.

The strategies used by health services in this study to conserve mattresses were: periodic assessment of the integrity of the mattress and covering (94%), covering the mattress with a

covering (94%), establishment of standards and routines for the cleaning and disinfection of mattresses (94%).

The nurse was identified by the majority of health services (78%) as one of the professionals responsible for performing the inspection of the mattress and covering, followed by auxiliary nurses (67%), cleaning staff (55%), and other professionals (22%), such as the coordinator of the institution and the head of the warehouse.

Inspection of the mattress and the covering was performed during the daily cleaning of the patient unit (55%); the bed setup (44%); final cleaning of the patient unit (44%); the specific inspection for this purpose was made periodically according to the rules and routines of the institution (5%), and at one (5%) institution, the inspection occurred at another time.

Considering all of the health services, 94% of interviewees covered the mattress with a covering to protect it and increase its durability. Among these, 47% used only leather fabric, 41% used polypropylene, and 12% used both leather and polypropylene. The choice of the covering material by professionals was based on the following criteria: strength / durability of the material (83%), user comfort (72%), ability to clean the mattress and covering (67%), and others (11%), for example, density, appearance and the lowest price.

Study participants were also asked about the use of products for cleaning and disinfection of mattresses and their coverings. The product most commonly used was 70% alcohol in hospitals and in LTCF (44% in both locations), but we emphasize the use of domestic products and solvent solutions, as described in Table 2.

Table 2 - Products used for cleaning and disinfecting mattresses and coverings in hospitals and institutions for the elderly. Municipality of Northern Parana, 2012

Mattress preservation strategies	Hospital facility		Long-term care facility for elderly	
	N*	%	N*	%
Products used for cleaning and disinfecting mattresses				
Alcohol 70%	03	17	04	22
Soap and water	04	22	01	5,0
Sodium hypochlorite	03	17	01	5,0
Do not perform	02	11	02	11
Peracetic acid	02	11	01	5,0
Other	01	5,0	01	5,0
Products used for cleaning and disinfecting covering				
Alcohol 70%	05	28	04	22
Soap and water	06	33	02	11
Peracetic acid	05	28	01	5,0
Sodium hypochlorite	02	11	03	17
Other	-	-	03	17

Source: author. *N=18, questions allowed more than one answer.

Regarding the criteria for replacing the mattress, hospitals mentioned damage to the mattress and covering (33%), and reaching the maximum period of use according to the brand - from one to five years - (28%). As to the final destination, we identified that mattresses were discarded along with the common waste (11%), with the contaminated waste (11%), or collected and discarded by outsourced services without specifying the final destination (5%).

LTCFs also reported the replacement of the mattress according to the identification of damage in the covering (28%), loss of density (28%) and reaching the maximum period of use, according to the brand - one to five years (28%). As a final destination, we emphasize: storage in the institution (17%), donated (17%), and collection and disposal by outsourced services (17%) without specification of the final destination, as shown in Table 3.

Table 3 - Criteria for mattress replacement, frequency of replacement and disposal of discarded materials in hospitals and long term care institutions for elderly. Municipality of Northern Parana, 2012

Mattress replacement	Hospital Facility		Long-term care facility for elderly	
	N*	%	N*	%
Criteria for mattress replacement				
Current damage to the covering	06	33	05	28
When losing density	05	28	05	28
When the mattress is damaged	06	33	02	11
When presenting visible stains	04	22	02	11
After long period of use	02	11	04	22
Other	02	11	03	17
Do not replace	01	5,0	-	-
Mattress replacement interval				
From 1 to 5 years	05	28	05	28
From 6 to 10 years	01	5,0	01	5,0
Do not replace	02	11	01	5,0
Other	03	17	-	-
Destination of the mattress when withdrawn from use				
Storage of the mattress in the institution	01	5,0	03	17
Donation	01	5,0	03	17
Collection and disposal of the mattress by outsourced service	01	5,0	03	17
Mattress disposal in contaminated waste	02	11	01	5,0
Mattress disposal in common waste	02	11	-	-
Do not replace	02	11	01	5,0
Other	03	17	-	-

Source: author. *N=18, questions allowed more than one answer.

DISCUSSION

The health services environment is influenced by the conditions related to the air, horizontal surfaces, water, waste and the patients themselves, who may present a risk of biological contamination, mainly.^{9,10}

Thus, the client's length of stay in this environment can interfere with his/her recovery due to factors such as the lack of hygiene and failure to maintain the conditions of the furniture used, including the mattress.

This study found that most hospitals acquired mattresses through a bidding process, which in the case of public institutions is regulated by the Federal Constitution, according to the article 37, item XXI. This article provides that the government must make purchases through a bidding process, ensuring transparency, avoiding waste and diversion of resources, aiming to purchase the product with the lowest price and the best quality.¹¹ However, if the manager does not provide a purchase order conforming to the appropriate dates, the bidding process may interfere with the timing of acquisition; this is due to the large amount of documents, permissions, applications, among others forms, required which can be a time-consuming process.¹²

In the case of acquisition of mattresses, this delay can be reflected in the use of unsuitable material, increasing the risk of microorganism transmission from the mattress to the patient; this happens, as an example, when a loss of the covering is observed.¹²

In turn, the LTCF acquired the mattresses through direct purchase from the supplier, assuming that this acquisition process can hinder the periodic replacement of mattresses, due to the low economic status of these institutions - a situation that can also be enhanced due to their nature of philanthropy. This form of administration allows for some tax exemption, but most of these institutions survive on donations from volunteers and through community services; and only 19% of the total raised budget is targeted to the purchase of materials and/or equipments.¹³

As much as health services encounter difficulties in performing the periodic acquisition of materials due to the time-consuming bidding process and low budget, for example, in this study we found that both hospitals and LTCF had an interval of one to five years in terms of the frequency of mattresses exchange, which is in accordance with the manufacturer's indications. This practice allows them to provide comfort and well being for patients, resulting in successful rest, which is the main purpose of a mattress.²

In addition to the replacement interval of the mattress, there are other criteria adopted by managers in selecting the material, among them we highlight mattress strength/durability, user comfort, and the required cleaning process, considered as important items for both user and manager. Thus, it is necessary for the buying process to be based on a comprehensive as-

assessment, which should also include factors related to comfort, well being and patient safety.

With regard to the constitution of the mattresses, in this study it was not possible to identify which material would be best for the patient, but findings present the polyurethane foam as the most suitable for the environment due to its suitability for recycling, unlike other materials.⁹

The highest frequency observed in the use of leather-type covering (*leather* and *polypropylene* fabrics) is in line with the Regulatory Standard n.32, which states that the protective cover is important for the preservation of mattresses and that it should consist of washable and waterproof material, allowing for cleaning and easy sanitization.⁶ The choice of a covering material that is easy to sanitize confirms the need to control the spread of microorganisms in the environment.¹⁴

Through this study, and according to the literature, we found that the strategies for protecting the mattress and its covering establish a triad of factors: periodic evaluation, covering use, cleaning and sanitization.^{6,15} In this sense, it is more likely that the mattress will be replaced only in the period indicated by the manufacturer, since a routine for this evaluation and replacement has been previously established, as recommended by the Regulatory Agency of the United Kingdom Department of Health, which specifies the conditions of replacement for medical devices.¹⁵

We also highlight that is important for nurses to perform this inspection, since this professional presents a background based on the principles of infection control, prevention, promotion and restoration of patients health, and a knowledge guided by quality of care and patient safety, which can help with the management of the mattress.¹⁶

The routine inspection conducted during the daily cleaning of the patient's unit supports the Medical Device Alert¹⁵, which identifies the need for periodic inspection of mattresses in addition to other actions, such as removing the covering followed by inspection of its color, and elimination of mattress covers that might have tears. In addition, some authors claim the need to perform the disinfection of hospital beds according to need and not according to predetermined criteria.¹⁷ Authors complement this by mentioning the need to systematically remove the cover of the mattress and discard those that are stained.¹⁸

As for the use of cleaning and disinfection products for the mattress and its covering, health services have been using 70% alcohol, a product considered to be low cost, affordable to health services, easy to use, among other advantages.¹⁹ However, despite these facilities and the recommendations of the Sanitization and Waste Management Manual for Health Facilities, and reaffirming the use of 70% alcohol for hygiene of the covering²⁰; it was found that some health services reported the use of domestic products and solvent solutions, such as kero-

sene, a substance that can cause chemical burns and irritant dermatitis, especially when used improperly.²¹

Frequent failures are observed in the process of cleaning and disinfecting surfaces. According to a study that analyzed the microbiological conditions of hospital beds before and after disinfection, it was found that the procedure was not being properly performed, and authors recommended initial cleaning with detergent, then drying the surface of the mattress, followed by disinfection using 70% alcohol.³

During cleaning and disinfection, the nonconformities in relation to the state of the mattress should be evaluated, such as deformities, stains that cannot be removed by cleaning, and perforations in the surface, aiming to prevent further damage to the mattress.

Thus, the criterion of complete replacement of the mattress when it shows any damage can be minimized if the inspection occurs in a systematic way, as this may allow only the replacement of the covering and not necessarily of the mattress, in order to reduce the generation of waste.

Regarding the disposal of the mattress, according to the National Environmental Council for Waste Management, managers and coordinators who are responsible for the waste generated through to its final disposal need to meet environmental, public health and occupational health requirements.²² However, both the literature and managers of health services, as the authorities responsible for collection disposal, suggest that the fate of unused mattresses is a challenge due to lack of regulation.⁹

The difficulty in discarding the mattress was cited by participants, who stated that they store or donate this medical device. This situation may encourage the dissemination of microorganisms, since these mattresses do not receive special treatment before disposal, and may reduce the useful life of landfills and lead to public exposure to improperly disposed waste.

One of the measures to minimize the problem of improperly discarded mattresses would be to collect them at hospitals, schools and detention centers to perform the grinding and separation of their compounds, which allow the recycling of about 60% of each mattress.⁹ This process would assist both services that generate waste as well as those responsible for the final destination of the mattress. These strategies, unfortunately, are not found in the Brazilian literature.⁹ Another measure would be the removal of the mattress covering, followed by washing in a hospital washing machine with adequate capacity for the size of this device, and performance of thermal and / or chemical disinfection, assessment of the mattresses' final status, and then donating as appropriate to charity institutions.⁹

FINAL CONSIDERATIONS

The study findings identified that managers of health institutions acquire mattresses that feature strength/durability

of the material, followed by patient comfort. For their maintenance, they use 70% alcohol, soap and water; and their disposal is based on the observation of signs of damage to the covering. Study participants also expressed difficulty and unfamiliarity regarding the maintenance and disposal of mattresses.

Thus, it is pertinent for regulatory agencies to establish specific standards for the preservation and final destination of mattresses, since the absence of routines can affect the quality of care – caused by the spread of microorganisms – and, as a result, the increase in length of hospital stay and the interference in patient recovery. Furthermore, we consider the negative consequences that the incorrect disposal brings to the environment and the population. Therefore, we emphasize that patient care should be considered beyond the environment of health services; also being based on environmental issues. Hence, it is essential that managers and regulatory agencies seek to be sensitive and address ecological issues, by developing standards and knowledge about preservation and recycling of permanent use materials, such as mattresses.

According to the results of this article, it is believed that the development of similar studies might provide managers with reflections and changes when it comes to the management of mattress.

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