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Safety of the hospital environment in terms of preventing falls on the part of the elderly: a descriptive study

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ABSTRACT

Aim: To evaluate the safety of the individual and collective physical environment to prevent falls on the part of the hospitalized elderly. **Method:** This is a descriptive cross-sectional and quantitative study. A total of one hundred and twenty seven (127) beds and their physical structure were evaluated in three units. Data were collected by means of a checklist. For analysis, the SPSS v.20.0 software was used, and descriptive statistics was employed as well as the Fisher's exact test for any association between the variables. **Results:** safety variables related to the movement of individuals showed a lack of compliance with safety standards (77.7%), and showed no statistical significance with regard to the incidence of falls. The physical structure of the public areas of the hospital were not adapted to facilitate the movement of persons (42.8%) and little consideration had been given to other health facilities (66.6%). **Discussion:** It is necessary to pay attention to non-conformities in order to decrease the risk of falling. **Conclusion:** It is necessary to ensure that the hospital environment adheres to technical standards and that the nursing staff pays attention to the environment in order to ensure safety and to prevent falls on the part of the elderly.

Descriptors: Accidental Falls; Geriatric Nursing; Health Facility Environment.

INTRODUCTION

Several factors inherent to the aging process may cause a progressive loss of ability on the part of the elderly in adapting to their environment, especially in terms of changing location, such as in a hospital. Thus, the evaluation of the environment of the patient is essential to develop strategies to help prevent falls.

Thinking about safe areas in which the elderly spend the majority of their time is a major challenge. A closer look is necessary since the environment can be a facilitator or a barrier to the physical performance of these individuals⁽¹⁾. In this sense, the hospital environment needs to be safe, foster rapid adaptation, provide security, functionality and comfort, and compensate for the limitations imposed by the aging process⁽²⁾.

The term "patient safety" is widely used, but rarely defined clearly. In its most elementary form, it can be defined as "...the act of avoiding, preventing and improving adverse outcomes or injuries arising in the hospital care process"^(3:32).

Ordinance No. 2095 of 2013⁽⁴⁾ approved the Basic Protocols for Patient Safety, and among these, there is the "Protocol for the Prevention of Falls" whose purpose is "...to reduce the occurrence of falls of patients in care facilities". In particular this relates to hospitalized patients, during the entire period of their hospitalization. According to the protocol, "...all patients should have their risk of falling assessed"; the outcome of the assessment must be recorded in medical records and preventive measures that are appropriate to each patient should be prescribed and implemented^(5:1).

The hospital environment is a strange world to the elderly and can lead to stressful experiences, albeit that human illness alone is an event that generates anxiety and insecurity⁽⁶⁾.

The physical environment and its structure, the furniture arrangement, and the ways in

which material is used have an important role to play in the occurrence of falls on the part of the elderly, accounting for approximately 30% to 50% of these events⁽⁷⁾. The falls suffered by hospitalized patients is one of the most important occurrences in terms of breaches in safety, and are often responsible for an increased hospitalization time and a worse recovery⁽⁸⁾.

In Brazil, an investigation into falls on the part of the hospitalized elderly in Belo Horizonte showed that, in 1000 beds, approximately 3% to 13% of individuals fall on a daily basis⁽⁹⁾. Another study conducted in nine wards of the Clinical Hospital of Porto Alegre, showed 58 specific events of falls from beds. The data revealed that most accidents occurred with regard to elderly patients (57%), male (50.9%), at night (56.60%) and in the clinical hospitalization sector (58%)⁽¹⁰⁾.

The fall is a multifactorial event of great complexity and, when associated with an environment and a context of care, it raises the need for an investigation and for continuing education on the key risk factors, the incidence, the consequences, and specific preventive measures⁽¹¹⁾. Given the above, the objective of this study is to evaluate the safety of the individual and collective physical environment in terms of the prevention of falls on the part of the hospitalized elderly.

METHODS

This is a quantitative, descriptive and cross-sectional study, conducted in a large teaching hospital that specializes in high complexity healthcare in the city of Curitiba, Paraná. The study was conducted in three units - in the wards of the Men's Medical Clinic, the Women's Medical Clinic and in General Surgery. The sample consisted of the evaluation of a single use

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environment, involving 127 beds occupied by patients of 60 years or more, and the physical structure of collective use, during the period April to July 2013.

Data were collected by means of a checklist. In the individual use environment, which refers to the room or space for private use in a ward, the following safety variables were investigated: presence of bars on beds, locks on the wheels, a bell, an auxiliary light, locks in the sliding furniture, easy access to belongings, free access to the bathroom, use of non-slip footwear and the arrangement of furniture around the bed. To evaluate the physical structure of collective use, the checklist was based on NBR 9050/2004 of the Brazilian Association of Technical Standards⁽¹²⁾, and considered the variables internal circulation, vertical circulation and restrooms. In order to support the recording of the physical environment, a digital photographic camera model S. PL120 was used.

Data were coded and organized using computer software Excel 2007, typed and submitted to conference twice to ensure the reliability of the results. For statistical analysis, the Statistical Package for Social Sciences - SPSS v.20.0 was used, and descriptive statistics (absolute and relative frequency) were employed in terms of the safety variables related to the physical structure of the collective use facilities. In order to ascertain the association between the dichotomic qualitative measures in terms of the safety of the environment for individual use and the occurrence of falls, we used the Fisher exact test, indicated for use with independent random samples. The results were considered statistically significant when $p < 0.05$, as a safety margin of 95% being due to chance with a 5% chance of error. The study was approved by the Ethics Committee of the investigated institution under registry CAAE 14066113.2.0000.0096 opinion number 231,500.

RESULTS

As can be seen in Table 1, in the individual use environment, of the nine items evaluated, 7 (77.7%) are not in accordance with the safety standards of NBR 9050/2004. It is noteworthy that in terms of the conformity with safety standards with regard to the beds, 127 (100%) had protective bars and lockable wheels, and only 2 beds (1.6%) were found to be unlocked. In all environments there was an individual bedside light; however, the location thereof did not offer easy access to the patient, either in terms of height or in terms of the positioning of the switch. In addition, 14 (11%) of the bedside lamps did not work, either due to a lack of light bulbs or due to electrical problems (Table 1).

As can be seen in Table 1, a bell for calling for assistance existed in all the beds and bathrooms. However 23 (18.1%) were not close to the patient, making it impossible for them to request support. As for the assessment of movement and the organization of the environment, 13 (10.2%) of the elderly did not have easy access to their belongings, 122 (96.1%) had sliding furniture without locks (a nightstand), and for 25 (19.7%), access to the bathroom was not free of objects, as there were chairs, sinks and garbage containers in the way.

The association between the safety variables of the environment for individual use and the occurrence of falls was not statistically significant. However, it has revealed a worrying percentage of 9 events (7%) among the elderly who were hospitalized during the study period.

In terms of the evaluation of the physical structure for collective use, of the 14 items assessed with regard to internal circulation, 6 of them (42.8%) were not in accordance with the NBR 9050/2004 guidelines (Table 1).

In Table 1, we can see the following non-compliances: in the three wards surveyed, the floor was not coated with non-slip material; the public phone was not at the minimum distance of 1.5 m in front of the door of any of the five elevators on the floor; there was no signs indicating "Risk of Fall", or non-slip strips and handrail on either sides of the bed ladder; the route to be taken by the patient was not free and unhindered.

The vertical circulation related to the use of elevators was standardized in all three wards and were in compliance with safety standards, except with regard to the existence of tactile signaling for warning purposes on the door of the elevators (Table 2).

In terms of sanitary facilities (Table 3), it appears that of the six items assessed, four (66.6%) do not conform to the ISO 9050/2004 standards. There were no standardized bars on the side and behind the toilet bowls for support and transfer

in any of the three wards. The toilet bowls were not at the proper height, the floor was not slip resistant and was uneven, and no signs indicating "Risk of Falls" is displayed. It is inferred that the toilet bowls of the three wards were not in accordance with the NBR 9050/2004 standards, thus becoming a predisposing factor to falls.

DISCUSSION

In the institution where this research was conducted, all the beds of the inpatient wards are electric. They have an independent remote control coupled to the upper side of the bed and they do not require the use of a ladder, providing greater safety and comfort. All beds have bars that only open from the outside, requiring the patient to request the assistance of the nursing staff or of a companion when it comes to opening the rail to get out of bed. Maintaining high

Table 1 - Association between environment safety variables for individual use and the occurrence of falls. Curitiba, 2013

Variables	Response	Occurrence of falls during hospitalization		Total number of beds evaluated		P* Value
		No	Yes	n	%	
		n	n	n	%	
Bed with rails	No	---	---	---	---	---
	Yes	118	9	127	100	
Locked wheels	No	1	1	2	1,6	0,137
	Yes	117	8	125	98,4	
Bedside light	No	13	1	14	11	1
	Yes	105	8	123	89	
Bedside Bell	No	21	2	22	18,1	0,666
	Yes	97	7	104	81,9	
Free access to the bathroom	No	23	2	25	19,7	1
	Yes	95	7	102	80,3	
Sliding furniture without latches	No	5	0	5	3,9	1
	Yes	113	9	122	96,1	
Organized furniture	No	20	0	20	15,7	0,353
	Yes	98	9	107	84,3	
Easy access to belongings	No	13	0	13	10,2	0,596
	Yes	105	9	114	89,8	
Use of non-slip footwear	No	17	1	18	14,2	1
	Yes	101	8	109	85,8	

Table 1 - Evaluation of the Physical structure of collective use - Internal Circulation. Curitiba, 2013

	Variables	Response	Hospitalization unit			
			CMM	CMF	CCG	%
1.	Are the floors of the corridors and passages coated with non-slip material?	No				100
		Yes	x	x	x	---
2.	Are the floors of the corridors and passages coated with regular, continuous and durable material?	No	X	X	X	100
		Yes				
3.	Do the floors of the corridors and passageways have continuous leveling, with no steps?	No				---
		Yes	X	X	X	100
4.	Do the stairs have visual signaling at the edge of the floor, with color contrasting with the finishing (0.02m and 0.03m wide)?	No				---
		Yes	X	X	X	100
5.	Are the obstacles such as wastebaskets, public telephones, fire extinguishers and others outside the congestion zone?	No				---
		Yes	X	X	X	100
6.	Does the visual signaling have contrasting colors?	No				---
		Yes	X	X	X	100
7.	Are the signaling plates and suspended elements, projected on the range of movement, at the minimum height of 210cm from the floor?	No				---
		Yes	x	x	x	100
8.	Is there at least one public telephone at a minimum distance of 1.5 m in front of the elevator door?	No				100
		Yes	x	x	x	---
9.	Do the doors have a minimum opening of 80 cm?	No				---
		Yes	x	x	x	100
10.	Are the door handles of the lever-type?	No				---
		Yes	x	x	X	100
11.	Is there any sign indicating "Risk of Falls"?	No				100
		Yes	X	x	X	100
12.	Are there handrails on both sides of the stairway?	No				100
		Yes	x	x	X	---
13.	Are there non-slip strips on the stairs?	No				100
		Yes	x	x	X	---
14.	Is the path to be taken by the patient free and unhindered?	No				100
		Yes	x	x	X	100

Source: Adapted check list according to NBR standards 9050/2004.

railings is a protective factor for older people; however, it can become a predisposing element in maintaining patients in bed for prolonged periods, leading to immobility syndrome and increased dependency. It may also become a risk factor for those elderly without a companion, as they might insist on leaving the bed alone by climbing over the protection bars and becoming subject to the occurrence of falls.

In this sense, the literature⁽¹³⁾ points to the need to eliminate environmental hazards such

as excessive noise or conversations; inadequate lighting and poor floor coating; beds in a low position with wheels locked and lowered side rails (or according to the unit policy), because when the side rails are closed, falls may be more likely. The authors also claim that keeping the bed at the correct height, at 100% to 120% of the lower length of the patient's leg, also helps to minimize the risk of falls.

Several patients reported that they neither like to use the bell to avoid disturbing the nursing

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Table 2 - Assessment of the physical structure of collective use - vertical circulation (Elevators). Curitiba, 2013.

Variables	Response	Hospitalization Unit			
		CMM	CMF	CCG	%
1. Does the elevator door have a minimum opening of 80 cm?	No				
	Yes	X	X	X	100
2. Is the time for keeping the door open between 5s and 15s?	No				
	Yes	X	X	X	100
3. Does the elevator cabin have minimum size of 110 cm by 140 cm?	No				
	Yes	X	X	X	100
4. Does the floor covering of the cabin have hard, non-slip surface, allowing easy maneuvering of the wheelchair?	No				
	Yes	X	X	X	100
5. Does the cabin floor have contrasting color to the floor pavement?	No				
	Yes	X	X	X	100
6. When opening the door, is the floor of the elevator at the same level of the floor of the lobby, without unevenness?	No				---
	Yes	X	X	X	100
7. Is there tactile signaling warning to the elevator doors, with its color contrasting to the floor, with width between 0.25 m to 0.60 m?	No				
	Yes	X	X	X	100
8. Are the emergency controls grouped on the bottom of the control panel of the cabin?	No				
	Yes	X	X	X	100

Source: Adapted check list according to NBR standards 9050/2004

staff, nor the bedside light to avoid disturbing whoever is nearby. Not infrequently, the elderly feel embarrassed when it comes to requesting help from the nursing team such as basic needs such as drinking water or going to the bathroom. This can be decisive in terms of the occurrence of accidents such as falls. The attention given by the staff also contributes to the patient's choice to use or not use the bell. If he uses it and is ignored, treated poorly or if there is a long delay, he will probably have a negative perception.

Related to the attention of the nursing staff with regard to answering the bell, a study conducted in four hospitals in the Midwestern United States, involving 641 nursing professionals, revealed that 49% of employees recognize that answering the bell immediately is an important action in terms of the safety of patients. 77% of those nurses also agree that these calls are significant and promote protection⁽¹⁴⁾. Guiding the nursing staff to initiate an immediate response to requests indicated by the use of the bell assists in promoting safer and more appropriate care. It is also necessary to require the infrastructure

team to undertake periodic reviews of the bells and bedside lamps. We emphasize the importance of patients' awareness regarding proper lighting at night.

The differences between a hospital and a domestic space, with their own movement and changes of space and organization, may represent major changes, especially for the elderly or those who have serious difficulty in adjusting themselves to changes in their environment⁽¹¹⁾. The ease of access to their belongings, the organization of the environment, and the use of non-slip shoes are contributory to reducing the risk of falls.

Regarding the organization of the environment, we highlight a documentary study that showed that 15 professionals (60%) considered the existence of various objects and furniture in the infirmary that hindered circulation as a downside⁽²⁾. The use of non-slip footwear is an encouraged practice that is already included in the prevention protocol in the hospital, and represents a simple strategy that is highly accepted by the elderly. In four hospitals in New

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Table 3 - Assessment of the physical structure of collective use - sanitary facilities. Curitiba, 2013

VARIABLES	Response	Hospitalization unit			
		CMM	CMF	CCG	%
1. Are there bars on the side and the bottom, near the toilet bowl for support and transfer?	No	X	X	X	100
2. Are the toilet bowls at a height of 0.43m and 0.45m from the finished floor, measured from the top edge without the seat?	Yes	X	X	X	100
3. Are there support bars near the shower?	No	X	X	X	100
	Yes				
4. Does the bathroom box have an opening for easy access?	No	X	X	X	100
	Yes				
5. Is the flooring slip resistant and leveled?	No	X	X	X	100
	Yes				
6. Are there signs indicating "Risk of Falls"?	No	X	X	X	100
	Yes				

Source: adapted check list according to technical standards

York, and one in Germany, the use of a yellow wristband and yellow or red anti-slip slippers as an identifier of patients at risk of falling, are part of the preventive kit⁽¹⁵⁾.

The assessment of risk factors in terms of hospitalized patients is a feature of care that needs to be developed at admission, and during the entire period that these patients remain hospitalized. In order to help ensuring patients' safety in a hospital setting, "nurses need to have a 360-degree view of the room every time they enter and exit"^(13:7). The perception of professionals regarding the possible risks that exist in the environment is fundamental to preventing accidents such as falls.

The environment associated with individual and private use is the site of highest retention and mobility during hospitalization. Comfort, safety and ease of locomotion are crucial, as they promote greater independence on the part of the hospitalized elderly.

In this sense, a 7% occurrence of falls among the hospitalized elderly is considered high by international standards⁽¹⁵⁾; however, in Brazil there is no consensus as to what is an acceptable standard. A study conducted in São

Paulo covering all the patients in inpatient wards (200 beds) in a highly complex private hospital which has been accredited by the Joint Commission International, noted 80 falls between January and December 2008. This presented a statistic of 1.45/1,000 falls of patients per day. The units that contributed most to this index were Medical, Neurological and Oncologic clinics, totaling respectively 2.79, 2.77 and 2.41/1,000 patient falls per day. In the other units, the incidence ranged between zero and 1.66/1,000 patient falls per day. The index of 2.0 was considered to be a warning⁽¹⁶⁾.

With regard to the physical structure, the common use service areas such as hallways, stairs and elevators need to provide spaces tailored to the needs of the elderly. In the Surgical Clinic, there are stretchers and tables with sliding wheels that can be used in the hallways. In the Male Medical Clinic, the emergency trolley, tables with sliding wheels for materials to be used in isolation situations and a refrigerator for examination purposes are situated in the hallway. In the Female Medical Clinic there are also tables with sliding wheels and a closet for trainees, which hinder free movement through the hospital.

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The lack of tactile signage on the doors of the elevators (they only display visual indications in contrasting color with regard to the floor), of warning notices in areas at risk of falls, non-slip bands and the presence of only one handrail on the stairs, are all extrinsic factors that contribute to the occurrence of falls during hospitalization.

According to WHO⁽¹⁷⁾, a fall can occur even in pathways with well-known routes, as a result of inadequate design of the buildings and little attention being paid to safety factors. The main problems are obstacles without clear signage, slippery surfaces, inadequate lighting and long distances between waiting areas and toilets.

Among the preventive measures, the NBR 9050/2004⁽¹²⁾ advocates the inclusion of bilateral handrails and non-slip strips on the stairs, warning signage such as signs featuring the message "risk of falls", and tactile signage in front of the elevator doors. Providing autonomy and safety in environments that are necessary to the circulation of patients in hospital institutions avoids the risk of falls and improves the quality of care.

Regardless of its character, institutions are responsible for the safety of its users, and "...in hospitals, there is a need for rules and standards to define and regulate the accessibility and safety of environments, as a form of prevention and safety with regard to the movement of people"^(18: 585).

The adequacy of the physical structure of the bathroom in terms of the vulnerability of the hospitalized elderly, and basic safety standards, are essential issues. Regarding the use of toilets, we can highlight environmental risks such as the presence of slippery floors and unevenness of the floor between the circulation area of the bathroom and the shower stall, lack of grab bars in bathrooms, and toilet seats that are of an inappropriate height⁽¹²⁾.

In general, the bathroom is identified as the place where many falls occur. The need for the

use of medications such as diuretics, laxatives and/or the preparation for examinations during hospitalization may trigger frequent and urgent needs regarding physiological elimination. Given these occurrences, the elderly tend to get up several times during the night to go to the bathroom, exposing themselves to the risk of falls. However, most studies performed at hospitals^(9,16,19) indicate the room/ward, followed by the bathroom, as being the most common sites with regard to the occurrence of falls.

In a study of 35 adverse event reports conducted at the National Institute of Traumatology and Orthopedics of Rio de Janeiro (INTO, abbreviation in Portuguese), whose objective was to evaluate the profile of falls by identifying patients at risk, researchers found falls in 34 of these reports, with an incidence of 55.8% in the patient's room and 44.1% in the bathroom⁽¹⁹⁾. These data corroborate the findings of a study undertaken in a private hospital in São Paulo, Brazil, which registered the notification of 80 in-hospital falls. Of these, 52 (65%) occurred in the patient's room and 21 (26.3%) in the bathroom⁽¹⁶⁾. Another study⁽²⁰⁾ showed that, of the 245 institutional events reported in a 30 month period, 42 (17.1%) related to failures in the physical infrastructure of the hospital building.

From the perspective of the physical structure, paying attention to items that are not in compliance is paramount in sanitary facilities, in order to eliminate significant risk factors with regard to falls. Classifying the patient in terms of the risk of falling, and guiding them on prevention, are basic and essential care measures that reduce and prevent such an event during hospitalization, and also in the home environment.

Thus, the guidelines and care provided by the health care team need to be started on admission; they must be performed continuously

and be prolonged during hospitalization. These are prudent measures to prevent the elderly from getting up unaided when they have to go to the bathroom^(19:85). To guide the hospitalized elderly, it is essential that professional nurses know the possibilities of the risk to which these elderly patients are subject in the hospital environment, their temporary or permanent limitations, and share with them the necessary actions to prevent falls.

CONCLUSION

The hospital environment is conducive to falls. Maintaining the physical structure in terms of safety standards are preventive measures with regard to falls.

The hospital, in which this study was undertaken, has a good ward infrastructure, with the presence of caged beds and an electrical system that allows the adjustment of the position and the height of the bed as needed. We consider this is an organized environment with a bell and bedside light in all wards and a bell in the toilet. However, some risky objects were found in the wards, such as bedside furniture without sliding latches, the bell being out of reach of the patient, and slippery flooring.

We point out, as negative aspects, the toilets, which are not in accordance with the current legislation and put patients at risk of falls. It is recommended that a survey be carried out of the conditions of these facilities, and that proposals for suitability, according to the NBR 9050/2004, be submitted to the management of the institution. Similarly, we recommend providing non-slip strips on the stairs, signaling critical spaces, removing or adjusting the unevenness of bathroom floors and the installation of complementary grab bars, including also the area outside the shower to provide support for

when the patient gets dressed, thus avoiding the need to use the sink as a safety bar.

The lack of statistical significance between the variables relating to environment safety for individual use and the occurrence of falls indicates the need for further studies related to the theme, including the intrinsic and behavioral factors of elderly inpatients.

Given that the prevalence rate of in-hospital falls on the part of the elderly is not considered acceptable, it is understood that the development of a standardized methodology for evaluation of this adverse event is essential. This standardization would allow comparisons between hospitals, and the results could be directed to specific processes for quality care and for the improvement of infrastructure.

It is understood that the implementation of the protocol for fall prevention proposed by the National Health Surveillance Agency (ANVISA, abbreviation in Portuguese)⁽⁵⁾ in all hospitals is necessary. This document stipulates the formation of a Center for Patient Safety in order to apply and monitor health conditions and treatment protocols and prevention of service failures. It is believed that hospitals that have implemented the protocol can create multidisciplinary teams or their own committees within each clinic, aiming to supervise and update the activities, and to consider for the prevention of falls. This will allow the creation of a profile and comparison with the national rate in terms of the occurrence of adverse events in the hospital environment.

Based on these results, we emphasize that maintaining the intra-hospital environment according to technical standards, and the need for encouraging the attention of nursing staff in terms of the safety of the hospital environment are essential in terms of safety in general and fall prevention in particular.

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