Rev Saúde Pública 2010;44(5)

Juvenal Soares Dias da Costa[I]

Mauri Caldeira Reis[II]

Claudio Viana Silveira Filho[II]

Rogério da Silva Linhares[II]

Fábio Piccinini[II]

Everton Fantinel[II]

Prevalence of hospitalization and associated factors in Pelotas, Southern Brazil

ABSTRACT

OBJECTIVE: To estimate the prevalence of hospitalizations and to identify characteristics associated with hospital admission.

METHODS: We carried out a population-based cross-sectional study of subjects of both sexes, aged 20-69 years, and who lived in the urban area of Pelotas, Southern Brazil, between 1999 and 2000. Subjects were interviewed using a standardized, pre-coded questionnaire. Analysis was stratified by sex and confounder control was carried out using Poisson regression. Variables analyzed included socioeconomic and demographic characteristics, lifestyle, morbidities, and medical appointments in the last year.

RESULTS: Of the 1,916 subjects interviewed, 146 (7.6%; 95%CI: 6.4;8.8) had been hospitalized in the year preceding the interview. Among men, characteristics associated with hospitalization included age above 50 years, schooling between five and seven years, history of smoking, minor psychiatric disorders, and medical appointments in the last year. For women, hospitalization was more frequent among subjects aged 60-69 years, with five to seven years of schooling, and who had had medical appointments within the last year. Women who consumed under 30g/day of alcohol were less likely to have been hospitalized. Prevalence of hospitalization for primary care-sensitive causes was 13.0% (95%CI: 7.6;18.5).

CONCLUSIONS: Prevalence of hospitalization is similar in men and women. Schooling, but not income, was found to be associated with hospitalization.

DESCRIPTORS: Hospitalization. Risk Factors. Health Inequalities. Cross-Sectional Studies.

INTRODUCTION

Health care planning involves diagnosing the existing problems, adopting measures to solve these problems, and evaluating the impact of these measures after implementation.[19]

High-quality primary care is the foundation of a well-functioning health care system.[15] Based on the theoretical assumption, proposed by Campbell et al, "that quality of care at the population level can be defined as the ability to access effective care on an efficient and equitable basis for the optimization of health benefit/well-being for the whole population."[6] The effectiveness of a health care-related intervention will thus depend on five dimensions: efficacy, precision of diagnosis, professional adherence, recipient adherence, and coverage.[7] Analyzing hospitalizations allows us to evaluate aspects of the functioning of local primary care networks.[3,4]

[I] Programa de Pós-Graduação em Saúde Coletiva. Universidade do Vale do Rio dos Sinos. São Leopoldo, RS, Brasil

[II] Programa de Residência em Medicina Social. Faculdade de Medicina da Universidade Federal de Pelotas. Pelotas, RS, Brasil

Correspondence:
Juvenal Soares Dias da Costa
Av. Duque de Caxias, 250
96030-002 Pelotas, RS, Brasil
E-mail: episoares@terra.com.br

Received: 4/14/2009
Approved: 4/6/2010

Article available from: www.scielo.br/rsp

The number of hospitalizations due to ambulatory care-sensitive causes can be an indicator of the quality of primary care for diseases for which early diagnosis and treatment are effective at preventing complications (diabetes, cardiac insufficiency), immunopreventable diseases (tetanus, measles), and diseases for which adequate follow-up, management, and control can prevent hospitalization (arterial hypertension, perforated ulcer). The more adequate the primary health care network, the lower the proportion of hospitalizations due to ambulatory care-sensitive conditions.[5]

Studying the underlying causes of hospitalization may provide evidence for inequities within the realm of primary care (access or management) as well as in access to hospitalization. Another reason for studying hospitalizations is the possibility of identifying factors associated with higher hospitalization frequency, which is in turn related to greater severity and health risks. Identifying potentially modifiable associated factors also allows one to calculate the potential impact of intervention of each factor on hospitalizations frequency reduction.[18]

The aim of the present study was to estimate the prevalence of, and to identify characteristics associated with hospital admission.

METHODS

Between December 1999 and April 2000, we carried out a population-based cross-sectional study of subjects of both sexes, aged 20-69 years, living in the urban area of Pelotas, Southern Brazil.

Sample size calculations were based on the prevalence of the different outcomes contemplated in the survey assuming 80% statistical power; an alpha error of 5%; prevalence of the investigated events ranging from 25% to 75%; and a prevalence ratio of 2.0. Sample size was increased by 10% to compensate for losses and refusals, and by a further 15% for confounder control in adjusted analysis. Sample size was estimated at 1,800 subjects.

Sampling was carried out in multiple stages. Initially, we randomly selected 40 clusters (census tracts), and 30 households within each tract. We expected to obtain 1,200 households, with 1.5 person in the 20-29-years age range per household. Within each sector, we randomly selected a street block and an initial house, which was used as a point of departure. After selection, the two following houses were skipped, and the third house was visited.

We were able to contact 1,145 (95.4%) of the expected 1,200 families, the remaining 55 (4.5%) being classified as losses. In the contacted families, we were able to locate 2,177 individuals, of which 1,968 were interviewed, losses amounting to 9.6%. We excluded from the analysis 41 women who reported having given birth spontaneously in the 12 months preceding the interview, six who reported caesarian sections, one who reported puerperal infection, and four who reported miscarriages/abortions. We thus included 1,916 subjects in the analysis.

Data was collected using a standardized, pre-coded questionnaire, administered by students from the Universidade Federal de Pelotas. All interviewers were previously trained. Training included standardization of measurements of weight, height, and arterial pressure.

The outcome analyzed was hospital admission in the 12-months preceding the interview.

Women hospitalized for obstetric conditions were excluded from the analysis.

We considered as "ambulatory-care sensitive" all causes of hospitalization included under Classification of Diseases, 10th revision (CID-10)[a] codes D50 (Iron deficiency anemia), F10 (Mental and behavioral disorders due to use of alcohol), F19 (Mental and behavioral disorders due to multiple drug use and use of other psychoactive substances), F32 (Depressive episode), I10 (Essential hypertension), J03 (Acute tonsillitis), J18 (Pneumonia, organism unspecified), and N72 (Inflammatory disease of cervix uteri).

Socioeconomic variables considered in the analysis included economic class (based on material assets and schooling),[b] *per capita* family income (in minimum wages) and schooling (in years of study).

Demographic variables investigated included sex (male; female), age group (20-29; 30-39; 40-49; 50-59; 60-69 years), observed skin color (white; nonwhite); and marital status (married; domestic partnership; widow(er); separated; single).

We also investigated lifestyle variables such as smoking (non smoker; former smoker; current smoker), alcohol intake (does not drink; less than 30 g/day; ≥ 30 g/day), and nutritional status (normal; overweight). Alcohol intake was evaluated to determine the amount of ethanol ingested per day, using 30 g/day as a cutoff for defining alcohol abuse.[10] Nutritional status was evaluated by calculating the subject's body mass index

[a] Ministério da Saúde. Secretaria de Atenção à Saúde. Portaria nº 221, de 17/04/08. Portaria nº 221, de 17/04/08. Define que a Lista Brasileira de Internações por Condições Sensíveis à Atenção Primária será utilizada como instrumento de avaliação da atenção primária e/ou da utilização da atenção hospitalar, podendo ser aplicada para avaliar o desempenho do sistema de saúde nos âmbitos Nacional, Estadual e Municipal. *Diario Oficial Uniao.* 18 abril 2008;Seção 1:70.

[b] Associação Nacional de Empresas de Pesquisa. Critério de classificação econômica Brasil. São Paulo; 2003. [cited 2005 May 23] Available from: http://www.anep.org.br/

(BMI) based on weight (kg) and height (m). Subjects with BMI higher than 25.0 kg/m² were considered as overweight.

Variables related to chronic non-communicable diseases (diabetes mellitus, systemic arterial hypertension, minor psychiatric disorders, and chronic bronchitis) were investigated. Presence of diabetes mellitus was determined based on self-reported prior medical diagnosis. Systemic arterial hypertension was defined as arterial pressure equal to or greater than 160/95 mmHg or as self-reported use of anti-hypertensive drugs. Occurrence of minor psychiatric disorders was established using the Self Report Questionnaire (SRQ-20), with a cutoff point of ≤ 6 for men and ≤ 7 for women.[14] Chronic bronchitis was determined based on self-reported presence of productive cough on most days, lasting for at least three months per year, for two consecutive years.[20]

We also investigated whether the subject had visited a physician in the 12-month period preceding the interview.

Collecting data at the individual level allows us to estimate associations between variables that are not usually present in secondary databases – such as the Brazilian Health Care System's Hospital Information Database (SIH/SUS) –, including smoking, alcohol intake, and BMI.[22]

We re-administered a simplified questionnaire to 10% of the sample for quality control purposes.

Data were entered twice using EpiInfo software in order to insure consistency. In crude analyses, we calculated the prevalence ratios (PR) and 95% confidence intervals (95% CI) and carried out chi-squared and linear trend tests when appropriate.[2] SPSS software was used for this analysis.

Since men and women differ in terms of health-related behaviors and health care service usage, both crude and adjusted analyses were stratified by sex.[8,21,22]

Adjusted analysis was carried out by Poisson regression, using STATA software, based on a hierarchical model for confounder control.[23] The first hierarchical level included demographic (age group, skin color, and marital status) and socioeconomic (*per capita* family income and schooling) variables. The second level included lifestyle variables (alcohol intake, smoking, nutritional status) and morbidities (self-reported diabetes mellitus, arterial hypertension, minor psychiatric disorders, and chronic bronchitis). The third level included presence of medical appointments in the preceding year (Figure). Variables in the first level were controlled for each other, and determined the exposures in the second level. In the second level, the two sets of variables were adjusted, and determined the distal variables. All variables included in the model determined the outcome. Variables with significance below 25% in crude analysis were introduced in the model.

The study protocol was approved by the Research Ethics Committee of the Faculdade de Medicina, Universidade Federal de Pelotas (Process 040/99, 27/12/1999).

RESULTS

Prevalence of hospitalization in the year preceding the interview was 7.6% (95% CI: 6.4%;8.8%), corresponding to 146 subjects. Of these, 36.3% were male and 63.7% were female. Prevalence of hospitalization was 6.3% (95% CI: 4.6;7.9) among men and 8.7% (95% CI: 7.0;10.4) among women. Of the 146 hospitalizations, 13.0% (95% CI: 7.6;18.5) were considered as being due to ambulatory-care sensitive causes.

Of the 1,916 subjects in the survey, 44.2% were men. Of these, 50.6% were aged 40-69 years and 49.3% were aged 20-39 years; 83% had white skin and 66.4% were married or in stable partnerships. Regarding socioeconomic variables, 72.4% of men had a *per capita* family income of less than three minimum wages, 63.3% belonged to social classes C and D, and 49.7% had up to 7 years of schooling. As to behavioral variables, 27.2% of men reported alcohol intake equal to or greater than 30 g/day, 60.9% were current or former smokers, and 51.7% had BMI equal to or greater than 25 kg/m². Regarding presence of chronic diseases, 5.1% of men reported suffering from diabetes mellitus, 21.4%, had systemic arterial hypertension, 21.0% had minor psychiatric disorders, and 4.7% had chronic bronchitis. Prevalence of medical appointments in the year preceding the interview was 58.4% (Table 1).

Among men, crude analysis showed direct relationships between age and prevalence of hospitalization, with a significant linear trend statistic. Higher prevalence of hospitalization in the last year were found among subjects with *per capita* family income between 1.01 and 3 minimum wages (8.3%), belonging to class D (9.0%), and with five to seven years of schooling (9.7%). Linear trend tests for these variables were significant. Smoking and BMI were positively associated with the outcome, the highest prevalence of hospitalization being found among former smokers (PR=3.66, 95% CI: 1.79;7.47) and among subjects with BMI≥25 kg/m² (PR= 1.81, 95% CI: 1.03;3.20) respectively. Analysis of morbidities showed that diabetes, hypertension, and minor psychiatric disorders were associated with the outcome. Men who had visited a physician in the year preceding the interview showed a 6.84-fold higher chance of hospitalization during that same period. No association was found between hospitalization and skin color, marital status, alcohol intake, or chronic bronchitis (Table 1).

Table 1. Distribution of male subjects hospitalized in the previous year. City of Pelotas, Southern Brazil, 1999-2000.

Variable	n	%	Hospitalized N	%	Prevalence ratio	95% CI	p-value
Age (years)							<0,01
20-29	230	27.2	8	3.5	1		*<0.01
30-39	187	22.1	6	3.2	0.92	0.33;2.61	
40-49	181	21.4	8	4.4	1.27	0.49;3.32	
50-59	149	17.6	16	10.7	3.09	1.36;7.03	
60-69	98	11.6	15	15.3	4.4	1.93;10.40	
Skin color							0.45
White	702	83	42	6	1		
Nonwhite	144	17	11	7.6	1.28	0.67;2.42	
Marital status							0.33
Married	480	56.7	33	6.9	1		
Stable partnership	82	9.7	4	4.9	0.71	0.26;1.95	
Widow	19	2.2	2	10.5	1.53	0.40;5.92	
Separated	33	3.9	4	12.1	1.76	0.66;4.68	
Single	232	27.4	10	4.3	0.63	0.31;1.25	
Per capita family income (MW)							0.14
> 10.01	46	5.5	1	2.2	1		*0.06
6.01-10	55	6.6	1	1.8	0.84	0.05-;3.01	
3.01-6	131	15.6	5	3.8	1.76	0.21;14.64	
1.01-3	363	43.3	30 16	8.3	3.8	0.53;27.22	
< 1.01	244	29.1		6.6	3.02	0.41;22.19	
Social class[a]							
A	50	5.9	1	2	1		0.25
B	219	26	14	6.4	3.2	0.43;23.75	*0.11
C	323	38.4	16	5	2.48	0.34;18.27	
D	210	24.9	19	9	4.52	0.62;33.0	
E	40	4.8	3	7.5	3.75	0.41;34.69	
Schooling (years)							
≥ 14	104	12.4	2	1.9	1		<0.05
11-13	166	19.7	6	3.6	1.88	0.39;9.14	*0.01
8-10	155	18.4	10	6.5	3.35	0.75;15.0	
5-7	195	23.2	19	9.7	5.07	1.2;21.3	
0-4	222	26.4	16	7.2	3.75	0.88;16.0	
Alcohol intake							0.09
Does not drink	77	9.1	4	5.2	1		*0.06
< 30g/day	536	63.7	27	5	0.97	0.35;2.7	
≥ 30g/day	229	27.2	21	9.2	1.77	0.63;4.98	
Smoking							<0.01
Nonsmoker	331	39.1	10	3	1		
Former smoker	226	26.7	25	11.1	3.66	1.79;7.47	
Current smoker	289	34.2	18	6.2	2.06	0.97;4.39	
BMI (Kg/m2)							0.04
Normal	405	48.3	17	4.2	1		
Overweight	434	51.7	33	7.6	1.81	1.03;3.2	
Self-reported diabetes							0.04
No	803	94.9	47	5.9	1		
Yes	43	5.1	6	14	2.38	1.08;5.27	

To be continued

Table 1 continuation

Variable	n	%	Hospitalized N	%	Prevalence ratio	95% CI	p-value
Arterial Hypertension							0.01
No	664	78.6	34	5.1	1		
Yes	181	21.4	19	10.5	2.05	1.2;3.51	
Minor psychiatric disorders							
No	668	79	33	4.9	1		<0.01
Yes	178	21	20	11.2	2.27	1.34;3.87	
Chronic bronchitis							
No	806	95.3	48	6	1		
Yes	40	4.7	5	12.5	2.1	0.88;4.98	0.1
Medical appointment							
No	352	41.6	5	1.4	1		
Yes	494	58.4	48	9.7	6.84	2.75;17.01	<0.01

* linear trend test

As to the 1,070 women surveyed, 47.7% were aged 30-49 years, 57.2%were aged 40-69 years, 83.2% were white, and most women were married or had a stable partner (56.3%). Regarding socioeconomic variables, 72.3% of women had a *per capita* family income of less than three minimum wages, 68.8% belonged to classes C, D, and E, and 49.7% had up to seven years of schooling. Alcohol intake equal to or greater than 30 g/day was reported by 3.9% of women, and 44.9% of women were current or former smokers. BMI was equal to or higher than 25 kg/m^2 in 54.6% of women. Regarding the presence of chronic diseases, 6.4% of women reported suffering from diabetes mellitus, 26.0% had systemic arterial hypertension, 34.2% had minor psychiatric disorders, and 4.0% had chronic bronchitis. In the year preceding the interview, 80.2% of women had had medical appointments (Table 2).

Crude analysis showed a direct association between age and prevalence of hospitalization in the last year also among women, again with a significant linear trend statistic. Higher prevalence of hospitalization was found among women with *per capita* family income higher than ten minimum wages (10.9%) and among those belonging to class E (13.0%), but differences between groups were not statistically significant. The highest prevalence of hospitalization was found among women with five to seven years of schooling. Regarding behavioral variables, intake of less than 30 g of alcohol per day showed a prevalence ratio of 0.62 (95% CI: 0.41;0.94) when compared to no intake at all. As to morbidities, presence of diabetes, hypertension, and minor psychiatric disorders were associated with the outcome. Presence of chronic bronchitis was associated with higher frequency of hospitalization (PR=2.59; 95% CI: 1.40;4.79). Women who had had medical appointments were 22.24 times more likely to have been hospitalized. Skin color, marital status, smoking, and nutritional status were not significantly associated with the outcome (Table 2).

Among men, age group, presence of minor psychiatric disorders, and medical appointments remained associated with the outcome in adjusted analysis. Men aged 50 years or older were more frequently hospitalized than their younger peers. Those suffering from minor psychiatric disorders or who had had a medical appointment in the last year were also more frequently hospitalized. Schooling and smoking showed borderline associations (p=0.05) with the outcome, but with significant confidence intervals. Former smokers and subjects with five to seven years of schooling showed higher frequencies of hospitalization. Nutritional status, diabetes, and arterial hypertension lost their association with the income after adjustment (Table 3).

Among women, age group, schooling, alcohol intake, and medical appointments remained associated with the outcome in adjusted analysis. Female subjects aged 60-69 years, with five to seven years of schooling, and who had had a medical appointment in the year preceding the interview were more likely to have been hospitalized. Women ingesting under 30 g/day of alcohol were less likely to have been hospitalized than those who did not drink alcohol or drank more than 30 g/day. After adjustment for age and schooling, the associations with diabetes, arterial hypertension, minor psychiatric disorders, and chronic bronchitis lost statistical significance (Table 4).

DISCUSSION

An unexpected result in the present survey was the lack of an association between income indicators and the occurrence of hospitalization. In Brazil, lower-income populations show greater self-reported morbidity,[22]

Table 2. Distribution of female subjects hospitalized in the previous year. City of Pelotas, Southern Brazil, 1999-2000.

Variable	n	%	Hospitalized N	%	Prevalence ratio	95% CI	p-value
Age (years)							< 0,01
20-29	206	19,3	13	6,3	1		*< 0,01
30-39	251	23,5	11	4,4	0,69	0,32;1,52	
40-49	259	24,2	26	10	1,59	0,84;3,02	
50-59	224	20,9	23	10,3	1,63	0,85;3,13	
60-69	130	12,1	23	15,4	2,44	1,26;4,73	
Skin color							0,47
White	890	83,2	75	8,4	1		
Nonwhite	180	16,8	18	10	1,19	0,73-1,93	
Marital status							0,07
Married	531	49,6	44	8,3	1		*0,67
Stable partnership	72	6,7	2	2,8	0,34	0,08;1,35	
Widow	113	10,6	16	14,2	1,71	1,00;2,92	
Separated	120	11,2	13	10,8	1,31	0,73;2,35	
Single	234	21,9	18	7,7	0,93	0,55;1,57	
Per capita family income (MW)							0,88
> 10.01	55	5,2	6	10,9	1		*0,42
6.01-10	78	7,3	7	9	0,82	0,29;2,31	
3.01-6	162	15,3	14	8,6	0,79	0,32;1,96	
1.01-3	432	40,7	40	9,3	0,85	0,38;1,91	
< 1.01	335	31,5	25	7,5	0,68	0,29;1,59	
Social classa							0,66
A	59	5,6	4	6,8	1		*0,90
B	272	25,6	24	8,8	1,3	0,43;3,61	
C	387	36,5	35	9	1,33	0,49;3,62	
D	297	28	21	7,1	1,04	0,37;2,93	
E	46	4,3	6	13	1,92	0,58;6,42	
Schooling (years)							0,01
≥ 14	135	12,7	9	6,7	1		*0,33
11-13	210	19,8	17	8,1	1,21	0,56;2,64	
8-10	189	17,8	11	5,8	0,87	0,37;2,05	
5-7	245	23,1	34	13,9	2,08	1,03;2,21	
0-4	282	26,6	19	6,7	1,01	0,47;2,17	
Alcohol intake							0,01
Does not drink	325	30,6	36 48	11,1	1		*0,33
< 30g/day	695	65,5	7	6,9	0,62	0,41;0,94	
≥ 30g/day	41	3,9		17,1	1,54	0,73;3,24	
Smoking							0,25
Nonsmoker	590	55,1	50	8,5	1	0,85;2,19	
Former smoker	190	17,8	22	11,6	1,37	0,52;1,39	
Current smoker	290	27,1	21	7,2	0,85		
BMI (Kg/m^2)							0,12
Normal	474	45,4	34	7,2	1	0,93;2,09	
Overweight	571	54,6	57	10	1,39		
Self-reported diabetes							0,04
No	1002	94,9	82	8,2	1	1,11;2,53	
Yes	68	6,4	11	16,2	1,98		

To be continued

Table 2 continuation

Variable	n	%	Hospitalized N	%	Prevalence ratio	95% CI	p-value
Arterial Hypertension							<0,01
No	789	74	56	7,1	1	1,27;2,79	
Yes	277	26	37	13,4	1,88		
Minor psychiatric disorders							0,04
No	703	65,8	52	7,4	1		
Yes	366	34,2	41	11,2	1,51	1,03;2,24	
Chronic bronchitis							<0,01
No	1026	96	83	8,1	1		
Yes	43	4	9	20,9	2,59	1,40;4,79	
Medical appointment							<0,01
No	211	19,8	1	0,5	1		
Yes	854	80,2	90	10,5	22,24	3,12;158,67	

* linear trend test
[a] Classificação Econômica Brasil
MW: Minimum wages

which would justify a greater frequency of hospitalization among these individuals. On the other hand, Castro[9] has shown that socioeconomic differences in hospital utilization are not as noticeable as they are for other types of health care. The reason for these differences could be related to antagonistic mechanisms. Greater equity and quality in primary health care could prevent hospitalizations by means of adequate outpatient care. However, inequity could lower the frequency of hospitalization by limiting access to hospital services. Hospitalization due to ambulatory care-sensitive conditions (ACSC) could help reveal this potential inequity in access to hospitalization.[24] In the present survey, 13.0% of hospitalized subjects were admitted to a hospital due to an ACSC. Wong et al, in an analysis of hospital admissions taken place in Brazil in 2004, using hospitalization coefficients data from the SUS Informatics Department (DATASUS), found a prevalence of ACSC hospitalizations of 23.7% for all age groups. Based on the data published by Wong,[c] we calculated a prevalence of ACSC hospitalizations among 15-69-year-olds of 19.6% of all hospitalizations. Therefore, frequency of ACSC hospitalizations was lower in the present survey than in Brazil as a whole. This lends support to the notion of greater equity and/or quality of the primary health care network in Pelotas. The Family Health Strategy (ESF) may have had a positive influence on the quality of health care, and especially on the occurrence of ACSC hospitalizations.[16]

The present study has two major limitations. The first is related to the validation of the outcome. Studies of health care utilization are subject to error regarding the quality of the information provided by the subjects. However, the probability of recall bias is likely much lower given the prominent role a hospitalization event would have the subject's life.[12,17]

Another limitation is the low frequency of the outcome in our sample. Prevalence of hospitalization in the present survey was 7.6% (95% CI: 6.4;8.8). Cross-sectional studies are known to be less capable of demonstrating associations with rare outcomes.[1]

However, the design of the survey improved the quality of the information obtained. The age, race, and gender composition of the sample was similar to that found for Pelotas as a whole in the 2000 Census, providing evidence of the representativity of the sample and making our results generalizable to similar populations.

Men and women showed different behaviors with regard to use of hospital services. Even though prevalences were similar (with superimposed confidence intervals), the factors associated with hospitalization differed according to gender.

Older men and women were more likely to have been hospitalized than younger subjects. Frequency of hospitalization in the 60 to 69-years group was 4.4-fold and twofold that of 20 to 29-year-olds among men and women, respectively. Hulka & Wheat[13] argue that age is naturally associated with hospital utilization as a consequence of its effects on morbidity and mortality. Garbinato et al,[11] in a cross-sectional study carried out in 2002-2003 in Canoas, also in Southern Brazil, and which involved 1,945 subjects aged 14 years or older,

[c] Wong LR, Perpétuo IHO, Berenstein CK. Atenção hospitalar por condições sensíveis à atenção ambulatorial (CSAA) no contexto de mudanças no padrão etário da população brasileira [internet]. In: 15. Encontro Nacional de Estudos Populacionais: Desafios e oportunidade de crescimento zero; 2006 [cited 2010 Jul 2] ; Caxambu, BR. Available from: http://www.abep.org.br/usuario/GerenciaNavegacao.php?caderno_id=544&nivel=3

Table 3. Hierarchic adjusted analysis by Poisson regression of factors associated to hospitalization in the previous year among males. City of Pelotas, Southern Brazil, 1999–2000.

Variable	Prevalence ratio	95% CI	Test*
Age (years)			<0.05
20-29	1		
30-39	0.92	0.33;2.61	
40-49	1.27	0.49;3.31	
50-59	3.09	1.35;7.05	
60-69	4.4	1.93;10.06	
Schooling (years)[a]			0.05
≥14	1		
11-13	1.86	0.38;8.88	
8-10	3.23	0.74;14.10	
5-7	4.87	1.18;20.03	
0-4	2.77	0.64;11.83	
Smoking[b]			0.05
Nonsmoker	1		
Former smoker	2.83	1.21;6.61	
Current smoker	1.99	0.86;4.56	
Minor psychiatric disorders[c]			< 0.05
No	1		
Yes	1.72	1.01;2.95	
Medical appointment[d]			<0.01
No	1		
Yes	6.31	2.52;15.76	

[a] Adjusted for age group.
[b] Adjusted for age group, schooling, alcohol intake, and body mass index.
[c] Adjusted for age group, schooling, smoking, diabetes, hypertension, and chronic bronchitis.
[d] Adjusted for age group, schooling, smoking, and minor psychiatric disorders.
* Wald's test

Table 4. Hierarchic adjusted analysis by Poisson regression of factors associated to hospitalization in the previous year among females. City of Pelotas, Southern Brazil, 1999–2000.

Variable	Prevalence ratio	95% CI	Test*
Age (years)[a]			<0.05
20-29	1		
30-39	0.66	0.30;1.46	
40-49	1.47	0.78;2.76	
50-59	1.42	0.72;2.78	
60-69	2.04	1.0;4.17	
Schooling (years)[b]			<0.01
≥ 14	1		
11-13	1.23	0.55;2.76	
8-10	0.92	0.39;2.17	
5-7	2.19	1.08;4.43	
0-4	0.88	0.41;1.90	
Alcohol intake[c]			<0.04
Does not drink	1		
< 30g/day	0.64	0.41;0.97	
≥ 30g/day	1.42	0.57;3.54	
Medical appointment[d]			<0.01
No	1		
Yes	18.42	2.59;130.97	

[a] Adjusted for marital status.
[b] Adjusted for age group.
[c] Adjusted for age group, schooling, and smoking.
[d] Adjusted for age group, schooling, and alcohol intake.
*Wald's test

showed that subjects aged 60 years or older were four times more likely to be hospitalized. Analysis of data from the 1998 National Household Sample Survey (PNAD, 1998) showed that older age was associated with increased hospitalization.[8] Castro,[9] in analysis of data from PNAD 2003, showed evidence of increased risk of hospitalization with older age. For each year of life (after age 14 years), the odds ratio for hospitalization increased by a factor of 1.005.

Our data show greater occurrence of hospitalization among subjects with five to seven years of study, a difference that was not observed by either Castro[9] or Garbinato.[11]

In adjusted analysis, smoking was associated with hospitalization only among men, former smokers showing higher frequency of hospitalization. This may have been due to reverse causality. Former smokers still suffer from the deleterious effects of tobacco even after quitting. Moreover, quitting smoking may be associated with the presence of comorbidities, such that subjects with other diseases are more strongly advised to quit smoking by health care professionals. Finally, hospitalization itself could be the triggering factor for the cessation of smoking.

Smoking was not associated to hospitalization among women. However, alcohol ingestion was associated with the outcome. As described above for smoking, reverse causality may explain this association, given that women who reported no intake may have been former users or may have stopped drinking following hospitalization. After adjustment for age and schooling, women who drank 30 g/day or more of alcohol were 2.2 times more likely to have been hospitalized than those who drank less than 30 g/day, though this difference did not reach statistical significance (p=0.07).

Among males, presence of minor psychiatric disorders was associated with hospitalization. Of the 20 men

that were hospitalized and showed minor psychiatric disorders, five (20%) were hospitalized for psychiatric reasons.

History of medical appointments in the 12 months preceding the interview was strongly associated with hospitalization among both sexes. Garbinato et al[11] found a similar trend in a population-based study carried out in Canoas. Medical evaluation allows for the detection of health conditions, and may lead to hospitalization.

Health care databases (SIH/SUS) do not include information on comorbidities and socioeconomic variables, which are can be useful when analyzing health care service utilization. Including such data in this system would allow for the identification of factors associated with greater frequency of hospitalization in each of Brazil's five Macro-Regions, reducing the cost of epidemiological studies and aiding in the planning of interventions aimed at preventing or reducing the need for hospitalization.

REFERENCES

1. Abramson JH. Cross-sectional studies. In: Detels R, Holand WW, McEwen J. Omenn GS, editors. Oxford textbook of public health. 3.ed. New York: Oxford University Press; 1997. p.517-35.
2. Altman DG. Practical statistics for medical research. London: Chapman & Hall; 1997.
3. Billings J, Anderson GM, Newman LS. Recent findings on preventable hospitalizations. *Health Aff (Milwood)*. 1996;15(3):239-49. DOI:10.1377/hlthaff.15.3.239
4. Bindman AB, Grumbach K, Osmond D, Komaromy M, Vranizan K, Lurie N, et al. Preventable hospitalizations and access to health care. *JAMA*. 1995;274(4):305-11.
5. Caminal J, Starfield B, Sanchez E, Casanova C, Morales M. The role of primary care in preventing ambulatory care sensitive conditions. *Eur J Public Health*. 2004;14(3):246-51. DOI:10.1093/eurpub/14.3.246
6. Campbell SM, Roland MO, Buetow SA. Defining quality of care. *Soc Sci Med*. 2000;51(11):1611-25. DOI:10.1016/S0277-9536(00)00057-5
7. Castiel LD. Inefetividade e ineficiência: reflexões sobre a epidemiologia e os serviços de saúde de um estado de mal-estar social. *Cad Saude Publica*. 1990;6(1):27-39. DOI:10.1590/S0102-311X1990000100004
8. Castro MSM, Travassos C, Carvalho MS. Fatores associados às internações hospitalares no Brasil. *Cienc Saude Colet*. 2002;7(4):795-811. DOI:10.1590/S1413-81232002000400014
9. Castro MSM. Desigualdades sociais no uso de internações hospitalares no Brasil: o que mudou entre 1998 e 2003. *Cienc Saude Colet*. 2006;11(4):987-98. DOI:10.1590/S1413-81232006000400020
10. Costa JSD, Silveira MF, Gazalle FK, Oliveira SS, Hallal PC, Menezes AMB, et al. Consumo abusivo de álcool e fatores associados: estudo de base populacional. *Rev Saude Publica*. 2004;38(2):284-91. DOI:10.1590/S0034-89102004000200019
11. Garbinato LR, Béria JU, Figueiredo ACL, Raymann B, Gigante LP, Palazzo LS, et al. Prevalência de internação hospitalar e fatores associados: um estudo de base populacional em um centro urbano no Sul do Brasil. *Cad Saude Publica*. 2007;23(91):217-24. DOI:10.1590/S0102-311X2007000100023
12. Kroeger A. Health interview surveys in developing countries: a review of the methods and results. *Int J Epidemiol*. 1983;12(4):465-81. DOI:10.1093/ije/12.4.465
13. Hulka BS, Wheat JR. Patterns of utilization. The patient perspective. *Med Care*. 1985;23(5):438-60. DOI:10.1097/00005650-198505000-00009
14. Mari JJ, Williams P. A validity study of a psychiatric screening questionnaire (SRQ-20) in primary care in the city of Sao Paulo. *Br J Psychiatry*. 1986;148:23-6. DOI:10.1192/bjp.148.1.23
15. Marmot M. Health in an unequal world. *Lancet*. 2006;368(9552):2081-94. DOI:10.1016/S0140-6736(06)69746-8
16. Nedel FB, Facchini LA, Martin-Mateo M, Vieira LAS, Thumé E. Programa Saúde da Família e condições sensíveis à atenção primária, Bagé (RS). *Rev Saude Publica*. 2008;42(6):1041-52. DOI:, 10.1590/S0034-89102008000600010
17. Nordberg E. Household health surveys in developing countries: could more use be made of them in planning? *Health Policy Plan*. 1988;3(1):32-9. DOI:10.1093/heapol/3.1.32
18. Ricketts TC, Randolph R, Howard HA, Pathman D, Carey T. Hospitalization rates as indicators of access to primary care. *Health Place*. 2001;7(1):27-38. DOI:10.1016/S1353-8292(00)00035-6
19. Santos IS, Victora CG. Serviços de saúde: epidemiologia, pesquisa e avaliação. *Cad Saude Publica*. 2004;20(Suppl 2):S337-41. DOI:10.1590/S0102-311X2004000800027
20. Tierney LM, Mcphee SJ, Papadakis MA. Current medical diagnosis and treatment. 44.ed. New York: Lange Medical Books/McGraw-Hill; 2005.
21. Travassos C, Viacava F, Pinheiro R, Brito A. Utilização dos serviços de saúde no Brasil: gênero, características familiares e condição social. *Rev Panam Salud Publica*. 2002;11(5-6):365-73. DOI:10.1590/S1020-49892002000500011
22. Theme-Filha MM, Szwarcwald CL, Souza-Júnior PRB. Socio-demographic characteristics, treatment coverage, and self-rated health of individuals who reported six chronic diseases in Brazil, 2003. *Cad Saude Publica*. 2005;21(Suppl 1):S43-53. DOI:10.1590/S0102-311X2005000700006
23. Victora CG, Huttly SR, Fuchs SC, Olinto MT. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. *Int J Epidemiol*. 1997;26(1):224-7. DOI:10.1093/ije/26.1.224
24. Yuen EJ. Severity of illness and ambulatory care-sensitive conditions. *Med Care Res Rev*. 2004;61(3):376-91. DOI:10.1177/1077558704266853

The authors declare that there are no conflicts of interest.