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Predictive factors for institutionalization of the elderly: a case-control study

ABSTRACT

OBJECTIVE: To identify predictive indicators of institutionalization of the elderly.

METHODS: A case-control study was carried out with 991 elderly individuals in the city of Pelotas, (Southern Brazil), from 2007 to 2008. The cases of institutionalized elderly adults (n = 393) were detected using a census of all long-stay institutions for the elderly in the city. The population controls (n = 598) were randomly selected using a comprehensive health survey. Pearson's chi-square test and linear trends were used to compare groups in the crude analysis; and the binary logistic regression model of the adjusted analysis, with the effects expressed as odds ratios.

RESULTS: Institutionalization was more frequent in females (OR = 1.96, 95%CI 1.31, 2.95). Elderly with advanced age (OR = 3.23 and OR = 9.56 for age groups 70-79 and ≥ 80 years, respectively), those who lived without a partner (single, divorced or widowed), and those who had no formal schooling or had a functional disability preventing them from performing basic activities for daily living were more likely to be institutionalized. An inverse trend between the incidence of elderly institutionalization and the level of physical activity was observed, where somewhat active and inactive subjects were more likely to be institutionalized (OR = 1.71 and OR = 4.73, respectively).

CONCLUSIONS: Of the factors examined, age ≥ 80 years, living without a partner and being physically inactive were the indicators most strongly associated with institutionalization. The encouragement of informal care through cultural and educational activities focused on the role of the family in caring for the elderly can prevent the institutionalization of these individuals.

DESCRIPTORS: Aged. Aging. Homes for the Aged. Risk Factors. Case-Control Studies. Health of institutionalized elderly.

INTRODUCTION

Population aging is accompanied by increases in morbidity and disability.^{9,13,19} Information provided by the *Instituto Brasileiro de Geografia e Estatística* (IBGE – National Institute of Geography and Statistics)⁹ highlights the enlargement of the top of the age pyramid. This enlargement represents the growth in the proportion of the population aged 65 and older. This subgroup comprised 4.8% of the total population in 1991, 5.9% in 2000 and 7.4% in 2010.

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⁹ Instituto Brasileiro de Geografia e Estatística. Sinopse do censo demográfico de 2010. Rio de Janeiro; 2011.

The strengthening of the primary care system will play a key role in the early detection of vulnerable elderly adults.^{10,17,20} Federal laws^{b,c} focused on the rights of the elderly bring attention to the importance of maintaining family and community living to allow these adults to exercise their citizenship and to maintain their dignity and autonomy.

Brazil has recently experienced increased demand for long-term care for the elderly.⁶ Institutionalization of the elderly is dependent on both cultural factors and the availability of family support and alternative services.¹⁸ The objective of this study was to identify factors associated with institutionalization of the elderly.

METHODS

This is a case-control population-based study of 991 elderly adults in Pelotas, Rio Grande do Sul (Southern Brazil), from 2007 to 2008. Cases were defined as individuals aged 60 years or older living in long-stay institutions for the elderly (LSIEs). The control group comprised individuals aged 60 years or older who lived in their homes in the community.

Cases were identified from a survey of records of the LSIEs registered in the *Vigilância Sanitária da Secretaria Municipal de Saúde* (Municipal Health Surveillance Department) and in the *Conselho Municipal do Idoso* (Municipal Board for the Elderly). Additionally, we searched for archived files in the *Ministério Público Municipal* (Municipal Prosecutor's Office) concerning the legalization of these institutions. Of the 25 surveyed institutions, one was excluded because it provides care only for adults who are mentally ill.

Controls were selected from a population-based cross-sectional study of the urban area of the city. Participants were chosen using cluster sampling in two stages: the census tracts defined by IBGE^d were the primary sampling units, and households were the secondary sampling units. Systematic sampling was used such that controls had a probability of being selected proportional to the size of the sector of the city in which they lived. The study included 126 sectors and 1,534 households.

A trained team approached the prospective interviewees and used a standardized, pre-coded questionnaire to conduct the interviews. The elderly adults were interviewed individually, either in the institution where they lived or in their home. If an elderly adult was unable to respond to questions independently, the information was collected from a caregiver.

If the team was unable to conduct an interview after three attempts on different days and times, with one attempt by a fieldwork supervisor, the interview was considered a loss or refusal. For quality control purposes, a research assistant re-visited all of the LSIEs and verified that the interviewers had conducted interviews with the residents, by contacting the person responsible for the institution. Ten percent of the control sample was contacted again and completed a shortened version of the instrument to confirm the information collected previously.

The outcome of interest in this study was long-stay institutionalization. To identify potential factors associated with institutionalization of the elderly, the following variables were investigated: gender, age, marital status, education, smoking status, physical activity level (either inactive, somewhat active or active, corresponding to ranges of physical activity in minutes per week based on responses to the Portuguese-language short version of the International Physical Activity Questionnaire – IPAQ)² and the presence of functional disability in basic activities of daily living (unable to perform at least one of six basic activities of daily living as proposed by the Katz Index: feeding, bathing, dressing, toileting, transferring and managing bowel and bladder continence).¹¹

The data were double entered into the EpiInfo version 6.04d software, with automatic checking of amplitude and consistency. We used the STATA software version 9.0 and descriptive statistics for prevalence estimates and 95% confidence intervals (95%CI). Pearson's chi-square test and the linear trend were used in the crude analysis. Binary logistic regression was used in the adjusted analysis, with effects expressed as odds ratios (OR) and respecting the hierarchy among the possible factors associated with the outcome (Figure). We adopted the strategy of backward selection for statistical modeling, and a critical p-value of ≤ 0.20 was required for a variable to remain in the model.

The study protocol was approved by the Research Ethics Committee of the Faculdade de Medicina da Universidade Federal de Pelotas (# 005/2008), and the elderly adults and their caregivers signed a consent form before the interview.

RESULTS

Of 448 eligible institutionalized elderly adults, 393 were interviewed (87.7%), and of these, 61.6% responded with the help of caregivers. In the 1,534 households that were visited, 644 elderly residents were

^b Brasil. Lei nº. 8.842 de 4 de janeiro de 1994. Dispõe sobre a política nacional do idoso, cria o Conselho Nacional do Idoso e dá outras providências. *Diário Oficial Uniao*. 1994; jan 5.; Sec.1.

^c Brasil. Lei nº. 10.741 de 1º de outubro de 2003. Dispõe sobre o Estatuto do Idoso e dá outras providências. *Diário Oficial Uniao*. 2003; out 3.; Sec.1.

^d Instituto Brasileiro de Geografia e Estatística. Cartograma municipal dos setores censitários: situação 2000 [CD-ROM]. Rio de Janeiro; 2000.

Table 1. Characteristics of institutionalized elderly (cases) and elderly living at home (controls). Pelotas, Southern Brazil, 2008.

Variable	Cases (n = 393)		Controls (n = 598)	
	n	%	n	%
Gender				
Male	103	26.2	222	37.1
Female	290	73.8	376	62.9
Age (completed years)				
60 to 69	62	16.1	318	53.2
70 to 79	121	31.4	183	30.6
≥ 80	203	52.5	97	16.2
Marital status				
Married	22	5.7	308	51.5
Single	126	32.4	47	7.9
Divorced	37	9.5	53	8.9
Widowed	204	52.4	189	31.7
Any formal education (completed years)				
No	195	54.5	111	18.6
Yes	163	45.5	486	81.4
Current smoking status ^a				
Non-smoker	161	63.1	340	56.8
Smoker	24	9.4	80	13.4
Ex-smoker	70	27.5	178	29.8
Physical activity level (minutes/week ^b)				
Inactive (0 to 9)	344	90.5	321	53.9
Somewhat active (10 to 149)	15	4.0	73	12.3
Active (≥ 150)	21	5.5	201	33.8
Any functional disability in basic activities of daily living				
Yes	312	79.4	160	26.8
No	81	20.6	438	73.2

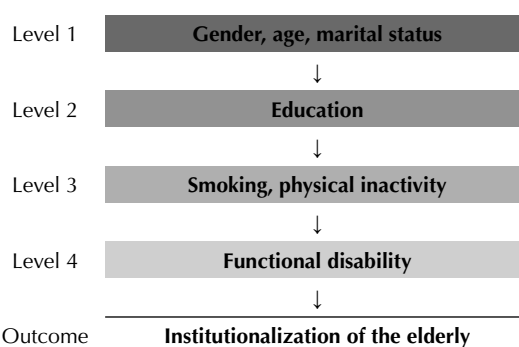
^a Variable with largest number of missing responses in the case group (n = 138)

^b Variable with largest number of missing responses in the control group (n = 3)

eligible. Of these, 598 were interviewed, and 91.8% reported their responses directly.

The average ages of elderly adults in an institution and in the community were 79.7 (SD 9.3) and 70.4 years (SD 8.7), respectively. There was a predominance of women in both groups (73.8% and 62.9%, respectively). The elderly adults who lived in LSIEs were mostly widowed (52.4%) and had no formal education (54.5%). On the other hand, being married and having formal education were more frequent among the elderly adults residing in the community.

The percentages of smokers among the institutionalized and non-institutionalized adults were similar. Moreover,

**Figure.** Hierarchical model of analysis. Pelotas, Southern Brazil, 2008.

90.5% of institutionalized individuals reported being physically inactive, and 33.8% of community residents were considered physically active. A total of 79.4% of institutionalized adults and 26.8% of elderly adults living in the community had limitations in at least one basic activity of daily living (Table 1).

In the crude analysis, the following groups had an OR of institutionalization that was significantly higher than that of their peers: older women; single, divorced or widowed individuals; adults with no formal education; and those with a functional disability. Moreover, more advanced age and lower levels of weekly physical activity were associated with a greater risk of institutionalization (Table 2).

In the adjusted analysis, based on the hierarchy of analysis model (Figure), all sociodemographic variables at level 1 were statistically significantly related to institutionalization of the elderly: female gender (OR = 1.96), advanced age (OR = 3.23 and 9.56 in subjects 70 to 79 and ≥ 80 years of age, respectively) and being single, divorced or widowed (single OR = 44.16, divorced OR = 13.27 and widowed OR = 11.18). On the second level, lack of formal education was also significantly associated with institutionalization ($p < 0.001$). Of the health-related behaviors (level three), an inverse trend was observed between risk of institutionalization and the level of physical activity. Therefore, somewhat active and inactive subjects showed greater risks of institutionalization compared to active subjects (OR = 1.71 and 4.73, respectively). In the fourth level, elderly adults with a functional disability were significantly more likely to be institutionalized than adults without disabilities (OR = 4.23, $p < 0.001$).

DISCUSSION

In the comparison of elderly adults in institutions and in the community, there was a predominance of women in both groups, but especially among the institutionalized adults. These results were expected because life

Table 2. Crude and adjusted effects of the independent study variables on institutionalization of the elderly. Pelotas, Southern Brazil, 2008.

Level	Variable	Crude Analysis			Adjusted Analysis		
		OR	95% CI	p	OR	95% CI	p
1	Gender			<0.001			<0.001
	Male	1			1		
	Female	1.66	1.26;2.20		1.96	1.31;2.95	
1	Age (completed years)			<0.001*			<0.001*
	60 to 69	1			1		
	70 to 79	3.39	2.38;4.84		3.23	2.12;4.92	
	≥ 80	10.73	7.46;15.45		9.56	6.13;14.91	
1	Marital Status			<0.001			<0.001
	Married	1			1		
	Single	37.53	21.72;64.86		44.16	23.98;81.35	
	Divorced	9.77	5.35;17.86		13.27	6.84;25.74	
	Widowed	15.11	9.39;24.31		11.18	6.42;19.45	
2	Any Formal Education (completed years)			<0.001			<0.001
	No	1			1		
	Yes	0.19	0.13;0.27		0.38	0.27;0.55	
3	Current Smoking Status			0.14			0.07
	Non-smoker	1			1		
	Smoker	0.63	0.39;1.04		0.93	0.47;1.87	
	Ex-smoker	0.83	0.59;1.16		1.65	1.03;2.65	
3	Physical activity level (minutes/week)			<0.001*			<0.001*
	Inactive (0 to 9)	10.26	6.38;16.49		4.73	2.64;8.48	
	Somewhat active (10 to 149)	1.97	0.96;4.02		1.71	0.73;4.02	
	Active (≥ 150)	1			1		
4	Functional disability in basic activities of daily living			<0.001			<0.001
	Yes	10.54	7.78;14.29		4.23	2.78;6.44	
	No	1			1		

* Linear Trend

expectancy at birth is not the same for both genders.²³ The population pyramids of developed and developing countries¹⁴ have demonstrated prolonged survival among women. This finding may be due to different factors: differences in exposure to occupational hazards, as men have traditionally worked in the labor market while women managed the home; the higher consumption of alcoholic beverages and tobacco products among men;¹⁵ and the greater use of health services and general concern for health among women.¹² In addition, there are higher rates of mortality from external causes, such as violence, among men especially as young adults.⁴

In our study, the risk of institutionalization increased with increasing age. The risk of functional disability doubles with each successive decade of life,⁸ with a higher prevalence of chronic diseases and hospital admissions among the oldest adults.^{12,23} These factors may increase the likelihood of institutionalization of

the elderly. Caregivers were more likely to respond to the survey on the behalf of institutionalized elderly adults, a finding that highlights the higher levels of dependence that these adults experience compared to elderly adults living in the community. We found important differences in marital status between the two groups: the majority of institutionalized elderly adults were widowed, whereas the majority of those living in the community were either married or living with a partner. This result held even after adjusting for the age of the subjects. These results are supported by the literature^{7,21} and bring attention to the importance of socialization to the welfare of the elderly, suggesting that social isolation and loneliness in old age are linked to the decline of physical and mental health and subsequent institutionalization. The presence of a companion for daily activities or of other social networks, such as neighbors and community groups,

is of great importance to the health of the elderly¹⁶ and improves their self-esteem and autonomy.

A high percentage of the elderly had no formal education, a factor that was associated with institutionalization in Pelotas. In the past, there were socio-cultural barriers that limited access to education, especially for women, which may explain this result. Low education levels have commonly been associated with negative health outcomes in the elderly, such as increased frailty, mental health problems and higher incidence of chronic diseases. In contrast, improving literacy may result in greater responsiveness of the elderly to health promotion programs.⁴

One of the major contributors to functional decline in the elderly is physical inactivity.²² In our study, lower levels of physical activity and functional capacity were associated with institutionalization. A recent census survey^c revealed that LSIEs in southern Brazil are typically small, housing approximately 30 residents each. Furthermore, the infrastructure of these institutions has been shown to be inappropriate for the age of the patients. Small, unsafe spaces are not adaptable to the mobility needs of this population and preclude an active lifestyle. Physical activity can slow functional decline, delay the onset of chronic diseases and promote economic and social benefits.¹ Therefore, the development of a physical infrastructure favorable to active aging is fundamental.

In the city of Pelotas, 1% of the entire elderly population lives in an institution. This finding is similar to the estimate of 0.6% from the *Instituto de Pesquisa Econômica Aplicada* (Institute of Applied Economic

Research)^f for southern Brazil. In Japan and Germany, the rates of institutionalization are 2% and 3.5%, respectively.⁵ Thus, although the life expectancies in developed countries are higher, the rates of institutionalization are comparable to those observed in our study. Balancing public and private responsibility for the care of the elderly and finding strategies for allowing the elderly to stay in their homes (for example, by encouraging informal caregiving from family and friends³) are possible alternatives that can be implemented in developing countries.

This study had some limitations. Economic and cognitive variables were not considered, and this exclusion may have led to an overestimation of the effect of behavioral factors on institutionalization. However, evaluating age and education has partially controlled for this effect, lessening the risk of bias. Because this was a case-control study, it is possible that our findings were due to a reverse causality bias, especially for physical activity.

It is important to consider the actions that can be taken to accommodate a rapidly growing elderly population in Brazil. Public health policies for the elderly should develop mechanisms to support and care for this group. Investing in primary health care and educating family members can increase the amount of formal and informal care that the elderly receive in their homes. Improving preventive care and monitoring for physical inactivity, chronic diseases and functional disability is also necessary, as these factors, along with the loss of independence, are associated with institutionalization of the elderly.

^c Instituto Brasileiro de Geografia e Estatística. IBGE Cidades@ [cited 2011 May 03]. Available from: <http://www.ibge.gov.br/cidadesat/painel/painel.php?codmun=431440#>

^f Instituto de Pesquisa Econômica Aplicada. Características das instituições de longa permanência para idosos – região Sul. Coordenação geral: Ana Amélia Camarano. Rio de Janeiro; 2008 [cited 2011 Sep 19]. Available from: http://www.ipea.gov.br/portal/images/stories/PDFs/livros/Livro_CaractdasInstituicoesRegiao_Sul.pdf

REFERENCES

1. Chodzko-Zajko WJ, Proctor DN, Fiatarone Singh MA, Minson CT, Nigg CR, Salem GJ, et al. American College of Sports Medicine position stand: exercise and physical activity for older adults. *Med Sci Sports Exerc.* 2009;41(7):1510-30. DOI:10.1249/MSS.0b013e3181a0c95c
2. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc.* 2003;35(8):1381-95. DOI:10.1249/01.MSS.0000078924.61453.FB
3. Del Duca GF, Thumé E, Hallal PC. Prevalência e fatores associados ao cuidado domiciliar a idosos. *Rev Saude Publica.* 2011;45(1):113-20. DOI:10.1590/S0034-89102010005000047
4. Feliciano AB, Moraes SA, Freitas ICM. O perfil do idoso de baixa renda no Município de São Carlos, São Paulo, Brasil: um estudo epidemiológico. *Cad Saude Publica.* 2004;20(6):1575-85. DOI:10.1590/S0102-311X2004000600015
5. Gibson MJ, Gregory SR, Pandya SM. Long-term care in developed nations: a brief overview. Washington (DC): AARP Public Policy Institute; 2003.
6. Goldani AM. Relações intergeracionais e reconstrução do estado de bem-estar. Por que se deve repensar essa relação para o Brasil? In: Camarano A, organizadora. Os novos idosos brasileiros: muito além dos 60? Rio de Janeiro: Ipea; 2004. p. 211-250.
7. Gonçalves LG, Vieira ST, Siqueira FV, Hallal PC. Prevalência de quedas em idosos asilados do município de Rio Grande, RS. *Rev Saude Publica.* 2008;42(5):938-45. DOI:10.1590/S0034-89102008000500021
8. Guralnik JM, LaCroix AZ, Abbott RD, Berkman LF, Satterfield S, Evans DA, et al. Maintaining mobility in late life. I. Demographic characteristics and chronic conditions. *Am J Epidemiol.* 1993;137(8):845-57.
9. Hoskins I, Kalache A, Mende S. Hacia una atención primaria de salud adaptada a las personas de edad. *Rev Panam Salud Publica.* 2005;17(5-6):444-51. DOI:10.1590/S1020-49892005000500017
10. Karsch UM. Idosos dependentes: famílias e cuidadores. *Cad Saude Publica.* 2003;19(3):861-6. DOI:10.1590/S0102-311X2003000300019
11. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged. The Index of ADL: a standardized measure of biological and psychosocial function. *JAMA.* 1963;185:914-9.
12. Lima-Costa MF, Barreto SM, Giatti L. Condições de saúde, capacidade funcional, uso de serviços de saúde e gastos com medicamentos da população idosa brasileira: um estudo descritivo baseado na Pesquisa Nacional por Amostra de Domicílios. *Cad Saude Publica.* 2003;19(3):735-43. DOI:10.1590/S0102-311X2003000300006
13. Onder G, Liperoti R, Soldato M, Carpenter I, Steel K, Bernabei R, et al. Case management and risk of nursing home admission for older adults in home care: results of the AgeD in HOme Care Study. *J Am Geriatr Soc.* 2007;55(3):439-44. DOI:10.1111/j.1532-5415.2007.01079.x
14. Organização Mundial da Saúde. Envelhecimento ativo: uma política de saúde. Brasília (DF): Organização Pan-Americana da Saúde; 2005.
15. Peixoto SV, Firmo JOA, Lima-Costa MF. Condições de saúde e tabagismo entre idosos residentes em duas comunidades brasileiras (Projetos Bambuí e Belo Horizonte). *Cad Saude Publica.* 2006;22(9):1925-34. DOI:10.1590/S0102-311X2006000900024
16. Ramos LR. Fatores determinantes do envelhecimento saudável em idosos residentes em centro urbano: Projeto Epidoso, São Paulo. *Cad Saude Publica.* 2003;19(3):793-8. DOI:10.1590/S0102-311X2003000300011
17. Rehem TCMSB, Trad LAB. Assistência domiciliar em saúde: subsídios para um projeto de atenção básica brasileira. *Cienc Saude Coletiva.* 2005;10 Supl:231-42. DOI:10.1590/S1413-81232005000500024
18. Rubenstein LZ, Nasr SZ. Health service use in physical illness. In: Ebrahim S, Kalache A, editors. *Epidemiology in old age.* London: BMJ Publishing Group; 1996. p. 106-25.
19. Sahlen KG, Dahlgren L, Hellner BM, Stenlund H, Lindholm L. Preventive home visits postpone mortality: a controlled trial with time-limited results. *BMC Public Health.* 2006;6(1):220. DOI:10.1186/1471-2458-6-220
20. Silvestre JA, Costa Neto MM. Abordagem do idoso em programas de saúde da família. *Cad Saude Publica.* 2003;19(3):839-47. DOI:10.1590/S0102-311X2003000300016
21. Sousa AI, Silver LD. Perfil sociodemográfico e estado de saúde auto-referido entre idosas de uma localidade de baixa renda. *Esc Anna Nery Rev Enferm.* 2008;12(4):706-16. DOI:10.1590/S1414-81452008000400015
22. Stuck AE, Walthert JM, Nikolaus T, Büla CJ, Hohmann C, Beck JC. Risk factors for functional status decline in community-living elderly people: a systematic literature review. *Soc Sci Med.* 1999;48(4):445-69. DOI:10.1016/S0277-9536(98)00370-0
23. Veras R. Envelhecimento populacional contemporâneo: demandas, desafios e inovações. *Rev Saude Publica.* 2009;43(3):548-54. DOI:10.1590/S0034-89102009005000025

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