MULTIDIMENSIONAL RISK OF FALLS IN ELDERLY

Risco multidimensional de queda em idosos

Riesgo multidimensional de caída en mayores

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ABSTRACT

Objective: To identify the multidimensional risk factors for falls, present in a sample of elderly residents in the community. **Methods:** This is a descriptive, cross-sectional and exploratory study with a sample of 31 elderly people from a Community Care Unit in Lisbon and Tagus Valley Region, Portugal, between October 2016 and February 2017. Scales and instruments of functional evaluation were used in order to assess the risk factors. Descriptive statistics were used. **Results:** The majority of the sample is 75 years of age or older (67.7%, n=21) and presents more than one fall risk factor in each dimension. It is worth mentioning the walking speed decline, with 58.1% (n=16) of the elderly taking more than 12.6 seconds to perform the Timed Up and Go Test; 54.8% (n=17) being moderately or severely dependent; 48.3% (n=15) without or with little confidence in carrying out the activities; 38.7% (n=12) consumed benzodiazepines and an average of 4.6 medications per day. In the environmental evaluation of the home, researchers note that lighting is only adequate in kitchens. The totality of the elderly has at least one carpet at home; 38.7% (n=12) have one domestic animal inside the house and 61.3% (n=19) have at least one piece of unstable furniture. The safety behaviors are low: 98.6% (n=30) have never been alerted to the risks of falling, 61.3% (n=19) refer not to persevere in choosing the preventive measures. **Conclusion:** The risk factors for falls identified in the sample are multidimensional. Decreased gait velocity, poor confidence in performing the activities, polypharmacy and non-adoption of safety behaviors by the elderly stand out.

Descriptors: Elderly; Accidental Falls; Risk Factors; Community.

RESUMO

Objetivo: *Identificar fatores de risco de queda presente numa amostra de idosos residentes na comunidade.* ***Métodos:*** *Trata-se de estudo descritivo, transversal e exploratório, com amostra de 31 idosos de uma Unidade de Cuidados na Comunidade, da região de Lisboa e Vale do Tejo, Portugal, entre outubro de 2016 e fevereiro de 2017. Aplicaram-se escalas e instrumentos de avaliação funcional para mensurar fatores de risco. Utilizou-se estatística descritiva.* ***Resultados:*** *A maioria da amostra tem idade igual ou superior a 75 anos (67,7%, n=21) e apresenta mais de um fator de risco de queda em cada dimensão. Salientam-se diminuição da velocidade da marcha, com 58,1% (n=18) dos idosos a demorar mais de 12,6 segundos para realizar o Timed Up and Go Test; 54,8% (n=17) é dependente em grau moderado ou severo; 48,3% (n=15) sem ou com pouca confiança na realização das atividades; 38,7% (n=12) consome benzodiazepinas e média de 4,6 medicamentos diários. Na avaliação ambiental do domicílio, os investigadores observam iluminação adequada apenas nas cozinhas. Na totalidade, tem pelo menos um tapete em casa; 38,7% (n=12) tem animal doméstico no interior da habitação e 61,3% (n=19) possui, pelo menos, uma peça de mobília instável. Os comportamentos de segurança são baixos: 98,6% (n=30) nunca foi alertado para os riscos de queda, 61,3% (n=19) refere não ser perseverante na escolha das medidas preventivas.* ***Conclusão:*** *Os fatores de risco de queda são multidimensionais. Salientam-se diminuição da velocidade de marcha, pouca confiança na realização das atividades, polimedicação e não adoção de comportamentos de segurança pelos idosos.*

Descritores: *Idoso; Acidentes por Quedas; Fatores de Risco.*

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RESUMEN

*Objetivo: Identificar los factores de riesgo de caída en una muestra de mayores residentes de la comunidad. **Métodos:** Se trata de un estudio descriptivo, transversal y exploratorio con una muestra de 31 mayores de una Unidad de Cuidados en la Comunidad, de la región de Lisboa y del Valle del Tejo, Portugal, entre octubre de 2016 y febrero de 2017. Se aplicaron escalas e instrumentos de evaluación funcional para mensurar los factores de riesgo. Se utilizó la estadística descriptiva. **Resultados:** La mayoría de la muestra tiene 75 años o más de edad (67,7%, n=21) y presenta más de un factor de riesgo de caída en cada dimensión. Se destaca la disminución de la velocidad de la marcha con el 58,1% (n=18) de los mayores tardando más de 12,6 segundos para realizar el Timed Up and Go Test; el 54,8% (n=17) es dependiente en grado moderado o severo; el 48,3% (n=15) tiene poca confianza para la realización de las actividades o no la tiene; el 38,7% (n=12) consume benzodiacepinas y una media de 4,6 medicamentos a diario. En la evaluación del ambiente del domicilio, los investigadores observan que la iluminación es adecuada solamente en las cocinas. En general tiene por lo menos una alfombra en la casa; el 38,7% (n=12) tiene animal doméstico en el interior de la habitación y el 61,3% (n=19) tiene, por lo menos, una pieza instable del mobiliario. Las conductas de seguridad son pocas: el 98,6% (n=30) nunca ha sido orientado para los riesgos de caída y el 61,3% (n=19) refiere no ser perseverante para la elección de las medidas de prevención. **Conclusión:** Los factores de riesgo de caída identificados en la muestra son multidimensionales. Se destacan la disminución de la velocidad de la marcha, la poca confianza para la realización de las actividades, la polimedicación y la no adopción de conductas de seguridad de parte de los mayores.*

Descriptores: Anciano; Accidentes por Caídas; Factores de Riesgo.

INTRODUCTION

Falls are recognized as a "growth area" in regard to the health of the elderly population. Assessment and prevention of risks require evidence-based intervention with measurable impact, otherwise, the number of falls and the associated cost will rise[1].

The prevalence of falls in the community is high[2], affecting some 1/3 of the elderly into the community[3]. Falls at home, with their related injuries, has consequences beyond physical injury, as it generates functional disability, contributes to increase the dependence in the elderly population, and is identified as one of the main causes of institutionalization[4].

The first step in prevention is the risk assessment, and in the event of fall, it is essential to determine the mechanism of fall[5], also considering that the multifactorial etiology of the fall may reflect the existence of a health problem that has not yet been identified[6]. Falls can be seen as a consequence of some disorders, chronic diseases, effects of aging on several systems, namely the skeletal, neurological and sensory[7], but more than an event in itself, this phenomenon assumes such a complexity underlying the prevention of health problems in the elderly, the environment, behavioral and socioeconomic conditions, that render it a geriatric syndrome[8].

Falling is a complex phenomenon resulting from a variety of factors that interact dynamically, which should be especially appreciated when assessing the risk of falls[9]. Systematic literature reviews refer as risk factors in the community: advanced age; being a woman; history of previous fall; cognitive decline; polypharmacy; presence of sedatives, hypnotics, neuroleptic and antipsychotic drugs, antidepressants, benzodiazepines, non-steroidal anti-inflammatory drugs, antihypertensives; arrhythmia, dizziness and palpitations; visual deficit; Parkinson's disease and knee arthritis; sensory impairment and comorbidities that interfere with gait and/or balance; difficulties in performing activities of daily living (ADL); use of walking aids; changes in gait or balance; environmental factors within and outside the home; presence of depressive symptoms/depression and compromised socioeconomic conditions[10-13]; changes in feet and use of inappropriate footwear; incontinence; fear of falling and environmental obstacles[12,13]; in addition to the widowhood and social network reduction, being emphasized that the greater the number of factors present, the greater the risk of falling and consequent injury[6,14].

Despite the multiplicity of risk factors, a number of different studies essentially evaluate the biological and physiological risk factors.

In view of the above, this study was aimed at identifying the risk factors for falls in a sample of community-dwelling elderly.

METHODS

This is a descriptive, exploratory, cross-sectional and quantitative study carried out between October 2016 and February 2017, with a convenience sample of 31 elderly people from a Community Care Unit, comprised in a Group of Health Centers of Lisbon and Tagus Valley region, Portugal, who met the following inclusion criteria: age ≥ 65 years; enrolled in the home visiting service of a primary health care unit; without cognitive decline, and who authorized the presence of the researcher in their housing unit.

Elderly individuals with complete mobility dependence (unable to walk) and those who move in a wheelchair were excluded.

Access to participants was conducted in two phases: 1) analysis of the individual medical records; 2) home visit.

The data collection instrument was constructed based on the World Health Organization (WHO) risk factor model, which determines a multidimensional assessment of the individual and the complex relationship between all dimensions. Therefore, these aspects were chosen for evaluation:

a) Sociodemographic description: age, sex, civil status, level of education, profession, family nucleous, reason for home visit; history of falls - episodes of falls within the last year, number of episodes, causes of falls, consequences, associated symptomatology; listing of associated pathologies according to ICD - 10[15]; list of current medication according to the Anatomical therapeutic chemical (ATC) code and the classification recommended by Infarmed[16].

b) Assessment of the housing unit: the following dimensions were considered – lighting, rugs and other decorative items that make walking difficult; presence of handrails and grab bars. In the impossibility of accessing other instruments, the study used one adapted from the literature to record the observation of the physical environment and architectural barriers in the house[17].

c) The cognitive state evaluated by the Mini-Mental State Examination (MMSE), Portuguese version, assessing the overall cognitive functions and relating the result to the level of education of the evaluated person[18].

d) Degree of dependence assessed by the modified Barthel scale, Portuguese version[19].

e) Fear of Falling assessed by the Falls Efficacy Scale (FES), Portuguese version[20].

f) Speed and gait quality by means of the Timed Up and Go Test (TUGT), according to which persons performing TUGT ≥ 12.6 seconds should be regarded as having a high risk of falling[21].

g) Practices and behaviors of the elderly in the prevention of falls, as determined by the assessment scale of the practices and behaviors of the elderly concerning the prevention of falls. The scale evaluates these practices and behaviors in two areas: communication and safety[22].

Data collection took place at the elderly's home during a face-to-face interview, by means of participant observation and application of the research instruments to the elderly and/or their relatives.

The participants of the study were previously informed about the methodology, objectives and purpose of the study, being guaranteed the anonymity and the commitment to respect all that was previously agreed. Each evaluation had an average duration of 90 minutes. This study was approved by the Ethics Committee for Health of the Health Administration of the Lisbon and Tagus Valley Region (Proc. 090/CES/INV/2016).

The statistical treatment of data was performed with use of the Statistical Package for the Social Sciences, version 23.0, and adopting techniques of descriptive statistics, since these make it possible to highlight a set of data of a sample, therefore facilitating its understanding.

RESULTS

Of the 31 elderly, 35.4% (n=11) are 85 years of age or older; 58.1% (n=18) are women; 64.5% (n=20) are married; 58.1% (n=18) lived with their spouse and had low level of education, with 93.6% (n=29) having studied only until the 1st Cycle (4th year) (Table I).

Table I - Sociodemographic characterization of the sample. Lisbon, Portugal, 2017.

Characterization	n	%
Age		
[65 - 74]	10	32.3
[75 - 84]	10	32.3
≥ 85	11	35.4
Sex		
Male	13	41.9
Female	18	58.1
Civil status		
Married	20	64.5
Single	0	0.0
Widowed	9	29.0
Common-law union	2	6.5
Household		
Spouse	18	58.1
Alone	3	9.7
Extended family	10	32.3

Level of education		
Illiterate	2	6.4
Up to the 1st Cycle (4th year)	29	93.6
Total	31	100

The evaluation of the degree of dependence (Table II) leads to the conclusion that 96.7% (n=30) are dependent on some type of help for satisfaction of their ADL.

The analysis of Table II allows us to conclude that the most representative condition is the cardiovascular disease, with 22.6% (n=7), which is also expressive when associated with an osteoarticular disorder, representing 29.1% (n=9).

The majority of the elderly consume more than one group of drugs, and benzodiazepines are consumed by 38.7% (n=12) of the sample. The average daily consumption of drugs in the sample is 4.6 medications/person (Table II).

The gait quality evaluation was performed by TUGT; 58, 1% (n=18) of the elderly needed more than 12.6 seconds to get up, walk a 3-meter distance, turn around, walk back and sit down.

The analysis of Table III, in relation to the application of the FES, shows that 41.9% (n=13) of the elderly presented little confidence and 6.4% (n=2), no confidence, which points out the situation when the difficulty perceived in the accomplishment of the task is directly related to feeling the risk of falling.

Table II - Distribution of the sample according to biophysiological risk factors. Lisbon, Portugal, 2017.

Biophysiological risk factors	n	%
Degree of dependence		
Full dependence (≤ 25)	0	0.0
Severe dependence (50 to 26)	4	12.9
Moderate dependence (75 to 51)	13	41.9
Mild dependence (99 to 76)	13	41.9
Completely independent (100)	1	3.3
Total	31	100.0
Associated disorders		
Cardiovascular	7	22.6
Metabolic	1	3.2
Osteoarticular	1	3.2
Cardiovascular and Metabolic	5	16.1
Cardiovascular and Osteoarticular	9	29.1
Cardiovascular, Metabolic and Osteoarticular	5	16.1
Others	3	9.7
Medication		
Antihypertensives	4	12.9
Oral antidiabetic agents	1	3.2
Psychopharmaceuticals	3	9.7
Analgesics and Anti-inflammatories	3	9.7
Benzodiazepines	12	38.7
Others	2	6.5
TUGT		
Up to 12.6 seconds	13	41.9
12.6 or more seconds	18	58.1

TUGT: Timed Up and Go Test

Table III - Sample distribution according to fear of falling. Lisbon, Portugal, 2017.

Confidence rating*	n	%
10	2	6.4
[11-49]	13	41.9
[50-89]	10	32.3
[90-100]	6	19.4
Total	31	100.0

*Falls Efficacy Scale

The analysis of Table IV shows that there are several obstacles in the home of the elderly that can contribute to the occurrence of falls, such as: the presence of stairs to access the house and uneven pavement outside all houses (100%; = 31); and the presence, inside the house, of animals (38.7%; n=12), uneven floor (19.4%; n=6) and stairs (12.9%; n=4).

It is important to point out that all the elderly have at least one rug at home, of which only 30.0% (n=6) are fixed in the bedroom and kitchen, 25.0% (n=4) in the bathroom, and 11.1% (n=2) in the hall/room and corridor.

In the assessment of the environmental risk, it was verified that, despite the availability of lighting in all rooms, it is only adequate in the kitchen, whereas, in other rooms, the illumination is to some degree deficient in relation to the needs of this age group.

The presence of unstable furniture (61.3%; n=19) telephone wires and power cords stretched across the floor (48.4%; n=15) deserved attention. There are several obstacles in the house that hinder the indoor mobility of the elderly, since 100.0% (n=31) of the doors have dimensions smaller than 90 cm, which makes accessibility difficult when a wheelchair or walking frame is needed; as well as 67.7% (n=21) have corridor width of less than 90 cm and 61.3% (n=19) of the elderly have furniture in the pathways.

It was observed that 64.5% (n=20) of the sample used the bathtub for hygiene care, and only 10.0% (n=2) of the cases feature a lateral grab bar. In relation to the shower box, 45.5% (n=5) of the situations present this support product.

As regards the application of the assessment scale of practices and behaviors of the elderly concerning the prevention of falls, it was observed that 96.8% (n=30) of the elderly reported never having been warned by the doctors about the risk of falls; 71.0% (n=22) stated that nurses sometimes warn them about the risk of falling, as well as 67.7% (n=21) are "sometimes" warned about this risk by their relatives; 61.3% (n=19) recognized they had never heard of or talked to other seniors about the risk factors for falls.

The elderly often (97.7%, n=21) report to family members or nurses the identified risk factors (Table V).

It should be noted that the prevalence of falls in this sample is 64.5% (n=20); the group aged 75-84 years was the most represented, with 40.0% (n=8), and 70.0% (n=14) of these were women, within the last three months, 70.0% (n=14) fell more than once. Of those who fell, 60.0% (n=12) fell at home, and the same percentage received medical intervention, of which 9.3% (n=2) were hospitalized with a serious injury, requiring surgical intervention.

Table IV - Distribution of the sample according to the environmental risk factors for fall. Lisbon, Portugal, 2017.

Presence of obstacles		n	%
Animals	Outside the house	2	6.5
	Inside the house	12	38.7
Stairs	Street access to the house	31	100
	Inside the house	4	12.9
Uneven floor	Outside the house	31	100
	Inside the house	6	19.4
Rugs	Hall/Living room	18	58.1
	Gripped to the floor	2	11.1
	Corridor	15	48.4
	Gripped to the floor	2	11.1
	Bedroom/bedside	22	71.0
	Gripped to the floor	6	30.0
	Kitchen	20	64.5
	Gripped to the floor	6	30.0
	Bathroom	16	51.6
	Gripped to the floor	4	25.0
Adequate lighting	Entrance hall/Living room	26	83.9
	Corridor	24	77.4
	Bedroom	27	87.1
	Kitchen	31	100
Household environment	Telephone wires/power cords on the floor	15	48.4
	Open drawers	4	12.9
	Unstable furniture	19	61.3
	Door sills leveled with floor	22	71.0

	Coxofemoral joint and knee - 90° angle - seated on a chair	24	77.4
	Coxofemoral joint and knee - 90° angle - seated on the bed	23	74.2
	Clear circulation paths of 1 meter around the bed	9	29.0
Furniture	Wheelchair/walking frame access/movement is allowed	9	29.0
	Presence of furniture in the pathways	19	61.3
	Floors and tiles with confusing patterns	7	22.6
	Door width < 90 cm	31	100
	Corridor width < 90 cm	21	67.7
	Presence of bathtub	20	64.5
	Grab bars in the bathtub	2	10.0
Bathroom	Presence of shower box	11	35.5
	Grab bars in the shower box	5	45.5
	Average height of bath mat – in centimetres	13.5	

Table V - Distribution of the sample according to practices and behaviors of the elderly concerning the prevention of falls. Lisbon, Portugal, 2017.

Practices and behaviors of the elderly	Always %	Sometimes %	Never %
Dimension: Communication			
I listen and talk to other aged people about the risk factors for falls	-	38,7	61.3
Doctors warn me about the risk of falling	-	3,2	96.8
Nurses warn me about the risk of falling	3,2	71,0	25.8
My relatives warn me about the risk of falling	3,2	67,7	29.1
I communicate to my family members the risk factors for falls	6,5	67,7	25.8
I communicate to the nurses the identified risk factors	3,2	71,0	25.8
Dimension: Safety practices and behaviors			
I select the right shoes for my feet	9,7	9,7	80.6
I choose to wear shoes with non-slip sole	3,2	19,4	77.4
When I get up from bed I first sit down with my feet on the floor and only then I stand up	90,3	6,5	3.2
I make sure my feet are flat on the floor before moving to a standing position	58,0	35,5	6.5
I verify if the bathroom floor is not slippery/wet before using it	-	29,0	71.0
Before hygiene care I make sure the floor is not slippery.	3,2	35,5	61.3
I try to be perseverant in choosing the best preventive measures against falls.	-	38,7	61.3
I organize the space of my room so as to facilitate the movement inside it	6,5	16,1	77.4
I remove obstacles that make it difficult to walk in the room	-	35,5	64.5
I remove obstacles that make it difficult to walk in the corridor	-	32,3	67.7

DISCUSSION

The prevalence of falls in the sample was high. In view of the multiple results presented in the elderly population assessed in this study, the main biophysiological risk factors for falls stand out and are in line with the findings of other studies: being over 85 years old[10,11], female gender[4,10,11,23], low level of education, presence of several comorbidities[13] and polymedication[6,10,11], with 38.7% taking benzodiazepines.

The majority of the elderly take more than 12.6 seconds to perform the TUGT, which represents a high risk of falling[21,23]. This functional evaluation test has been recommended by several agencies and researchers for being a good predictor of the risk of short-term falls in the community-dwelling elderly[21,24]. Associated with these gait impairments, difficulties arise in the accomplishment of ADL, since gait is the self-care that most influences the performance of ADL[25]. The difficulty faced by the elderly in the individual accomplishment of ADL compromises their independence, reduces their quality of life and increases the risk of dependence, and is a contributing factor to falls[10].

Half of the elderly in the sample who have a history of falls in the last 12 months regularly consume benzodiazepines,

which is a determinant factor for the occurrence of falls, since this consumption increases the risk by 2 to 4 times, as it affects the central nervous system and hinders the balance, tactile sensitivity, lower limb muscle strength and reaction time[4,11]. Most of the study sample consume 4 or more medicines, which is worrying because, not only does the risk of falls increase, but also the functional status is aggravated with the number of drugs consumed[4,11].

The evaluation of the "fear of falling" in the elderly through the Portuguese version of the FES[26] allowed to verify the degree of confidence that they presented in the accomplishment of the ADL, in which almost half of the sample shows little or no confidence. The perceived difficulty in performing the task is directly related to the feeling of risk, where the fear of falling may represent an emotional response to a threat, as well as assume a protective character when the elderly decide to protect themselves against the risk[26-29]. Nevertheless, this potential risk of falling becomes real when it leads to limitations and insecurity[29].

In the discourse of the elderly and families it transpires that, after the fall, fear becomes a conditioning factor in the accomplishment of the ADL. The fear of falling leads the elderly to avoid walking and the family itself advises them not to move much. The sedentary behavior may promote post-fall dependence, and professionals need to make an early introduction of interventions intended to control fear, dependence, and functionality decline[27,28].

With regard to the environmental risk assessment, the described results corroborate the evidence, showing that the prevalence of obstacles in the home of elderly people is high[14], with at least one obstacle identified in 80% of the houses and five or more, in 39% of those. The existence of obstacles associated with other risk factors are strong determinants of falls in this population[10,11,14].

In terms of environmental risk, it stands out that all items have high values, highlighting the presence of rugs and the lack of proper grip to the floor, as well as the presence of unstable furniture. Interventions made by nurses in the management of environmental risk should contribute to correct some obstacles in the household and be conducive to the reduction of falls[12].

The evaluation of the practices and behaviors of the elderly for the prevention of falls shows that they are poor, which leads to the conclusion that there is no safety culture on the part of the elderly regarding the prevention of falls, leaving here a window of opportunity for nurses in the area of health education.

Including the assessment of the behaviour related to the fall event can contribute to strengthen health education directed at the elderly, their empowerment to health promotion and well-being, as well as a result that is sensitive to nursing care[22].

The findings in the dimension of communication reinforce the idea that the evaluated elderly do not talk to themselves or their family and professionals about risk factors for falls and preventive measures. In terms of behavioral risk, the lack of a safety culture of fall prevention is observed, as well as the presence of barriers in communication, both from the elderly to the professionals and from them to the elderly.

The underestimation of the occurrence of falls by the health professionals and family members, especially sons and daughters, indicates the fear of recognizing their own vulnerability and prompt a potential institutionalization, since such accident is one of the main reasons pointed out by relatives for searching an institution, its repetition and the secondary consequences to an event can lead to institutionalization[30].

The fall in the elderly contributes directly to the functional decline, higher dependence and increased complications associated with the immobility syndrome, which makes it necessary to identify other risk factors in addition to the biophysiological ones, namely the identification of behavioral risk factors, in order to enable a clearer perception of the multifactorial nature of falls and the implementation of actions in the scope of health promotion, directed towards the change in both the professionals' and the elderly's behaviors, empowering them and making them responsible for their health, with the main objective that the elderly be active and autonomous for longer[22].

The limitations of the study are related to its exploratory nature and the sample size and type, which makes it difficult to extrapolate the data to other contexts. Data collection through face-to-face interview may have influenced the response of the elderly in an attempt to provide the socially desirable response, but the results are important for the understanding of the complex and multifactorial nature of the risk factors for falls in the elderly population.

The results of this study justify the pertinence of the debate about the risk factors that nurses should evaluate during the home visit to the elderly, since most of the scales adopted to assess the risk only evaluate the biophysiological risk, neglecting the interaction of the elderly in their natural environment. The determination of (un)safe behaviors opens up an array of potential interventions for nurses in primary health care to control the environmental and behavioral risk, as well as to monitor health-disease transitions.

CONCLUSION

The study identified the risk factors for falls in a sample of community-dwelling elderly.

Among the risk factors of biophysiological etiology, these stand out: age; gait speed decline; moderate or severe degree of dependence; lack of confidence in the accomplishment of the activities; consumption of benzodiazepines and polymedication. In the household environmental assessment, the researchers observed that lighting is only adequate in kitchens, all of the elderly have at least one rug at home, most have a domestic animal inside the house and have at least one piece of unstable furniture.

The safety behaviors are scarce, a high percentage of the elderly has never been alerted to the risks of falling, either by the family or by health professionals, and refers not being perseverant in choosing the best preventive measures.

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