Health Scope. 2024 February; 13(1): e141912. https://doi.org/10.5812/healthscope-141912.

Published online: 2024 March 2. **Research Article**

Improving Best Practices in Assessing the Usage Conditions of Hospital and Long-Term Care Mattresses

Alessandra Lyrio Barbosa Giroti [1], Adriano Menis Ferreira [1], Liliane Moretti Carneiro [1], Elenir Rose Jardim Cury [1], André Luiz Silva Alvim [2], Aires Garcia dos Santos Junior [1], Layze Braz de Oliveira [3], Inara Viviane de Oliveira Sena [3], Denise de Andrade [4], Odinea Maria Amorim Batista [3], Alvaro Francisco Lopes de Sousa [5,*]

[1] Federal University of Mato Grosso do Sul, Três Lagoas, Brazil
[2] Federal University of Juiz de Fora, Juiz de Fora, Brazil
[3] Federal University of Piauí, Teresina, Brazil
[4] Ribeirão Preto College of Nursing, University of São Paulo, Ribeirão Preto, São Paulo, Brazil
[5] Institute of Teaching and Research, Sírio Libanês Hospital, São Paulo, Brazil

[*] *Corresponding author:* Institute of Teaching and Research, Sírio Libanês Hospital, São Paulo, Brazil. Email: sousa.alvaromd@gmail.com

Received 2023 October 10; **Revised** 2024 January 9; **Accepted** 2024 January 21.

Abstract

Background: Inadequate mattresses can pose risks to users, and the routine inspection of mattresses often falls short in various healthcare settings.

Objectives: To evaluate the physical condition of mattresses in hospitals and long-term care facilities and to explore the association with management practices regarding procurement, handling, and maintenance.

Methods: This analytical descriptive cross-sectional study was conducted in 13 hospitals and 5 long-term care facilities, examining a total of 278 mattresses through proportional stratified sampling. The Mann-Whitney U test, Kruskal-Wallis test, and Multiple Regression Analysis were utilized for data analysis.

Results: Only 9.9% of the mattresses met the physical evaluation criteria, highlighting a significant gap in mattress management standardization. The highest compliance was noted in the utilization of waterproof coverings, whereas the lowest was in mattress labeling. Factors significantly influencing the scores included the involvement of nurses in the evaluation process, periodic replacement of coverings, type of administration, assessment of mattress and covering integrity during bed making, and the nature of the institution.

Conclusions: Due to inadequate physical conditions in both hospital and long-term care settings, the low approval rate of mattresses underscores the urgent need for standardized mattress management practices. Descriptors: Beds, Hospital Infection, Disinfection, Long-Term Care Facilities for the Elderly, Patient Safety.

Keywords: Hospital Infection, Disinfection, Mattresses, Long Stay Institution for the Elderly

1. Background

Healthcare-associated infection (HAI) is a significant threat to patient safety in healthcare settings, often stemming from poor hand hygiene and surface contamination (1). This global concern extends beyond hospitals to all healthcare settings, including home care, leading to thousands of patient injuries and deaths annually due to healthcare errors (2, 3).

The state of the art reveals that patients acquiring HAIs exhibit predictors that influence in-hospital mortality, necessitating the development and implementation of risk management policies. Researchers emphasize the significance of preventing and controlling these infections, which can escalate healthcare costs and directly impact patient safety. Consequently, immediate attention from health policymakers is underscored, urging the review of previous programs and standards and the implementation of evidence-based HAI control programs and health education to mitigate this health burden (4-6).

Annually, millions of residents in Long-Term Care Facilities (LTCFs) contract care-associated infections,

influenced by population, environmental factors, and resource availability (1, 2). Environmental factors, including mattresses, contribute to microorganism spread, necessitating proper care and use, such as impermeable covers and regular inspections (7).

Brazilian guidelines recommend impermeable covers for healthcare mattresses, while international literature offers more comprehensive routines (8). Nursing plays a central role in patient care, making them key to ensuring mattress quality, comfort, and patient well-being. Establishing standards for mattress acquisition, handling, and maintenance is crucial in preventing complications and HAIs.

2. Objectives

This study evaluates hospital and LTCF mattresses, linking their physical condition to acquisition and maintenance processes to prevent HAIs, given the risks posed by inadequate mattresses and the lack of routine inspections across services.

3. Methods

3.1. Type of Study

This study is analytical and descriptive with a cross-sectional design, carried out from January to February 2021 in hospitals and Long-Term Care Facilities (LTCFs) for the elderly located in Campo Grande, Mato Grosso do Sul, Brazil.

3.2. Sample

The sample consisted of 267 mattresses, chosen from a total of 1,210 beds in hospitals and LTCFs. The response variable was the proportion of mattresses deemed adequate (33.5% ± 5%) with a significance level of 5%. Using proportional stratified sampling, the final sample size was adjusted to 278 mattresses to ensure a safety margin above the calculated threshold for evaluation. The study focused on mattresses used in pediatric, clinical, and surgical beds, excluding those in use by bedridden patients due to logistical constraints. For the purpose of random selection, mattresses were sequentially numbered, ensuring a sample size that exceeded the necessary minimum for evaluation.

3.3. Data Collection and Study Protocol

Data collection took place during scheduled visits to institutions in 2 phases. The first phase utilized a validated questionnaire (9) focused on mattress management practices within healthcare facilities, encompassing criteria for acquisition and maintenance. Structured interviews were conducted with personnel responsible for mattress management, typically involving members of the Hospital Infection Control Committee (HICC), Hospital Hospitality, or administrative staff. The second phase involved a physical assessment of mattresses using the "Audit of Physical Aspects of Mattresses" tool (10). This assessment covered an inspection for tears, fissures, leaks, stains, the condition of waterproof covers, labeling, foam quality, zipper functionality, structural integrity of the bed frame, and any signs of biological material contamination. Additionally, a water test was performed to evaluate the waterproof effectiveness of the cover and to check for potential contamination within the foam, applying a total of 11 criteria for evaluation.

3.4. Research Instrument Evaluation

The research instrument underwent face-content validation by 5 doctoral experts in the field, utilizing the Delphi method for its effectiveness in reaching expert consensus. The panel consisted of three nurses and 2 physicians, all holding doctoral degrees and selected for their scholarly publications. The assessment of the online questionnaire was conducted using the Likert scale to evaluate the significance of each item. After 2 rounds, consensus was reached. The Content Validity Index (CVI) was employed to measure agreement on the instrument's appearance, comprehension, and relevance, with a minimum agreement of 80% required for each item. This criterion was achieved for all items. The final CVI stood at 97%, reflecting a high level of expert consensus.

3.5. Data Analysis and Statistics

Data were organized using Google Forms, and statistical analyses were performed using Epi-info™ 7.2.4 (Centers for Disease Control and Prevention, Atlanta, Georgia, USA) and Bio Estat 5.3 (Mamirauá Society, Belém, Pará, Brazil). These software packages facilitated the automation of calculations, enhancing precision and reliability. Descriptive statistics encompassed absolute and relative frequencies, 95% confidence intervals, means, standard deviations, and the range of mattress evaluation scores. The Mann-Whitney Test was applied for comparison between 2 groups of scores, while the Kruskal-Wallis Test, followed by the Dunn Test, was utilized for comparisons among 3 or more groups. Multiple regression analysis was conducted with mattress scores as outcomes, selecting predictor

variables based on statistical significance and employing the "backward selection" method. A significance level of 5% was established for the analyses.

3.6. Ethical Approval

In compliance with Resolution No. 466 of December 12, 2012, this research received approval from the Research Ethics Committee (REC) of the Federal University of Mato Grosso do Sul under Protocol No. 4,371,150/2010 (CAAE - 37772920.4.0000.0021).

4. Results

From the initial sample of 278 mattresses, 6 were excluded due to evaluation difficulties arising from patients being bed-bound, leaving 272 mattresses for assessment. All evaluated mattresses were foam-based. Based on the 11 criteria set for evaluation, with 6 being essential for mattress approval, only 27 mattresses met the approval criteria out of the total sample (n = 272), equating to 9.9% (95% CI: 6.4% to 13.5%). The evaluation scores varied from 2 to 11, with an average score of 6.75 (± 1.97 SD).

Table 1 illustrates the compliance rate of the sample with each evaluated criterion, highlighting the mandatory criteria in bold. The criterion with the least compliance was the presence of a label on the mattress, observed in only 11% of the sample (n = 272), whereas the criterion with the highest compliance was the presence of a waterproof cover, noted in 98.5% of the mattresses, serving to protect the foam. The thickness of the mattresses varied from 4 to 18 cm, averaging 11.3 cm (± 2.1 cm SD), with only 27.9% of mattresses meeting the minimum thickness requirement.

There was a lower percentage (4.8%) of approved mattresses in the surgical bed type (n = 83) compared to 11.2% in clinical beds (n = 169) and 20.0% in pediatric beds (n = 20). Surgical beds had the lowest average evaluation score (Table 2).

Among the beds evaluated, no approved mattresses were identified in institutions that replace mattresses based on necessity or that were unable to specify the frequency of replacement. The largest proportion of approved mattresses (18.2%) and the highest average evaluation score were observed in the facilities (n = 121) that replaced mattresses every 1 to 5 years. Notably, while 5.8% of mattresses were approved in the cohort (n = 86) of institutions with a replacement cycle of less than one year, this group exhibited a lower average score based on the evaluation criteria (see Table 3).

According to Table 4, there were no significant differences in the median evaluation scores between mattresses covered with napa and those covered with corvin material. Similarly, the percentage of mattresses that met approval criteria was comparable for both types of covering materials.

The Multiple Linear Regression analysis presented in Table 5 sheds light on the determinants influencing mattress evaluation scores in healthcare environments. Significantly impactful variables include the involvement of nurses in the assessment of mattresses and coverings, which is strongly associated with better scores, as evidenced by a partial regression coefficient of 1.680 ($P < 0.001$). The frequency of replacing mattress coverings is inversely related to evaluation scores ($P < 0.001$). Additionally, the form of administrative management ($P < 0.001$), the rigor of inspections for mattress and covering integrity during bed preparation ($P = 0.009$), and the type of institution ($P = 0.044$) are also significant predictors of mattress evaluation outcomes. These findings underscore the importance of management practices and the responsibilities of staff in upholding the quality of mattresses in healthcare settings.

5. Discussion

In our study, we assessed the physical conditions of 272 mattresses based on 11 criteria. The results revealed varying compliance scores, with an average of 6.75. Approximately 61% of the criteria were met, and only 27 mattresses were approved. Even a single failure in one of the six mandatory criteria resulted in disapproval. The mattress approval rate was higher in facilities with fewer beds and those under private management. This suggests that institutions with robust management practices tend to perform better in terms of mattress compliance, which can have a positive impact on financial performance and process quality (11, 12).

The criterion with the highest compliance rate (98.5%) concerning the presence of a waterproof covering on the mattresses, as well as higher approval rates in services where they are regularly replaced, is related to the function of the external protective cover. This cover prevents the absorption of blood and bodily fluids and facilitates cleaning and hygiene (12).

Similar results were found in studies conducted in the United States (11-13), indicating that little importance is given to the analysis of hospital mattresses. Higher approvals were also observed in services that have a specific routine for the mattress and covering evaluation and perform it during bed-making. Institutions that evaluate only during terminal cleaning had a lower percentage of approved mattresses,

Table 1. Evaluation of Mattresses According to Presentation and Waterproofing Criteria, Campo Grande/Ms - 2021 (N = 272)

Criteria	No (%)
The covering was waterproof [a].	268 (98.5)
The bed frame was free from contamination by blood or other bodily fluids	242 (89.0)
No leaks [a].	201 (73.9)
The bed frame was solid but with holes	194 (71.3)
Passed the support surface test (Foam)	187 (68.8)
The mattress had a zipper	185 (68.0)
No stains [a].	178 (65.4)
No tears or fissures [a].	171 (62.9)
The mattress passed the water test [a, b].	103 (37.9)
Had a minimum thickness of 12.7 cm	76 (27.9)
The mattress was labeled	30 (11.0)

[a] Mandatory Criteria

[b] Water testing was not conducted on 132 mattresses, as 83 of them lacked zippers, 4 lacked waterproof covering, 15 had tears or cracks, 13 were unsuitable due to not meeting minimum thickness requirements, 11 had leaks, 4 were stained, and 2 were classified as other reasons.

Table 2. Number and Percentage of Approved Mattresses, Mean, Standard Deviation (SD), Minimum and Maximum Values (Min-Max) of Mattress Evaluation Scores According to the Characteristics of the Institutions, Campo Grande/Ms - 2021 (N = 272)

Variables	n	No. % of Approved	Mean ± SD [a]	Min-Max	P-Value [b]
Type of institution					0.012
Long-Term Care Facility	53	10 (18.9)	7.4 ± 2.1 [c]	4 - 11	
Hospital	219	17 (7.8)	6.6 ± 1.9 [a]	2 – 11	
Type of management					< 0.001
Private	69	14 (20.3)	7.6 ± 1.5 [c]	5 - 11	
Public	47	5 (10.6)	6.6 ± 2.0 [a]	3 - 10	
Philanthropic	156	8 (5.1)	6.4 ± 2.0 [a]	2 - 11	
Number of beds					< 0.001
Up to 49 beds	13	4 (30.8)	8.5 ± 1.5 [c]	6 - 11	
50 to 99 beds	118	11 (9.3)	7.1 ± 1.7 [a]	3 - 10	
100 beds or more	141	12 (8.5)	6.3 ± 2.1 [a]	2 - 11	
Type of bed					0.003
Pediatric	20	4 (20.0)	7.0 ± 2.1 [c]	3 - 10	
Medical/surgical	169	19 (11.2)	7.0 ± 1.9 [c]	2 - 11	
Surgical	83	4 (4.8)	6.1 ± 1.9 [a]	2 - 10	

[a] The Mann-Whitney Test was used to compare 2 groups, and the Kruskal-Wallis Test, followed by the Dunn Test, was used for 3 groups.

[b] P-values indicate statistically significant differences.

[c] Different letters indicate statistically significant differences.

probably because this procedure is not as frequent as bed-making.

Services that periodically change mattresses, typically every one to five years, also achieved higher scores. Both the mattress (foam block) and the covering have a finite lifespan, which varies depending on the manufacturer, typically ranging from 1 to 7 years, depending on their characteristics (12).

In this context, some aspects are essential in mattress evaluation for acquisition, such as the cleaning process. Services that consider this factor had higher approval rates. During the cleaning process of the mattress and other bed structures, various factors become obstacles,

Table 3. Number and Percentage of Approved Mattresses of Mattress Evaluation Scores According to the Management Characteristics, Campo Grande/Ms - 2021 (N = 272)

Variables	n	No. % of Approved	Mean ± SD [a]	Min-Max	P-Value
Acquisition of mattresses [b]					0.181
Bidding	54	6 (11.1)	6.8 ± 1.9 [b]	3 - 10	
Direct purchase	250	22 (8.8)	6.8 ± 2.0 [b]	2 - 11	
Donation	66	5 (7.6)	7.3 ± 1.9 [b]	3 - 11	
Parliamentary amendment	54	4 (7.4)	6.5 ± 2.0 [b]	4 - 10	
Frequency of mattress replacement					< 0.001 [c]
Less than 1 year	86	5 (5.8)	5.8 ± 2.0 [b]	2 - 10	
From 1 to 5 years	121	22 (18.2)	7.3 ± 1.9 [a]	4 - 11	
Necessity	59	-	7.0 ± 1.3 [a]	3 - 9	
Couldn't provide information	6	-	6.5 ± 2.6 [b]	3 - 9	
Reason for choosing the mattress [b]					< 0.001 [c]
Mattress cleaning process	49	10 (20.4)	6.8 ± 2.3 [b]	3 - 10	
User comfort	101	17 (16.8)	7.3 ± 2.0 [b]	3 - 11	
Material resistance	113	18 (15.9)	7.0 ± 2.1 [b]	3 - 11	
Price	56	5 (8.9)	6.9 ± 1.6 [b]	3 - 10	
Not optional	73	5 (6.8)	6.9 ± 1.6 [b]	3 - 10	
Durability	109	7 (6.4)	6.0 ± 2.1 [a]	2 - 10	
Frequency of mattress evaluation					0.200
Daily	183	18 (9.8)	7.0 ± 2.0 [b]	2 - 11	
Weekly	63	7 (11.1)	7.0 ± 1.9 [b]	3 - 10	
Monthly	7	2 (28.6)	8.0 ± 1.6 [b]	6 - 10	
Not done	19	-	7.0 ± 1.6 [b]	3 - 9	
Method of mattress evaluation [b]					< 0.001 [c]
During concurrent cleaning	119	17 (14.3)	7.0 ± 1.9 [b]	4 - 11	
During bed-making	89	15 (16.8)	7.0 ± 2.0 [b]	3 - 11	
During terminal cleaning	152	13 (8.5)	6.0 ± 1.9 [a]	2 - 10	
During specific evaluation routine	46	9 (19.6)	8.0 ± 2.0 [c]	3 - 11	
Nursing spontaneous evaluation	3	-	7.0 ± 1.5 [b]	6 - 9	
Only when the covering is damaged	19	-	7.0 ± 1.6 [b]	3 - 9	

[a] Different capital letters indicate statistically significant differences.

[b] The Kruskal-Wallis Test, followed by the Dunn Test, was used to compare 4 or more groups.

[c] $P \leq 0.05$ indicates statistically significant differences.

including the team's lack of awareness of the risk of infection from inadequately cleaned and disinfected mattresses, as well as incorrect execution of cleaning, use of improper products, or incorrect concentrations, among other factors (14, 15).

It is recommended to clean mattresses between each patient admission, in addition to the daily routine during bed-making. This should consider the manufacturer's guidelines and the type of contamination to choose the appropriate product. It's crucial to mention that certain products can cause drying of the covering, leading to the appearance of fissures that reduce the product's lifespan. Similarly, it's impossible to perform effective cleaning and disinfection of a damaged mattress with damp foam (1, 16).

Another factor directly related to the quality of mattresses in use is that when the evaluation is conducted by nurses or administrators, approval rates tend to be higher. This is likely due to their decision-making authority and governance to solve problems

Table 4. The Number and Percentage of Mattresses That Were Approved, Alongside the Mean, Standard Deviation (SD), and the Minimum and Maximum Values (Min-Max) of Mattress Evaluation Scores, Categorized by the Type of Mattress Covering Material Used in Campo Grande/Ms - 2021 (N = 272)

Variables	n	No. % of Approved [a]	Mean ± SD	Min-Max	P-Value
Material of the mattress covering [b]					0.099
Vinyl	195	19 (9.7)	7.0 ± 1.8 [b]	3 - 11	
Corvin	198	20 (10.1)	7.0 ± 2.1 [b]	2 - 11	
Reason for choosing the mattress covering [b]					< 0.001 [c]
Material resistance	122	9 (7.4)	6.0 ± 2.1 [b]	2 - 10	
User comfort	97	6 (6.2)	6.0 ± 2.1 [b]	2 - 11	
Durability	121	14 (11.6)	7.0 ± 2.0 [a]	3 - 11	
Mattress cleaning process	176	24 (13.6)	7.0 ± 1.9 [a]	3 - 11	
Non-optional	35	3 (8.6)	7.0 ± 1.6 [a]	4 - 10	
Price	18	5 (27.8	8.0 ± 1.6 [c]	5 - 10	
Impermeability	13	1 (7.7)	7.5 ± 1.7 [a]	4 - 10	
Frequency of mattress covering evaluation					0.254
Daily	240	25 (10.4)	7.0 ± 2.0 [b]	2 - 11	
Weekly	25	-	7.0 ± 1.5 [b]	3 - 9	
Monthly	7	2 (28.6)	7.9 ± 1.6 [b]	6 - 10	
Method of evaluating the integrity of the mattress covering [b]					0.001 [c]
During concurrent cleaning	141	18 (12.8)	7.0 ± 2.0 [b]	3 - 11	
During bed-making	89	15 (16.8)	7.0 ± 2.0 [b]	3 - 11	
During terminal cleaning	155	13 (8.4)	6.0 ± 1.9 [a]	2 - 10	
During specific evaluation routine	43	8 (18.6)	7.0 ± 2.0 [b]	3 - 11	
Nursing spontaneous evaluation	3	-	7.0 ± 1.5 [b]	6 - 9	
Mattress covering replacement					< 0.001 [c]
Yes	178	27 (15.2)	7.0 ± 2.0 [b]	3 - 11	
No, replace the mattress	69	-	6.0 ± 2.0 [a]	2 - 10	
No	25	-	6.0 ± 2.0 [a]	3 - 9	
Professional [b]					0.021 [c]
Nurse	216	24 (11.1)	7.0 ± 2.0 [b]	2 - 11	
Nursing technician/assistant	168	9 (5.4)	7.0 ± 2.0 [b]	2 - 10	
Hygiene Assistant	98	5 (5.1)	6.0 ± 1.9 [a]	2 - 10	
Caregiver	22	1 (4.5)	6.5 ± 2.4 [a]	4 - 11	
Administrator	7	2 (28.6)	7.9 ± 1.6 [c]	6 - 10	
Nursing intern	11	-	7.9 ± 1.1 [c]	6 - 9	
Housekeeper	11	-	6.8 ± 1.3 [b]	5 - 9	

[a] Different capital letters indicate statistically significant differences.

[b] The Mann-Whitney Test was used to compare 2 groups. The Kruskal-Wallis Test, followed by the Dunn Test (We used standard practices with letters for indicating significant differences), was used for 3 or more groups.

[c] $P \leq 0.05$ indicate statistically significant differences.

related to patient beds, which is not observed in other mid-level professionals.

When assessing mattress permeability, both sides of the covering and foam should be inspected, as well as any loss of color. It's essential to consider the characteristics of the patient using the mattress, such as age, bedridden status, any type of incontinence, admission to an endemic area for certain microorganisms, and other factors (14).

Table 5. Multiple Linear Regression between the Mattress Approval Criteria Score (Outcome) and the Characteristics of the Institutions and Management, Campo Grande/Ms - 2021 (N = 272) [a]

Variables	Partial Regression Coefficient	P-Value
The nurse is the person responsible for the mattress and covering evaluation	1.680	< 0.001 [b]
Mattress covering replacement	-1.069	< 0.001 [b]
Type of administration	0.632	< 0.001 [b]
Integrity evaluation of mattress and covering during bed-making	-0.896	0.009 [b]
Type of institution	0.946	0.044 [b]
Type of bed	0.344	0.089
Frequency of mattress replacement	-0.277	0.095
Number of beds	0.243	0.495

[a] The predictor variables were chosen using the "backward selection" method.

[b] P ≤ 0.05 indicates a statistically significant association.

5.1. Implications of the Study for Nursing Practice

Nurses are central to patient care, making mattresses a key component in ensuring patient comfort and preventing complications such as pressure ulcers and skin injuries. Recognizing the significance of mattress quality and integrity is vital for nurses in delivering safe and comfortable care.

Nurses can take a leading role in advocating for and instituting standardized practices concerning mattress selection, maintenance, and assessment. Their active involvement in evaluating mattresses to ascertain compliance with quality standards is crucial for enhancing patient well-being and averting potential health issues.

This study identified differences in mattress approval rates depending on the healthcare facility type. Nurses in various environments, including hospitals and long-term care facilities, must understand these discrepancies and tailor their practices to ensure optimal care delivery.

5.2. Limitations

It is important to note the limitations of this study, particularly that it was conducted during the COVID-19 pandemic. This period saw many institutions having to adjust their routines, leading to a decline in participation, most notably among long-term care facilities. Consequently, conducting new research focused on mattress auditing for the prevention of HAIs would be of significant value.

5.3. Conclusions

This study demonstrates that only 9.9% of the examined sample had mattresses that met the required standards, primarily due to the inadequate physical characteristics of the mattresses used in hospitals and long-term care facilities (ILPI). Additionally, there is an absence of standardized protocols for the procurement, maintenance, and replacement of these items to guarantee patient safety. Despite the introduction of recent national legislation, there remains a substantial discrepancy between sanitary regulations and the actual practices of healthcare services in terms of maintaining suitable bedding. This discrepancy underscores the necessity for policy development focused on the standardization of mattresses within healthcare settings, given their extensive physical contact with patients and the current lack of regulation in most institutions.

Footnotes

Authors' Contribution: Adriano Menis Ferreira participated in study design, data collection, data analysis, study supervision, manuscript writing, and critical revisions for important intellectual content; Liliane Moretti Carneiro contributed to study design, data collection, manuscript writing, and critical revisions for important intellectual content. Alessandra Lyrio Barbosa Giroti played a crucial role in study design, data collection, data analysis, study supervision, manuscript writing, and critical revisions for important intellectual content. Elenir Rose Jardim Cury contributed to data collection, data analysis, study supervision, and manuscript writing. André Luiz Silva Alvim participated in study design, data collection, data analysis, manuscript writing, and critical revisions for

important intellectual content. Aires Garcia dos Santos Junior contributed to data collection, data analysis, manuscript writing, and critical revisions for important intellectual content. Layze Braz de Oliveira participated in data collection, data analysis, and manuscript writing. Inara Viviane de Oliveira Sena contributed to data collection, data analysis, and manuscript writing. Denise Andrade participated in study design, data analysis, study supervision, manuscript writing, and critical revisions for important intellectual content. Odinea Maria Amorim Batista contributed to data collection, data analysis, and manuscript writing. Álvaro Francisco Lopes Sousa played a significant role in study design, data collection, data analysis, study supervision, manuscript writing, and critical revisions for important intellectual content.

Conflict of Interests: The authors declare that they have no conflicting interests.

Data Availability: Available upon request to the corresponding author.

Ethical Approval: In accordance with the requirements of Resolution No. 466, dated December 12, 2012, this research was submitted for approval to the Research Ethics Committee (REC) of the Federal University of Mato Grosso do Sul and was approved under Protocol No. 4,371,150/2010 (CAAE - 37772920.4.0000.0021).

Funding/Support: Coordination for the Improvement of Higher Education Personnel (CAPES) - grant number: 001.

References

1. Li X, Lam I, Teska P, Grinstead D, Becker L. Infection Risks Associated with Damaged Mattresses and Management Strategy Using Repair Patches. *Infection Control Tips*. 2021;**In Press**(In Press).
2. Giroti ALB, Ferreira AM, Cury ERJ, Rigotti MA, Carneiro LM, Diniz MO. [Management of mattresses in the prevention of healthcare-associated infection: a cross-sectional study]. *Revista Prevenção de Infecção e Saúde*. 2023;**8**(1). Portuguese. https://doi.org/10.26694/repis.v8i1.3872.
3. Robert J F, Kimberly K M, Luke A M, Steven M C, Hieu H P, Brian G H. An Ounce of Prevention: Reducing the Risk of COVID-19 Transmission in Long-Term Care Facilities. *J Geriatr Med Gerontol*. 2020;**6**(4). https://doi.org/10.23937/2469-5858/1510105.
4. Khammarnia M, Ansari-Moghaddam A, Barfar E, Ansari H, Abolpour A, Setoodehzadeh F, et al. Systematic review and meta-analysis of hospital acquired infections rate in a middle east country (1995-2020). *Med J Islam Repub Iran*. 2021;**35**:102. [PubMed ID: 34956948]. [PubMed Central ID: PMC8683797]. https://doi.org/10.47176/mjiri.35.102.
5. Molhave M, Leth S, Gunst JD, Jensen-Fangel S, Ostergaard L, Wejse C, et al. Long-Term Symptoms among Hospitalized COVID-19 Patients 48 Weeks after Discharge-A Prospective Cohort Study. *J Clin Med*. 2021;**10**(22). [PubMed ID: 34830580]. [PubMed Central ID: PMC8618663]. https://doi.org/10.3390/jcm10225298.
6. Classen DC, Rhee C, Dantes RB, Benin AL. Healthcare-associated infections and conditions in the era of digital measurement. *Infect Control Hosp Epidemiol*. 2024;**45**(1):3-8. [PubMed ID: 37747086]. [PubMed Central ID: PMC10782200]. https://doi.org/10.1017/ice.2023.139.
7. Angeloni NLN, Silva M, Valle LAR, Sousa AFL, Valim MD, Andrade D, et al. Impact of an educational intervention on standard precautions during the COVID-19 pandemic. *Rev Bras Enferm*. 2023;**76**(4). e20220750. [PubMed ID: 37672465]. [PubMed Central ID: PMC10476515]. https://doi.org/10.1590/0034-7167-2022-0750.
8. Instituto Nacional De Metrologia Qualidade E Tecnologia. *Aprova o Regulamento Técnico da Qualidade e os Requisitos de Avaliação da Conformidade para Colchões e Colchonetes de Espuma Flexível de Poliuretano – Consolidado*. Portugal: MINISTÉRIO DA ECONOMIA; 2021.
9. Reis JAXD, Rossaneis MA, Haddad MDCL, Belei RA. [Criterion for Acquisition, Preservation and Disposal of Mattresses in Health Institutions]. *Reme Revista Mineira de Enfermagem*. 2014;**18**(3). Portuguese. https://doi.org/10.5935/1415-2762.20140049.
10. Peto R, Calrow A. An audit of mattresses in one teaching hospital. *Prof Nurse*. 1996;**11**(9):623-4. 626. [PubMed ID: 8718367].
11. Marks B, de Haas E, Abboud T, Lam I, (Neel) Datta I. Uncovering the rates of damaged patient bed and stretcher mattresses in Canadian acute care hospitals. *Can J Infect Control*. 2018;**33**(3):171-5.
12. Hooker EA. Hospital mattress failures-A hidden patient danger. *Infect Control Hosp Epidemiol*. 2023;**44**(3):501-3. [PubMed ID: 34895384]. https://doi.org/10.1017/ice.2021.486.
13. Bradbury SL, Mack D, Crofts T, Ellison R3. Potential bloodborne pathogen exposure from occult mattress damage. *Am J Infect Control*. 2014;**42**(4):421-2. [PubMed ID: 24559597]. https://doi.org/10.1016/j.ajic.2013.10.011.
14. Creamer E, Humphreys H. The contribution of beds to healthcare-associated infection: the importance of adequate decontamination. *J Hosp Infect*. 2008;**69**(1):8-23. [PubMed ID: 18355943]. https://doi.org/10.1016/j.jhin.2008.01.014.
15. Hooker EA, Bochan M, Reiff TT, Blackwell C, Webb KW, Hart KW. Decreasing Clostridium difficile health care-associated infections through use of a launderable mattress cover. *Am J Infect Control*. 2015;**43**(12):1326-30. [PubMed ID: 26498703]. [PubMed Central ID: PMC4679628]. https://doi.org/10.1016/j.ajic.2015.07.002.
16. Viana Rel H, dos Santos SG, Oliveira AC. Recovery of resistant bacteria from mattresses of patients under contact precautions. *Am J Infect Control*. 2016;**44**(4):465-9. [PubMed ID: 26739639]. https://doi.org/10.1016/j.ajic.2015.10.027.