

Noemia Urruth Leão Tavares<sup>I</sup>

Andréa Dâmaso Bertoldi<sup>II</sup>

Elaine Thumé<sup>III</sup>

Luiz Augusto Facchini<sup>II</sup>

Giovanny Vinícius Araújo de França<sup>IV</sup>

Sotero Serrate Mengue<sup>V</sup>

# Factors associated with low adherence to medication in older adults

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## ABSTRACT

**OBJECTIVE:** To assess factors associated with low adherence to pharmacotherapy in older adults.

**METHODS:** Cross-sectional population-based study, with a representative sample of 1,593 individuals aged 60 or older, living in the urban area of Bagé, RS, Southern Brazil, in 2008. A multiple stage sampling model was used. The data were collected through individual household interviews. The analyses of the association between low adherence regarding pharmacotherapy, measured using the Brief Medication Questionnaire (BMQ), and demographic, socioeconomic, behavioral, health, assistance and prescription factors were carried out applying Poisson regression model to assess crude and adjusted prevalence ratios, their respective 95% confidence intervals and p-value (Wald test).

**RESULTS:** Around 78.0% of individuals reported have taken at least one medication in the seven days prior to the interview. Of these, approximately one third (28.7%) were considered to have low adherence to the treatment. The factors significantly associated to low adherence to treatment were: age (65 to 74 years old), not having health insurance, having to purchase (totally or partially) their own medicines, having three or more morbidities, having functional disabilities and using three or more medicines.

**CONCLUSIONS:** The increased use of medicines by older adults, because of the high prevalence of non-communicable diseases in this group, and the access to the treatment need to be considered by health care professionals regarding fostering adherence to treatment, which increases therapeutic solutions and quality of life among older people.

**DESCRIPTORS:** Aged. Patient Dropouts. Medication Adherence. Health Services Accessibility. Socioeconomic Factors. Primary Health Care. Family Health Program. Cross-Sectional Studies.

<sup>I</sup> Curso de Farmácia. Faculdade de Ciências da Saúde. Universidade de Brasília. Brasília, DF, Brasil

<sup>II</sup> Departamento de Medicina Social. Faculdade de Medicina. Universidade Federal de Pelotas. Pelotas, RS, Brasil

<sup>III</sup> Departamento de Enfermagem. Faculdade de Enfermagem. Universidade Federal de Pelotas. Pelotas, RS, Brasil

<sup>IV</sup> Programa de Pós-Graduação em Epidemiologia. Universidade Federal de Pelotas. Pelotas, RS, Brasil

<sup>V</sup> Departamento de Medicina Social. Faculdade de Medicina. Universidade Federal do Rio Grande do Sul. Porto Alegre, RS, Brasil

### Correspondence:

Noemia Urruth Leão Tavares  
Faculdade de Ciências da Saúde – UnB  
Campus Universitário Darcy Ribeiro  
70910-900 Brasília, DF, Brasil  
E-mail: nul.tavares@gmail.com

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## INTRODUCTION

Older adults are the principle consumers and the greatest beneficiaries of modern pharmacotherapy. Around 80.0% of Brazilians aged more than 60 years take at least one medication per day, which highlights the need to evaluate the determinants of this use, and especially adherence to treatment.<sup>4,6,12</sup>

Adherence to treatment is the degree to which the individual's behavior and the doctor or health care professional's guidance are in agreement.<sup>16,27</sup> Low adherence may negatively affect the patient's clinical evolution, leading to personal, social and economic consequences.<sup>14</sup>

There are many factors that may influence adherence to treatment, including factors intrinsic to the patient, those concerning the disease and/or characteristics of the treatment and those related to interactions between patients and health care professionals.<sup>27</sup> Some obstacles to adherence are more common in older patients and should be investigated, as they call for special care in the clinical management of these patients. Factors related to the disease need to be tackled by the patient in adhering to treatment, especially: the severity of the symptoms, the level of disability (physical, psychological, social and professional), the rate of progression and the severity of the disease and the availability of treatment.<sup>20</sup>

It is common for older adults to be treated for different health conditions simultaneously, and this can result in a complex medication regime. As well as presenting pharmacological risks, polypharmacy,<sup>17</sup> defined as simultaneous and chronic use of multiple medications, predisposes those practicing it to low adherence.<sup>13,27</sup>

In Brazil, there are few population-based studies on adherence to pharmacological treatment in older adults.<sup>5</sup> This study aimed to analyze factors associated with low adherence to treatment by older adults.

## METHODS

This was a population-based cross-sectional study, part of a piece of research on home care for older adults, which took place between July and November 2008, the data from which have been previously published.<sup>24,25</sup> The sample was composed of individuals aged 60 and over, residents in an area covered by primary health care services in an urban area of the municipality of Bagé, RS, Southern Brazil. In 2006, there were 122,461 inhabitants, 82.0% of whom lived in the urban zone. There were 15 Family Health Care Units, in 2008, totaling 19 teams responsible for 51.0% of the municipality's urban population. Five units still maintained the traditional model of primary health care and covered the rest of the population (49.0%).

A multiple stage sampling model was used.<sup>24,25</sup> Data collection included demarcating the area covered by each Primary Health Care Unit, which was then divided into micro-areas and then were numbered. The starting point for data collection was randomly selected for each square. One residence of every six was selected to favor dispersion within the area's sample. All older adults living in the selected residences were invited to take part in the study. If no interview was obtained after three attempts on different days and at different times, this was deemed to be a loss or refusal, no substitutions were included.

Of the 1,713 older adults located, 1,593 agreed to take part, giving 76 losses (4.0%) and 44 refusals (3.0%). This sample, then, had statistical power of at least 80.0% for detecting prevalence ratios of 1.30 and above, with a level of significance of 5% for analyzing associations.

A structured questionnaire containing general questions and questions on self-perception was applied to the older adults. In the case of the participant being partially incapacitated in responding to the questionnaire, the general questions were applied to the main carer and in case of total incapacity the questions on self-perception were not asked.

The demographic and socioeconomic variables analyzed were: sex (female; male), age (60 to 64; 65 to 74; 75 and over), self-reported skin color (white; non-white), marital status (married or cohabiting; widowed; divorced or single), schooling (0; 1 to 7; 8 to 20 years of study), socioeconomic level (classes A to E<sup>a</sup>) and having private health insurance (yes; no). The number of medically diagnosed morbidities reported (hypertension, diabetes, stroke, lung problems, cancer, spinal problems, kidney problems, rheumatism) were evaluated, grouped into 0; 1; 2;3 or more, as was self-perceived health, analyzed in two categories (very bad, bad or regular; good or very good).

The Mini-mental<sup>7</sup> test was used to identify signs of cognitive deficit, with the results being dichotomized (deficit; no deficit). The presence of symptoms of depression was assessed using the Geriatric Depression Scale,<sup>19</sup> and the results were divided into depression (from 0 to 5) and no depression ( $\geq 6$ ). Functional incapacity for instrumental activities of daily living (IADL) (yes; no) was measured using Lawton's scale.<sup>11</sup> Eight instrumental activities of daily living were assessed: (i) using the telephone; (ii) transportation within the

<sup>a</sup> According to "Brazil Economic Classification Criteria" – Brazilian Association of Population Studies (ABEP)

community; (iii) shopping; (iv) housework; (v) doing laundry; (vi) preparing meals; (vii) taking medications as prescribed; and (viii) managing money. Those older adults who reported needing help with at least one of these activities were deemed incapacitated.

The questionnaire also evaluated whether the older adult had visited the doctor with the preceding three months (no/once/twice or more), the type of primary care model in the area of residence (traditional/Family Health Care Strategy), the way in which medication was generally obtained (collected from the health center/paid for/partly from the health center and partly paid for) and the number of medications taken in the seven days preceding the interview (1, 2, 3 or more).

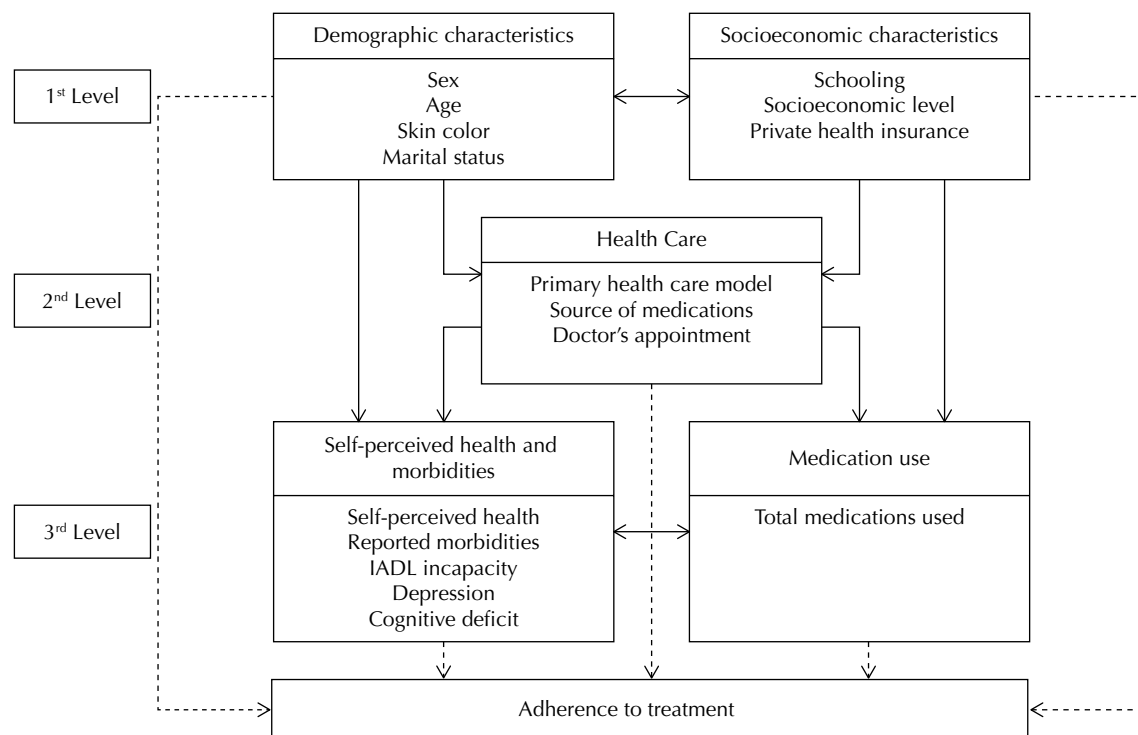
To measure the patients' self-reported adherence, the Brief Medication Questionnaire (BMQ)<sup>21</sup> was used, an instrument composed of three domains with questions identifying obstacles to compliance regarding regime, beliefs and recall. The validated Portuguese version of the BMQ was used<sup>1</sup> to classify adherence according to the number of positive responses into: strong adherence (none), probable strong adherence (1), probable adherence (2) and low adherence (3 or more) in any domain. Adherence to treatment was only investigated in those who had used at least one medicine in the seven days preceding the interview.

The Stata version 11.0 statistical program was used to analyze the data. There were 1,242 older adults

who responded to the questions referring to the BMQ, enabling the outcome to be classified. Exploratory descriptive analysis was conducted for the variables involved in the study, including the main questions from the BMQ. The BMQ score was dichotomized for the univariate analysis, with those with scores  $\geq 3$  considered to be non-adherent. The prevalence of low adherence to treatment was calculated for the categories of the independent variables in the unadjusted analysis, considering the dichotomized outcome.

A Poisson regression model was used to estimate adjusted and unadjusted prevalence ratios and 95% confidence intervals (95%CI), considering the sample design effect using the Stata `svy` command. Confounding factors were controlled for in the multivariate analysis using a hierarchized analysis model (Figure). Variables with  $p < 0.20$  were included in the multiple model and a 5% level of significance was adopted for variables to remain in the model, using backward elimination of the variables. The statistical significance of the prevalence ratios obtained in the Poisson regression models were evaluated using the Wald test.

The project was approved by the Ethics Committee of the Faculty of Medicine of the *Universidade Federal de Pelotas* (Process no. 15/08, 2008). Ethical principles were strictly followed and participants signed an informed consent form.



**Figure.** Hierarchized model to analyze the factors associated with adherence to treatment in older adults. Bagé, RS, Southern Brazil, 2008.

**Table 1.** Description of the sample of older adults according to the variables in the study. Bagé, RS, Southern Brazil, 2008. (N = 1,242)

Variable	n	%
Sex (N = 1,242)		
Male	468	37.7
Female	774	62.3
Age (years) (N = 1,242)		
60 to 64	307	24.7
65 to 74	562	45.3
75 or more	373	30.0
Skin color (N = 1,242)		
White	981	79.0
Non-white	261	21.0
Schooling (completed years of study) (N = 1,241)		
0	293	23.6
1 to 7	686	55.3
8 to 20	262	21.1
Socioeconomic level (N = 1,232) <sup>a</sup>		
A/B	408	33.1
C	487	39.5
D/E	337	27.4
Marital status (N = 1,242)		
Single/Divorced	195	15.7
Married or cohabiting	629	50.6
Widowed	418	33.7
Private health insurance (N = 1,236)		
No	792	64.1
Yes	444	35.9
Model of primary health care (N = 1,242)		
Traditional	568	45.7
Family Health Care Strategy	674	54.3
Source of medication (N = 1,241)		
Health center	465	37.5
Paid for	558	45.0
Partly from the health care center, partly paid for	218	17.5
Doctor's appointment in the last 3 months (N = 1,240)		
No	551	44.4
Yes	689	55.6
Self-perceived health (N = 1,206)		
Very good/Good	716	59.4
Regular/Bad/Very bad	490	40.6
Number of reported morbidities (N = 1,242) <sup>b</sup>		
0	226	18.2
1	305	24.6
2	333	26.8
3 or +	378	30.4

Continue

## Continuation

IADL Incapacity (N = 1,238) <sup>c</sup>		
No	810	65.4
Yes	428	34.6
Depression (N = 1,184)		
No	1,007	85.1
Yes	177	14.9
Cognitive deficit (N = 1,184)		
No	1,025	86.6
Yes	159	13.4
Total medications used (N = 1,241)		
1	300	24.2
2	291	23.4
3 or +	650	52.4

<sup>a</sup> According to "Brazil Economic Classification Criteria" – Brazilian Association of Population Studies (ABEP).<sup>b</sup> Hypertension, diabetes, stroke, lung problems, cancer, spinal problems, kidney problems, rheumatism.<sup>c</sup> Instrumental activities of daily living.**RESULTS**

Around 2/3 of the sample were women. Most participants were aged between 65 and 74 and reported having white skin, having up to seven years of schooling and were married or cohabiting. More than half of the sample belonged to socioeconomic classes C, D or E, had no private health insurance, lived in areas covered by the Family Health Care Strategy, viewed their own health as very good or good and reported having had at least one doctor's appointment in the last three months (Table 1).

Half of the older adults reported having two or more morbidities. The most commonly reported were hypertension (55.3%), spinal problems (37.4%), heart problems (29.6%) and diabetes (15.1%) (data not shown in the table). Around 1/3 had instrumental incapacities in activities of daily living, 14.9% showed signs of depression and 13.4% cognitive deficit (Table 1).

Of the older adults who reported taking at least one medicine daily, more than half took three or more (mean = 3 medications; SD = 1.9; maximum = 14). When asked about how they obtained their medications, the majority of times, 37.4% reported collecting them from the health center, 45.0% paid for them and 17.5% collected some from the health center and paid for some (Table 1).

As regards adherence, 11.6% of the interviewees were classed as adhering to treatment (no positive responses in the domains evaluated), 26.7% as probable adherents (one positive response), 32.9% as probable low adherents (two positive responses) and around 1/3 were deemed to have low adherence (three or more positive responses) (data not shown in the table).

Of the principle aspects approached in the BMQ domains, the following stood out: reporting missing a day (59.8%) or a dose (37.6%) of treatment, aspects related to the prescribed treatment regime evaluated by the BMQ regime domain (Table 2). In the domain which evaluated the patient's belief in the efficacy of the treatment and side effects, 5.2% reported that the medication "did not work properly". In the recall domain, which identified problems related to remembering to take medication, 16.0% reported difficulty in remembering to take their medicines (Table 2).

In the unadjusted analysis, low adherence to treatment was statistically associated with age (65 to 74 years old), not having health insurance, having to pay for (all or part) of their medicines, having three or more morbidities, having an instrumental incapacity in daily living activities and taking three or more medicines (Table 3). These associations remained statistically significant in the adjusted analysis (Table 4).

## DISCUSSION

This study evaluated adherence to pharmacological treatment in a population sample of individuals aged 60 and over in the south of Brazil. A high prevalence of medication use has been identified in this age group. Around 1/3 of older adults who use medication have low adherence to treatment. This prevalence is consistent with estimated found in the literature, which range between 20.0% and 50.0% of all patients not adhering to treatment.<sup>8,16,27</sup> However, this estimate is lower than the prevalence found in another national study of 466 older adults (62.9%),<sup>18</sup> and greater than that of an

international study with a cohort of 2,149 older patients with high blood pressure (14,1%).<sup>10</sup> Both of these studies used different instruments to assess reported adherence, which may explain the differences found.

Socioeconomic characteristics and level of education were not associated with low adherence to treatment. Participants aged < 75 had the highest prevalence of low adherence, as was also seen in a study in the United States.<sup>10</sup> One hypothesis to explain greater adherence to treatment by older individuals is fear of damaging their health and desire to live and the need to follow treatment increases their motivation to follow medical treatment regimes.<sup>3</sup>

Factors related to the health and the care of older patients that may affect adherence to treatment include: type, severity and duration of the illness, number of morbidities, frequency with which health care services are used, patient satisfaction with health care professionals and care quality.<sup>13</sup> In this study, no significant difference were found between levels of adherence to treatment and the primary health care model in the area of residence or having had a doctor's appointment in the preceding three months. However, having private health care was shown to be associated with less risk of low adherence to treatment.

Primary care practices and actions regarding medicine use by older people need to be reviewed. The health care team can contribute to promoting adherence in their patients by prescribing simpler regimes, providing information on the benefits and side effects of the treatment and by considering cognitive difficulties and problems accessing the prescribed treatments for these patients.<sup>16</sup>

The simultaneous occurrence of multiple pathologies that are associated with ageing has significant repercussions on adherence to treatment. It leads to the adoption of treatments with large consumption of medicines, increasing health care costs and affecting behavior and lifestyle.<sup>26</sup> Having more reported morbidities was positively associated with low adherence to treatment. This reinforces that simultaneously being treated for various chronic conditions, the lack of sharing in the management of chronic morbidities and in the medicine regime may predispose the older individual to low adherence.<sup>13,15,27</sup>

Cognitive impairment is one of the most significant risk factors for low adherence to treatment in older adults,<sup>23</sup> above all the inability to prioritize, plan and organize, as well as the inability to remember information.<sup>9,20</sup> Difficulties in remembering to take medicines and using various medicines at the same time were obstacles reported by older adults in following treatment. However, no evidence was found of a link between low adherence to treatment and the presence

**Table 2.** Description of the main issues covered in the domains of the Brief Medical Questionnaire. Bagé, RS, Southern Brazil, 2008. (N = 1,242)

Questions	%
Regime domain	
Reported missing a day of treatment	59.8
Reported missing doses of treatment	37.6
Beliefs domain	
Reported that some medications "do not work properly"	5.2
Recall domain	
Receive a schematic of multiple doses of medications	65.3
Reported difficulty in reading what was written on the packet	20.8
Reported difficulty in remembering to take medications	16.0
Reported difficulty in obtaining the medications	12.0
Reported difficulties in taking various medicines at the same time	13.5

**Table 3.** Prevalence of older adults classified as having low adherence<sup>a</sup> to treatment according to the Brief Medical Questionnaire and unadjusted prevalence ratios<sup>b</sup> with the factors of the study. Bagé, RS, Southern Brazil, 2008. (N = 1,242)

Variable	n	% Low adherence	Unadjusted RP	95%CI	p <sup>c</sup>
Level 1 <sup>b</sup>					
Sex (N = 1,242)					0.273
Male	468	26.9	1	1	
Female	774	29.8	1.11	0.92;1.33	
Age (N = 1,242)					0.048
60 to 64	307	26.4	1	1	
65 to 74	562	32.2	1.22	0.98;1.52	
75 and over	373	25.5	0.97	0.75;1.25	
Skin color (N = 1,242)					0.537
White	981	28.3	1	1	
Non-white	261	30.3	1.07	0.87;1.32	
Schooling (years of study) (N = 1,241)					0.306
0	293	31.1	1	1	
1 to 7	686	29.2	0.94	0.76;1.15	
8 to 20	262	25.2	0.81	0.62;1.06	
Socioeconomic level (N = 1,232) <sup>d</sup>					0.807
Classes A/B	408	29.9	1	1	
Class C	487	27.9	0.93	0.76;1.15	
Classes D/E	337	29.1	0.97	0.78;1.22	
Marital status (N = 1,242)					0.877
Single/Divorced	195	28.2	1	1	
Married	629	28.3	1.00	0.78;1.30	
Widowed	418	29.7	1.05	0.80;1.38	
Private health insurance (N = 1,236)					0.027
No	792	31.1	1	1	
Yes	444	25.0	0.80	0.66;0.97	
Level 2 <sup>b</sup>					
Primary Health Care Model (N = 1,242)					0.973
Traditional	568	28.7	1	1	
ESF	674	28.8	1.00	0.84;1.20	
Source of medication (N = 1,241)					< 0.001
Health care center	465	24.1	1	1	
Pay for	558	25.3	1.05	0.85;1.30	
Partly at the health care center and partly paid for	218	47.7	1.98	1.60;2.45	
Doctor's appointment in the last 3 months (N = 1,240)					0.782
No	551	28.3	1	1	
Yes	689	29.0	1.03	0.86;1.22	
Level 3 <sup>b</sup>					
Self-perceived health (N = 1,206)					0.079
Very good/Good	716	26.4	1	1	
Regular/Bad/Very bad	490	31.0	1.18	0.98;1.41	
Number of reported morbidities (N = 1,242) <sup>e</sup>					0.004
0	226	23.5	1	1	
1	305	27.2	1.16	0.86;1.56	
2	333	26.1	1.11	0.83;1.50	
3 or +	378	35.4	1.51	1.15;1.98	

Continue

## Continuation

IADL incapacity (N = 1,238) <sup>f</sup>					0.009
No	810	26.2	1	1	
Yes	428	33.2	1.27	1.06;1.51	
Depression (N = 1,184)					0.491
No	1,007	28.0	1	1	
Yes	177	30.5	1.09	0.85;1.39	
Cognitive deficit (N = 1,184)					0.673
No	1,025	28.7	1	1	
Yes	159	27.0	0.94	0.72;1.24	
Total medications used (N = 1,241)					< 0.001
1	300	3.7	1	1	
2	291	24.7	6.75	3.65;12.47	
3 or +	650	42.0	11.45	6.37;20.61	

<sup>a</sup> Non adherents = Low adherence according to BMQ (3 or + positive responses).

<sup>b</sup> Variables are grouped into levels according to their entry into adjusted model of analysis.

<sup>c</sup> Wald test.

<sup>d</sup> According to "Brazil Economic Classification Criteria" – Brazilian Association of Population Studies (ABEP).

<sup>e</sup> Hypertension, diabetes, stroke, lung problems, cancer, spinal problems, kidney problems, rheumatism.

<sup>f</sup> Instrumental activities of daily living.

of signs of depression or cognitive impairment, in contrast to the results of other studies with patients in this age group.<sup>10</sup>

Findings indicate association between functional incapacity in instrumental activities of daily living and increased age and the need for help within the home.<sup>24</sup> In this study, the prevalence of low adherence was higher among older adults with functional incapacity in activities of daily living. This reinforces the importance of activities aiming to prevent of delay the onset of functional incapacity, improving older adults' autonomy in managing their own health care and treatment.

Another important factor in the adherence of older adults is access to medication. The majority of the population served by the public health care service is on low incomes; therefore, free medicine is often their only option for accessing medication. Older adults who need to pay for some or all of their medicines had lower adherence compared to those who did not pay for them. The cost of treatment, therefore, is shown to be an important factor in adherence to treatment in this segment of the population.<sup>5</sup>

In an outpatient based study that took place in Campinas, SP, Southeastern Brazil,<sup>3</sup> the lack of medication in primary health care units and spending on medicines were highlighted by the older adults interviewed as the main difficulties in acquiring medicine. This finding emphasizes the importance of appropriate pharmaceutical care management in primary health care

as a facilitator of access to medications at this level of care, which could impact on adherence to treatment.

The number of medicines used by the older adult was shown to be a strong predictor of low adherence to treatment, as has also been found in other studies.<sup>10,18</sup> Polypharmacy, along with problems related to cognitive properties and lack of knowledge of the medicines prescribed make it difficult for older adults to adhere to treatment.<sup>2,3,22</sup>

A limitation of the study is in the use of self-reporting to measure adherence to treatment, which is subject to recall error and may imply a certain degree of inaccuracy in the estimates obtained. Moreover, the lack of consensus on the ideal way of evaluating adherence to treatment and the variety of methods used in the literature make comparisons with other studies difficult. In spite of the limitations, it was possible to estimate adherence to pharmacological treatment in a population-based sample of older adults in the South of Brazil, contributing to the generation of a body of evidence supporting interventions aimed at this group of patients.<sup>10</sup>

The findings indicate the need for strategies to guarantee access to treatments, which may decrease the number of medications prescribed and the number of daily doses. An important strategy would be for the Brazilian Unified Health System to provide medications in fixed, slow release doses for the treatment of the most prevalent chronic diseases, contributing to adherence to prescribed treatments.

**Table 4.** Adjusted prevalence ratios<sup>a</sup> between older adults classified as low adherence<sup>b</sup> to treatment according to the Brief Medical Questionnaire with the factors of the study. Bagé, RS, Southern Brazil, 2008. (N = 1,242)

Variable	n	% Low adherence	Adjusted PR	95%CI	p <sup>c</sup>
Age (years) (N = 1,242)					0.052
60 to 64	307	26.4	1	1	
65 to 74	562	32.2	1.25	1.00;1.56	
75 or more	373	25.5	1.01	0.78;1.31	
Private health insurance (N = 1,236)					0.028
No	792	31.1	1.00	1	
Yes	444	25.0	0.81	0.67;0.98	
Source of medication (N = 1,241)					< 0.001
Health care center	465	24.1	1	1	
Pay for	558	25.3	1.07	0.86;1.33	
Partly at the health care center and partly paid for	218	47.7	1.97	1.59;2.44	
Number of reported morbidities (N = 1,242) <sup>d</sup>					0.012
0	226	23.5	1	1	
1	305	27.2	1.04	0.78;1.40	
2	333	26.1	1.09	0.81;1.46	
3 or +	378	35.4	1.39	1.06;1.82	
IADL Incapacity (N = 1,238) <sup>e</sup>					0.011
No	810	26.2	1	1	
Yes	428	33.2	1.25	1.05;1.49	
Number of medications used (N = 1,241)					< 0.001
1	300	3.7	1	1	
2	291	24.7	6.50	3.52;12.01	
3 or +	650	42.0	10.18	5.65;18.33	

<sup>a</sup> Variables shown are those with 5% level of significance after adjusted analysis using Poisson regression.

<sup>b</sup> Non adherents = Low adherence according to BMQ (3 or + positive responses).

<sup>c</sup> Wald test.

<sup>d</sup> Hypertension, diabetes, stroke, lung problems, cancer, spinal problems, kidney problems, rheumatism.

<sup>e</sup> Instrumental activities of daily living.

Pharmacotherapeutic monitoring of older adults by the health care services is essential to the shared management of treatment by health care professionals and patients, enabling viable strategies to be adopted that are aimed at the specific needs of the individual. The frequency of chronic-degenerative diseases that

affect older adults and predisposition to functional incapacity are also relevant. These factors should be considered by health care professionals in encouraging adherence to treatment and increasing problem solving treatment and quality of life for these patients.

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